The Living World

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Taxonomy	10
Taxonomical Aids	4
Sytematics & Type study	2
Introduction & Growth as Criterion for Being Living	1
Introduction & Growth as Criterion for Being Living	1
Reproduction as Criterion for Being Living	1

1. The label of a herbarium sheet does not carry information on
1. date of collection
2. name of collector
3. local names
4. height of the plant

2. Match the items given in Column I with those in Column II and select the *correct* option given below-

Column I	Column II
a. Herbarium	i. It is a place having a collection of preserved plants and animals.
b. Key	ii. A list that enumerates methodically all the species found in an area with brief description aiding identification.
c. Museum	iii. Is a place where dried and pressed plant specimens mounted on sheets is kept.
d. Catalogue	iv. A booklet containing a list of characters and their alternates which are helpful in identification of various taxa.

1. a-I b-iv c-iii d-ii
2. a-iii b-ii c-I d-iv
3. a-ii b-iv c-iii d-i
4. a-iii b-iv c-i d-ii

3.
Match column I with column II for housefly classification and select the correct option using the codes given below:

Column I	Column II
A. Family	1. Diptera
B. Order	2. Arthropoda
C. Class	3. Muscidae
D. Phylum	4. Insecta

1. A-3 B-1 C-4 D-2
2. A-3 B-2 C-4 D-1
3. A-4 B-3 C-2 D-1
4. A-4 B-2 C-1 D-3

4.
Study the four statements (I-IV) given below and select the two correct ones out of them :

I. Definition of biological species was given by Ernst Mayr.

II. Photoperiod does not affect reproduction in plants.

III. Binomial nomenclature system was given by RH Whittaker.

IV. In unicellular organisms, reproduction is synonymous with growth.

The two correct statements are
1. II and I
2. III and IV
3. I and IV
4. I and II

5.
Nomenclature is governed by certain universal rules. Which one of the following is contrary to the rules of nomemclature?
1. The first word in a biological name represents the genus name and second is specific epithet
2. The names are derived from latin and written in italics.
3. When written by hand, the names are to be underlined.
4. Biological names can be written in any language

6. Which one of the following is not a correct statement?
1. Botanical Gardens have collection of living plants for reference.
2. A museum has collection of photographs of plants and animals
3. Key is taxonomic aid for identification of specimens.
4. herbarium houses dried, pressed and preserved plant specimens

7. Which one of the following is common to multicellular fungi, filamentous algae and protonema of mosses?
1. Diplontic life cycle
2. Members of kingdom-Plantae
3. Mode of nutrition
4. Multiplication by fragmentation

8.
Which one of the following animals is correctly matched with its particular named taxonomic category?
1. Cuttlefish – Mollusca, a class
2. Humans – Primate, the family
3. Housefly – Musca, an order
4. Tiger – Tigris, the species

9. ICBN stands for :
1. Indian Congress of Biological Names
2. International Code of Botanical Nomenclature
3. Indian Code of Botanical Nomenclature
4. International Congress of Biological Names

10. Select the correctly written scientific name of Mango which was first described by Carolus Linnaeus :
1. Mangifera Indica
2. Mangifera indica Car. Linn.
3. *Mangifera indica* Linn.
4. Mangifera indica

11. The contrasting characteristics generally in a pair used for identification of animals in Taxonomic Key are referred to as :
1. Lead
2. Couplet
3. Doublet
4. Alternate

12. Which of the following is against the rules of ICBN?
1. Hand written scientific names should be underlined.
2. Every species should have a generic name and a specific epithet.
3. Scientific names are in Latin and should be italized.
4. Generic and specific names should be written starting with small letters.

13. Which one of the following aspects is an exclusive characteristic of living things?
1. Increase in mass by accumulation of material both on surface as well as internally
2. Isolated metabolic reactions occur in vitro
3. Increase in mass from outside only
4. Perception of events happening in the environment and their memory

14. Practical purpose of taxonomy or classification :
1. Facilitate the identification of unknown species
2. Explain the origin of organisms
3. To know the evolutionary history
4. Identification of medicinal plants

15. Which arrangement is in correct ascending order:
1. Species < genus < order < family
2. Genus < species < family < order
3. Order < family < genus < species
4. Species < genus < family < order

16. Biosystematics aims at : -
(1) The classification of organisms based on broad morphological characters
(2) Delimiting various taxa of organism and establishing their relationships
(3) The classification of organisms based on their evolutionary history and establishing their phylogeny on the totality of various parameters from all fields of studies
(4) Identification and arrangement of organisms on the basis of cytological characteristics

17. Species are considered as :-
(1) Real basic units of classification
(2) The lowest units of classification
(3) Artificial concept of human mind which cannot be defined in absolute terms
(4) Real units of classification devised by taxonomists

18. Which of the following less general in characters as compared to genus : -
1. Species
2. Division
3. Class
4. Family

19. Which one of the following belongs to the family Muscidae?
1. Cockroach
2. House fly
3. Fire fly
4. Grasshopper

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Biological Classification

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Kingdom Monera	25
Virus, Viroids & Prions	20
Kingdom Fungi	13
Kingdom Protista	6
Different Classification Systems	3
Lichens	3
Protozoa	2

1. Which of the following are found in extreme saline conditions?
(1) Archaebacteria
(2) Eubacteria
(3) Cyanobacteria
(4) Mycobacteria

2. Which one of the following is wrong for fungi?
1. They are eukaryotic
2. All fungi possess a purely cellulosic cell wall
3. They are heterotrophic
4. They both are unicellular and multicellular

3. Methanogens belong to
1. eubacteria
2. archaebacteria
3. dinoflagellates
4. slime moulds

4. Select the wrong statement.
1. The walls of diatoms are easily destructible
2. Diatomaceous earth' is formed by the cell walls of diatoms
3. Diatoms are chief producers in the oceans
4. Diatoms are microscopic and float passively in water

5.
Which among the following is *not* a prokaryote?
1. Saccharomyces
2. Mycobacterium
3. Nostoc
4. Oscillatoria

6.
Select the *wrong* statement:
1. Cell wall is present in members of Fungi and Plantae
2. Mushrooms belong to Basidiomycetes
3. Pseudopodia are locomotory and feeding structures in Sporozoans
4. Mitochondria are the powerhouse of the cell in all kingdoms except monera

7.
After karyogamy followed by meiosis, spores are produced exogenously in
1. Neurospora
2. Alternaria
3. Agaricus
4. Saccharomyces

8.
Which of the following organisms are known as chief producers in the oceans ?
1. Dinoflagellates
2. Diatoms
3. Cyanobacteria
4. Euglenoids

9. Viroids differ from viruses in having;
1. DNA molecules without protein coat
2. RNA molecules with protein coat
3. RNA molecules without protein coat
4. DNA molecules with protein coat

10. Which among the following are the smallest living cells, known without a definite cell wall, pathogenic to plants as well as animals and can survive without oxygen?
1. Pseudomonas
2. Mycoplasma
3. Nostoc
4. Bacillus

11.
Chrysophytes, euglenoids, dinoflagellates and slime moulds are included in the kingdom
1. Protista
2. Fungi
3. Animalia
4. Monera

12.
The primitive prokaryotes responsible for the production of biogas from the dung of ruminant animal, include the
1. thermoacidophiles
2. methanogens
3. eubacteria
4. halophiles

13.
Which one of the following statements is wrong?
1. Golden algae are also called desmids
2. Eubacteria are also called false bacteria.
3. Phycomycetes are also called algal fungi.
4. Cyanobacteria are also called blue-green algae.

14.
One of the major compound of cell wall of most fungi is
1. peptidoglycan
2. cellulose
3. hemicelluloses
4. chitin

15.
Which of the following statements is wrong for viroids?
1. They are smaller than viruses
2. They causes infections
3. Their RNA is of high molecular weight
4. They lack a protein coat

16. The imperfect fungi which are decomposers of litter and help in mineral cycling belong to
1. Deuteromycetes
2. Basidiomycetes
3. Phycomycetes
4. Ascomycetes

17. Select wrong statement.
1. The viroids were discovered by D.J lvanowski
2. W.M Stanley showed that viruses could be crystallized.
3. The term 'contagium vivum fluidum' was coined by MW Beijerinck
4. Mosaic disease in tobacco and AIDS in human beings are caused by viruses.

18. Cell wall is absent in :
(1) Nostoc
(2) Aspergillus
(3) Funaria
(4) Mycoplasma

19. Choose the wrong statement.
1. Penicillium is multicellular and produces antibiotics.
2. Neurospora is used in the study of biochemicalgenetics.
3. Morels and truffles are poisonous mushrooms.
4. Yeast is unicellular and useful in fermentation.

20. In which group of organisms the Cell walls form two thin overlapping shells which fit together?
1. Chrysophytes
2. Euglenoids
3. Dinoflagellates
4. Slime moulds

21. Pick up the wrong statement.
1. Cell wall is absent in Animalia.
2. Protista have photosynthetic and heterotropic modes of nutrition
3. Some fungi are edible
4. Nuclear membrane is present in Monera.

22. Which of the following are most suitable indicators of SO_2 pollution in the environment?
1. Lichens
2. Conifers
3. Algae
4. Fungi

23.

Which one of the following matches is correct?

(a)Phytophthora	Aseptate Mycelium	Basidiomycetes
(b) Alternaria	Sexual reproduction Absent	Deuteromycetes
(c) Mucor	Reproduction by conjugation	Ascomycetes
(d) Agaricus	Parasitic fungus	Basidiomycetes

1. a
2. b
3. c
4. d

24.

The guts of cow and buffalo possess
1. Fucus sp
2. Chlorella sp
3. methanogens
4. cyanobacteria

25. Which of the following shows coiled RNA strand and capsomeres ?
1. Polio virus
2. Tobacco mosaic virus
3. Measles virus
4. Retro virus

26. Viruses have :
1. DNA enclosed in a protein coat
2. Prokaryotic nucleus
3. Single chromosome
4. Both DNA and RNA

27. A location with luxuriant growth of lichens on the trees indicates that the :
1. Trees are very healthy
2. Trees are heavily infested
3. Location is highly polluted
4. Location is not polluted

28. The motile bacteria are able to move by
1. fimbriae
2. flagella
3. cilia
4. pili

29. Which of the following are likely to be present in deep sea water?
1. Eubacteria
2. Blue-green algae
3. Saprophytic fungi
4. Archaebacteria

30. The most abundant prokaryotes helpful to human in making curd from milk and in production of antibiotics are the ones categorized as
1. Cyanobacteria
2. archaebacteria
3. Chemosynthetic autotrophs
4. Heterotrophic bacteria

31. The cyanobacteria are also referred to as
1. Protists
2. golden algae
3. Slime moulds
4. Blue-green algae

32. Which statement is wrong for viruses?
1. All are parasites
2. All of them have helical symmetry
3. They have the ability to synthesize nucleic acids and proteins
4. Antibiotics have no effect on them

33. Which one single organism or the pair of organisms is correctly assigned to its or their named taxonomic group'?
1. Paramecium and Plasmodium belong to the same kingdom as that of Penicillium
2. Lichen is a composite organism formed from the symbiotic association of an algae and a protozoan
3. Yeast is used in making bread and brew is a fungus
4. Nostoc and Anabaena are examples of Protista

34. Maximum nutritional diversity is found in the group
1. Fungi
2. Animalia
3. Monera
4. Plantae

35.
Organisms called Methanogens are most abundant in a
1. cattle yard
2. polluted stream
3. hot spring
4. sulphur rock

36.
Which one of the following organisms is not an example of eukaryotic cells?
1. Escherichia coli
2. Euglena viridis
3. Amoeba proteus
4. Paramecium caudatum

37.
Which one of the following is wrongly matched?
1. Puccinia - Smut
2. Root Exarch- protoxylem
3. Cassia- Imbricate aestivation
4. Root pressure - Guttation

38. Virus envelope is known as
1. caspid
2. virion
3. nucleoprotein
4. core

39. Infectious proteins are present in
1. geminiviruses
2. prions
3. viroids
4. satellite viruses

40. T.O. Diener discovered a
1. free infectious RNA
2. free infectious DNA
3. infectious protein
4. bacteriophage

41. The thalloid body of a slime mould (Myxomycetes) is known as :
1. protonema
2. Plasmodium
3. fruiting body
4. mycelium

42. What is common about Trypanosoma, Noctiluca, Monocystis and Giardia?
1. These are all unicellular protists
2. They have flagella
3. They produce spores
4. These are all parasites

43. Evolutionary history of an organism is known as:
1. Phylogeny
2. Ancestry
3. Palaeontology
4. Ontogeny

44. The causative agent of mad-cow disease is a:
1. bacterium
2. prion
3. worm
4. virus

45. Which of the following statements is incorrect?
1. Yeasts have filamentous bodies with long thread-like hyphae
2. Morels and truffles are edible delicacies
3. Claviceps is a source of many alkaloids and LSD
4. Conidia are produced exogenously and ascopores endogenously

46. Match the Column-I with Column-II

	Column-I		Column-II
(a)	Saprophyte	(i)	Symbiotic association of fungi with plant roots
(b)	Parasite	(ii)	Decomposition of dead organic materials
(c)	Lichens	(iii)	Living on living plants or animals
(d)	Mycorrhiza	(iv)	Symbiotic association algae and fungi

Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(ii)	(iii)	(iv)	(i)
2.	(i)	(ii)	(iii)	(iv)
3.	(iii)	(ii)	(i)	(iv)
4.	(ii)	(i)	(iii)	(iv)

47. Which of the following statements is incorrect?
1. Prions consist of abnormally folded proteins
2. Viroids lack a protein cost
3. Viruses are obligate parasites
4. Infective consituent in viruses is the protein coat

48. Mad cow disease in cattle is caused by an organism which has :
1. Inert crystalline
2. Abnormally folded protein
3. Free RNA without protein coat
4. Free DNA without protein coat

49. Which of the following statements is correct?
1. Lichens do not grow in polluted areas.
2. Algal component of lichens is called mycobiont
3. Fungal component of lichens is called phycobiont
4. Lichens are not good pollution indicators.

50. Match the organisms in column I with habitats in column II.

Column I	Column II
(a) Halophiles	(i) Hot springs
(b) Thermoacidophiles	(ii) Aquatic environment
(c) Methanogens	(iii) Guts of ruminants
(d) Cyanobacteria	(iv) Salty areas

Select the correct answer from the options given below:
1. (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)
2. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
3. (a)-(iii), (b)-(iv), (c)-(i), (d)-(i)
4. (a)-(ii). (b)-(iv), (c)-(iii), (d)-(i)

51. Which of the following is correct about viroids?
(1) They have free RNA without protein coat
(2) They have DNA with protein coat
(3) They have free DNA without protein coat
(4) They have RNA with protein coat

52. Which of the following is incorrect about Cyanobacteria?
1. They are photoautotrophs
2. They lack heterocysts
3. They often form blooms in polluted water bodies
4. They have chlorophyll A similar to green plants

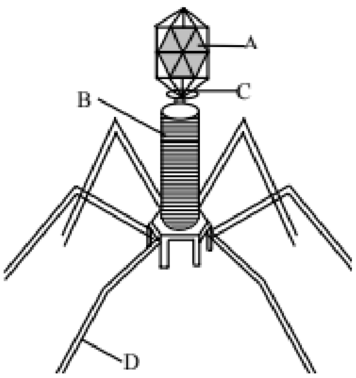
53. How many organisms in the list given below are autotrophs ?
Lactobacillus, Nostoc, Chara, Nitrosomonas, Nitrobacter, Streptomyces, Sacharomyces, Trypanosoma, Porphyra, Wolfia
1. Five
2. Six
3. Three
4. Four

54. Which one of the following sets of items in the option 1 – 4 are correctly categorized with one exception in it ?

	ITEMS	CATEGORY	EXCEPTION
1	Kangaroo, Koala, wombat	Australian marsupials	Wombat
2	Plasmodium, Cuscuta, Trypanosoma	Protozoan parasites	Cuscuta
3	Typhoid, Pneumonia, Diphtheria	Bacterial diseases	Diphtheria
4	UAA, UAG, UGA	Stop codons	UAG

55. In the five-kingdom classification, *Chlamydomonas* and *Chlorella* have been included in
1. Algae
2. Plantae
3. Monera
4. Protista

56. Given below is the diagram of a bacteriophage. In which one of the options all the four parts A, B, C and D are correct –



Options

	A	B	C	D
1.	Sheath	Collar	Head	Tail fibres
2.	Head	Sheath	Collar	Tail fibres
3.	Collar	Tail fibres	Head	Sheath
4.	Tail fibres	Head	Sheath	Collar

57. Black (stem) rust of wheat is caused by -
1. Ustilago nuda
2. Puccinia graminis
3. Xanthomonas oryzae
4. Alternaria solani

58. Select the correct combination of the statements (a-d) regarding the characteristics of certain organisms –
(a) Methanogens are Archaebacteria which produce methane in marshy areas
(b) Nostoc is a filamentous blue-green alga which fixes atmospheric nitrogen
(c) Chemosynthetic autotrophic bacteria synthesize cellulose from glucose
(d) Mycoplasma lack a cell wall and can survive without oxygen
The correct statements are -
1. (a), (b) (c)
2. (b), (c), (d)
3. (a), (b) (d)
4. (b), (c)

59. Auxospores and hormocysts are formed respectively, by -
(1) Some cyanobacteria and many diatoms
(2) Several diatoms and a few cyanobacteria
(3) Several cyanobacteria and several diatoms
(4) Some diatoms and several cyanobacteria

60. There exists a close association between the alga and the fungus within a lichen. The fungus -
1. Provides food for the alga
2. Provides protection, anchorage and absorption for the alga
3. Fixes the atomospheric nitrogen for the alga
4. releases oxygen for the alga

61. Barophilic prokaryotes -
(1) Grow slowly in highly alkaline frozen lakes at high altitudes
(2) Grow and multiply in very deep marine sediments
(3) Readily grow and divide in sea water enriched in any soluble salt of barium
(4) Occur in water containing high concentrations of barium hydroxide

62. What is correct for stages of Puccinia :
1. Telia and aecia on wheat
2. Telia and uredo stage on wheat
3. Telia and aecia on barberry
4. None

63. According to five kingdom system blue green algae belongs to :
1. Metaphyta
2. Monera
3. Protista
4. Algae

64. Which of the following survives a temperature of 104 to 106$^{\circ}C$:
1. Marine Archaebacteria
2. Hot water spring thermophiles
3. Seeds of angiosperms
4. Eubacteria

65. Lichens are well known combination of an alga and a fungus where fungus has :-
(1) An epiphytic relationship with the alga
(2) A parasitic relationship with the alga
(3) A symbiotic relationship with the alga
(4) A saprophytic relationship with the alga

66. Koch's postulates not applicable to :
1. Mycobacterium leprae
2. Tuberculosis
3. Pneumonia
4. Cholera

67. Diatomaceous earth is used as heat insulator in boilers and steam pipes because the cell wall of diatom :
1. Composed of iron
2. Composed of silicon dioxide
3. Is conductor of heat
4. Is bad conductor of electricity

68. Enzymes not found in :
1. Fungi
2. Algae
3. Virus
4. Cyanobacteria

69. Virus are living, because :
1. They multiply in host cells
2. Carry anaerobic respiration
3. Carry metabolic activity
4. Cause infection

70. Which disease of man is similar with cattle's, bovine spongiform encephalopathy :
1. Encephalitis
2. Jacob-Creutzfeldt disease
3. Spongiocitis of cerebrum
4. Spondylitis

71. Organisms which obtain energy by the oxidation of reduced inorganic compounds are called : -
1. Photo autotrophs
2. Chemo autotrophs
3. Saprozoic
4. Coproheterotrophs

72. In five kingdom system, the main basis of classification : -
(1) Structure of nucleus
(2) Nutrition
(3) Structure of cell wall
(4) Asexual reproduction

73. Black rust of wheat is caused by :
1. Puccinia
2. Ustilago
3. Albugo
4. Phytophthora

74. Stored food in fungi :
1. Starch
2. Proteins
3. Glycogen
4. Chitin

75. Viruses are no more "alive" than isolated chromosomes because : -
(1) They require both RNA and DNA
(2) They both need food molecules
(3) They both require oxygen for respiration
(4) Both require the environment of a cell to replicate

76. In which kingdom would you classify the archaea and nitrogen-fixing organism, if the five-kingdom system of classification is used :
(1) Plantae
(2) Fungi
(3) Protista
(4) Monera

77. Tobacco mosaic virus is a tubular filament of size : -
(1) 300 × 10 nm
(2) 300 × 5 nm
(3) 300 × 20 nm
(4) 700 × 30 nm

78. Which one of the following statements about viruses is correct : -
(1) Viruses possess their own metabolic system
(2) All viruses contain both RNA and DNA
(3) Viruses are obligate parasites
(4) Nucleic acid of viruses is known as capsid

79. Cauliflower mosaic virus contains : -
1. ss RNA
2. ds RNA
3. ds DNA
4. ss DNA

80. What is true for Archaebacteria : -
1. All Halophiles
2. All photosynthetic
3. All fossils
4. Oldest living beings

81. What is true for cyano bacteria : -
1. Oxygenic with nitrogenase
2. Oxygenic without nitrogenase
3. Non oxygenic with nitrogenase
4. Non oxygenic without nitrogenase

82. Adhesive pad of fungi penetrate the host with the help of : -
1. Mechanical pressure and enzymes
2. Hooke and suckers
3. Softening by enzymes
4. Only by mechanical pressure

83. Which of the following statements is correct?
1. Organisms that depend on living plants are called saprophytes.
2. Some of the organisms can fix atmospheric nitrogen in specialized cells called sheath cells.
3. The fusion of two cells is called Karyogamy.
4. Fusion of protoplasms between two motile or non-motile gametes is called plasmogamy.

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Plant Kingdom

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Bryophytes	12
Gymnosperms	12
Algae: Introduction	8
Pteridophytes	8
Pheophyceae: Brown Algae	5
Rhodophyceae: Red Algae	5
Chlorophyceae: Green Algae	2
Angiosperms	2
Life Cycle Patterns in Plants	2
Classification System	2

1. Conifers are adapted to tolerate extreme environmental conditions because of
1. broad hardy leaves
2. superficial stomata
3. thick cuticle
4. the presence of vessels

2. Which one of the following statements is wrong?
1. Algae increase the level of dissolved oxygen in the immediate environment
2. Algin is obtained from red algae and carrageenan from brown algae
3. Agar-agar is obtained from Gelidium and Gracilaria
4. Laminaria and Sargassum are used as food

3.
Which of the following statement is *correct?*
1. Ovules are not enclosed by ovary wall in gymnosperms
2. Selaginella is heterosporous, while Salvinia is homosporous
3. Horsetails are gymnosperms
4. Stems are usually unbranched in both Cycas and Cedrus

4.
Which one is *wrongly* matched?
1. Uniflagellate gametes - Polysiphonia
2. Biflagellate zoospores - Brown algae
3. Gemma cups - Marchantia
4. Unicellular organism - Chlorella

5. An example of colonial alga is:
1. Volvox
2. Ulothrix
3. Spirogyra
4. Chlorella

6. Zygotic meiosis is characteristic of
1. Fucus
2. Funaria
3. Chlamydomonas
4. Marchantia

7. Life cycle of Ectocarpus and Fucus respectively are:
1. Diplontic, Haplodiplontic
2. Haplodiplontic, Diplontic
3. Haplodiplontic, Haplontic
4. Haplontic, Diplontic

8. Select the mismatch
1. Cycas - Dioecious
2. Salvinia - Heterosporous
3. Equisetum - Homosporous
4. Pinus - Dioecious

9.
In bryophytes and pteridophytes, transport of male gametes requires
1. insects
2. birds
3. water
4. wind

10.
Select the correct statement.
1. Salvinia, Ginkgo and Pinus all are gymnosperms
2. Sequoia is one of the tallest trees
3. The leave of gymnosperms are not well adapted to extremes of climate
4. Gymnosperms are both homosporous and heterosporous

11.
Read the following five statements (I to V) and select the option with all correct statements.
I. Mosses and lichens are the first organisms to colonise a bare rock.
II. Selaginella is a homosporous pteridophyte.
III. Coralloid roots in Cycas have VAM.
IV. Main plant body in bryophytes is gametophytic, whereas in pteridophytes it is sporophytic.
V. In gymnosperms, male and female gametophytes are present within sporangia located on sporophyte.
1. I, III and IV
2. II, III and IV
3. I, IV and V
4. II, III and V

12.

In which of the following gametophyte is not independent free-living?
1. Funaria
2. Marchantia
3. Pteris
4. Pinus

13.

Which one of the following statements is wrong?
1. Algin and carrageenan are products of algae
2. Agar-agar is obtained from Gelidium and Gracilaria
3. Chlorella and Spirulina are used as space food
4. Mannitol is stored food in Rhodophyceae

14.

Male gametes are flagellated in
1. Polysiphonia
2. Anabaena
3. Ectocarpus
4. Spirogyra

15. An alga which can be employed as food for human beings :
1. Ulothrix
2. Chlorella
3. Spirogyra
4. Polysiphonia

16.
Besides paddy fields, cyanobacteria are also found inside vegetative part of:

1. Cycas

2. Equisetum

3. Psilotum

4. Pinus

17. Read the following statements (A-E) and answer the question which follows them.
(A) In liverworts, mosses, and ferns gametophytes are free-living
(B) Gymnosperms and some ferns are heterosperms
(C) Sexual reproduction in *Fucus*, Volvox and Albugo is oogamous
(D) The sporophyte in liverworts is more elaborate than that in mosses
(E) Both, Pinus and Marchantia are dioecious
How many of the above statements are correct?
1. Two
2. Three
3. Four
4. One

18.
The gametophyte is not an independent, free living generation in
1. Adiantum
2. Marchantia
3. Pinus
4. Polytrichum

19.
Mannitol is a sugar alcohol. It is as stored food in
1. Fucus
2. Gracillaria
3. Chara
4. Porphyra

20.
Archegoniophore is present in
1. Chara
2. Adiantum
3. Funaria
4. Marchantia

21.
A prokaryotic autotrophic nitrogen-fixing symbiont is found in
1. Cycas
2. Cicer
3. Pisum
4. Alnus

22. Male and female gametophytes are independent and free-living in
1. Mustard
2. Castor
3. Pinus
4. Sphagnum

23. Mannitol is the stored food in
1. Chara
2. Porphyra
3. Fucus
4. Gracillaria

24. Phylogenetic system of classification is based on
1. evolutionary relationships
2. morphological features
3. chemical constituents
4. floral characters

25. Which one of the following is considered important in the development of seed habit?
1. Dependent sporophyte
2. Heterospory
3. Halplontic life cycle
4. Free-living gametophyte

26.
Which one of the following is heterosporous?
1. Dryopteris
2. Salvinia
3. Adiantum
4. Equisetum

27. If you are asked to classify the various algae into distinct groups, which of the following characters you should choose ?
1. Types of pigments present in the cell
2. Nature of stored food materials in the cell
3. Structural organisation of thallus
4. Chemical compositions of the cell wall

28. Moss peat is used as a packing material for sending flowers and live plants to distant places because:
1. it is easily available
2. it is hygroscopic
3. it reduces transpiration
4. it serves as a disinfectant

29. In a moss the sporophyte:
1. is partially parasitic on the gametophyte
2. produces gametes that give rise to the gametophyte
3. arises from a spore produced from the gametophyte
4. manufactures food for itself, as well as for the gametophyte

30. Pinus seed cannot germinate and establish without fungal association. This is because:
1. its seeds contain inhibitors that prevent germination.
2. its embryo is immature.
3. it has obligate association with mycorrhizae.
4. it has very hard seed coat.

31. From evolutionary point of view, retention of the female gametophyte with developing young embryo on the parent sporophyte for some time, is first observed in :
1. Gymnosperms
2. Liverworts
3. Mosses
4. Pteridophytes

32. Which of the following pairs is of unicellular algae?
1. Gelidium and Gracilaria
2. Anabaena and Volvox
3. Chlorella and Spirulina
4. Laminaria and Sargassum

33. Phycoerythrin is the major pigment in :
1. Red algae
2. Blue-green algae
3. Green algae
4. Brown algae

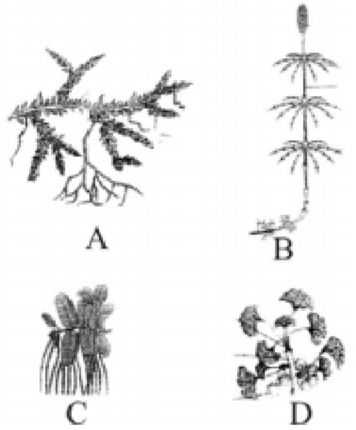
34. Which of the following statements is incorrect about gymnosperms?
1. They are heterosporous
2. Male and female gametophytes are free-living
3. Most of them have narrow leaves with thick cuticle
4. Their seeds are not covered

35. Male and female gametophytes do not have an independent free-living existence in:-
1. Pteridophytes
2. Algae
3. Angiosperms
4. Bryophytes

36. Read the following five statements (I - V) and answer as asked next to them.
(I) In Equisetum the female gametophyte is retained on the parent sporophyte
(II) In Ginkgo male gametophyte is not independent
(III) The sporophyte in Riccia is more developed than that in Polytrichum
(IV) Sexual reproduction in Volvox is isogamous
(V) The spores of slime molds lack cell walls
How many of the above statements are correct ?
1. Three
2. Four
3. One
4. Two

37. Which one of the following pairs is wrongly matched ?
1. Salvinia - Prothallus
2. Viroids – RNA
3. Mustard-Synergids
4. Ginkgo-Archegonia

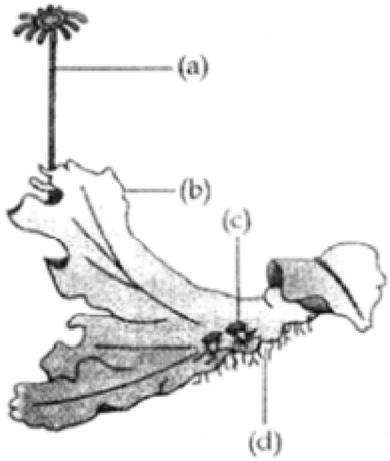
38. Examine the figures A, B, C and D. In which one of the four options all the items, A, B, C and D are correct ?



Options :

	A	B	C	D
1.	Equisetum	Ginkgo	Selaginella	Lycopodium
2.	Selaginella	Equisetum	Salvinia	Ginkgo
3.	Funaria	Adiantum	Salvinia	Riccia
4.	Chara	Marchantia	Fucus	Pinus

39. Examine the figure given below and select the right option giving all the four parts (a, b, c and d) correctly identified :



	(a)	(b)	(c)	(d)
1.	Antheri-diophore	Male thallus	Globule	Roots
2.	Archego-niophore	Female thallus	Gemmacup	Rhizoids
3.	Archego-niophore	Female thallus	Bud	Foot
4.	Seta	Sporophyte	Protonema	Rhizoids

40. Selaginella and Salvinia are considered to represent a significant step toward evolution of seed habit because :
1. Embryo develops in female gametophyte which is retained on parent sporophyte.
2. Female gametophyte is free and gets dispersed like seeds.
3. Female gametophyte lacks archegonia.
4. Megaspore possess endosperm and embryo surrounded by seed coat.

41. Consider the following four statements whether they are correct or wrong
(A) The sporophyte in liverworts is more elaborate than that in mosses
(B) Salvinia is heterosporous
(C) The life-cycle in all seed-bearing plants is diplontic
(D) In Pinus male and female cones are borne on different trees
The two wrong statements together are :
1. Statements (A) and (B)
2. Statements (A) and (C)
3. Statements (A) and (D)
4. Statements (B) and (C)

42. Match items in Column I with those in Column II -

Column I	Column II
(A) Peritrichous flagellation	(J) Ginkgo
(B) Living fossil	(K) Macrocystes
(C) Rhizophore	(L) Escherichia coli
(D) Smallest flowering plant	(M) Selaginella
(E) Largest Perennial alga	(N) Wolffia Perennial alga

Select the correct answer with the following
(1) A –L ; B –J; C –M ; D – N ; E – K
(2) A– K ; B – J; C – L ; D –M; E – N
(3) A– J ; B – K; C – N ; D –L; E – K
(4) A– N ; B – L; C – K ; D – N; E –J

43. Water is essential for Bryophyta:
1. For fertilization and homosporous nature
2. Water should be filled in archegonium for fertilization
3. Water is necessary for movement of sperm
4. For dissemination of spores

44. True statement for Ulothrix :
1. Filamentous thallus and flagellated reproductive structures
2. Branched thallus
3. Flagellated cells absent
4. None of the above

45. In oogamy fertilization involves -
(1) A large non-motile female gamete and a small motile male gamete
(2) A large non-motile female gamete and a small non-motile male gamete
(3) A large motile female gamete and a small non-motile male gamete
(4) A small non-motile female gamete and a large motile male gamete

46. Which of the following statement is true for bryophyta -
1. Along with water absorption roots also provide anchorment to plants
2. Sporophyte is dominant
3. Gametophyte is dominant and sporophyte is mostly parasitic
4. Gametophyte is parasitic

47. Phenetic classification of organisms is based on:-
(1) The ancestral lineage of existing organisms
(2) Dendogram based on DNA characteristics
(3) Sexual characteristics
(4) Observable characteristics of existing organisms

48. In ferns, Meiosis takes place at the time of :
1. Spore formation
2. Spore germination
3. Gamete formation
4. Antheridia and archegonia formation

49. Which of the following plants produces seeds but not flowers : -
(1) Maize
(2) Mint
(3) Peepal
(4) Pinus

50. Which of the following is without exception in Angiosperms : -
(1) Presence of vessels
(2) Double fertilisation
(3) Secondary growth
(4) Autotrophic nutrition

51. A student observed an algae with chl. 'a' 'd' and phycoerythrin it should belong to :
1. Phaeophyta
2. Rhodophyta
3. Chlorophyta
4. Bacillariophyta

52. Sexual reproduction in Spirogyra is an advanced feature because it shows : -
(1) Different size of motile sex organs
(2) Same size of motile sex organs
(3) Morphologically different sex organs
(4) Physiologically differentiated sex organs

53. Which one of the following pairs of plants are not seed producers : -
(1) Fern and Funaria
(2) Funaria and Ficus
(3) Ficus and Chlamydomonas
(4) Punica and Pinus

54. Cycas have two cotyledons but not included in angiosperms becuase of : -
1. Naked ovules
2. Seems like monocot
3. Circinate ptyxis
4. Compound leaves

55. Which of the following algae contains mannitol as reserve food material?
(1) Volvox
(2) Ulothrix
(3) Ectocarpus
(4) Gracilaria

56. Which of the following algae produce Carrageen?
(1) Red algae
(2) Blue-green algae
(3) Green algae
(4) Brown algae

57. Gemmae are present in:
(1) Some Gymnosperms
(2) Some Liverworts
(3) Mosses
(4) Pteridophytes

58. Genera like *Selaginella* and *Salvinia* produce two kinds of spores. Such plants are known as
1. Homosporous
2. Heterosporous
3. Homosorus
4. Heterosorus

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Animal Kingdom

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Phylum Coelenterata	8
Phylum Ctenophora & Platyhelminthes	8
Study of Aves & Mammals	8
Comparative study of Cartilagenous & Bony Fishes	7
Phylum Chordata	6
Phylum Annelida	5
Phylum Arthropoda	5
General Introduction: Vertebrates & Agnatha	4
Phylum Porifera	4
Phylum Aschelminthes	2
Phylum Mollusca	2
Phylum Echinodermata	1
Study of Amphibians	1
Study of Reptilia	1
Super Class Pisces & its General Characteristics	1

1. Which among these is the correct combination of aquatic mammals?
1. Dolphin, Seals, Trygon
2. Whales, Dolphin, Seals
3. Trygon, Whales, Seals
4. Seals, Dolphine, Sharks

2. Choose the correct statement.
1. All mammals are viviparous
2. All cyclostomes do not possess jaws and paired fins
3. All reptiles have a three-chambered heart
4. All Pisces have gills covered by an operculum

3.
Identify the vertebrate group of animals characterized by crop and gizzard in its digestive system.
1. Amphibia
2. Reptilia
3. Aves
4. Osteichthyes

4.
Which one of these animals is not a homeotherm?
1. Macropus
2. Chelone
3. Camelus
4. Psittacula

5. In case of Poriferans, the spongocoel is lined with flagellated cells called:
1. oscula
2. Choanocytes
3. Mesenchymal cells
4. Ostia

6. Which of the following characteristic features always holds true for the corresponding group of animals?

(a) Viviparous	(1) Mammalia
(b) Possess a mouth with an upper and a lower jaw	(2) Chordata
(c) 3-chambered heart with one incompletely Divided ventricle	(3) Reptilia
(d) Cartilaginous-Endoskeleton	(4) Chondrichthyes

1. a
2. b
3. c
4. d

7.
Which of the following characteristics is not shared by birds and mammals?
1. Breathing using lungs
2. Viviparity
3. Warm blooded nature
4. Ossified endoskeleton

8.
Which of the following features is not present in the phylum –Arthorpoda?
1. Metameric segmentation
2. Parapodia
3. Jointed appendages
4. Chitinous exoskeleton

9. A jawless fish, which lays eggs in freshwater and whose ammocoetes larvae after metamorphosis return to the ocean is
1. Eptratretus
2. Myxine
3. Neomyxine
4. Petromyzon

10. Metagenesis refers to
1. The presence of different morphic forms
2. Alternaton of generation between asexual and sexual phrases of an organism
3. Occurance of a drastic change in form during post-embryonic development
4. the presence of segmented body and parthenogenic mode of reproduction

11.

Which of the following represent the correct combination without any exception?

Characteristic	Class
(a) Mammary gland; hair on body; pinnae; two pairs of limbs	Mammalia
(b) Mouth ventral; gills without operculum; skin with placoid scales; persistent notochord	Chondrichthyes
(c) Sucking and circular mouth; jaws absent integument without scales; paired appendages	Cyclostomata
(d) Body covered with feathers; skin moist and glandular; lungs with air sacs fore limbs from wings;	Aves

1. a
2. b
3. c
4. d

12.

Which of the following animals is not viviparous?
1. Flying fox (bat)
2. Elephant
3. Platypus
4. Whale

13.
Which group of animals belong to the same phylum?

1. Earthworm, Pinworm, Tapeworm

2. Prawn, Scorpion, Locusta

3. Sponge, Sea anemone, Starfish

4. Malarial parasite, Amoeba, Mosquito

14. Match the name of the animal (column I), with one characteristics (column II), and the phylum/class (column III) to which it belongs :

	Column I	Column II	Column III
(1)	Ichthyophis	terrestrial	Reptilia
(2)	Limulus	body covered by chitinous exoskeleton	Pisces
(3)	Adamsia	radially symmetrical	Porifera
(4)	Petromyzon	ectoparasite	Cyclostomata

1. (1)
2. (2)
3. (3)
4. (4)

15. Select the Taxon mentioned that represents both marine and fresh water species :
1. Echionoderms
2. Ctenophroa
3. Cephalocarodata
4. Cnidaria

16. Planaria possess high capacity of
1. metamorphosis
2. regeneration
3. alternation of generation
4. bioluminescene

17. A marine cartilaginous fish that can produce electric current is:
1. Pristis
2. Torpedo
3. Trygon
4. Scoliodon

18. In which one of the following, the genus name, its two characters and its phylum are not correctly matched, whereas the remaining three are correct?

	Genus Name		Two Characters	Phylum
(a)	Pila	(i) (ii)	Body segmented Mouth with Radula	Mollusca
(b)	Asterias	(i) (ii)	Spiny skinned Water vascular system	Echinodermata
(c)	Sycon	(i) (ii)	Pore bearing Canal system	Porifera
(d)	Periplaneta	(i) (ii)	Jointed appendages Chitinous exoskeleton	Arthropoda

1. (a)
2. (b)
3. (c)
4. (d)

19. One example of animals having a single opening to the outside that serves both as mouth as well as anus is
1. Octopus
2. Asterias
3. Ascidia
4. Fasciola

20.
What will you look for to identity the sex of the following? Select the correct match.
1. Male frog – a copulatory pad on the first digit of the hind limb.
2. Female cockroach – anal cerci
3. Male shark – claspers borne on pelvic fins
4. Female Ascaris – sharply curved posterior end

21.
In which one of the following the genus name, its two characters and its class/phylum are correctly matched?

Genus	Two Characters	Class/phylum
(a) Salman dra	(i) A tympanum represents ear (ii) Fertilisation is extermal	Amphibia
(b) Pteropus	(i) Skin possesses hair (ii) Oviparous	Mammalia
(c) Aurelia	(i) Cnidobles (ii) organ leval of Organization	Coelenterata
(d) Ascaris	(i) Body segmented (ii) Males and Female distinct	Annelida

1. (a)
2. (b)
3. (c)
4. (d)

22.
Which one of the following groups of animals is correctly matched with its one characteristic feature without even a single exception?
1. Chordata – possess a mouth provided with an upper and a lower jaw
2. Chondrichthyes – possess cartilaginous endoskeleton
3. Mammalia – give birth to young ones
4. Reptilia – posses 3-incompletely heart with one incompletely divided ventricle.

23. Which one of the following statements about all the four of Spongilla, leech, dolphin and penguin is correct?
1. Penguin is homoiothermic while remaining three are poikilothermic
2. Leech is a fresh water form while others are marine
3. Songilla has special collared cells called choanocytes, not found in the remaining three
4. All are bilaterally symmetrical

24. Which one of the following kinds of animals are triploblastic?
1. Flat worms
2. Sponges
3. Ctenophores
4. Corals

25. Which one of the following statements about certain given animals is correct?
1. Roundworms(Aschelminthes) are pseudocoelomates
2. Molluscs are acoelomates
3. Insects are pseudocoelomates
4. Flat worms (Platyhelminthes) are coelomates

26. Which one of the following groups of animals is bilaterally symmetrical and triploblastic?
1. Coelenterates (cnidarians)
2. Ascheminthes (roundworms)
3. Ctenophores
4. Sponges

27. Which one of the following pairs of animal comprises 'jawless fishes'?
1. Lampreys and eels
2. Mackerals and rohu
3. Lampreys and hag fishes
4. Guppies and hag fishes

28.
Which one of the following is not characteristic of phylum-Annelida?
1. Closed circulatory system
2. Segmentation
3. Pseudocoelom
4. Ventral nerve cord

29.
Which one of the following phyla is correctly matched with its two general characteristics?
1. Arthropoda - Body divided into head, thorax and abdomen and respiration by mouth
2. Chordata - Notochord at some stage and separate anal and urinary openings to the outside
3. Echinodermata – Pentamerous radial symmetry and mostly internal fertilization
4. Mollusca - Normally oviparous and development through a trochophore or veliger larva

30. Which one of the following pairs is mismatched?
1. Pila globosa- pearl oyester
2. Apis indica- honey bee
3. Laccifer lacca- lac insect
4. Bombyx mori- silk worm

31. What is common between parrot, platypus and kangaroo?
1. Homeothermy
2. Toothess jaws
3. Functional post-anal tail
4. Oviparity

32. Which of the following pairs are correctly matched?

Animals		Morphological features
A. Crocodile	-	4- chambered heart
B. Sea urchin	-	Parapodia
C. Obelia	-	Metagenesis
D. Lemur	-	Thecodont

1. A, C and D
2, B, C and D
3. Only A and D
4. Only A and B

33. What is true about Nereis, Scorpion, Cockroach and Silver fish?
1. They all have jointed paired appendages
2. They all possess dorsal heart
3. None of them is aquatic
4. They all belong to the same phylum

34. Which one of the following is a matching set of a phylum and its three examples?
1. Cnidaria- Bonellia, Physalia, Aurelia
2. Platyhekminthes- Planaria, Schistosoma, Enterobius
3. Mollusca- Loligo, Teredo, Octopus
4. Prifera- Spingilla, Euplectella, pennatula

35. Which one of the following has an open circulatory system?
1. Pheretima
2. Periplaneta
3. Hirudinaria
4. Octopus

36. Consider following features:
(a) Organ system level of organisation
(b) Bilateral symmetry
(c) True coelomates with segmentation of body
Select the correct option of animal groups which possess all the above characteristics.
1. Annelida, Mollusca and Chordata
2. Annelida, Arthropoda and Chordata
3. Annelida, Arthropoda and Mollusca
4. Arthropoda, Mollusca and Chordata

37. Match the following organism with their respective characteristics:

(a)	Pila	(i)	Flame cells
(b)	Bombyx	(ii)	Comb plates
(c)	Pleurobrachia	(iii)	Radula
(d)	Taenia	(iv)	Malpighian tubules

Select the correct option from the following:

	(a)	(b)	(c)	(d)
1.	(iii)	(ii)	(iv)	(i)
2.	(iii)	(ii)	(i)	(iv)
3.	(iii)	(iv)	(ii)	(i)
4.	(ii)	(iv)	(iii)	(i)

38. Match the following genera with their respective phylum :

(a) Ophiura	(i) Mollusca
(b) Physalia	(ii) Platyhelminthes
(c) Pinctada	(iii) Echinodermata
(d) Planaria	(iv) Coelenterata

Select the correct option :
1. (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)
2. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
3. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
4. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

39. Which of the following animals are true coelomates with bilateral symmetry ?
1. Adult Echinoderms
2. Aschelminthes
3. Platyhelminthes
4. Annelids

40. Which of the following statements are true for the phylum-Chordata?
(a) In Urochordata notochord extends from head to tail and it is present throughout their life
(b) In Vertebrata notochord is present during the embryonic period only
(c) Central nervous system is dorsal and hollow
(d) Chordata is divided into 3 subphyla : Hemichordata, Tunicata and Cephalochordata
1. (c) and (a)
2. (a) and (b)
3. (b) and (c)
4. (d) and (c)

41. Bilaterally symmetrical and acoelomate animals are exemplified by :
1. Platyhelminthes
2. Aschelminthes
3. Annelida
4. Ctenophora

42. Match the following columns and select the correct option.

Column - I	Column - II
a. 6 - 15 pairs of gill slits	(i) Trygono
b. Heterocercal caudal fin	(ii) Cyclostomes
c. Air Bladder	(iii) Chondrichthyes
d. Poison sting	(iv) Osteichthyes

	(a)	(b)	(c)	(d)
1.	(iii)	(iv)	(i)	(ii)
2.	(iv)	(ii)	(iii)	(i)
3.	(i)	(iv)	(iii)	(ii)
4.	(ii)	(iii)	(iv)	(i)

43. Which of the following options does correctly represent the characteristic features of phylum Annelida?
1. Triploblastic, unsegmented body, and bilaterally symmetrical.
2. Triploblastic, a segmented body, and bilaterally symmetrical.
3. Triploblastic, flattened body, and acoelomate condition.
4. Diploblastic, mostly marine and radially symmetrical.

44. Match the following group of organisms with their respective distinctive characteristics and select the correct option :

	Organisms	Characteristics
(a)	Platyhelminthes	Cylindrical body with no segmentation
(b)	Echinoderms	Warm blooded animals with direct development
(c)	Hemichordates	Bilateral symmetry with incomplete digestive system
(d)	Aves	Radial symmetry with indirect development

1. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
2. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
3. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
4. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv

45. Match the following columns and select the correct option :

Column - I	**Column - II**
(a) Aptenodytes	(i) Flying fox
(b) Pteropus	(ii) Angel fish
(c) Pterophyllum	(iii)Lamprey
(d) Petromyzon	(iv)Penguin

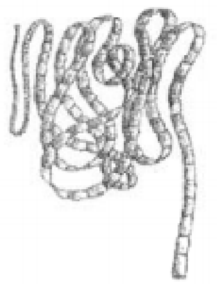
1. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
2. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
3. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
4. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

46. All vertebrates are chordates but all chordates are not vertebrates, why?
1. Notochord is replaced by a vertebral column in adult of some chordates.
2. Ventral hollow nerve cord remains throughout life in some chordates.
3. All chordates possess a vertebral column.
4. All chordates possess notochord throughout their life.

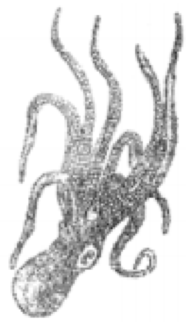
47. Which one of the following categories of animals, is correctly described with no single exception in it ?
1 All bony fishes have four pairs of gills and an operculum on each side
2. All sponges are marine and have collared cells
3. All mammals are viviparous and possess diaphragm for breathing
4. All reptiles possess scales, have a three chambered heart and are cold blood (poikilothermal)

48. Which one of the following pairs of animals are similar to each other pertaining to the feature stated against them ?
1. Garden lizard and Crocodile - Three chambered heart
2. Ascaris and Ancylostoma - Metameric segmentation
3. Sea horse and Flying fish - Cold blooded (poikilothermal)
4. Pteropus and Ornithorhyncus - Viviparity

49. The figure shows four animals (a), (b), (c) and (d). Select the correct answer with respect to a common characetrsitcs of two of these animals.


(a)


(b)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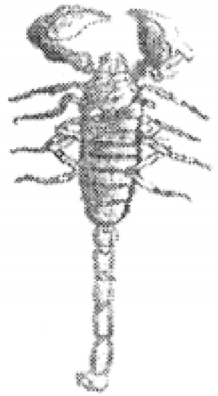

(d)

1. (c) and (d) have a true coelom
2. (a) and (d) respire mainly through body wall
3. (b) and (c) show radial symmetry
4. (a) and (b) have cnidoblasts for selfdefence

50. Which one of the following statements is totally wrong about the occurrence of notochord, while the other three are correct ?
1. It is present throughout life in Amphioxus
2. It is present only in larval tail in Ascidians
3. It is replaced by vertebral column in adult frog
4. It is absent throughout life in humans from the very beginning

51. In contrast to Annelids the Platyhelminths show
(1) Absence of body cavity
(2) Presence of pseudocoel
(3) Radial symmetry
(4) Bilateral symmetry

52. From the following statements select the wrong one -
(1) Prawn has two pairs of antennae
(2) Milliepedes have two pairs of appendages in each segment of the body
(3) Animals belonging to Phylum porifera are exclusively marine
(4) Nematocysts are characteristic of the phylum cnidaria.

53. Hollow air filled bones (pneumatic bones) occurs in :
1. Mammals
2. Reptiles
3. Urodela
4. Aves

54. Which characteristic is true for Obelia :
1. Metagenesis
2. Morphogenesis
3. Apolysis
4. Pedogeny

55. The animals with bilateral symmetry in young stage and radial pentamerous symmetry in the adult stage, belong to the phylum -
(1) Mollusca
(2) Cnidaria
(3) Echinodermata
(4) Annelida

56. What is true for mammalia :
1. Platypus is oviparous
2. Bats have feather
3. Elephant is a ovo viviparous
4. Diaphragm is absent in them

57. Similarity in *Ascaris lumbricoides* and *Anopheles stephensi* is
1. Sexual dimorphism
2. Metamerism
3. Anaerobic respiration
4. Endoparasitism

58. In which of the following notochord is present in embryonic stage : -
(1) All chordates
(2) Some chordates
(3) Vertebrates
(4) Non chordates

59. In which of the following animal post anal tail is found
1. Earthworm
2. Lower invertebrate
3. Scorpion
4. Snake

60. Match List - I with List - II

List - I	List - II
(a) Metamerism	(i) Coelenterata
(b) Canal system	(ii) Ctenophora
(c) Comb Plates	(iii) Annelida
(d) Cnidoblasts	(iv) Porifera

Choose the correct answer from the options given below.

	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(ii)	(i)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(iii)	(iv)	(i)	(ii)

61. Match the following

List-I	List-II
(a) Physalia	I. Pearl oyster
(b) Limulus	II. Portuguese Man of War
(c) Ancylostoma	III. Living fossil
(d) Pinctada	IV. Hookworm

Choose the correct answer from the options given below.
(a) (b) (c) (d)
1. (ii) (iii) (iv) (i)
2. (i) (iv) (iii) (ii)
3. (ii) (iii) (i) (iv)
4. (iv) (i) (iii) (ii)

62. Read the following statements.
(a) Metagenesis is observed in Helminths.
(b) Echinoderms are triploblastic and coelomate animals.
(c) Round worms have organ-system level of body organization
(d) Comb plates present in ctenophores help in digestion.
(e) Water vascular system is characteristic of Echinoderms.
Choose the correct answer from the options given below.
1. (a), (d) and (e) are correct
2. (b), (c) and (e) are correct
3. (c), (d) and (e) are correct
4. (a), (b) and (c) are correct

63. Which one of the following organisms bears hollow and pneumatic long bones?
1. *Macropus*
2. *Ornithorhynchus*
3. *Neophron*
4. *Hemidactylus*

Morphology of Flowering Plants

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Flower	24
Seed	9
Families of Flowering Plants	8
Fruits	5
Morphology of Roots	4
Semi Technical Description	3
Aerial Stem Modification	2
Modification of Roots	2
Morphology of Stems	2
Venation, Types of Leaves & Phyllotaxy	2
Inflorescence	1

1. The term 'polyadelphous' is related to
1. gynoecium
2. androecium
3. corolla
4. calyx

2. Radial symmetry is found in the flowers of
1. Brassica
2. Trifolium
3. Pisum
4. Cassia

3. Free-central placentation is found in
1. Dianthus
2. Argemone
3. Brassica
4. Citrus

4. Coconut fruit is a:
1. Berry
2. Nut
3. Capsule
4. Drupe

5. In Bougainvillea thorns are the modifications of:
1. Adventitious root
2. Stem
3. Leaf
4. Stipules

6. Root hairs develop from the region of:
1. Elongation
2. Root cap
3. Meristematic activity
4. Maturation

7.
Pneumatophores occur in
1. Halophytes
2. Free-floating hydrophytes
3. Carnivorous plants
4. Submerged hydrophytes

8.
Sweet potato is a modified
1. Stem
2. Adventitious root
3. Tap root
4. Rhizome

9.
Tricarpellary, syncarpous is found in flowers of
1. Solanaceae
2. Fabaceae
3. Poaceae
4. Liliaceae

10.
Cotyledon of maize grain is called
1. coleorhizae
2. coleopite
3. scutellum
4. plumule

11.
Which of the following is not a stem modification?
1. Thorns of citrus
2. Tendrils of cucumber
3. Flattened structure of Opuntia
4. Pitcher of Nepenthes

12. The wheat grain has an embryo with one large, shield-shaped cotyledon known as
1. epiblast
2. coleorrhiza
3. scutellum
4. coleoptile

13. Axile placentation is present in
1. Dianthus
2. Lemon
3. Pea
4. Argemone

14. Among China rose, mustard, brinjal, potato, guava, cucumber, onion and tulip, how many plants have superior ovary?
1. Five
2. Six
3. Three
4. Four

15.

⊕ ⚥ $K_{(5)}\ C_{(5)}\ A_5\ G_{(\underline{2})}$ is the floral formula of

1. Allium
2. Sesbania
3. Petunia
4. Brassica

16.

Keel is the characteristic feature of flower of
1. tulip
2. Indigofera
3. Aloe
4. tomato

17.

Perigynous flowers are found in
1. guava
2. cucumber
3. China rose
4. rose

18.

The hilum is a scar on the
1. seed, where funicle was attached
2. fruit, where it was attached to pedicel
3. fruit, where style was present
4. seed, where micropyle was present

19. When the margins of sepals or petals overlap one another without any particular direction, the condition is termed as:
1. Vexillary
2. Imbricate
3. Twisted
4. Valvate

20. Which one of the following statements is correct?
1. The seed in grasses is not endospermic
2. Mango is a parthenocarpic fruit
3. A proteinaceous aleurone layer is present in maize gain.
4. A sterile pistil is called a staminode.

21. An example of edible underground stem is:
1. Carrot
2. Groundnut
3. Sweet potato
4. Potato

22. Placentation in tomato and lemon is
1. Parietal
2. free central
3. marginal
4. axile

23. Cymose inflorescence is present in
1. Solanum
2. Sesbania
3. Trifolium
4. Brassica

24. Vexillary aestivation is characteristic of the family
1. Fabaceae
2. Asteraceae
3. Solanaceae
4. Brassicaceae

25. In unilocular ovary with a single ovule, the placentation is
1. marginal
2. basal
3. free central
4. axile

26. The correct floral formula of chilli is
1. ⊕⚥ $K_5\ C_5\ A_5\ \underline{G}_{(2)}$
2. ⊕⚥ $K_5\ C_5\ A_5\ G_{(2)}$
3. ⊕ ⚥ $K_{(5)}\ C_{(5)}\ A_5\ \underline{G}_{(2)}$
4. ⊕⚥ $K_{(5)}\ C_5\ A_5\ G_{(2)}$

27.
Flowers are zygomorphic in
1. gulmohur
2. tomato
3. datura
4. mustard

28.
A drupe develops in
1. wheat
2. pea
3. tomato
4. mango

29.
The ovary is half inferior in flowers of
1. cucumber
2. cotton
3. guava
4. peach

30. The technical term used for the androecium in a flower of China rose (Hibiscus rosa-sinensis) is
1. monadelphous
2. diadelphous
3. polyadrous
4. polyadelphous

31. The scutellum observed in a grain of wheat or maize is comparable to which part of the seed in other monocotyledons?
1. Cotyledon
2. Endosperm
3. Aleurone layer
4. Plumule

32.
The floral formula $\oplus$ ⚥ $K_{(5)}\ C_{(5)}\ A_5\ \underline{G(2)}$ is that of
1. tulip
2. soybean
3. sunnhemp
4. tobacco

33. An example of axile placentation is
1. Argemone
2. Dianthus
3. Lemon
4. Marigold

34. What type of placentation is seen in sweet pea ?
1. Basal
2. Axile
3. Free-central
4. Marginal

35. Pentamerous, actinomorphic flowers, bicarpillary ovary with oblique septa, and fruit a capsule or berry, are characteristic features of:
1. Asteraceae
2. Brassicaceae
3. Solanaceae
4. Liliaceae

36. Placentation, in which ovules develop on the inner wall of the ovary or in peripheral part, is:
1. Free central
2. basal
3. Axile
4. Parietal

37. Which of the following shows whorled phyllotaxy ?
1. Mustard
2. China rose
3. Alstonia
4. Calotropis

38. Bicarpellary ovary with obliquely placed septum is seen in :
1. Brassica
2. Aloe
3. Solanum
4. Sesbania

39. Match the placental types (column-I) with their examples (column-II)

Column I	Column II
(a) Basal	(i) Mustard
(b) Axile	(ii) China rose
(c) Parietal	(iii) Dianthus
(d) Free central	(iv) Sunflower

Choose the correct answer from the following options:
1. (a)-(ii), (b)-(iii),(c)-(iv), (d)-(i)
2. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
3. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
4. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

40. Ray florets have:
1. Superior ovary
2. Hypogynous ovary
3. Half inferior ovary
4. Inferior ovary

41. The roots that originate from the base of the stem are:
(1) Primary roots
(2) Prop roots
(3) Lateral roots
(4) Fibrous roots

42. The ovary is half inferior in:
(1) Mustard
(2) Sunflower
(3) Plum
(4) Brinjal

43. Correct position of floral parts over thalamus in the mustard plant is :
1. Gynoecium occupies the highest position, while the other parts are situated below it.
2. Margin of the thalamus grows upward, enclosing the ovary completely, and other parts arise below the ovary.
3. Gynoecium is present in the center and other parts cover it partially.
4. Gynoecium is situated in the center, and other parts of the flower are located at the rim of the thalamus, at the same level.

44. Which of the following is the correct floral formula of Liliaceae?
1. $\% \; ⚥ \; C_{1+2+(2)} \; A_{(9)+1} \; \underline{G}_1$
2. $\oplus \; ♂ \; ♀ \; K_{(5)} \; \overbrace{C_{(5)} A_5} \; \underline{G}_{(2)}$
3. $Br \oplus ⚥ \; \overbrace{P_{(3+3)} A_{3+3}} \; G_{(3)}$
4. $\oplus \; ⚥ \; K_{(5)} \; \overbrace{C_{(5)} A_5} \; \underline{G}_{(2)}$

45. Identify the correct features of Mango and Coconut fruits.
(i) In both fruit is a drupe
(ii) Endocarp is edible in both
(iii) Mesocarp in Coconut is fibrous, and in Mango, it is fleshy
(iv) In both, the fruit develops from the monocarpellary ovary
Select the correct option from below :
(1) (i), (iii) and (iv) only
(2) (i), (ii) and (iii) only
(3) (i) and (iv) only
(4) (i) and (ii) only

46. Which one of the following organisms is correctly matched with its three characteristics ?
1. Tomato : Twisted aestivation, Axile placentation, Berry
2. Onion : Bulb, Imbricate aestivation, Axile placentation
3. Maize : C_3 pathway, Closed vascular bundles, Scutellum
4. Pea : C_3 pathway, Endospermic seed, Vaxillary aestivation

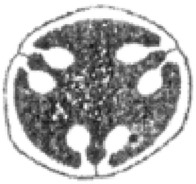
47. Consider the following four statements A, B, C & D and select the right option for two correct statement Statements
(A) In vexillary aestivation, the large posterior petal is called standard, two lateral ones are wings and two small anterior petals are termed keel
(B) The floral formula for Liliaceae is
$Br \oplus ⚥ \; P_{(3+3)} \; A_{3+3} \; \underline{G}_{(3)}$
(C) In pea flower the stamens are monadelphous
(D) The floral formula for Solanaceae is
$\oplus \; ⚥ \; K_{(3)} C_3 \; A_{(4)} \; \underline{G}_{(2)}$
The correct statements are –
1. A and B
2. B and C
3. C and D
4. A and C

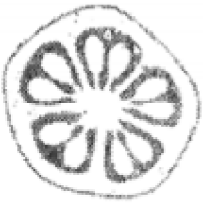
48. The correct floral formula of soyabean is –
1. $\% \; ⚥ \; K_5 \; C_{1+(2)+2} \; A_{(9)+1} \; \underline{G}_1$
2. $\% \; ⚥ \; K_{(5)} \; C_{1+2+(2)} \; A_{(9)+1} \; \underline{G}_1$
3. $\% \; ⚥ \; K_{(5)} \; C_{1+2+(2)} \; A_{1+(9)} \; \underline{G}_1$
4. $\% \; ⚥ \; K_{(5)} \; C_{1+(2)+2} \; A_{(9)+1} \; \underline{G}_1$

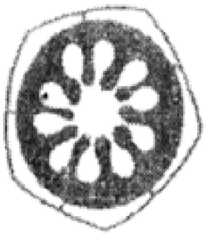
49. Aestivation of petals in the flower of cotton is correctly shown in –
(1) 
(2) 
(3) 
(4) 

50. Which one of the following is a xerophytic plant in which the stem is modified into a flat green and succulent structure –
1. Casurina
2. Hydrilla
3. Acacia
4. Opuntia

51. Which one of the following diagrams represents the placentation in Dianthus ?

1. 

2. 

3. 

4. 

52. Whorled, simple leaves with reticulate venation are present in :
1. Alstonia
2. Calotropis
3. Neem
4. China Rose

53. The edible part of mango is:-
(1) Receptacle
(2) Epicarp
(3) Mesocarp
(4) Endocarp

54. In a longitudinal section of a root, starting from the tip upward, the four zones occur in the following order :-
(1) Root cap, cell division, cell maturation, cell enlargement
(2) Cell division, cell enlargement, cell maturation, root cap
(3) Celldivision,cell maturation, cell enlargement, root cap
(4) Root cap, cell division, cell enlargement, cell maturation

55. Pneumatophores are found in :
1. The vegetation which is found in marshy and saline lake
2. The vegetation which found in saline soil
3. Xerophytes
4. Epiphytes

56. Edible part in mango is : -
(1) Mesocarp
(2) Epicarp
(3) Endocarp
(4) Epidermis

57. The aleurone layer in maize grain is specially rich in :-
(1) Proteins
(2) Starch
(3) Lipids
(4) Auxins

58. Diadelphous stamens are found in:
(1) Pea
(2) China rose and citrus
(3) China rose
(4) Citrus

59. Match Column-I with Column-II

	Column-I		Column-II
a	$\% \text{⚥} K_{(5)} C_{1+2+(2)} A_{(9)+1} \underline{G}_1$	i	Brassicaceae
b	$\oplus \text{⚥} K_{(5)} \overparen{C_{(5)} A_5} \underline{G}_2$	ii	Liliaceae
c	$\oplus \text{⚥} \overparen{P_{(3+3)} A_{3+3}} \underline{G}_{(3)}$	iii	Fabaceae
d	$\oplus \text{⚥} K_{2+2} C_4 A_{2-4} \underline{G}_{(2)}$	iv	Solanaceae

Select the correct answer from the options given below.
(a) (b) (c) (d)
1. (ii) (iii) (iv) (i)
2. (iv) (ii) (i) (iii)
3. (iii) (iv) (ii) (i)
4. (i) (ii) (iii) (iv)

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Anatomy of Flowering Plants

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Activity of Cork Cambium	6
Activity of Vascular Cambium	5
Types of Wood	4
Vascular Tissue System	4
Anatomy of Root	3
Epidermal Tissue System	3
Meristematic Tissue: Classification	3
Monocot Leaf	3
Complex Tissue: Phloem	2
Complex Tissue: Xylem	2
Dicot Stem	2
Monocot Stem	2
Meristematic Tissue: Root Apex	1
Tissue: Introduction & Classification	1

1. Cortex is the region found between
1. epidermis and stele
2. pericycle and endodermis
3. endodermis and pith
4. endodermis and vascular bundle

2. The vascular cambium normally gives rise to:
1. Primary Phloem
2. Secondary xylem
3. Periderm
4. Phelloderm

3.
Stomata in grass leaf are
1. Dumb-bell shaped
2. Kidney shaped
3. Rectangular
4. Barrel shaped

4. Secondary xylem and phloem in dicot stem are produced by
1. Apical meristems
2. Vascular cambium
3. Phellogen
4. Axillary meristems

5.
Casparian strips occur in
1. Epidermis
2. Pericycle
3. Cortex
4. Endodermis

6.
Plants having little or no secondary growth are
1. Grasses
2. Deciduous angiosperms
3. Conifers
4. Cycads

7. Identify the wrong statement in the context of heartwood:
1. It is highly durable
2. It conducts water and minerals efficiently
3. It compromises dead elements with highly lignified walls
4. Organic compounds are deposited in it.

8.
Specialised epidermal cells surrounding the guard cells are called
1. subsidiary cells
2. bulliform cells
3. lenticels
4. complementary cells

9. Read the different components from I to IV in the list given below and tell the correct order of the components with reference to their arrangement from outer side to inner side in a woody dicot stem.
I. Secondary Cortex
II. Wood
III. Secondary phloem
IV. Phellem
The correct order is
1. III,IV,II,I
2. I,II,IV,III
3. IV,I,III,II
4. IV,III,I,II

10.

Vascular bundles in monocotyledons are considered closed because
1. a bundle sheath surrounds each bundle
2. cambium is absent
3. there are no vessels with perforations
4. xylem is surrounded all around by phloem

11. Age of a tree can be estimated by :
1. biomass
2. number of annual rings
3. diameter of its heartwood
4. its height and girth

12. Lenticels are involved in:
1. Gaseous exchange
2. Food transfer
3. Photosynthesis
4. Transpiration

13. Interfascicular cambium develops from the cells of
1. Xylem parenchyma
2. Endodermis
3. Pericycle
4. Medullary rays

14. Companion cells are closely associated with
1. Sieve elements
2. Vessel elements
3. Trichomes
4. guard cells

15. Closed vascular bundles lack
1. Ground tissue
2. Conjuctive tissue
3. Cambium
4. Pith

16.
The cork cambium, cork and secondary cortex are collectively called
1. phellogen
2. periderm
3. phellem
4. phelloderm

17. The chief water conducting elements of xylem in gymnosperms are
1. vessels
2. fibres
3. transfusion tissue
4. tracheids

18. Which one of the following is not a lateral meristem?
1. Intrafascicular cambium
2. Interfascicular cambium
3. Phellogen
4. Intercalary meristem

19. Heartwood differs from sapwood in
1. presence of rays and fibres
2. absence of vessels and parenchyma
3. having dead and non-conducting elements
4. being susceptible to pests and pathogens

20. Anatomically fairly old dicotyledonous root is distinguished from the dicotyledonous stem by
1. absence of secondary xylem
2. absence of secondary phloem
3. presence of cortex
4. position of protoxylem

21. Guard cells help in
1. protection against grazing
2. transpiration
3. guttation
4. fighting against infection

22. Grass leaves curl inwards during very dry weather. Select the most appropriate reason from the following :
1. Tyloses in vessels
2. closure of stomata
3. Flaccidity of bulliform cells
4. Shrinkage of air spaces in spongy mesophyll

23. Phloem in gymnosperms lacks:
1. Both sieve tubes and companion cells
2. Albuminous cells and sieve cells
3. Sieve tubes only
4. Companion cells only

24. Which of the statements given below is not true about the formation of Annual Rings in trees?
1. Annual rings are not prominent in trees of temperate regions.
2. Annual rings are a combination of spring wood and autumn wood produced in a year.
3. Differential activity of cambium causes light and dark bands of tissue - early and late wood respectively.
4. Activity of cambium depends upon variation in climate.

25. In the dicot root the vascular cambium originates from :
1. Tissue located below the phloem bundles and a portion of pericycle tissue above protoxylem.
2. Cortical region
3. Parenchyma between endodermis and pericycle
4. Intrafascicular and interfascicular tissue in a ring

26. Regeneration of damaged growing grass following grazing is largely due to :
1. Lateral meristem
2. Apical meristem
3. Intercalary meristem
4. Secondary meristem

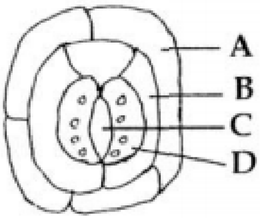
27. Identify the incorrect statement.
1. Sapwood is involved in conduction of water and minerals from root to leafs.
2. Sapwood is the innermost secondary xylem and is lighter in colour
3. Due to deposition of tannins, resins, oils etc., heart wood is dark in colour.
4. Heart wood does not conduct water but gives mechanical support.

28. The transverse section of a plant shows following anatomical features :
(a) Large number of scattered vascular bundles surrounded by bundle sheath.
(b) Large conspicuous parenchymatous ground tissue.
(c) Vascular bundles conjoint and closed.
(d) Phloem parenchyma absent.
Identify the category of plant and its part :
(1) Monocotyledonous root
(2) Dicotyledonous stem
(3) Dicotyledonous root
(4) Monocotyledonous stem

29. Large, empty colorless cells of the adaxial epidermis along the veins of grass leaves are
1. Lenticels
2. Guard cells
3. Bundle sheath cells
4. Bulliform cells

30. Which of the following statements about cork cambium is incorrect?
1. It forms a secondary cortex on its outside
2. It forms a part of periderm
3. It is responsible for the formation of lenticels
4. It is a couple of layers thick

31. Given below is the diagram of a stomatal apparatus. In which of the following all the four parts labelled as A, B, C and D are correctly identified –



	A	B	C	D
(1)	Guard cell	Stomatal aperture	Subsidiary Cell	Epidermal Cell
(2)	Epidermal Cell	Guard Cell	Stomatal aperture	Subsidiary cell
(3)	Epidermal Cell	Subsidiary Cell	Stomatal aperture	Guard Cell
(4)	Subsidiary Cell	Epidermal Cell	Guard Cell	Stomatal aperture

32. Some vascular bundles are described as open because these :
1. are not surrounded by pericycle
2. are surrounded by pericycle but no endodermis
3. are capable of producing secondary xylem and phloem
4. possess conjunctive tissue between xylem and phloem

33. The periderm includes :
1. Secondary phloem
2. Cork
3. Cambium
4. All of these

34. Main function of lenticel is : -
(1) Transpiration
(2) Guttation
(3) Gaseous exchange
(4) Bleeding

35. Vessels are found in : -
(1) All angiosperms and some gymnosperm
(2) Most of the angiosperm and few gymnosperms
(3) All angiosperms, all gymnosperms and some pteridophyta
(4) All pteridophyta

36. Four radial V.B. are found in : -
(1) Dicot root
(2) Monocot root
(3) Dicot stem
(4) Monocot stem

37. Axillary bud and terminal bud derived from the activity of : -
(1) Lateral meristem
(2) Intercalary meristem
(3) Apical meristem
(4) Parenchyma

38. The apical meristem of the root is present
(1) Only in radicals
(2) Only in tap roots
(3) Only in adventitious roots
(4) In all the roots

39. Match List I with List II

List - I	List - II
a) Cells with active cell division capacity	(i) Vascular tissues
(b) Tissue having all cells similar in structure and function	(ii) Meristematic tissue
(c) Tissue having different types of cells	(iii) Sclereids
(d) Dead cells with highly thickened walls and narrow lumen	(iv) Simple tissue

Select the correct answer from the options given below.

	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iii)	(iv)
(2)	(iii)	(ii)	(iv)	(i)
(3)	(ii)	(iv)	(i)	(iii)
(4)	(iv)	(iii)	(ii)	(i)

40. Match List-I with List-II.

List -I	List-I
(a)Lenticels (b)Cork cambium (c) Secondary cortex (d)Cork	(i) Phellogen (ii) Suberin deposition (iii) Exchange of gases (iv) Phelloderm

Choose the correct answer from the options given below.
(a) (b) (c) (d)
1. (ii) (iii) (iv) (i)
2. (iv) (ii) (i) (iii)
3. (iv) (i) (iii) (ii)
4. (iii) (i) (iv) (ii)

41. Select the correct pair.
1. Cells of medullary rays that form part of a cambial ring - Interfascicular cambium
2. Loose parenchyma cells rupturing the epidermis and forming a lens-shaped opening in the bark - Spongy parenchyma
3. Large colorless empty cells in the epidermis of grass leaves - Subsidiary cells
4. In dicot leaves, vascular bundles are surrounded tissue by large thick-walled cells - Conjunctive tissue

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*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Structural Organisation in Animals

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Glandular Epithelium & Cell Junction	6
Simple Epithelium	5
Cockroach: Intro & External Morphology	4
Compound & Specialised Epithelium	4
Connective Tissue	4
Cardiac Muscle & Smooth Muscle	3
Cockroach: Digestive System	3
Cockroach: Head & Mouth Parts	2
Cockroach: Compound Eye	1
Cockroach: Female Reproductive System	1
Cockroach: Structure of Thorax	1
Cockroach: Male Reproductive System	1
Nervous Tissue	1

1. Select the correct route for the passage of sperms in male frogs:
1. Testes → Vasa efferentia → Kidney → Seminal Vesicle→ Urinogenital duct → Cloaca
2. Testes → Vasa efferentia → Bidder's canal → Uretar→ Cloaca
3. Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca
4. Testes → Bidder's canal→ Kidney→ Vasa efferentia→ Urinogenital duct→ Cloaca

2. In male cockroaches, sperms are stored in which part of the reproductive system?
1. Seminal vesicles
2. Mushroom glands
3. Testes
4. Vas deferens

3. Smooth muscles are
1. involuntary, fusiform, non-striated
2. voluntary, multinucleate, cylindrical
3. involuntary, cylindrical, striated
4. voluntary, spindle-shaped, uninucleate

4.
Which of the following features is used to identify a male cockroach from a female cockroach?
1. Presence of a boat shaped sternum on the 9th abdominal segment
2. Presence of caudal styles
3. Forewings with darker tegmina
4. Presence of anal cerci

5. Which type of tissue correctly matched with its location?

Tissue	Location
(1) Areolar tissue	Tendons
(2) Transitional epithelium	Tip of nose
(3) Cuboidal epithelium	Lining of stomach
(4) Smooth muscle	Wall of intestine

6. The function of the gap junction is to
1. Performing cementing to keep neighbouring cells together
2. Facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules
3. Separate two cells from each other
4. Stop substance from leaking across a tissue

7.

The terga sterna and pleura of cockroach body are joined by
1. cementing glue
2. muscular tissue
3. arthrodial membrane
4. cartilage

8. Choose the correctly matched pair:
1. Tendon-Specialized connective tissue
2. Adipose tissue-Dense connective tissue
3. Areolar tissue- Loose connective tissue
4. Cartilage- Loose connective tissue

9. Choose the correctly matched pair
1. Inner lining of salivary ducts- Ciliated epithelium
2. Moist surface of buccal cavity- Glandular epithelium
3. Tubular parts of nephrons- Cuboidal epithelium
4. Inner surface of bronchioles- Squamous epithelium

10.
What external changes are visible after the last moult of a cockroach nymph ?
1. Anal cerci develop
2. Both fore wings and hind wings develop
3. Labium develops
4. Mandibles become harder

11. Select the correct statement from the ones given below with respect to Periplaneta americana.
1. Nervous system located dorsally, consists of segmentally arranged ganglia joined by a pair of lingitudinal connectives
2. Males bear a pair of short thread like anal styles
3. There are 16 very long Malpighian tubules present at the junctions of midgut and hindgut
4. Grinding of food is carried out only by the mouth parts

12.
One very special feature in the earthworm Pheretima is that
1. the typhlosole greatly increases the effective absorption area of the digested food in the intestine
2. the S-shaped setae embedded in the integument are the defensive weapons used against the enemies
3. it has a long dorsal tubular heart
4. fertilization of eggs occurs inside the body

13.
The ciliated columnar epithelial cells in humans are known to occur in
1. bronchioles and fallopian tubes
2. bile duct and Oesophagus
3. fallopian tubes and urethra
4. eustachian tube and stomach lining

14.
Which of the following is correctly states as it happens in the common cockroach?
1. Oxygen is transported by hemoglobin in blood
2. Nitrogenous excretory product is urea
3. The food is ground by mandibles and gizzard
4. Malpighian tubules are excretory organs projecting out from the colon

15. The kind of epithelium which forms the inner walls of blood vessels is:
(1) cuboidal epithelium
(2) columnar epithelium
(3) ciliated columnar epithelium
(4) squamous epithelium

16. The epithelial tissue present on the inner surface of bronchioles and fallopian tubes is
1. cuboidal
2. glandular
3. ciliated
4. squamous

17. The cell junctions called tight, adhering and gap junctions are found in
1. muscular tissue
2. connective tissue
3. epithelial tissue
4. neural tissue

18. The kind of tissue that forms the supportive structure in our pinna (external ears) is also found in
1. Vertebrae
2. Nails
3. Ear ossicled
4. tip of the nose

19. In which one of the following preparations are you likely to come across cell junctions most frequently?
1. Ciliated epithelium
2. Thrombocytes
3. Tendon
4. Hyaline cartilage

20.
The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in:
1. Bronchioles and Fallopian tubes
2. Bile duct and Bronchioles
3. Fallopian tubes and Pancreatic duct
4. Eustachian tube and salivary duct

21. Select the correct sequence of organs in the ailmentary canal of cockroach starting from mouth:
1. Pharynx→Oesophagus→Ileum→Crop→Gizzard→Colon→Rectum
2. Pharynx→Oesophagus→Crop→Gizzard→Ileum→Colon→Rectum
3. Pharynx→Oesophagus→Gizzard→Crop→Ileum→Colon→Rectum
4. Pharynx→Oesophagus→Gizzard→Ileum→Crop→Colon→Rectum

22. Match the following cell structure with its characteristic feature :
(a) Tight junctions (i) Cement neighbouring cells together to form sheet
(b) Adhering junctions (ii) Transmit information through chemical to another cells
(c) Gap junctions (iii) Establish a barrier to prevent leakage of fluid across epithelial cells
(d) Synaptic junctions (iv) Cytoplasmic channels to facilitate communication between adjacent cells
Select correct option from the following :
1. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
2. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
3. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
4. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

23. Which of the following statements is INCORRECT ?
1. Cockroaches exhibit mosaic vision with less sensitivity and more resolution
2. A mushroom-shaped gland is present in the 6^{th}-7^{th} abdominal segments of male
3. A pair of spermatheca is present in the 6^{th} segment of female cockroach
4. Female cockroach possesses sixteen ovarioles in the ovaries.

24. Cuboidal epithelium with brush border of microvilli is found in :
1. Ducts of salivary glands
2. Proximal convoluted tubule of nephron
3. Eustachian tube
4. Lining of intestine

25. Goblet cells of alimentary canal are modified from:
1. Columnar epithelial cells
2. Chondrocytes
3. Compound epithelial cells
4. Squamous epithelial cells

26. If the head of cockroach is removed, it may live for few days because:
(1) The cockroach does not have nervous system
(2) The head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body
(3) The head holds a 1/3rd of a nervous system while the rest is situated along the dorsal part of its body
(4) The supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen.

27. In cockroach, identify the parts of the foregut in correct sequence:-
1. Mouth → Oesophagus → Pharynx → Crop → Gizzard
2. Mouth → Crop → Pharynx → Oesophagus → Gizzard
3. Mouth → Gizzard → Crop → Pharynx → Oesophagus
4. Mouth → Pharynx → Oesophagus → Crop → Gizzard

28. Match the following columns with reference to cockroach and select the correct option :

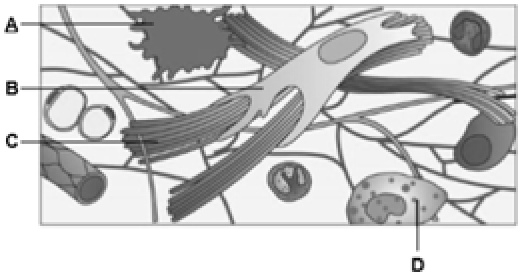
Column - I	Column - II
(a) Grinding of	(i) Hepatic caeca the food particles
(b) Secrete gastric	(ii) 10th segment juice
(c) 10 pairs	(iii) Proventriculus
(d) Anal cerci	(iv) Spiracles
	(v) Alary muscles

1. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
2. (a)-(iv), (b)-(iii), (c)-(v), (d)-(ii)
3. (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)
4. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)

29. Select the incorrectly matched pair from the following:
1. Chondrocytes - Smooth muscle cells
2. Neurons - Nerve cells
3. Fibroblast - Areolar tissue
4. Osteocytes - Bone cells

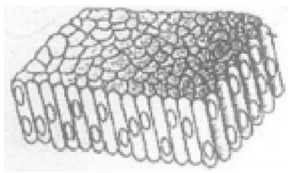
30. The supportive skeletal structures in the human external ears and in the nose tip are examples of :
1. Areolar tissue
2. Bone
3. Cartilage
4. Ligament

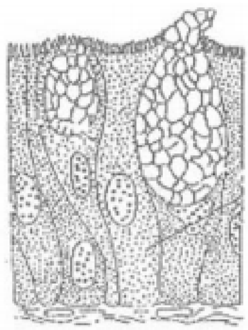
31. Given below is the diagrammatic sketch of a certain type of connective tissue. Identify the parts labeled A, B,C and D and select the right option about them

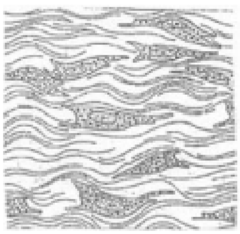


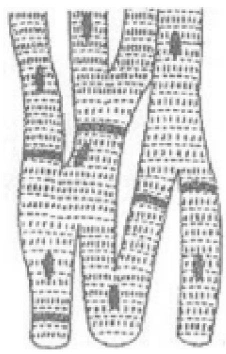
	Part-A	Part-B	Part-C	Part-D
1	Mast cell	Marcophage	Fibroblast	Collagen fibres
2.	Macrophage	Collegen fibres	Fibroblast	Mast cell
3.	Mast cell	Collagen fibres	Fibroblast	Macrophage
4.	Macrophage	Fibroblast	Collagen fibres	Mast cell

32. The four sketches (A, B, C and D) given below, represent four different types of animal tissues. Which one of these is correctly identified in the options given, along with its correct location and function ?

(A)


(B)


(C)


(D)


	Tissue	Location	Function
1.	(C) Collagen fibres	Cartilage	Attach skeletal muscles to bones
2.	(D) Smooth muscle tissue	Heart	Heart contraction
3.	(A) Columnar epithelium	Nephron	Secretion and absorption
4.	(B) Glandular epithelium	Intestine	Secretion

33. Frogs differ from humans in possessing :
1. thyroid as well as parathyroid
2. paired cerebral hemispheres
3. hepatic portal system
4. nucleated red blood cells

34. The cells lining the blood vessels belongs to the category of :
1. Connective tissue
2. Smooth muscle tissue
3. Squamous epithelium
4. Columnar epithelium

35. Which one of the following structure in pheretima is correctly matched with its function ?
1. Typhlosole-storage of extra nutrients
2. Clitellum-secretes cocoon
3. Gizzard-absorbs digested food
4. Setae-defence against predators

36. Ureters act as urinogenital ducts in :
1. frog's males
2. human males
3. human females
4. frog's both males and females

37. Consider the following four statements (A-D) related to the common frog Rana tigrina, and select the correct option stating which ones are true (T) and which ones are false (F).

Statements :
(A) On dry land, it would die due to lack of O_2 if its mouth is forcibly kept closed for a few days
(B) it has four-chambered heart
(C) On dry land, it turns uricotelic from ureotelic
(D) Its life-history is carried out in pond water

	(A)	(B)	(C)	(D)
1.	F	T	T	F
2.	T	F	F	T
3.	T	T	F	F
4.	F	F	T	T

38. Neuroglial cells associated with :
1. Heart
2. Kidney
3. Brain
4. Eyes

39. Ommatidia serve the purpose of photoreception in : -
(1) Cockroach
(2) Frog
(3) Humans
(4) Sunflower

40. Which one of the following characteristic is incorrect with respect to cockroach?
(1) In females, 7^{th} - 9^{th} sterna together form a genital pouch.
(2) 10^{th} abdominal segment in both sexes, bears a pair of anal cerci.
(3) A ring of gastric caeca is present at the junction of midgut and hind gut.
(4) Hypopharynx lies within the cavity enclosed by the mouth parts.

41. Which of the following statements wrongly represents the nature of smooth muscle?
(1) Communication among the cells is performed by intercalated discs
(2) These muscles are present in the wall of blood vessels
(3) These muscle have no striations
(4) They are involuntary muscles

42. Following are the statements about prostomium of earthworm.
(a) It serves as a covering for mouth.
(b) It helps to open cracks in the soil into which it can crawl.
(c) It is one of the sensory structures.
(d) It is the first body segment.
Choose the correct answer from the options given below.
1. (a), (b), (c) and (d) are correct
2. (b) and (c) are correct
3. (a), (b) and (c) are correct
4. (a), (b) and (d) are correct

43. Identify the types of cell junctions that help to stop the leakage of the substances across a tissue and facilitation of communication with neighbouring cells via rapid transfer of ions and molecules.
1. Adhering junctions and Tight junctions, respectively.
2. Adhering junctions and Gap junctions, respectively.
3. Gap junctions and Adhering junctions, respectively.
4. Tight junctions and Gap junctions, respectively.

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Cell: The Unit of Life

(Expected Questions in NEET 2022: 5)

Subtopic Name	Number of Questions
Ribosome and Inclusion Bodies	13
Nucleus	8
Cilia & Flagella	7
Plastids	7
Mitochondria	6
Cell Wall	5
Golgi Apparatus	5
Endoplasmic Reticulum	5
Lysosomes	5
Cell Membrane	3
Details of Prokaryotic Cell Structure	3
Eukaryotic Cell	3
Cell Organisation	2
Cytoskeleton	2
Endomembrane System	2
Prokaryotic Cell Organisation	2
Vacuole	2
Bacterial Staining & Shape	1
Cell Theory	1
Evidence for Fluidic Nature of Membrane	1

1. Select the mismatch.
1. Gas vacuoles - Green bacteria Cells
2. Large central vacuoles - Animal cells
3. Protists - Eukaryotes
4. Methanogens -Prokaryotes

2. Select the wrong statement.
1. Bacterial cell wall is made up of peptidoglycan
2. Pili and fimbriae are mainly involved in motility of bacterial cells
3. Cyanobacteria lack flagellated cells
4. Mycoplasma is a wall-less microorganism

3. A cell organelle containing hydrolytic enzyme is
1. lysosome
2. microsome
3. ribosome
4. mesosome

4.
Which of the following is true for nucleolus?
1. Larger nucleoli are present in dividing cells.
2. It is a membrane-bound structure.
3. It takes part in spindle formation.
4. It is a site for active ribosomal RNA synthesis.

5.
The Golgi complex participates in
1. Fatty acid breakdown
2. Formation of secretory vesicles
3. Respiration in bacteria
4. Activation of amino acid

6.
Many ribosomes may associate with a single mRNA to form multiple copies of a polypeptide simultaneously. Such strings of ribosomes are termed as
1. Polysome
2. Polyhedral bodies
3. Plastidome
4. Nucleosome

7. Which of the following cell organelles is responsible for extracting energy from carbohydrates to form ATP?
1. Ribosome
2. Chloroplast
3. Mitochondrion
4. Lysosome

8.
Microtubules are the constituents of
1. spindle fibres, centrioles and cilia
2. centrioles, spindle fibres and chromatin
3. centrosome, nucleosome and centrioles
4. cilia, flagella and peroxisomes

9.
Which one of the following cell organelles is enclosed by a single membrane?
1. Chloroplasts
2. Lysosomes
3. Nuclei
4. Mitochondria

10.
A complex of ribosomes attached to a single strand of RNA is known as
1. polymer
2. polypeptide
3. okazaki fragment
4. polysome

11. Which of the following structure is not found in a prokaryotic cell?
1. Nuclear envelope
2. Ribosome
3. Mesosome
4. Plasma membrane

12. Match the columns and identify the correct option.

Column I	Column II
A. Thylakoids	1. Disc-shaped sacs in Golgi apparatus
B. Cristae	2. Condensed structure of DNA
C. Cisternae	3. Flat membranous sacs in stroma
D. Chromatin	4. Infolding in mitochondria

1. A-4 B-3 C-1 D-2
2. A-3 B-4 C-1 D-2
3. A-3 B-1 C-4 D-2
4. A-3 B-4 C-2 D-1

13. Identify the correct order of organization of genetic material from largest to smallest.
1. Chromosome,gene,genome,nucleotide
2. Genome,chromosome,nucleotide,gene
3. Genome,chromosome,gene,nucleotide
4. Chromosome,genome,nucleotide,gene

14. Which of the following is not membrane bound?
1. Vacuoles
2. Ribosomes
3. Lysosome
4. Mesosomes

15. The structures that help some bacteria to attach to rocks and/or host tissues are
1. Rhizoids
2. Fimbriae
3. Mesosomes
4. Holdfast

16. Cellular organelles with membranes are
1. Nucleus, ribosome and mitochondria
2. Chromosomes, ribosome and endoplasmic reticulum
3. Endoplasmic reticulum, ribosome and nuclei
4. Lysosomes, Golgi apparatus and mitochondria.

17.

The chromosomes in which centromere is situated close to one end are
1. metacentric
2. acrocentric
3. telocentric
4. sub-metacentric

18.

Select the correct matching in the following pairs.
1. Smooth ER-Oxidation of phospholipids
2. Smooth ER-Synthesis of lipids
3. Rough ER-Synthesis of glycogen
4. Rough ER-Oxidation of fatty acids

19.

Which one of the following is not an inclusion body found in prokaryotes?
1. Phosphate granule
2. Cyanophycean granule
3. Glycogen granule
4. Polysome

20.

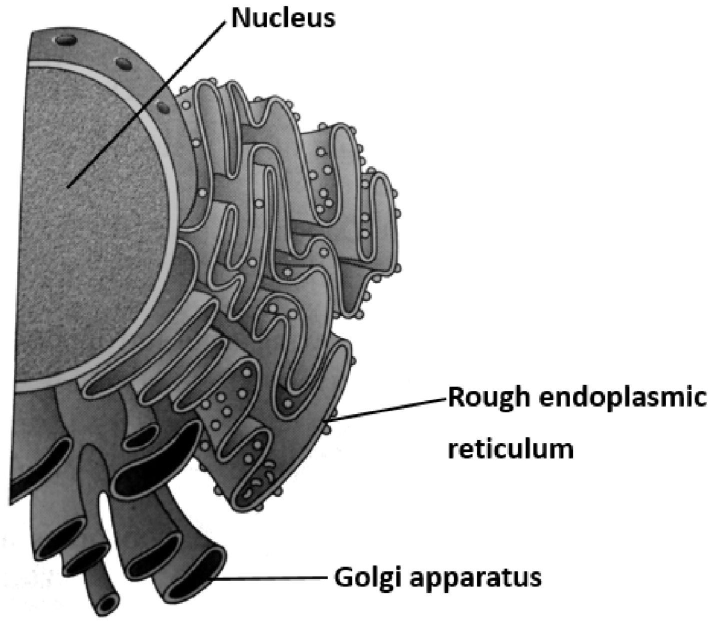
DNA is not present in
1. chloroplast
2. ribosomes
3. nucleus
4. mitochondria

21. Which structures perform the function of mitochondria in bacteria ?
1. Nucleoid
2. Ribosomes
3. Cell wall
4. Mesosomes

22. The osmotic expansion of a cell kept in water is chiefly regulated by
1. Mitochondria
2. Vacuoles
3. Plastids
4. Ribosomes

23. Match the following and select the correct answer :
List - I
A) Centriole
B) Chlorophyll
C) Cristae
D) Ribozymes
List – II
(i) Infoldings in mitochondria
(ii) Thylakoids
(iii) Nucleic acids
(iv) Basal body cilia or flagella
1. A-iv B-ii C-i D-iii
2. A-i B-ii C-iv D-iii
3. A-i B-iii C-ii D-iv
4. A-iv B-iii C-i D-ii

24.
Which one of the following organelle in the figure correctly matches with its function?



1. Golgi apparatus, protein synthesis

2. Golgi apparatus, formation of glycolipids

3. Rough endoplasmic reticulum, protein synthesis

4. Rough endoplasmic reticulum, formation of glycoproteins

25.
The Golgi complex plays a major role

1. in digesting proteins and carbohydrates

2. as energy transferring organelles

3. in post translational modification of proteins and glycosidation of lipids

4. in trapping the light and transforming it into chemical energy

26. A major site for synthesis of lipids is :
1. SER
2. Symplast
3. Nucleoplasm
4. RER

27. Ribosomal RNA is actively synthesized in
1. Lysosomes
2. Nucleolus
3. Nucleoplasm
4. Ribosomes

28. What is true about ribosomes?
1. The prokaryotic ribosomes are 80S, where S stands for sedimentation coefficient
2. These are composed of ribonucleic acid and proteins
3. These are found only in eukaryotic cells
4. These are self-splicing introns of some RNAs

29. Select the correct statement from the following regarding cell membrane.
1. Na^+ and K^+ ions move across cell membrane by passive transport
2. Proteins make up 60 to 70% of the cell membrane
3. Lipids are arranged in a bilayer with polar heads towards the inner part
4. Fluid mosaic model of cell membrane was proposed by Singer and Nicolson

30. Which one of the following structures between two adjacent cells is an effective transport pathway?
1. Plasmodesmata
2. Plastoquinones
3. Endoplasmic reticulum
4. Plasmalemma

31.
Important site for formation of glycoproteins and glycolipids is.
1. Golgi apparatus
2. plastid
3. lysosome
4. vacuole

32.
Peptide synthesis inside a cell takes place in
1. mitochondria
2. chromoplast
3. ribosomes
4. chloroplast

33. Which one of the following has its own DNA?
(1) Mitochondria
(2) Dictyosome
(3) Lysosome
(4) Peroxisome

34. The main arena of various types of activities of a cell is –
(1) Plasma membrane
(2) Mitochondrian
(3) Cytoplasm
(4) Nucleus

35. Alage have cell wall made up of –
(1) Cellulose, galactans and mannans
(2) Hemicellulose, pectins and proteins
(3) Pectins, cellulose and proteins
(4) Cellulose, hemicellulose and pectins

36. Middle lamella is mainly composed of
1. hemicellulose
2. muramic acid
3. calcium pectate
4. phosphoglycerides

37. Plasmodesmata are
1. lignified cemented layers between cells
2. locomotory structures
3. membranes connecting the nucleus with plasmalemma
4. connections between adjacent cells

38. The cytoskeleton is made up of
1. calcium carbonate granules
2. callose deposits
3. cellulosic microfibrils
4. proteinaceous filaments

39.
Polysome is formed by
1. several ribosomes attached to a single mRNA
2. many ribosomes attached to a strand of endoplasmic reticulum
3. a ribosome with several subunits
4. ribosomes attached to each other in a linear arrangement

40.
Vacuole in a plant cell
1. is membrane-bound and contains storage proteins and lipids
2. is membrane-bound and contains water and excretory substances
3. lacks membrane and contains air
4. lacks membrane and contains water and excretory substances

41. Which one of the following is not a constituent of cell membrane?
1. Cholesterol
2. Glycolipids
3. Proline
4. Phospholipids

42. Select the wrong statement from the following:
1. both chloroplast and mitochondria contain an inner and an outer membrane
2. both chloroplasts and mitochondria have an internal compartment, the thylakoid space bounded by the thylakoid membrane
3. both chloroplasts and mitochondria contain DNA
4. the chloroplasts are generally much larger than mitochondria

43. The concept of "*Omnis cellula-e-cellula*" regarding cell division was first proposed by:
1. Aristotle
2. Rudolf Virchow
3. Theodore Schwann
4. Schleiden

44. Which of the following pair of organelles does not contain DNA?
1. Nuclear envelope and Mitochondria
2. Mitochondria and Lysosomes
3. Chloroplast and Vacuoles
4. Lysosomes and vacuoles

45. Which of the following statements is not correct?
1. Lysosomes are formed by the process of packaging in the endoplasmic reticulum.
2. Lysosomes have numerous hydrolytic enzymes
3. The hydrolytic enzyme of lysosomes are active under acidic pH
4. Lysosomes are membrane bound structure.

46. Which of the following cell organelles is present in the highest number in secretory cells?
1. Mitochondria
2. Golgi complex
3. Endoplasmic reticulum
4. Lysosomes

47. Non-membranous nucleoplasmic structures in nucleus are the site for active synthesis of
1. protein synthesis
2. mRNA
3. rRNA
4. tRNA

48. Which of the following nucleic acids is present in an organism having 70 S ribosomes only?
1. Single stranded DNA with protein coat
2. Double stranded circular naked DNA
3. Double stranded DNA enclosed in nuclear membrane
4. Double stranded circular DNA with histone proteins

49. Match the column I with column II.

Column I	Column II
(a) Golgi apparatus	(i) Synthesis of protein
(b) Lysosomes	(ii) Trap waste and excretory products
(c) Vacuoles	(iii) Formation of glycoproteins and glycolipids
(d) Ribosomes	(iv) Digesting biomolecules

Choose the right match from options given below:
1. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
2. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
3. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
4. (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

50. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells?
(1) Peroxisomes
(2) Golgi bodies
(3) Polysomes
(4) Endoplasmic reticulum

51. Which of the following statement about inclusion bodies incorrect ?
(1) These are involved in ingestion of food particles.
(2) They lie free in the cytoplasm.
(3) These represent reserve material in cytoplasm.
(4) They are not bound by any memberane.

52. Inclusion bodies of blue-green, purple, and green photosynthetic bacteria are :
1. Contractile vacuoles
2. Gas vacuoles
3. Centrioles
4. Microtubules

53. The biosynthesis of ribosomal RNA occurs in :
1. Ribosomes
2. Golgi apparatus
3. Microbodies
4. Nucleolus

54. The size of Pleuropneumonia - like Organism (PPLO) is :
1. 0.02 μm
2. 1-2 μm
3. 10-20 μm
4. 0.1 μm

55. Match the following columns and select the correct option :

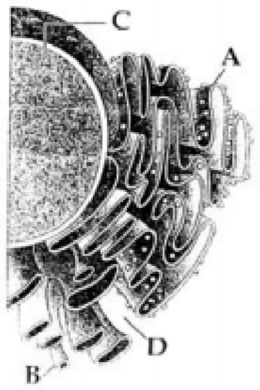
Column - I	**Column - II**
(a) Smooth endoplasmic reticulum	(i) Protein synthesis
(b) Rough endoplasmic reticulum	(ii) Lipid synthesis
(c) Golgi complex	(iii) Glycosylation
(d) Centriole	(iv) Spindle formation

1. (a)-(ii), (b)-(i), (c)-(iii). (d)-(iv)
2. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)
3. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
4. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

56. Which one of the following cellular parts is correctly described ?
1. Centrioles - sites for active RNA synthesis
2. Ribosomes - those on chloroplasts are larger (80s) while those in the cytoplasm are smaller (70s)
3. Lysosomes - optimally active at a pH of about 8.5
4. Thylakoids - flattened membranous sacs forming the grana of chloroplasts

57. An elaborate network of filamentous proteinaceous structures present in the cytoplasm which helps in the maintenance of cell shape is called -
1. Endosplasmic Reticulum
2. Plasmalemma
3. Cytoskeleton
4. Thylakoid

58. Identify the components labelled A, B, C and D in the diagram below from the list (i) to (viii) given along with –

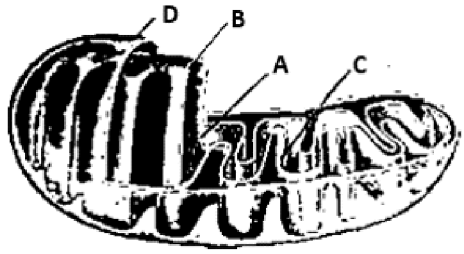


Components :
(i) Cristae of mitochondria
(ii) Inner membrane of mitochondria
(iii) Cytoplasm
(iv) Smooth endoplasmic reticulum
(v) Rough endoplasmic reticulum
(vi) Mitochondrial matrix
(vii) Cell vacuole
(viii) Nucleus
The correct components are :

	A	B	C	D
1.	(i)	(iv)	(viii)	(vi)
2.	(vi)	(v)	(iv)	(vii)
3.	(v)	(i)	(iii)	(ii)
4.	(v)	(iv)	(viii)	(iii)

59. Which one of the following is not considered as a part of the endomembrane system ?
1. Lysosome
2. Golgi complex
3. Peroxisome
4. Vacuole

60. The figure below shows the structure of a mitochondrion with its four parts labelled (A), (B), (C). and (D) Select the part correctly matched with its function. –



1. Part (A) : Matrix – major site for respiratory chain enzymes
2. Part (D) : Outer membrane – gives rise to inner membrane by splitting
3. Part (B) : Inner membrane – forms infoldings called cristae
4. Part (C) : Cristae – possess single circular DNA molecule and ribosome

61. According to widely accepted "fluid mosaic model" cell membranes are semi-fluid, where lipids and integral proteins can diffuse randomly. In recent years, this model has been modified in several respects. In this regard, which of the following statements are incorrect -
(1) Proteins can also undergo flip-flop movements in the lipid bilayer
(2) Many proteins remain completely embedded within the lipid bilayer
(3) Proteins in cell membranes can travel within the lipid bilayer
(4) Proteins can remain confined within certain domains of the membranes

62. The main organelle involved in modification and routing of newly synthesized proteins to their destinations is -
(1) Endoplasmic Reticulum
(2) Lysosome
(3) Mitochondria
(4) Chloroplast

63. Chlorophyll in chloroplasts is located in -
(1) Grana
(2) Pyrenoid
(3) Stroma
(4) Both (1) and (3)

64. Role of microtubules :
1. To help in cell division
2. Cell membrane formation
3. Respiration
4. Pinocytosis

65. Difference between eukaryotes and prokaryotes:
1. ss circular DNA in prokaryotes
2. Histone with prokaryotic DNA
3. Operon in eukaryotes
4. Membrane bound organelles in eukaryotes

66. Flagella of prokaryotic and eukaryotic cells differ in :-
(1) Location in cell and mode of functioning
(2) Microtubular organization and type of movement
(3) Microtubular organization and function
(4) Type of movement & placement in cell

67. In chloroplasts, chlorophyll is present in the :-
(1) Inner membrane
(2) Thylakoids
(3) Stroma
(4) Outer membrane

68. Double unit membrane is absent in :
1. Ribosomes
2. Nucleus
3. Plastids
4. E.R

69. In fluid mosaic model of plasma membrane
(1) Upper layer is non-polar and hydrophilic
(2) Polar layer is hydrophobic
(3) Phospholipids form a bimolecular layer in middle part
(4) Proteins form a middle layer

70. Ribosomes are produced in :
(1) Nucleolus
(2) Cytoplasm
(3) Mitochondria
(4) Golgibody

71. Mitotic spindle is mainly composed of which protein :-
(1) Actin
(2) Tubulin
(3) Actomyosin
(4) Myoglobin

72. Which of the following ribosomes are engaged in protein synthesis in animal cell :
1. Ribosomes which occur on nuclear membrane and E.R.
2. Ribosomes of only cytosol
3. Ribosomes of only nucleolus and cytosol
4. Ribosomes of only mitochondria and cytosol

73. Extranuclear DNA is found in :
1. Lysosome and chloroplast
2. Chloroplast and mitochondria
3. Mitochondria and lysosome
4. Golgi and E.R.

74. Lysosome contains :
1. Oxidative enzymes
2. Hydrolytic enzymes
3. Reductive enzymes
4. Anabolic enzymes

75. Chromosomes in a bacterial cell can be 1–3 in number and : -
(1) Are always circular
(2) Are always linear
(3) Can be either circular or linear, but never both within the same cell
(4) Can be circular as well as linear within the same cell

76. Difference in gram $\oplus$ and gram Θ bacteria is due to -
1. Cell wall
2. Cell membrane
3. Ribosome
4. Cytoplasm

77. Extranuclear chromosomes occur in : -
1. Peroxisome, Ribosome
2. Chloroplast and Mitochondria
3. Mitochondria and Ribosome
4. Chloroplast and Lysosome

78. Element necessary for the middle lamella
1. Ca
2. Zn
3. K
4. Cu

79. Microtubules absent in : -
1. Mitochondria
2. Flagella
3. Spindle fibres
4. Centriole

80. When the centromere is situated in the middle of two equal arms of chromosomes, the chromosome is referred as:
(1) Sub-metacentric
(2) Acrocentric
(3) metacentric
(4) Telocentric

81. Match List - I with List - II

List -I	List - II
(a) Cristae	(i) Primary constriction in chromosome
(b) Thylakoids	(ii) Disc-shaped sacs in Golgi apparatus
(c) Centromere	(iii) Infoldings in mitochondria
(d) Cisternae	(iv) Flattened membranous sacs in stroma of plastids

Choose the correct answer from the options given below.

	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(i)	(ii)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(i)	(iv)	(iii)	(ii)

82. Which of the following is an incorrect statement?
(1) The perinuclear space forms a barrier between the materials present inside the nucleus and that of the cytoplasm.
(2) Nuclear pores act as passages for proteins and RNA molecules in both directions between nucleus and cytoplasm.
(3) Mature sieve tube elements possess a conspicuous nucleus and usual cytoplasmic organelles.
(4) Microbodies are present both in plant and animal cells.

83. The organelles that are included in the endomembrane system are:
(1) Golgi complex, Mitochondria, Ribosomes and Lysosomes
(2) Golgi complex, Endoplasmic reticulus, Mitochondria and Lysosomes
(3) Endoplasmic reticulum, Mitochondria, Ribosomes and Lysosomes
(4) Endoplasmic reticulum, Golgi complex, Lysosomes and Vacuoles

Biomolecules

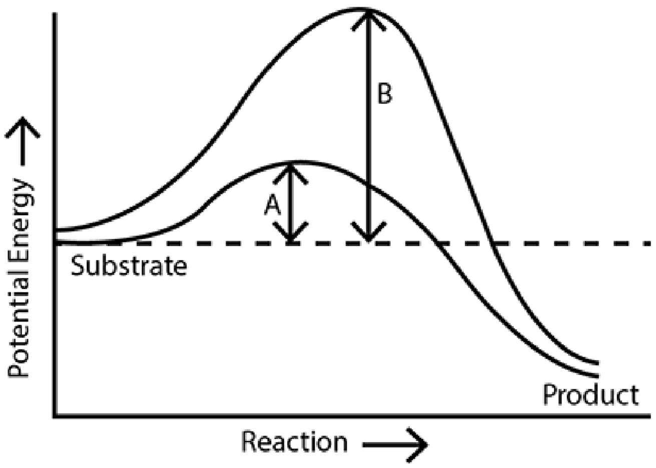
(Expected Questions in NEET 2022: 4)

Subtopic Name	Number of Questions
Enzymes	15
Amino Acids & Proteins	8
Lipids	8
Nucleic Acid	5
Element Analysis and Primary & Secondary Metabolite	4
Carbohydrates	3

1. Which of the following are not polymeric?
1. Protiens
2. Polysaccharides
3. Lipids
4. Nucleic acids

2. A non-proteinaceous enzyme is
1. lysozyme
2. ribozyme
3. ligase
4. deoxyribonuclease

3.
Which of the following describes the given graph correctly?



1. Endothermic reaction with energy A in the presence of enzyme and B in the absence of enzyme
2. Exothermic reaction with energy A in the presence of enzyme and B in the absence of enzyme
3. Endothermic reaction with energy A in the absence of enzyme and B in the presence of enzyme
4. Exothermic reaction with energy A in the absence of enzyme and B in the presence of enzyme

4.
Which one of the following statements is wrong?
1. Cellulose is a polysaccharide
2. Uracil is a pyrimidine
3. Glycine is a sulphur containing amino acid
4. Sucrose is a disaccharide

5.
A typical fat molecule is made up of
1. One glycerol and three fatty acid molecules
2. One glycerol and one fatty acid molecule
3. Three glycerol and three fatty acid molecules
4. Three glycerol molecules and one fatty acid molecule.

6.
Water soluble pigments found in plant cell vacuoles are
1. cholrophylls
2. carotenoids
3. anthocyanins
4. xanthophylls

7. The chitinous exoskeleton of arthropods is formed by the polymerization of
1. Keratine sulphate and chondroitin sulphate
2. D-glucosamine
3. N-acetyl glucosamine
4. Lipoglycans

8. Which of the following biomolecules have a phosphodiester bond?
1. Fatty acids in a diglyceride
2. Monosaccharides in a polysaccharide
3. Amino acids in a plypeptide
4. Nucleic acids in a nucleoide

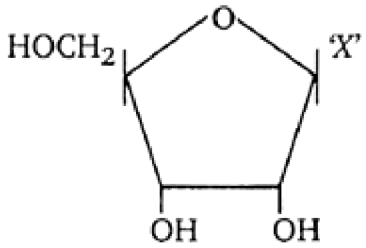
9.
A phosphoglyceride is always made up of
1. only an unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.
2. a saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.
3. a saturated or unsaturated fatty acid esterified to a phosphate group which is also
attached to a glycerol molecule.
4. only a saturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.

10. Select the option which is not correct with respect to enzyme action:
1. Substrate binds with enzyme at its active site.
2. Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate
3. A non-competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate
4. malonate is a competitive inhibitor of succinic dehydrogenase

11. The essential chemical components of many coenzymes are:
1. Nucleic acid
2. Carbohydrates
3. Vitamins
4. Proteins

12. Transition state structure of the substrate formed during an enzymatic reaction is:
1. Permanent but unstable
2. transeint and unstable
3. permanent and stable
4. transeint but stable

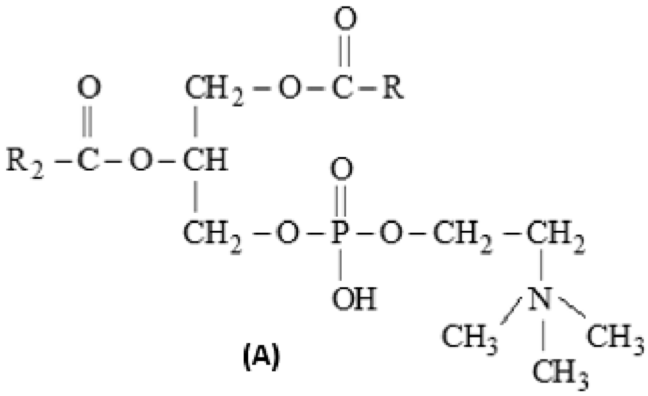
13. Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the category shown and the one blank component X in it



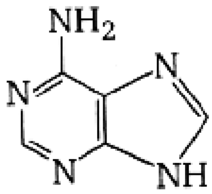
Category Component
1. Cholesterol Guanin
2. Amino acid NH_2
3. Nucleotide Adenine
4. Nucleoside Uracil

14. Which one is the most abundant protein in the animal world?
1. Trypsin
2. Haemoglobin
3. Collagen
4. Insulin

15. Which one of the following structural formulae of two organic compounds are correctly identified along with its related function?



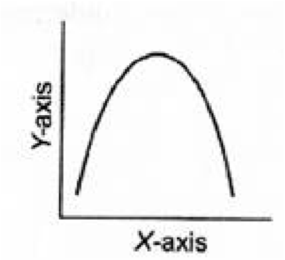
(A)



(B)

1. A- Triglyceride – sources of energy e-major
2. B- Uracil – a component of DNA
3. A- Lecithin – a component of cell membrane
4. B- Adenine – a nucleotide that makes up nucleic acids

16. The curve given below shows enzymatic activity with relation to three conditions (pH, temperature and substrate concentration) what do the two axises (X and Y) represent?



	X - axis	Y-axis
(a)	Temperature	Enzyme activity
(b)	Substrate concentration	Enzymatic activity
(c)	Enzymatic activity	Temperature
(d)	Enzymatic activity	pH

1. (a)
2. (b)
3. (c)
4. (d)

17.
A competitive inhibitor of succinic dehydrogenase is
1. malonate
2. Oxaloacetate
3. α-ketoglutarate
4. malate

18. An organic substance bound to an enzyme and essential for its activity is called:
1. coenzyme
2. holoenzyme
3. apoenzyme
4. isoemzyme

19. Consider the following statements:
(A) Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group
(B) A complete catalytic enzyme with its bound prosthetic group is called apoenzyme
Select the correct option
1. (A) is false but (B) is true
2. Both (A) and (B) are true
3. (A) is true but (B) is false
4. Both (A) and (B) are false

20. Which of the following organic compounds is the main constituent of Lecithin?
1. Arachidonic acid
2. Phospholipid
3. Cholesterol
4. Phosphoprotein

21. Prosthetic groups differ from co-enzymes in that
1. they require metal ions for their activity
2. they (prosthetic groups) are tightly bound to apoenzymes.
3. their association with apoenzymes is transient.
4. they can serve as co-factors in a number of enzyme-catalyzed reactions.

22. "Ramachandran plot" is used to confirm the structure of
1. RNA
2. Proteins
3. Triacylglycerides
4. DNA

23. Match the following:

(a)	Inhibitor of catalytic activity	(i)	Ricin
(b)	Possess peptide bonds	(ii)	Malonate
(c)	Cell wall material in fungi	(iii)	Chitin
(d)	Secondary metabolite	(iv)	Collagen

Choose the correct option from the following:

	(a)	(b)	(c)	(d)
(1)	(iii)	(i)	(iv)	(ii)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(ii)	(iii)	(i)	(iv)
(4)	(ii)	(iv)	(iii)	(i)

24. Identify the basic amino acid from the following.
1. Glutamic Acid
2. Lysine
3. Valine
4. Tyrosine

25. Which one of the following is the most abundant protein in the animals?
(1) Collagen
(2) Lectin
(3) Insulin
(4) Hemoglobin

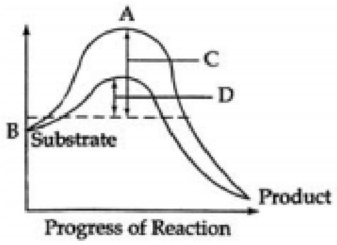
26. Identify the statement which is incorrect.
1. Sulphur is an integral part of cysteine.
2. Glycine is an example of lipids.
3. Lecithin contains a phosphorus atom in its structure.
4. Tyrosine possesses an aromatic ring in its structure.

27. Match the following :
(a) Aquaporin (i) Amide
(b) Asparagine (ii) Polysaccharide
(c) Abscisic acid (iii) Polypeptide
(d) Chitin (iv) Carotenoids
Select the correct option :
1. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
2. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
3. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
4. (a)-(iii), (b)-(i), (c) -(ii), (d)-(iv)

28. Which one of the following biomolecules is correctly characterised ?
1. Palmitic acid - an unsaturated fatty acid with 18 carbon atoms
2. Adenylic acid - adenosine with a glucose phosphate molecule
3. Alanine amino acid - Contains an amino group and an acidic group anywhere in the molecule
4. Lecithin - a phosphorylated glyceride found in cell membrane

29. For its activity, carboxypeptidase requires :
1. Iron
2. Niacin
3. Copper
4. Zinc

30. The figure given below shows the conversions of a substrate into product by an enzyme. In which one of the four options (1-4) the components of reaction labelled as A, B, C and D are identified correctly –



Options

	A	B	C	D
1.	Transition state	Potential energy	Activation energy without enzyme	Activation energy with enzyme
2.	Potential energy	Transition state	Activation energy with enzyme	Activation energy without enzyme
3.	Activation energy with enzyme	Transition state	Activation energy without enzyme	Potential energy
4.	Potential energy	Transition state	Activation energy with enzyme	Activation energy without enzyme

31. Three of the following statements about enzymes are correct and one is wrong. Which
one is wrong
1. Enzymes are denatured at high temperature but in certain exceptional organisms they are effective even at temperatures 80º - 90ºC
2. Enzymes are highly specific
3. Most enzymes are proteins but some are lipids
4. Enzymes require optimum pH for maximal activity

32. Which of the following is the simplest amino acid -
(1) Alanine
(2) Asparagine
(3) Glycine
(4) Tyrosine

33. Which of the following statements regarding enzyme inhibition is correct -
1. Competitive inhibition is seen when a substrate competes with an enzyme for binding to an inhibitor protein
2. Non-competitive inhibitors often bind to the enzyme irreversibly
3. Competitive inhibition is seen when the substrate and the inhibitor compete for the active site on the enzyme
4. Non-competitive inhibition of an enzyme can be overcome by adding large amounts of substrate

34. Nucleotides are building blocks of nucleic acids. Each nucleotide is a composite molecule formed by -
1. Base-sugar-OH
2. Base-sugar-phosphate
3. Sugar-phosphate
4. $(\text{Base-sugar-phosphate})_n$

35. Which protein is found in maximum amount:
1. Catalase
2. Zinc carbonic anhydrase
3. Transferase
4. RUBISCO

36. ATP is :
1. Nucleotide
2. Nucleoside
3. Nucleic acid
4. Vitamin

37. Role of enzyme in reactions is to
1. Decrease activation energy
2. Increase activation energy
3. Act as inorganic catalyst
4. None of the above

38. Phospholipids are esters of glycerol with :-
(1) Three carboxylic acid residues
(2) Two carboxylic acid residues and one phosphate group
(3) One carboxylic acid residue and two phosphate groups
(4) Three phosphate groups

39. The major portion of the dry weight of plants comprises of : -
(1) Nitrogen, phosphorus and potassium
(2) Calcium, magnesium and sulphur
(3) Carbon, nitrogen and hydrogen
(4) Carbon, hydrogen and oxygen

40. Which of the following are not secondary metabolites in plants?
(1) Vinblastin, curcumin
(2) Rubber, gums
(3) Morphine, codeine
(4) Amino acids, glucose

41. Match List -I with List - II.

List-I	List-Ii
(a) Protein	I. C-C double bonds
(b) Unsaturated fatty acid	II. Phosphodiester bonds
(c) Nucleic acid	III. Glycosidic bonds
(d)Polysaccharides	IV. Peptide bonds

Choose the correct answer from the options given below.
(a) (b) (c) (d)
1. (ii) (i) (iv) (iii)
2. (iv) (iii) (i) (ii)
3. (iv) (i) (ii) (iii)
4. (i) (iv) (iii) (ii)

42. Identify the incorrect pair.
(1) Lectins - Concanavalin A
(2) Drugs - Ricin
(3) Alkaloids - Codeine
(4) Toxin - Abrin

43. Following are the statements with reference to 'lipids'.
(a) Lipids having only single bonds are called unsaturated fatty acids.
(b) Lecithin is a phospholipid.
(c) Trihydroxy propane is glycerol.
(d) Palmitic acid has 20 carbon atoms including carboxyl carbon.
(e) Arachidonic acid has 16 carbon atoms.
Choose the correct answer from the options given below.
1. (b) and (c) only
2. (b) and (e) only
3. (a) and (b) only
4. (c) and (d) only

Cell Cycle & Cell Division

(Expected Questions in NEET 2022: 4)

Subtopic Name	Number of Questions
Cell Cycle: Meiosis I	17
Intro to Cell Cycle & Interphase	17
Cell Division: Mitosis (Karyokinesis)	13
Cell Cycle: Meiosis II	1

1. During cell growth, DNA synthesis takes place in
1. S-phase
2. G_1-phase
3. G_2 -phase
4. M-phase

2.
The stage during which separation of the paired homologous chromosomes begins is
1. Pachytene
2. Diplotene
3. Diakinesis
4. Zygotene

3. Which of the following options gives the correct sequence of events during mitosis?
1. Condensation, nuclear membrane disassembly, arrangement at equator, centromere division, segregation, telophase
2. Condensation, crossing over, nuclear membrane disassembly, segregation, telophase
3. Condensation, centromere division, segregation, arrangement at equator, telophase
4. condensation, nuclear membrane disassembly, crossing over, segregation, telophase

4.
Match the stages of meiosis in column to their characteristic features in Column II and select the correct option using the codes given below

Column I	Column II
a. pachytene	1. pairing of homologous chrmosomes
b. metaphase – 1	2. terminalisation of chiasmata
c. diakinesis	3. crossing-over take place
d. Zygotene	4. chromosomes align at equatorial plate

1. A-3 B-4 C-2 D-1
2. A-1 B-4 C-2 D-3
3. A-2 B-4 C-3 D-1
4. A-4 B-3 C-2 D-1

5.
Which of the following is not a characteristic feature during mitosis cells ?
1 Disappearance of nucleolus
2. Chromosome movement
3. Synapsis
4. Spindle fibres

6.
Spindle fibres attach on to
1. kinetochore of the chromosome
2. centromer of the chromosome
3. kinetosome of the chromosome
4. telomere of the chromosome

7.
In meiosis crossing over is initiated at
1. leptotene
2. zygotene
3. diplotene
4. pachytene

8. Arrange the following events of meiosis in correct Sequences
I. Crossing over
II. Synapsis
III. Terminalisation of chiasmata
IV. Disappearance of nucleolus
1. II,I,IV,III
2. II,I,III,IV
3. I,II,III,IV
4. II,III,IV,I

9.

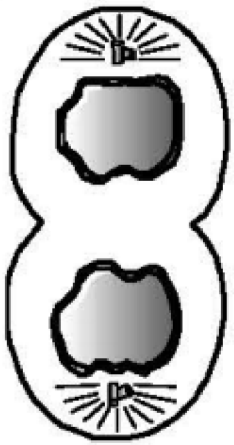
Match the following column I with column II.

Column I	Column II
A. Synapsis aligns homologous chromosomes	1. Anaphase II
B. Synthesis of RNA and protein	2. Zygotene
C. Action of enzyme recombinase	3. G2 - phase
D. Centromeres do not separate, but chromatids move towards opposite poles	4. Anaphase I
	5. Pachytene

1. A-2 B-1 C-3 D-4
2. A-2 B-3 C-5 D-4
3. A-1 B-2 C-5 D-4
4. A-2 B-3 C-4 D-5

10. During which phase(s) of cell cycle, amount of DNA in a cell remains at 4 C level if the initial amount is denoted as 2C ?
1. G_0 and G_1
2. G_1 and S
3. Only G_2
4. G_2 and M

11. A stage in cell division is shown in the figure. Select the answer which gives correct identification of the stage with its characteristics.



1.	Late anaphase	Chromosomes move away from equatorial plate, Golgi complex not present
2.	Cytokinesis	Cell plate formed, mitochondria distributed between two daughter cells
3.	Telophase	Endoplasmic reticulum and nucleolus not reformed yet
4.	Telophase	Nuclear envelop reforms, Golgi complex reforms

1. (1)
2. (2)
3. (3)
4. (4)

12. In 'S' phase of the cell cycle
1. amount of DNA doubles in each cell.
2. amount of DNA remains same in each cell
3. chromosome number is increased
4. amount of DNA is reduced to half in each cell.

13. The enzyme recombinase is required at which stage of meiosis
1. Pachytene
2. Zygotene
3. Dipotene
4. Diakenesis

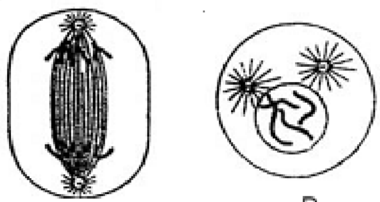
14. The complex formed by a pair of synapsed homologous chromosomes is called
1. Kinetochore
2. Bivalent
3. Axoneme
4. Equatorial plate

15. During gamete formation, the enzyme recombinase participates during
1. Metaphase-I
2. Anaphase-II
3. Prophase-I
4. Prophase-II

16.
Select the correct option with respect to mitosis.
1. Chromatids start moving towards opposite poles in telophase.
2. Golgi complex and endoplasmic reticulum are still visible at the end of prophase.
3. Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase.
4. Chromatids separate but remains in the center of the cell in anaphase.

17. During mitosis ER and nucleolus begin to disappear at
1. late prophase
2. early metaphase
3. late metaphase
4. early prophase

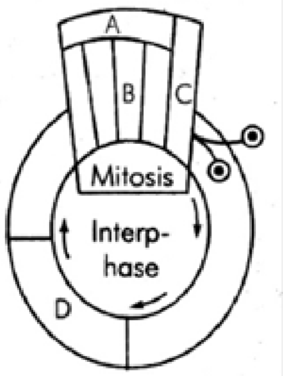
18. Which stages of cell division do the following figures A and B represent respectively?



A B

1. Metaphase- telophase
2. Telophase- Metaphase
3. Late anaphase- Prophase
4. Prophase- Anaphase

19.
Given below is a schematic break-up of the phases/stages of cell cycle



Which one of the following is the correct indication of the stage/phase in the cell cycle?
1. B-Metaphase
2. C-Karyokinesis
3. D-Synthetic phase
4. A-Cytokinesis

20. Synapsis occurs between
1. a male and a female gamete
2. mRNA and ribosomes
3. spindle fibres and centromere
4. two homologous chromosomes

21. Cells in G_0 phase:
1. terminate the cell cycle
2. exit the cell cycle
3. enter the cell cycle
4. suspend the cell cycle

22. The correct sequence of phases in cell cycle is:
1. $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$
2. $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$
3. $G_1 \rightarrow G_2 \rightarrow S \rightarrow M$
4. $S \rightarrow G_1 \rightarrow G_2 \rightarrow M$

23. After meiosis I, the resultant daughter cells have
1. same amount of DNA as in the parent cell in S
2. twice the amount of DNA in comparison to haploid
3. same amount of DNA in comparison to haploid gamete
4. four times the amount of DNA in comparison to haploid gamete

24. Crossing over takes place between which chromatids and in which stage of the cell cycle?
1. Non-sister chromatids of non-homologous chromosomes at Zygotene stage of prophase I.
2. Non-sister chromatids of homologous chromosomes at Pachytene stage of prophase I.
3. Non-sister chromatids of homologous chromosomes at Zygotene stage of prophase I.
4. Non-sister chromatids of non-homologous chromosomes at Pachytene stage of prophase I.

25. Some dividing cells exit the cell cycle and enter the vegetative inactive stage. This is called the quiescent stage (G_0). This process occurs at the end of:
1. $G_1\, phase$
2. S phase
3. $G_2\, phase$
4. M phase

26. Identify the correct statement with regard to G_1 phase (Gap 1) of interphase.
1. The reorganisation of all cell components takes place.
2. The cell is metabolically active, grow but does not replicate its DNA
3. Nuclear Division takes place
4. DNA synthesis or replication takes place.

27. Dissolution of the synaptonemal complex occurs during :
(1) Zygote
(2) Diplotene
(3) Leptotene
(4) Pachytene

28. Match the following with respect to meiosis:

a. Zygotene	i. Terminalization
b. Pachytene	ii. Chiasmata
c. Diplotene	iii. Crossing over
d. Diakinesis	iv. Synapsis

Select the correct option from the following:

	(a)	(b)	(c)	(d)
1.	iv	iii	ii	i
2.	i	ii	iv	iii
3.	ii	iv	iii	i
4.	iii	iv	i	ii

29. Attachment of spindle fibers to kinetochores of chromosomes becomes evident in :
1. Anaphase
2. Telophase
3. Prophase
4. Metaphase

30. In a mitotic cycle, the correct sequence of phases is
1. S, G_1, G_2, M
2. G_1, S, G_2, M
3. M, G_1, G_2, S
4. G_1, G_2, S, M

31. During Meiosis 1, in which stage synapsis takes place?
1. Pachytene
2. Zygotene
3. Diplotene
4. Leptotene

32. Match the following events that occur in their respective phases of cell cycle and select the correct option :
(a) G 1 phase (i) Cell grows and organelle duplication
(b) S phase (ii) DNA replication and chromosome duplication
(c) G 2 phase (iii) Cytoplasmic growth
(d) Metaphase in M-phase (iv) Alignment of chromosomes
1. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
2. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
3. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
4. (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

33. Identify the meiotic stage in which the homologous chromosomes separate while the sister chromatids remain associated at their centromeres :
1. Metaphase-II
2. Anaphase-I
3. Anaphase-II
4. Metaphase-I

34. At metaphase, chromosomes are attached to the spindle fibres by their :
1. Centromere
2. Satellites
3. Secondary constrictions
4. Kinetochores

35. Centromere is required for -
(1) Movement of chromosomes towards poles
(2) Cytoplasmic cleavage
(3) Crossing over
(4) Transcription

36. What occurs in crossing over :
1. Recombination
2. Mutation
3. Independent assortment
4. None

37. Crossing over that results in genetic recombination in higher organisms occurs between:-
1. Non-sister chromatids of a bivalent
2. Two daughter nuclei
3. Two different bivalents
4. Sister chromatids of a bivalents

38. In the somatic cell cycle :-
1. DNA replication takes place in S-phase
2. A short interphase is followed by a long mitotic phase
3. G_2 phase follows mitotic phase
4. In G_1 phase, DNA content is double the amount of DNA present in the original cell

39. Amount of cellular DNA increases during :
1. Cytokinesis
2. Fertilisation
3. Mutation
4. Respiration

40. If you are provided with root-tips of onion in your class and are asked to count the chromosomes, which of the following stages can you most conveniently look into
1. Telophase
2. Anaphase
3. Prophase
4. Metaphase

41. Spindle fibre unites with which structure of chromosomes :
1. Chromocenter
2. Chromomere
3. Kinetochore
4. Centriole

42. Best material for the study of mitosis in laboratory : -
(1) Anther
(2) Root tip
(3) Leaf tip
(4) Ovary

43. In which stage of cell cycle, DNA replication occurs :
1. G_1 - phase
2. S - phase
3. G_2 - phase
4. M - phase

44. Which of the following stages of meiosis involves division of centromere?
(1) Anaphase II
(2) Telophase II
(3) Metaphase I
(4) Metaphase II

45. Match List-I with List-II

List-I	List-II
(a) S phase	I. Proteins are synthesized
(b) G_2 phase	II. Inactive phase
(c) Quiescent stage	III. Interval between mitosis and initiation of DNA replication
(d) G_1 phase	IV. DNA replication

Choose the correct answer from the options given below.
(a) (b) (c) (d)
1. (iv) (i) (ii) (iii)
2. (ii) (iv) (iii) (i)
3. (iii) (ii) (i) (iv)
4. (iv) (ii) (iii) (i)

46. The centriole undergoes duplication during:
(1) Metaphase
(2) G_2 phase
(3) S-phase
(4) Prophase

47. Which stage of meiotic prophase shows terminalisation of chiasmata as its distincitve feature?
(1) Diakinesis
(2) Pachytene
(3) Leptotene
(4) Zygotene

48. The fruit fly has 8 chromosomes (2n) in each cell. During the interphase of Mitosis if the number of chromosomes at G_1 phase is 8, what would be the number of chromosomes after the S phase?
1. 4
2. 32
3. 8
4. 16

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*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Transport in Plants

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Transpiration	8
Phloem Translocation	4
Means of Transport: Active	2
Osmosis	2
Stomata	2
Water Potential	2
Ascent of Sap	1
Pathways of transport	1
Plasmolysis	1

1. Which of the following facilitates opening of stomatal aperture?
1. Decrease in turgidity of guard cells
2. Radial orientation of cellulose microfibrils in the cell wall of guard cells.
3. Longitudinal orientation of cellulose microfibrils in the cell wall of guard cells
4. Contraction of outer wall of guard cells

2. The water potential of pure water is:
1. Less than zero
2. More than zero but less than one
3. More than one
4. Zero

3. Root pressure develops due to
1. Active absorption
2. Low osmotic potential in Soil
3. Passive absorption
4. Increase in transpiration

4. A column of water within xylem vessels of tall trees does not break under its weight because of
1. Dissolved sugar in water
2. Tensile strength of water
3. Lignification of xylem vessels
4. Positive root pressure

5.

Transpiration and root pressure cause water to rise in plants by
1. pulling it upward
2. pulling and pushing it, respectively
3. pushing it upward
4. pushing and pulling it, respectively

6. Which one of the following is correctly matched?
1. Passive transport of nutrients-ATP
2. Apoplast- Plasmodesmata
3. Potassium- Readily mobilized
4. Bakane of rice seedlings-F Skoog

7.
Which one of the following elements in plants not re-mobilized?
1. Calcium
2. Potassium
3. Sulphur
4. Phosphorus

8. Xylem translocates:
1. Water, minerals salts, some nitrogen and hormones
2. Water only
3. Water and mineral salts only
4. Water, mineral and some organic nitrogen only

9. What is the direction of movement of sugars in phloem?
1. Bi-directional
2. Non-multidirectional
3. Upward
4. Downward

10. Which of the following is not a feature of active transport of solutes in plants ?
1. Occurs against concentration gradient
2. Non-selective
3. Occurs through membranes
4. Requires ATP

11. What will be the direction of flow of water when a plant cell is placed in a Hypotonic solution?
1. Water will flow in both directions.
2. Water will flow out of the cell.
3. Water will flow into the cell.
4. No flow of water in any direction.

12. The process responsible for facilitating loss of water in liquid form from the tip of grass blades at night and early morning is:
1. Root pressure
2. Imbibition
3. Plasmolysis
4. Transpiration

13. Select the incorrect statement.
1. Transport of molecules in phloem can be bidirectional.
2. The movement of minerals in the xylem is unidirectional.
3. Unloading of sucrose at the sink does not involve the utilization of ATP.
4. Elements most easily mobilized in plants from one region to another are phosphorus, sulfur, nitrogen, and potassium.

14. Guttation is the result of :
1. Root pressure
2. Diffusion
3. Transpiration
4. Osmosis

15. Function of companion cells is :
1. Loading of sucrose into sieve elements
2. Providing energy to sieve elements for active transport
3. Providing water to phloem
4. Loading of sucrose into sieve elements by passive transport

16. Osmotic potential and water potential of pure water respectively :
1. 0 and 0
2. 0 and 1
3. 100 and 0
4. 100 and 100

17. What shall be the water potential of a root hair cell absorbing water from the soil
1. Zero
2. Less than zero
3. More than zero
4. Infinite

18. Casparian bands are found in :
1. Endodermis
2. Pericycle
3. Periderm
4. Cortex

19. The movement of ions against the concentration gradient will be :
1. Active transport
2. Osmosis
3. Diffusion
4. All of the above

20. Opening and closing of stomata is due to the : -
1. Hormonal change in guard cells
2. Change in Turgor pressure of guard cells
3. Gaseous exchange
4. Respiration

21. Loading of phloem is related to : -
1. Increase of sugar in phloem
2. Elongation of phloem cell
3. Separation of phloem parenchyma
4. Strengthening of phloem fiber

22. When water moves through a semipermeable membrane then which of the following pressure develops : -
1. O.P.
2. S.P.
3. T.P.
4. W.P.

23. Match List - I with List-II.

List-I	List-II
(a) Cohesion	(i) More attraction in liquid phase
(b) Adhesion	(ii)Mutual attraction among water molecules
(c) Surface tension	(iii)Water loss in liquid phase
(d) Guttation	(iv) Attraction towards polar surfaces

Choose the correct answer from the options given below.
(a) (b) (c) (d)
1. (iii) (i) (iv) (ii)
2. (ii) (i) (iv) (iii)
3. (ii) (iv) (i) (iii)
4. (iv) (iii) (ii) (i)

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Mineral Nutrition

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Mineral Function	17
Nitrogen Fixation	13
Classification of Nutrients	5
Nodule formation	5
Ammonia Assimilation & Nitrogen Export	1
Mineral Deficiency & Toxicity	1
Nitrogen Metabolism: 1	1

1. Select the mismatch:
1. Rhodospirillum - Mycorrhiza
2. Anabaena - Nitrogen fixer
3. Rhizobium - Alfalfa
4. Frankia - Alnus

2.
In which of the following forms is iron absorbed by plants?
1. Ferric
2. Ferrous
3. Free element
4. Both ferric and ferrous

3.
Which of the following elements is responsible for maintaining turgor in cells ?
1. Magnesium
2. Sodium
3. Potassium
4. Calcium

4.
In which of the following, all three are macronutrients?
1. Iron, copper, molybdenum
2. Molybdenum, magnesium, manganese
3. Nitrogen, zinc, manganese
4. Nitrogen, magnesium, phosphorus

5. During biological nitrogen fixation, inactivation of nitrogenase by oxygen poisoning is prevented by
1. Leghaemoglobin
2. Xanthophylls
3. Carotene
4. Cytochrome

6.

Minerals known to be required in large amounts for plant growth include
1. phosphorus, potassium, sulphur, calcium
2. calcium, magnesium, manganese, copper
3. potassium, phosphorus, selenium, boron
4. magnesium, sulphur, iron, zinc

7. Deficiency symptoms of nitrogen and potassium are visible first in :
1. Senescent leaves
2. Young leaves
3. Roots
4. Buds

8. The most abundant intracellular cation is :
1. Ca^{2+}
2. H^{+}
3. K^{+}
4. Na^{+}

9. Best defined function of manganese in green plants is
1. Photolysis of water
2. Calvin cycle
3. Nitrogen fixation
4. Water absorption

10. An element playing important role in nitrogen fixation is
1. molybdenum
2. copper
3. manganese
4. zinc

11.
The function of leghemoglobin in the root nodules of legumes is
1. oxygen removal
2. nodule differentiation
3. expression of nif gene
4. inhibition of nitrogenase activity

12.
Nitrifying bacteria
1. convert free nitrogen to nitrogen compounds
2. convert proteins into ammonia
3. reduce nitrates to free nitrogen
4. oxidize ammonia to nitrates

13. Which one of the following is not a micronutrient?
1. Molybdenum
2. Magnesium
3. Zinc
4. Boron

14. The free-living, anaerobic nitrogen-fixer is
1. Beijerinckia
2. Rhodospirillum
3. Rhizobium
4. Azotobacter

15. Manganese is required in
1. nucleic acid synthesis
2. plant cell wall formation
3. photolysis of water during photosynthesis
4. chlorophyll synthesis

16. Which of the following is a symbiotic nitrogen fixer?
1. Glomus
2. Azotobacter
3. Frankia
4. Azolla

17.
Nitrogen-fixation in root nodules of Alnus is brought about by
1. Bradyrhizobium
2. Clostridium
3. Frankia
4. Azorhizobium

18. Which one of the following elements is not an essential micronutrient for plant growth?
1. Mn
2. Zn
3. Cu
4. Ca

19. A plant requires magnesium for :
1. holding cells together
2. protein synthesis
3. chlorophyll synthesis
4. cell wall development

20. Farmers in a particular region were concerned that pre-mature yellowing of leaves of a pulse crop might cause decrease in the yield. Which treatment could be most beneficial to obtain maximum seed yield?
1. Frequent irrigation of the crop
2. Treatment of the paints with cytokinins alongwith a small dose of nitrogenous fertilizer
3. Removal of all yellow leaves and spraying the remaining green leaves with 2,4,5-trichlorophenoxy acetic acid
4. Application of iron and magnesium to promote synthesis of chlorophyll

21. *Thiobacillus* is a group of bacteria helpful in carrying out:
1. Denitrification
2. Nitrogen fixation
3. Chemoautotrophic fixation
4. Nitrification

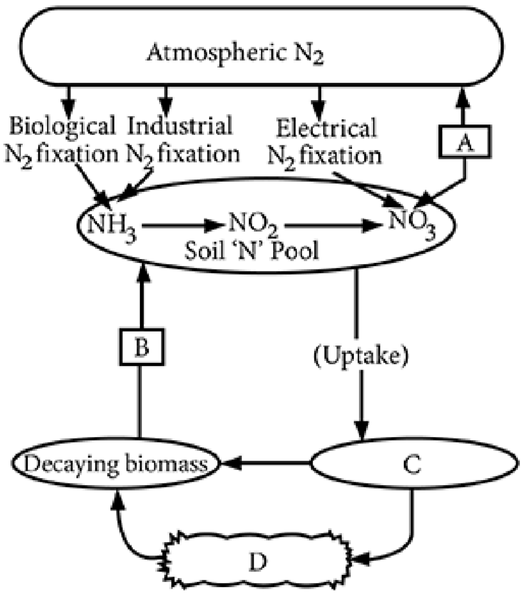
22. Which of the following bacteria reduce nitrate in soil into nitrogen ?
1. Nitrobacter
2. Thiobacillus
3. Nitrococcus
4. Nitrosomonas

23. In Glycine max, the product of biological nitrogen fixation is transported from the root nodules to other parts as:
1. Ammonia
2. Glutamate
3. Nitrates
4. Ureides

24. Which of the following elements helps in maintaining the structure of ribosomes?
1. Magnesium
2. Zinc
3. Copper
4. Molybdenum

25. For its action, nitrogenase requires :
1. Light
2. Mn^{2+}
3. Super oxygen radicals
4. High input of energy

26. Study the cycle shown below and select the option which gives correct words for all the four blanks A, B, C and D



Options :

A	B	C	D
1. Denitrification	Ammonification	Plants	Animals
2. Nitrification	Denitrification	Animals	Plants
3. Denitrification	Nitrification	Plants	Animals
4. Nitrification	Ammonification	Animals	Plants

27. Leguminous plants are able to fix atmospheric nitrogen through the process of symbiotic nitrogen fixation. Which one of the following statements is not correct during this process of nitrogen fixation -
1. Nodules act as sites for nitrogen fixation
2. The enzyme nitrogenase catalyses the conversion of atmospheric N_2 to NH_3
3. Nitrogenase is insensitive to oxygen
4. Leghaemoglobin scavenges oxygen and is pinkish in colour

28. Which one of the following is essential for photolysis of water ?
1. Boron
2. Manganese
3. Zinc
4. Copper

29. Which one of the following is not an essential mineral element for plants while the remaining three are ?
1. Phosphorus
2. Iron
3. Manganese
4. Cadmium

30. The deficiencies of micronutrients, not only affects growth of plants but also vital functions such as photosynthetic and mitochondrial electron flow. Among the list given below, which group of three elements shall affect most, both photosynthetic and mitochondrial electron transport -
(1) Ca, K, Na
(2) Co, Ni, Mo
(3) Mn, Co, Ca
(4) Cu, Mn, Fe

31. All of the following statements concerning the Actinomycetous filamentous soil bacterium Frankia are correct EXCEPT that Frankia -
(1) Forms specialized vesicles in which the nitrogenase is protected from oxygen by a chemical barrier involving triterpene hopanoids
(2) Can induce root nodules on many plant species
(3) Like Rhizobium, it usually infects its host plant through root hair deformation and stimulates cell proliferation in the host's cortex
(4) Cannot fix nitrogen in the free-living state

32. Which of the following is a non–symbiotic nitrogen fixing bacteria?
1. Rhizobium
2. Mycorrhiza
3. Azotobacter
4. Nitrosomonas

33. If by radiation all nitrogenase enzyme are inactivated, then there will be no :-
(1) Fixation of atmospheric nitrogen
(2) Conversion from nitrate to nitrite in legumes
(3) Conversion from ammonium to nitrate in soil
(4) Fixation of nitrogen in legumes

34. Nitrogen fixing bacteria converts :
1. $N_2 \rightarrow NH_3$
2. $NH_4^+ \rightarrow Nitrates$
3. $NO_2 \rightarrow NO_3$
4. $NO_3 \rightarrow N_2$

35. Plants take zinc in form of :
1. $ZnSO_4$
2. Zn^{++}
3. ZnO
4. Zn

36. The major role of minor elements inside living organisms is to act as : -
(1) co-factors of enzymes
(2) Building blocks of important amino acids
(3) Constituent of hormones
(4) Binder of cell structure

37. Which element is located at the centre of the porphyrin ring in chlorophyll?
(1) Calcium
(2) Magnesium
(3) Potassium
(4) Manganese

38. Which one of the following mineral elements plays an important role in biological nitrogen fixation : -
(1) Copper
(2) Manganese
(3) Zinc
(4) Molybdenum

39. Boron in green plants assists in : -
(1) Activation of enzymes
(2) Acting of enzyme cofactor
(3) Photosynthesis
(4) Sugar transport

40. Enzyme first used for nitrogen fixation : -
1. Nitrogenase
2. Nitroreductase
3. Transferase
4. Transaminase

41. Cytochrome is : -
1. Metallo flavo protein
2. Fe containing porphyrin pigment
3. Glycoprotein
4. Lipid

42. Roots of which plant contains a pink pigment which have affinity for oxygen : -
1. Carrot
2. Soyabean
3. Mustard
4. Radish

43. Match Column-I with Column- II.

Column I	Column II
(a) Nitrococcus (b) Rhizobium (c) Thiobacillus (a) Nitrobactèr	(i) Denitrification (ii) Conversion of ammonia to nitrite (iii) Conversion of nitrite to nitrate (iv) Conversion of atmospheric nitrogen to ammonia

Choose the correct answer from the options given below.
(a) (b) (c) (d)
1. (iii) (i) (iv) (ii)
2. (iv) (iii) (ii) (i)
3. (ii) (iv) (i) (iii)
4. (i) (ii) (iii) (iv)

Photosynthesis in Higher Plants

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
C4 Cycle (Hatch & Slack Pathway)	11
Light Reaction	10
Dark Reaction	6
Photorespiration	3
Photorespiration	3
Historical View: Experiments	2
C4 Plants Examples	1
Chemiosmotic hypothesis	1
Factors Affecting Photosynthesis	1

1. The process which makes major difference between C3 and C4 plants is
1. glycolysis
2. Calvin cycle
3. photorespiration
4. respiration

2.
Which of the following is *not* a product of light reaction of photosynthesis?
1. ATP
2. NADH
3. NADPH
4. Oxygen

3.
Oxygen is *not* produced during photosynthesis by
1. Green sulphur bacteria
2. Nostoc
3. Cycas
4. Chara

4. With reference to factors affecting the rate of photosynthesis, which of the following statements is not correct?
1. increasing atmospheric CO_2 concentration up to 0.05% can enhance CO_2 fixation rate
2. C_3 plants respond to higher temperatures with enhanced photosynthesis while C4 plants have much lower temperature optimum
3. Tomato is a greenhouse crop which can be grown in CO_2 enriched atmosphere for higher yield
4. Light saturation for CO_2 fixation occurs at 10% of full sunlight

5. Phosphoenol pyruvate (PEP) is the primary CO_2 acceptor in:
1. C_4 plants
2. C_2 plants
3. C_3 and C_4 plants
4. C_3 plants

6.
A plant in your garden avoids photorespiratory losses, has improved water use efficiency, shows high rates of photosynthesis at high temperatures and has improved efficiency of nitrogen utilization. In which of the following physiological groups would you assign this plant?
1. C_4
2. CAM
3. Nitrogen –fixer
4. C_3

7.
In chloroplast the highest number of protons are found in
1. lumen of thylakoids
2. inter membrane space
3. antennae complex
4. stroma

8. In photosynthesis, the light-independent reactions take place at
1. Thylakoid lumen
2. photosystem I
3. photosystem II
4. Stromal matrix

9. Cyclic -photophosphorylation results in the formation of
1. NADPH
2. ATP and NADPH
3. ATP, NADPH and O_2
4. ATP

10.
In leaves of C4-plants malic acid synthesis during CO2-fixation occurs in
1. epidermal cells
2. mesophyll cells
3. bundle sheath
4. guard cells

11. In the leaves of C_4 plants, malic acid formation during CO_2 fixation occurs in the cells of :
1. mesophyll
2. bundle sheath
3. phloem
4. epidermis

12.
The chemiosmotic coupling hypothesis of oxidative phosphorylation proposes that Adenosine Triphosphate (ATP) is formed because
1. high energy bonds are formed in mitochondrial proteins
2. ADP is pumped out of the matrix into the inter membrane space
3. a proton gradient forms across the inner membrane
4. there is a change in the permeability of the inner mitochondrial membrane toward Adenosine Diphosphate (ADP)

13. In Hatch and Slack pathway, the primary CO_2 acceptor is -
1. Oxaloacetic acid
2. Phosphoglyceric acid
3. Phosphoenol pyruvate
4. Rubisco

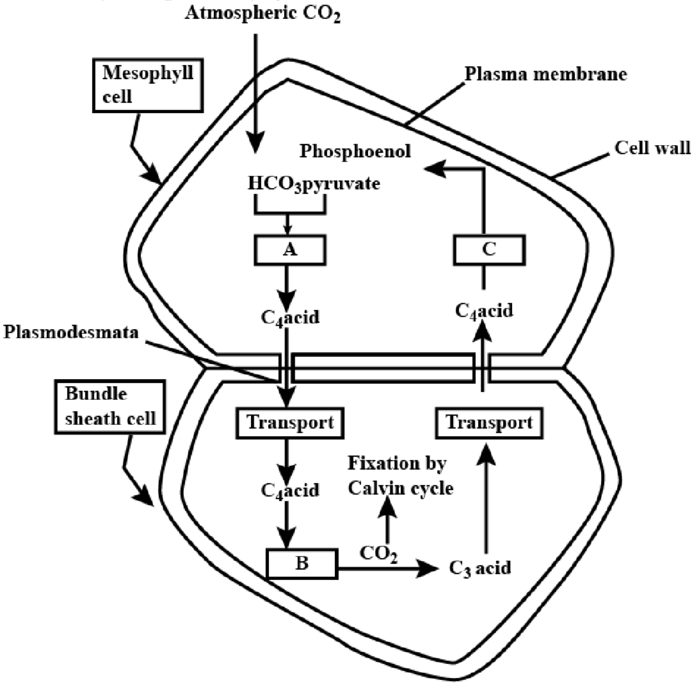
14. One scientist cultured Cladophora in a suspension of Azotobacter and illuminated the culture by splitting light through a prism. He observed that bacteria accumulated mainly in the region of :
1. Violet and green light
2. Indigo and green light
3. Orange and yellow light
4. Blue and red light

15. The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of:
1. 1 molecule of the 3-C compound
2. 1 molecule of the 6-C compound
3. 1 molecule of a 4-C compound and 1 molecule of the 2-C compound
4. 2 molecules of the 3-C compound

16. During non-cyclic photophosphorylation, when electrons are lost from the reaction center at PS II, what is the source which replaces these electrons?
1. Oxygen
2. Water
3. Carbon dioxide
4. Light

17. Which of the following statements is incorrect?
1. RuBisCO is a bifunctional enzyme
2. In C4 plants, the site of RuBisCO activity is mesophyll cell
3. The substrate molecule for RuBisCO activity is a 5-carbon compound
4. RuBisCO action requires ATP and NADPH

18. Study the pathway given below-



In which of the following options correct words for all the three blanks A, B and C are indicated?

	A	B	C
1.	Fixation	Transamination	Regeneration
2.	Fixation	Decarboxylation	Regeneration
3.	Carboxylation	Decarboxylation	Reduction
4.	Decarboxylation	Reduction	Regeneration

19. Read the following four statements A, B, C and D and select the right option having both correct statements –
STATEMENTS
(A) Z-scheme of light reaction takes place in presence of PSI only
(B) Only PSI functional in cyclic photophosphorylation
(C) Cyclic photophosphorylation result into synthesis of ATP and NADPH2
(D) Stroma lamellae lack PSII as well as NADP
Options
1. A and B
2. B and C
3. C and D
4. B and D

20. In Kranz anatomy, the bundle sheath cells have :
1. thick walls, many intercellular spaces and few chloroplasts
2. thin walls, many intercellular spaces and no chloroplasts
3. thick walls, no intercellular spaces and large number of chloroplasts
4. thin walls, no intercellular spaces and several chloroplasts

21. Chemiosmotic theory of ATP synthesis in the chloroplasts and mitochondria is based on
(1) Membrane potential
(2) Accumulation of K ions
(3) Proton gradient
(4) Accumulation of Na ions

22. Photosynthesis in C_4 plants is relatively less limited by atmospheric CO_2 levels because
(1) The primary fixation of CO_2 is mediated via PEP carboxylase
(2) Effective pumping of CO_2 into bundle sheath cells
(3) Four carbon acids are the primary initial CO2 fixation products
(4) Rubisco in C_4 plants has higher affinity for CO_2

23. Photosynthetic Active Radiation (PAR) has the following range of wavelengths
(1) 340-450 nm
(2) 450-950 nm
(3) 500-600 nm
(4) 400-700 nm

24. In C_3 plants, the first stable product of photosynthesis during the dark reaction is :-
(1) Oxaloacetic acid
(2) 3-phosphoglyceric acid
(3) Phosphoglyceraldehyde
(4) Malic acid

25. Photosynthetically active radiation (PAR) represents the following range of wave length
(1) 450-950 nm
(2) 340-450 nm
(3) 400-700 nm
(4) 500-600 nm

26. The first step for initiation of photosynthesis will be :
1. Photolysis of water
2. Excitement of chlorophyll molecule due to absorption of light
3. ATP formation
4. Glucose formation

27. For the synthesis of one glucose molecule the calvin cycle operates for :
1. 2 times
2. 4 times
3. 6 times
4. 8 times

28. For assimilation of one CO_2 molecule in C_3 plants; the energy required in form of ATP & $NADPH_2$
1. 2 ATP & 2 $NADPH_2$
2. 5 ATP & 3 $NADPH_2$
3. 3 ATP & 2 $NADPH_2$
4. 18 ATP & 12 $NADPH_2$

29. Which is the first CO_2 acceptor enzyme in C_4 plants :
1. RuDP Carboxylase
2. Phosphoric acid
3. RUBISCO
4. PEP-Carboxylase

30. In photosynthesis, energy from light reaction to dark reaction is transferred in the form of
1. ADP
2. ATP
3. RUDP
4. Chlorophyll

31. Which of the following absorb light energy for photosynthesis : -
(1) Chlorophyll
(2) Water molecule
(3) O_2
(4) RUBP

32. What happens in light reaction (Photo chemical reaction) :
1. Formation of ATP and $NADPH_2$
2. Formation of ATP
3. Formation of sugar
4. Breakdown of sugar

33. Which one of the following concerns photophosphorylation : -
1. $\text{ADP} + \text{AMP} \xrightarrow{\text{Lightenergy}} \text{ATP}$
2. $\text{ADP} + \text{Inorganic PO}_4 \xrightarrow{\text{Lightenergy}} \text{ATP}$
3. $\text{ADP} + \text{Inorganic PO}_4 \rightarrow \text{ATP}$
4. $\text{AMP} + \text{Inorganic PO}_4 \xrightarrow{\text{Lightenergy}} \text{ATP}$

34. In sugarcane plant $^{14}CO_2$ is fixed in malic acid, in which the enzyme that fixes CO_2 is :-
(1) Ribulose biphosphate carboxylase
(2) Phosphoenol pyruvic acid carboxylase
(3) Ribulose phosphate kinase
(4) Fructose phosphatase

35. Which one of the following is wrong in relation to photorespiration : -
(1) It occurs in chloroplasts
(2) It occurs in daytime only
(3) It is a characteristic of C_4 plants
(4) It is a characteristic of C_3 plants

36. Which pair is wrong : -
1. C_3 – Maize
2. C_4 – Kranz anatomy
3. Calvin cycle - PGA
4. Hatch and Slake cycle – O.A.A

37. The first stable product of CO_2 fixation in sorghum is:
(1) Succinic acid
(2) Phosphoglyceric acid
(3) Pyruvic acid
(4) Oxaloacetic acid

38. Which of the following statements is incorrect?
1. Grana lamellae have both PSI and PS II.
2. Cyclic photophosphorylation involves both PS I and PS II.
3. Both ATP and $NADPH+H^+$ are non-cyclic synthesized during photophosphorylation.
4. Stroma lamellae have PS I only and lack NADP reductase.

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Respiration in Plants

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
ETS	5
Aerobic Respiration	3
Glycolysis	3
Kreb's Cycle	3
Oxidative Phosphorylation	3
Amphibolic Nature of Respiration	2
Fermentation	2
Respiratory Quotient	1

1. Which of the following biomolecules is common to respiration-mediated breakdown of fats, carbohydrates and proteins?
1. Glucose-6-phosphate
2. Fructose 1, 6-bisphosphate
3. Pyruvic acid
4. Acetyl Co-A

2.
What is the role of NAD^+ in cellular respiration?
1. It functions as enzymes
2. It functions as an electron carrier
3. It is a nucleotide source for ATP synthesis
4. It is the final electron acceptor for anaerobic respiration

3.
Which of these statements is incorrect?
1. Enzymes of TCA cycle are present in mitochondrial matrix.
2. Glycolysis occurs in cytosol.
3. Glycolysis operates as long as it is supplied with NAD that can pick up hydrogen atoms.
4. Oxidative phosphorylation takes place in outermitochondrial membrane.

4. Oxidative phosphorylation is
1. formation of ATP by transfer of phosphate group from a substrate to ADP
2. oxidation of phosphate group in ATP
3. addition of phosphate group to ATP
4. formation of ATP by energy released from electrons removed during substrate oxidation

5. Which statement is wrong for Krebs' cycle?
1. There is one point in the cycle where FAD+ is reduced to FADH2
2. During conversion ofsuccinyl CoA to succinic acid, a molecule of GTP is synthesized.
3. The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid.
4. There are three points in the cycle where NAD+ is reduced to NADH + H+

6. Which of the metabolites is common to respiration mediated breakdown of fats, carbohydrates and proteins?
1. Frutose1, 6 - bisphosphate
2. Pyruvic acid
3. Acetyl CoA
4. Glucose- 6 -phopsphate

7. The energy-releasing metabolic process in which substrate is oxidized without an external electron acceptor is called
1. glycolysis
2. fermentation
3. aerobic respiration
4. photorespiration

8.
The energy-releasing process in which the substrate is oxidized without an external electron acceptor is called
1. fermentation
2. photorespiration
3. aerobic respiration
4. glycolysis

9. Conversion of glucose to glucose-6-phosphate, the first irreversible reaction of glycolysis, is catalyzed by:
1. Phosphofructokinase
2. Aldolase
3. Hexokinase
4. Enolase

10.
Respiratory Quotient (RQ) value of tripalmitin is:
1. 0.09
2. 0.9
3. 0.7
4. 0.007

11.
Which of the following statements regarding mitochondria is incorrect ?
1. Mitochondrial matrix contains single circular DNA molecule and ribosomes
2. Outer membranes is permeable to monomers of carbohydrates, fats and proteins
3. Enzymes of electron transport are embedded in outer membrane
4. Inner membrane is convoluted with infoldings

12. Where is the respiratory electron transport system (ETS) located in plants?
1. Mitochondrial matrix
2. Outer mitochondrial membrane
3. Inner mitochondrial membrane
4. Intermembrane space

13. The number of substrate level of phosphorylations in one turn of citric acid cycle is
1. One
2. Two
3. Three
4. Four

14. Pyruvate dehydrogenase activity during aerobic respiration requires :-
1. Calcium
2. Iron
3. Cobalt
4. Magnesium

15. In mitochondria, protons accumulate in the :
1. Matrix
2. Outer membrane
3. Inner membrane
4. Intermembrane space

16. During which stage in the complete oxidation of glucose are the greatest number of ATP molecules formed from ADP -
(1) Glycolysis
(2) Krebs cycle
(3) Electron transport chain
(4) Conversion of pyruvic acid to acetyl CoA

17. In glycolysis, during oxidation electrons are removed by -
(1) Glyceraldehyde-3-phosphate
(2) NAD^+
(3) Molecular oxygen
(4) ATP

18. Which of the following yield maximum energy :
1. By glycolysis in a sprinter
2. Aerobic respiration in germinating seeds
3. Fermentation by yeast
4. Anaerobic respiration

19. How many ATP molecules produced by Aerobic oxidation of one molecule of glucose : -
(1) 2
(2) 4
(3) 38
(4) 34

20. Glycolysis is : -
(1) Oxidation of glucose to glutamate
(2) Conversion of pyruvate to citrate
(3) Oxidation of glucose to pyruvate
(4) Conversion of glucose to haem

21. In which one of the following do the two names refer to one and the same thing : -
(1) Kreb's cycle and Calvin cycle
(2) Tricarboxylic acid cycle and citric acid cycle
(3) Citric acid cycle and Calvin cycle
(4) Tricarboxylic acid cycle and urea cycle

22. Which of the following statements is incorrect?
1. ATP is synthesized through complex V.
2. Oxidation-reduction reactions produce proton gradient in respiration.
3. During aerobic respiration, the role of oxygen is limited to the terminal stage.
4. In ETC (Electron Transport Chain), one molecule of $NADH+H^+$ gives rise to 2ATP molecules, and one $FADH_2$ gives rise to 3 ATP molecules.

Plant Growth & Development

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Auxin Function	5
Gibberellin	5
Growth Hormones & Auxin	5
Abscisic Acid	4
Cytokinin	3
Photoperiodism	3
Ethylene	2
Growth Model	2
Seed Dormancy	2
Development	1
Vernalization	1

1. You are given a tissue with its potential for differentiation in an artificial culture. Which of the following pairs of hormones would you add to the medium to secure shoots as well as roots?
1. IAA and gibberellin
2. Auxin and cytokinin
3. Auxin and abscisic acid
4. Gibberellin & abscisic acid

2. Fruit and leaf drop at early stages can be prevented by the application of:
1. Ethylene
2. Auxins
3. Gibberellic acid
4. Cytokinins

3.

Typical growth curve in plants is
1. sigmoid
2. linear
3. stair-steps shaped
4. parabolic

4. Which one of the following growth regulators is known as stress hormone ?
1. Abscissic acid
2. Ethylene
3. GA_3
4. Indole acetic acid

5. One of the synthetic auxin is
1. NAA
2. IAA
3. GA
4. IBA

6. Which one of the following acids is a derivative of carotenoids?
1. Indole-butyric acid
2. Indole-3-acetic acid
3. Gibberellic acid
4. Abscisic acid`

7. "Foolish seedling" disease of rice led to the discovery of:
1. GA
2. ABA
3. 2, 4-D
4. IAA

8. Which one of the following pairs, is not correctly matched?
1. Abscisic acid - Stomatal closure
2. Gibberellic acid - Leaf fall
3. Cytokinin - Cell division
4. IAA - Cell wall elongation

9. It takes very long time for pineapple plants to produce flowers. Which combination of hormones can be applied to artificially induce flowering in pineapple plants throughout the year to increase yield?
1. Cytokinin and Abscisic acid
2. Auxin and Ethylene
3. Gibberellin and Cytokinin
4. Gibberellin and Abscisic acid

10. What is the site of perception of photoperiod necessary for induction of flowering in plants?
1. Leaves
2. Lateral buds
3. Pulvinus
4. Shoot apex

11. Removal of shoot tips is a very useful technique to boost the production of tea- leaves. This is because
1. Gibberellins prevent bolting and are inactivated.
2. Auxins prevent leaf drop at early stages.
3. Effect of auxins is removed and growth of lateral buds is enhanced.
4. Gibberellins delay senescence of leaves.

12. In order to increase the yield of sugarcane crop, which of the following plant growth regulators should be sprayed ?
1. Ethylene
2. Auxins
3. Gibberellins
4. Cytokinins

13. Which of the following is not an inhibitory substance governing seed dormancy?
1. Abscisic acid
2. Phenolic acid
3. Para-ascorbic acid
4. Gibberellic acid

14. Name the plant growth regulator which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane crop.
1. Gibberellin
2. Ethylene
3. Abscisic acid
4. Cytokinin

15. Who coined the term 'Kinetin'?
1. Skoog and Miller
2. Darwin
3. Went
4. Kurosawa

16. Inhibitory substances in dormant seeds cannot be removed by subjecting seeds to:
1. Gibberellic acid
2. Nitrate
3. Ascorbic acid
4. Chilling conditions

17. Match the following concerning the activity/function and the phytohormone involved :-

(a) Fruit ripener	(i) Abscisic acid
(b) Herbicide	(ii) GA 3
(c) Bolting agent	(iii) 2, 4-D
(d) Stress hormone	(iv) Ethephon

Select the correct option from following :-
1. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
2. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
3. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
4. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

18. Vernalisation stimulates flowering in -
(1) Turmeric
(2) Carrot
(3) Ginger
(4) Zamikand

19. Which one of the following generally acts as an antagonist to gibberellins ?
1. Ethylene
2. ABA
3. IAA
4. Zeatin

20. One of the commonly used plant growth hormone in tea plantations is -
1. Abscisic acid
2. Zeatin
3. Indole-3- acetic acid
4. Ethylene

21. Root development is promoted by -
1. Auxin
2. Gibberellin
3. Ethylene
4. Abscisic acid

22. What is necessary for ripening of fruits :
1. 80% of ethylene
2. Abscissic acid
3. 2, 4 D
4. A.M.O. – 16

23. Effect of light and dark rhythm on plants :
1. Photonasty
2. Phototropism
3. Photoperiodism
4. Photomorphogenesis

24. The maximum growth rate occurs in :-
(1) Senescent phase
(2) Lag phase
(3) Exponential phase
(4) Stationary phase

25. Cell elongation in internodal regions of the green plants takes place due to :-
(1) Cytokinins
(2) Gibberellins
(3) Ethylene
(4) Indole acetic acid

26. If the apical bud has been removed then we observe :
1. More lateral branches
2. More axillary buds
3. Plant growth stops
4. Flowering stops

27. Which hormone is responsible for fruit ripening :
1. Ethylene
2. Auxin
3. Ethyl chloride
4. Cytokinin

28. Coconut milk is used in tissue culture in which present :
1. Cytokinin
2. Auxin
3. Gibberellin
4. Ethylene

29. Seed dormancy is due to the : -
(1) Ethylene
(2) Abscissic acid
(3) IAA
(4) Starch

30. Coconut milk factor is : -
(1) An auxin
(2) A gibberellin
(3) Abscissic acid
(4) Cytokinin

31. The plant hormone used to destroy weeds in a field is:
(1) 2, 4-D
(2) IBA
(3) IAA
(4) NAA

32. Plants follow different pathways in response to environment or phases of life to form different kinds of structures. This ability is called:
(1) Plasticity
(2) Maturity
(3) Elasticity
(4) Flexibility

33. The site of perception of light in plants during photoperiodism is:
1. Axillary bud
2. Leaf
3. Shoot apex
4. Stem

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Digestion & Absorption

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Gastric Secretions	10
Histology of Gut	4
Pancreatic Secretions	4
Intestinal Secretions	3
Protein Energy Malnutrition	3
Absorption	3
Alimentary Canal: Oral Cavity & Teeth	2
Disorders of Digestive System	2
Accessory Digestive Glands	1
Peristalsis: Gland in Alimentary Canal	1

1. Which of the following options best represents the enzyme composition of pancreatic juice?
1. Amylase, pepsin, trypsinogen, maltase
2. Peptidase, amylase, pepsin, rennin
3. Lipase, amylase, trypsinogen, procarboxypaptidase
4. Amylase, peptidase, trypsonigen, rennin

2.
Which of the following terms describe human dentition?
1. Thecodont, Diphyodont, Homodont
2. Thecodont, Diphyodont, Heterodont
3. Pleurodont, Monophyodont, Homodont
4. Pleurodont, Diphyodont, Heterodont

3. A baby boy aged two years is admitted to play school and passes through a dental check-up. The dentist observed that the boy had twenty teeth. Which teeth were absent in the boy?
1. Canines
2. Pre-molars
3. Molars
4. Incisors

4.
Which of the following guards the opening of hepatopancereatic duct into the duodenum ?
1. Ileocaecal valve
2. Pyloric sphincter
3. Sphincter of Oddi
4. Semilunar valve

5.
In the stomach, gastric acid is secreted by the
1. oxyntic cells
2. peptic cells
3. acidic cells
4. gastrin secreting cells

6. The enzyme that is not present in succus entericulus is
1. maltase.
2. nucleases.
3. nucleosidases.
4. lipases.

7.

Which of the following statement is not correct?
1. Brunner's glands are present in the submucosa of stomach and secrete pepsinogen
2. Goblet cells are present in the mucosa of intestine and secrete mucus
3. Oxyntic cells are present in the mucosa of stomach and secrete HCI.
4. Acini are present in the pancreas and secrete carboxypeptidase

8.

Gastric juice of infants contains
1. maltase, pepsinogen, rennin
2. nuclease, pepsinogen, lipase
3. pepsinogen, lipase, rennin
4. amylase, rennin, pepsinogen

9. Select the correct match of the digested products in humans given in column-I with their' absorption site and mechanism in column-II

Column I	Column II
(1) Fructose, Na+	Small intestine, passive absorption
(2) Glycerol, fatty acids	Duodenum, move as chilomicrons
(3) Cholesterol, maltose	Large intestine, active absorption
(4) Glycine, glucose	Small intestine, active absorption

1. (1)
2. (2)
3. (3)
4. (4)

10. The initial step in the digestion of milk in infant is carried out by ?
1. Lipase
2. Trypsin
3. Rennin
4. Pepsin

11. Anxiety and eating spicy food together in an otherwise normal human, may lead to
1. Indigestion
2. Jaundice
3. Diarrhoea
4. vomiting

12. Carrier ions like Na+ facilitate the absorption of substance like
1. amino acids and glucose
2. glocose and fatty acids
3. fatty acids and glycerol
4. fructose and some amino acids

13. If for some reason our goblet cells are non-functional, this will adversely affect
1. production of somatostatin
2. secretion of sebum from the sebaceous glands
3. maturation of sperms
4. smooth movement of food down the intestine

14. When breast feeding is replaced by less nutritive food low in proteins and calories; the infants below the age of one year are likely to suffer from
1. marasmus
2. rickets
3. kwashiorkor
4. pellagra

15. Which one of the following statement is true regarding digestion and absorption of food in humans?
1. Oxyntic cells in our stomach secrete the proenzyme pepsinogen
2. Fructose and amino acids are absorbed through intestinal mucosa with the help of carrier ions like Na^+.
3. Chylomicrons are small lipoprotein particles that are transported from intestine into blood capillaries.
4. About 60% of starch is hydrolysed by salivary amylase in our mouth.

16.
What will happen if HCl secretion of parietal cells of gastric glands is blocked with an inhibitor?
1. Gastric juice will be deficient in chymosin
2. Gastric juice will be deficient in pepsinogen
3. in the absence of HCl secretion, inactive pepsinogen is not converted into the active enzyme pepsin
4. Enterokinase will not be released from the duodenal mucosa and so trypsinogen is not converted to trypsin

17.
Which one of the following is the correct matching of the site of action on the given substrate, the enzyme acting upon it and the end product?
1. Duodenum : Triglycerides $\xrightarrow{\text{Trypsin}}$ Monoglycerides
2. Small intestine : starch $\alpha \xrightarrow{\text{Amylase}}$ Disaccharide (maltose)
3. Small intestine : Proteins $\xrightarrow{\text{Pepsin}}$ Amino acids
4. Stomach : Fats $\xrightarrow{\text{Lipase}}$ Micelles

18. Match the following structures with their respective location in organs:

(a)	Crypts of Lieberkuhn	(i)	Pancreas
(b)	Glisson's Capsule	(ii)	Duodenum
(c)	Islets of Langerhans	(iii)	Small intestine
(d)	Bruunner's Glands	(iv)	Liver

Select the correct option from the following:

	(a)	(b)	(c)	(d)
1.	(iii)	(ii)	(i)	(iv)
2.	(iii)	(i)	(ii)	(iv)
3.	(ii)	(iv)	(i)	(iii)
4.	(iii)	(iv)	(i)	(ii)

19. Match the items given in Column - I with those in Column - II and choose the correct option.

Column-I		**Column-II**
(a) Rennin	(i)	Vitamin B_{12}
(b) Enterokinase	(ii)	Facilitated transport
(c) Oxyntic cells	(iii)	Milk proteins
(d) Fructose	(iv)	Trypsinogen

1. (a) - (iii), (b)- (iv), (c)- (ii), (d)-(i)
2. (a) - (iv), (b)- (iii), (c)- (i), (d)-(ii)
3. (a) - (iv), (b)- (iii), (c)- (ii), (d)-(i)
4. (a) - (iii), (b)- (iv), (c)- (i), (d)-(ii)

20. Kwashiorkor disease is due to
1. simultaneous deficiency of proteins and fats
2. simultaneous deficiency of proteins and calories
3. deficiency of carbohydrates
4. protein deficiency not accompanied by calorie deficiency

21. The enzyme enterokinase helps in the conversion of
1. trypsinogen into trypsin
2. caseinogen into casein
3. pepsinogen into pepsin
4. protein into polypeptides

22. The intrinsic factor that helps in the absorption of vitamin B_{12} is secreted by-
1. Goblet cells
2. Hepatic cells
3. Oxyntic cells
4. Chief cells

23. The proteolytic enzyme rennin is found in :
1. Intestinal juice
2. Bile juice
3. Gastric juice
4. Pancreatic juice

24. If for some reason the parietal cells of the gut epithelium become partially non-functional, what is likely to happen -
(1) The pH of stomach will fall abruptly
(2) Steapsin will be more effective
(3) Proteins will not be adequately hydrolysed by pepsin into proteoses and peptones
(4) The pancreatic enzymes and specially the trypsin and lipase will not work efficiently

25. Jaundice is a disorder of -
1. Skin and eyes
2. Digestive system
3. Circulatory system
4. Excretory system

26. One of the constituents of the pancreatic juice while poured into the duodenum in humans is :
1. Enterokinase
2. Trypsinogen
3. Chymotrypsin
4. Trypsin

27. Epithelial cells of the intestine involved in food absorption have on their surface -
(1) Zymogen granules
(2) Pinocytic vesicles
(3) Phagocytic vesicles
(4) Microvilli

28. Deficiency of protein leads to :
1. Rickets
2. Scurvy
3. Kwashiorkor
4. Carotenemia

29. Lactose composed of :
1. Glucose + galactose
2. Glucose + fructose
3. Glucose + glucose
4. Glucose + mannose

30. In stomach after physical and chemical digestion, food is called :
1. Chyme
2. Chyle
3. Amino acid
4. Bolus

31. In mammals milk is digested by action of :
1. Rennin
2. Amylase
3. Intestinal bacteria
4. Invertase

32. Succus entericus is referred to as:
1. Gastric juice
2. Chyme
3. Pancreatic juice
4. Intestinal juice

33. Sphincter of oddi is present at :
1. Gastro-oesophageal junction
2. Junction of jejunum and duodenum
3. Ileo-caecal junction
4. Junction of hepato-pancreatic duct and duodenum

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Breathing & Exchange of Gases

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Respiratory System: Transport of Gases	7
Respiratory System: Pulmonary Volumes & Capacities	6
Respiratory System: Exchange of Gases	5
Respiratory Disorders	5
Respiratory System: Trachea & Basic Anatomy of Lung	4
Respiratory System: Pulmonary Ventilation	2

1. Lungs are made up of air-filled sacs, the alveoli. They do not collapse even after forceful expiration, because of:
1. Inspiratory Reserve Volume
2. Tidal Volume
3. Expiratory Reserve Volume
4. Residual Volume

2.
Which of the following options correctly represents the lung conditions in asthma and emphysema, respectively?
1. Inflammation of bronchioles; Decreased respiratory surface
2. Increased number of bronchioles; Increased respiratory surface
3. Increased respiratory surface; Inflammation of bronchioles
4. Decreased respiratory surface; Inflammation of bronchioles

3. The partial pressure of oxygen in the alveoli of the lungs is
1. equal to that in the blood
2. more than that in the blood
3. less than that in the blood
4. less than that of carbon dioxide

4.
Match the items given Column I with those in Column II and select the correct option given below:

Column I	Column II
a. Tidal volume	i. 2500-3000 mL
b. Inspiratory Reserve	ii. 1100-1200 mL volume
c. Expiratory Reserve	iii. 500-550 mL volume
d. Residual volume	iv. 1000-1100 mL

1. a-iii b-ii c-i d-iv
2. a-iii b-i c-iv d-ii
3. a-i b-iv c-ii d-iii
4. a-iv b-iii c-ii d-i

5. Lungs do not collapse between breaths and some air always remains in the lungs which can never be expelled because
1. there is a negative pressure in the lungs
2. there is a negative intrapleural pressure pulling at the lung walls
3. there is a positive intrapleural pressure
4. pressure in the lungs in higher than the atmospheric pressure

6.
Reduction in pH of blood will
1. reduce the blood supply to the brain
2. decrease the affinity of hemoglobin with oxygen
3. release bicarbonate ions by the liver
4. reduce the rate of heart beat

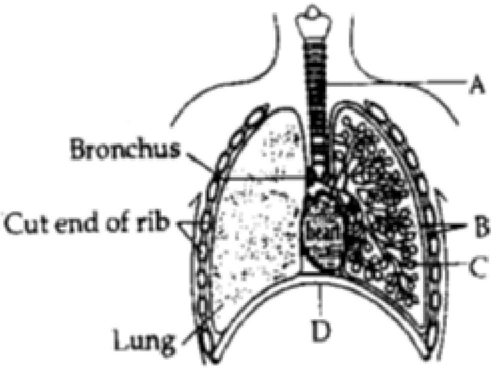
7.
Asthma may be attributed to
1. allergic reaction of the mast cells in the lungs
2. inflammation of the trachea
3. accumulation of fluid in the lungs
4. bacterial infection of the lungs

8.
Name the chronic respiratory disorder caused mainly by cigarette smoking
1. asthma
2. respiratory acidosis
3. respiratory alkalosis
4. emphysema

9. Name the pulmonary disease in which alveolar surface area involved in gas exchange is drastically reduced due to damage in the alveolar walls.
1. Pleurisky
2. Emphysema
3. Pneumonia
4. Asthma

10. Approximately seventy percent of carbon-dioxide absorbed by the blood will be transported to the lungs
1. as bicarbonate ions
2. in the form of dissolved gas molecules
3. by binding to R.B.C
4. as carbamino-haemoglobin

11. The figure shows a diagrammatic view of human respiratory system with labels A, B, C and D. Select the option which gives correct identification and main function and/or characteristics.

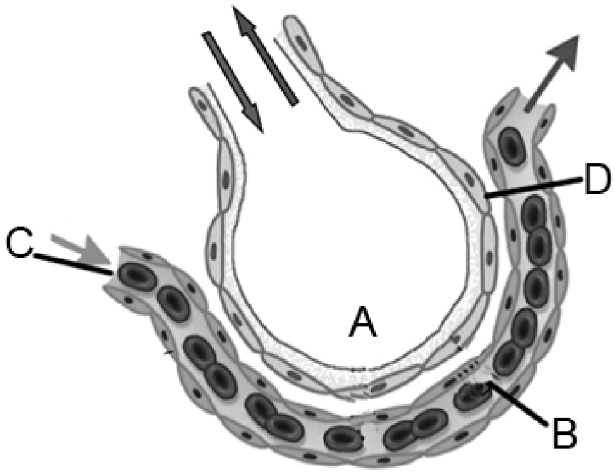


1. B-pleural membrane-surround ribs on both sides to provide cushion against rubbing.
2. C-Alveoli-thin walled vascular bag like structures for exchange of gases.
3. D-Lower end of lungs-diaphragm pulls it down during inspiration
4. A-trachea-ling tube supported by complete cartilagnous rings for conducting inspired air.

12. Which one of the following is the correct statement for respiration in humans?
1. Cigarette smoking may lead to inflammation of bronchi
2. Neural signals from pneumotaxic centre in pons region of brain can increase the duration of inspiration
3. Workers in grinding and stone breaking industries may suffer, from lung fibrosis
4. About 90% of carbon dioxide(CO_2) is carried by haemoglobin as carbamino haemoglobin

13.
Two friends are eating together on a dining table. One of them suddenly starts coughing while swallowing some food. This coughing would have been due to improper movement of
1. diaphragm
2. neck
3. tongue
4. epiglottis

14. The figure given below shows a small part of human lung where exchange of gas takes place. In which one of the options given below, the one part A, B C or D is correctly identified along with its function.



1. A – Alveolar cavity – main site of exchange of respiratory gases
2. D – Capillary wall – exchange of O_2 and CO_2 take place here
3. B – Red blood cell – transport of CO_2 mainly.
4. – Arterial capillary – passes oxygen to tissues

15. Listed below are four respiratory capacities (1-4)and four jumbled respiratory volumes of a normal human adult

Respiratory capacities	Respiratory volume
(1) Residual volume	2500 mL
(2) Vital capacity	3500 mL
(3)Inspiratory reserve volume	1200 mL
(4) Inspiratory capacity	4500 mL

Which one of the following is the correct matching of two capacities and volumes?
1. (1) 2500 mL, (4) 4500 mL
1. (3) 1200 mL, (1) 2500 mL
3. (2) 4500 mL, (3) 2500 mL
4. (4) 4500 mL, (2) 3500 mL

16. What is true about RBCs in humans?
1. they carry about 20-25 per cent ofCO_2
2. They transport 99.5 per cent of O_2
3. They transport about 80 per cent oxygen only and the rest 20 per cent of it is transported in dissolved state in blood plasma
4. They do not carry CO_2 at all

17.
What is vital capacity of our lungs?
1. Inspiratory reserve volume plus tidal volume
2. Total lung capacity minus expiratory reserve volume
3. Inspiratory reserve volume plus expiratory reserve volume
4. Total lung capacity minus residual volume

18. The majority of carbon dioxide produced by our body cells is transported to the lungs :
1. dissolved in the blood
2. as bicarbonates
3. as carbonates
4. attached to haemoglobin

19. Tidal Volume and Expiratory Reserve Volume of an athlete is 500 mL and 1000 mL respectively. What will be his Expiratory Capacity if the Residual Volume is 1200 mL?
1. 2700 mL
2. 1500 mL
3. 1700 mL
4. 2200 mL

20. Select the correct statement.
1. Expiration occurs due to external intercostal muscles.
2. Intrapulmonary pressure is lower than the atmospheric pressure during inspiration.
3. Inspiration occurs when atmospheric pressure is less than intrapulmonary pressure.
4. Expiration is initiated due to contraction of diaphragm.

21. The maximum volume of air a person can breathe in after a forced expiration is known as :
1. Expiratory Capacity
2. Vital Capacity
3. Inspiratory Capacity
4. Total Lung Capacity

22. Select the correct events that occur during inspiration.
(a) Contraction of diaphragm
(b) Contraction of external inter-costal muscles
(c) Pulmonary volume decreases
(d) Intra pulmonary pressure increases
(1) (c) and (d)
(2) (a), (b) and (d)
(3) only (d)
(4) (a) and (b)

23. Identify the wrong statement with reference to transport of oxygen.
1. Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin.
2. Higher H^+ conc. in alveoli favours with formation of oxyhaemoglobin.
3. Low pCO_2 in alveoli favours the formation of oxyhaemoglobin.
4. Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2.

24. The Total Lung Capacity (TLC) is the total volume of air accommodated in the lungs at the end of forced inspiration. This includes :
1. RV; IC (Inspiratory Capacity); EC (Expiratory Capacity); and ERV
2. RV; ERV; IC and EC
3. RV; ERV; VC (Vital Capacity) and FRC (Functional Residual Capacity)
4. RV (Residual Volume); ERV (Expiratory Reserve Volume); TV (Tidal Volume); and IRV (Inspiratory Reserve Volume

25. Match the following columns and select the correct option :

Column - I	Column - II
(a) Pneumotaxic Centre	(i) Alveoli
(b) O_2 Dissociation curve	(ii) Pons region of the brain
(c) Carbonic Anhydrase	(iii) Haemoglobin
(d) Primary site of exchange of gases	(iv) R.B.C.

1. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
2. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
3. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
4. (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)

26. Bulk of carbon dioxide (CO_2) released from body tissues into the blood is present as :
1. carbamino-haemoglobin in RBCs
2. bicarbonate in blood plasma and RBCs
3. Free CO_2 in blood plasma
4. 70% carbamino-haemoglobin and 30% as bicarbonate

27. Transport of gases in alveoli takes place by :
1. Active transport
2. Passive transport
3. Simple diffusion
4. None

28. The partial pressures (in mm Hg) of oxygen (O_2) and carbon dioxide (CO2) at alveoli (the site of diffusion) are :
1. pO_2=95 and pCO_2 = 40
2. pO_2 = 159 and pCO_2 =0.3
3. pO_2 = 104 and pCO_2=40
4. pO_2 = 40 and pCO_2=45

29. Select the favorable conditions required for the formation of oxyhemoglobin at the alveoli.
1. High pO_2, high pCO_2, less H^+, higher temperature
2. Low pO_2, low pCO_2, more H^+, higher temperature
3. High pO_2, low pCO_2, less H^+, lower temperature
4. Low pO_2 high pCO_2 more H^+, higher temperature

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Body Fluids & Circulation

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Blood: Blood Group (A,B,O)	7
Blood: General Description & RBC	7
Human Heart: Cardiac Cycle	6
ECG & Coronary Artery Disease	5
Human Heart: Double Circulation	5
Blood: Blood Clotting	4
Atherosclerosis, Hypertension & Ventricular Fibrillation	2
Blood: White Blood Cells	2
Lymph	2
Rhythmic Excitation of Human Heart	2
Blood: Blood Group	1
Human Heart: Gross Anatomy	1

1. Adult human RBCs are enucleated. Which of the following statement(s) is/ are the most appropriate explanation for this feature?
(a) They do not need to reproduce
(b) They are somatic cells
(c) They do not metabolize
(d) All their internal space is available for oxygen transport
1. Only (a)
2. (a),(c) and (d)
3. (b) and (c)
4. Only (d)

2. The hepatic portal vein drains blood to liver from:
1. Stomach
2. Kidneys
3. Intestine
4. Heart

3. Match the items given in Column I with those inColumn II and select the correct option givenbelow:

Column I	Column II
a. Tricuspid valve	i. Between left atrium and left ventricle
b. Bicuspid valve	ii. Between right ventricle and pulmonary artery
c. Semilunar valve	iii. Between right atrium and right ventricle

1. a-iii b-i c-ii
2. a-i b-iii c-ii
3. a-i b-ii c-iii
4. a-ii b-i c-iii

4. Name the blood cells, whose reduction in number can cause clotting disorder, leading to excessive loss of blood from the body.
1. Erythrocytes
2. Leucocytes
3. Neutrophils
4. Thrombocytes

5. Serum differs from blood in
1. lacking globulins
2. lacking albumins
3. lacking clotting factors
4. lacking antibodies

6.
Match the items given in Column I with those in column II and select the correct option given below:-

Column I	Column II
a. Fibrinogen	i. Osmotic balance
b. Globulin	ii. Blood clotting
c. Albumin	iii. Defence mechanism

1. a-iii b-ii c-i
2. a-i b-ii c-iii
3. a-i b-iii c-ii
4. a-ii b-iii c-i

7. Which one of the following animals has two separate circulatory pathways?
1. Frog
2. Lizard
3. Whale
4. Shark

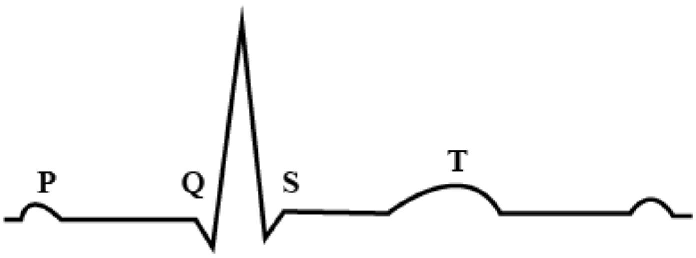
8. Doctors use stethoscope to hear the sounds produced during each cardiac cycle. The second sound is heard when
1. AV valves open up
2. Ventricullar Walls vibrate due to gushing in of blood from atria
3. Semi lunar valces close down after the blood flows into vessels from ventricles
4. AV node receives signal from SA node

9.
Blood pressure in the mammalian aorta is maximum during
1. systole of the left atrium
2. diastole of the right ventricle
3. systole of the left ventricle
4. diastole of the right atrium

10.

Which one of the following is correct ?
(1) Serum = Blood + Fibrinogen
(2) Lymph = Plasma + RBC + WBC
(3) Blood = Plasma + RBC + WBC
(4) Plasma = Blood – Lymphocytes

11. The diagram given here is the standard ECG of a normal person, The P - wave represents the



1. Initiation of the ventricular contraction

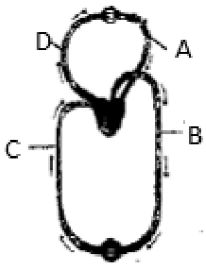
2. Beginning of the systole

3. End of systole

4. Contraction of both the atria

12. Person with blood group AB is considered as universal recipient because he has:
1. both A and B antigens on RBC but no antibodies in the plasma
2. both A and B antibodies in the plasma
3. no antigen on RBC and no antigens in the plasma
4. both A and B antigens in the plasma but no antibodies

13. Figure shows schematic plan of blood circulation in humans with labels A to D. Identify the label and give its function/s.



1. B-pulmonary artery- takes blood from heart to lungs, PO_2 = 90mm Hg
2. C-Vena Cava- takes blood from body parts to rigjht auricle, PCO_2 = 45mm Hg
3. D-Dorsal aorta- takes blood from heart to body parts, PO_2 = 95mm Hg
4. A- pulmonary vein - takes impure blood from body parts, PO_2 = 60mm Hg

14. A certain road accident patient with unknown blood group needs immediate blood transfusion. His one doctor friend at once offers his blood. What was the blood group of the donor?
1. Blood group B
2. Blood group AB
3. Blood group O

15.
Arteries are best defined as the vessels which
1. carry blood away from the heart to different organs
2. break up into capillaries which reunite to form a vein
3. carry blood from one visceral organ to another visceral organs
4. supply oxygenated blood to the different organs

16.
Which one of the following statements is correct regarding blood pressure?
1. 100/55 mmHg is considered an ideal blood pressure
2. 105/50 mmHg makes one very active
3. 190/110 mmHg may harm vital organs like brain and kidney
4. 130/90 mmHg is considered high and requires treatment

17.
A person with unknown blood group under system, has suffered much blood loss in accident and needs immediate blood transfusion. His one friend who has a v certificate of his own blood type, offers for blood donation without delay. What would have the type of blood group of the donor friend?
1. Type AB
2. Type O
3. Type A
4. Type B

18.
'Bundle of His' is a part of which one of the following organs in humans?
1. Heart
2. Kidney
3. Pancreas
4. Brain

19.
Which one of the following plasma proteins is involved in the coagulation of blood?
1. Serum amylase
2. A globulin
3. Fibrinogen
4. An albumin

20. In a standard ECG, which one of the following alphabets is the correct representation of the respective activity of the human heart?
1. R-repolarisation of ventricles
2. S-start of systole
3. T-end of diastole
4. P-depolarisation of the atria

21. The most popularly known blood grouping is the ABO grouping. It is named ABO and not ABC, because 'O' in it refers to having
1. other antigens besides A and B on RBCs
2. over dominance of this type on the genes for A and B types
3. one antibody only- either anti A or anti-B on the RBCs
4. no antigens A and B on RBCs

22. Globulins contained in human blood plasma are primarily involved in
1. defence mechanisms of body
2. osmotic balance of body fluids
3. oxygen transport in the blood
4. clotting of blood

23.
Which type of white blood cells are concerned with the release of histamine and the natural anticoagulant heparin?
1. Neutrophils
2. Basophils
3. Eosinophils
4. Monocytes

24.
The most active phagocytic white blood cells are
1. neutrophils and eosinophils
2. lymphocytes and macrophages
3. eosinophils and lymphocytes
4. neutrophils and monocytes

25. Match the Column I and Column II

	Column-I		Column-II
(a)	P-waves	(i)	Depolarisation of ventricles
(b)	QRS complex	(ii)	Repolarisation of ventricles
(c)	T-wave	(iii)	Coronary ischemia
(d)	Reduction in the size of T-wave	(iv)	Depolarisation of artria
		(v)	Repolarisation of atria

Select the correct option

	(a)	(b)	(c)	(d)
1.	(ii)	(iii)	(v)	(iv)
2.	(iv)	(i)	(ii)	(iii)
3.	(iv)	(i)	(ii)	(v)
4.	(ii)	(i)	(v)	(iii)

26. What would be the heart rate of a person if the cardiac output is 5L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL?
1. 125 beats per minute
2. 50 beats per minute
3. 75 beats per minute
4. 100 beats per minute

27. The QRS complex in a standard ECG represents:
1. Depolarisation of auricles
2. Depolarisation of ventricles
3. Reploarisation of ventricles
4. Repolarisation of auricles

28. Match the following columns and select the correct option .

Column-I	Column-II
(1) Eosinophils	(i) Immune response
(2) Basophils	(ii) Phagocytosis
(3) Neutrophils	(iii) Release histaminase, destructive enzymes
(4) Lymphocytes	(iv) Release granules containing histamine

(1) (iv) (i) (ii) (iii)
(2) (i) (ii) (iv) (iii)
(3) (ii) (i) (iii) (iv)
(4) (iii) (iv) (ii) (i)

29. Which of the following is associated with a decrease in cardiac output?
1. Sympathetic nerves
2. Parasympathetic neural signals
3. Pneumotaxic center
4. Adrenal medullary hormones

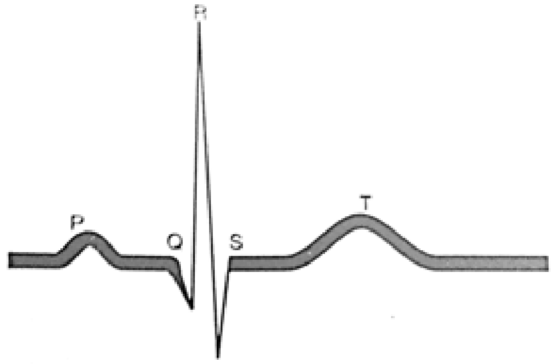
30. Which of the following conditions causes erythroblastosis fetalis?
1. Mother Rh^{+ve} and fetus Rh^{-ve}
2. Mother Rh^{-ve} and fetus Rh^{+ve}
3. Both mother and fetus Rh^{-ve}
4. Both mother and fetus Rh^{+ve}

31. Which one of the following human organs is often called the "graveyard" of RBCs ?
1. Kidney
2. Spleen
3. Liver
4. Gall bladder

32. Given below are four statements (a-d) regarding human blood circulatory system-
(a) Arteries are thick-walled and have narrow lumen as compared to veins
(b) Angina is acute chest pain when the blood circulation to the brain is reduced
(c) Persons with blood group AB can donate blood to any person with any blood group under ABO system
(d) Calcium ions play a very important role in blood clotting
Which two of the above statements are correct ?
1. (a) and (b)
2. (b) and (c)
3. (c) and (d)
4. (a) and (d)

33. The haemoglobin content per 100 ml of blood of a normal healthy human adult is -
1. 25-30 g
2. 17-20g
3. 12-16 g
4. 5-11

34. Given below is the ECG of a normal human. Which one of its components is correctly interpreted below ?



1. Peak P-Initiation of left atrial contraction only
2. Complex QRS-One complete pulse
3. Peak T-Initiation of total cardiac contraction
4. Peak P and Peak R together-systolic and diastolic blood pressures

35. Arterial blood pressure in human beings :
1. 120 and 80 mm Hg
2. 150 and 100 mm Hg
3. 50 and 100 mm Hg
4. None

36. In the ABO system of blood groups if both antigens are present but no antibody, the blood group of the individual would be :-
(1) O
(2) AB
(3) A
(4) B

37. Ventricular contraction is in command of :
1. S.A. Node
2. A.V. Node
3. Purkinje fibers
4. Papillary muscles

38. In which point, pulmonary artery is different from pulmonary vein :
1. Its lumen is broad
2. Its wall is thick
3. It have valves
4. It does not possess endothelium

39. Impulse of heart beat originates from: -
(1) S.A. Node
(2) A. V. Node
(3) Vagus Nerve
(4) Cardiac Nerve

40. Which of the following statement is true for Lymph : -
(1) WBC and serum
(2) All components of blood except RBCs and some proteins
(3) RBCs, WBCs and Plasma
(4) RBCs, Proteins and Platelets

41. Bundle of His is a network of : -
(1) Muscle fibres distributed throughout the heart walls
(2) Muscle fibres found only in the ventricle wall
(3) Nerve fibres distributed in ventricles
(4) Nerve fibres found throughout the heart

42.

- What is correct for Blood group 'O': -

1. No antigens but both a and b antibodies are present
2. A antigen and b antibody
3. Antigen and Antibody both absent
4. A and B antigens and a, b, antibodies

43. Persons with 'AB' blood group are called as "Universal recipients". This is due to:
(1) Presence of antibodies, anti-A and anti-B, on RBCs
(2) Absence of antibodies, anti-A and anti-B, in plasma
(3) Absence of antigens A and B on the surface of RBCs
(4) Absence of antigens A and B in plasma

44. Which enzyme is responsible for the conversion of inactive fibrinogens to fibrins?
1. Epinephrine
2. Thrombokinase
3. Thrombin
4. Renin

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Excretory Products & their Elimination

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Nitrogenous Excretory Products	8
Autoregulation of GFR	7
Concentration of Urine	4
Formation of Urine	4
Nephron	3
Micturition Reflex	2
Disorders of Excretory System	1
Formation of Urine: Ultrafiltration	1
Human Kidney: Functions	1
Human Kidney: Location & Cut Section	1
Role of other Organs in Excretion	1

1. A decrease in blood pressure/volume will not cause the release of
1. Atrial natriuretic factor
2. Aldosterone
3. ADH
4. Renin

2. Match the items given in Column I with those in Column II and select the correct option given below:

Column I	Column II
a. Glycosuria	i. Accumulation of uric acid in joints
b. Gout	ii. Mass of crystallized salts within the kidney
c. Renal calculi	iii. Inflammation in glomeruli
d. Glomerulonephritis	iv. Presence of glucose in nephritis urine

1. a-iii b-ii c-iv d-i
2. a-i b-ii c-iii d-iv
3. a-ii b-iii c-i d-iv
4. a-iv b-i c-ii d-iii

3. Match the items given in Column I with those Column II and select the correct option givenbelow:

Column I (Function)	Column II (Part of Excretory System)
a. Ultra filtration	i. Henle's loop
b. Concentration of urine	ii. Ureter
c. Transport of urine	iii. Urinary bladder
d. Storage of urine	iv. Malpighi an corpuscle
	v. Proximal convoluted tubule

1. a-iv b-v c-ii d-iii
2. a-iv b-i c-ii d-iii
3. a-v b-iv c-i d-ii
4. a-v b-iv c-i d-iii

4. Which of the following statements is correct?
1. The descending limb of loop of Henle is impermeable to water.
2. The ascending limb of loop of Henle is permeable to water.
3. The descending limb of loop of Henle is permeable to electrolytes.
4. The ascending limb of loop of Henle is impermeable to water.

5. The part of nephron involved in active reabsorption of sodium is
1. distal convoluted tubule
2. proximal convoluted tubule
3. Bowman 's capsule
4. descending limb of Henle's loop

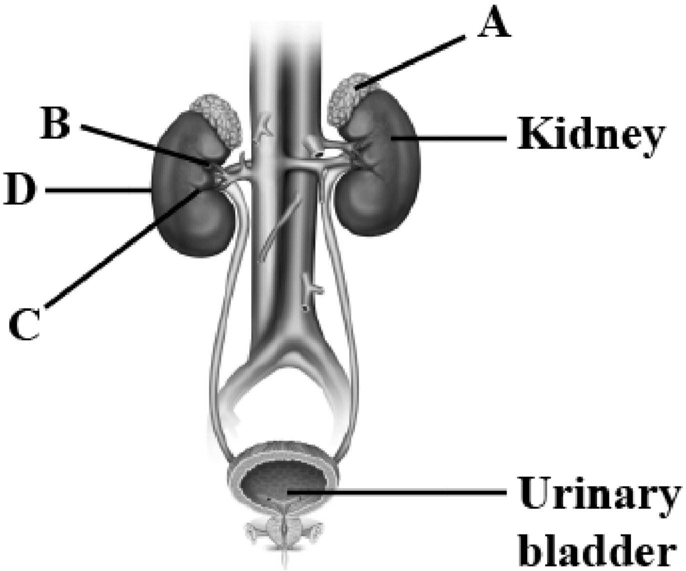
6.
Removal of proximal convoluted tubule from the nephron will result in
1. more diluted urine
2. more concentrated urine
3. no change in quality and quantity of urine
4. no urine formation

7.

Which of the following does not favour the formation of large quantities of dilute urine?
1. Alcohol
2. Caffeine
3. Renin
4. Atrial-natriuretic factor

8. Which of the following causes an increase in sodium reabsorption in distal convoluted tubule?
1. Increase in aldosterone levels
2. Increase in antidiuretic hormone levels
3. Decrease in aldosterone levels
4. Decrease in antidiuretic hormone levels

9. Figure shows human urinary system with structures labelled A to D. Select option which correctly identifies them and gives their characteristics and / or functions.



1. B-pelvis - broad funnel shaped space inner to hilum, directly connected to loops of Henle.
2. C- Medulla- inner zone of kidney and contains complex nephrons.
3. D- Cortex- outer part of kidney and do not contain any part of nephrons
4. A- Adernal gland- located at the anterior part of kidney. Secrete catecholamines which stimulate glycogen breakdown

10. The maximum amount of electrolytes and water (70-80%) from the glomerular filtrate is reabsorbed in which part of the nephron?
1. Ascending limb of loop of Henle
2. Distal convoluted tubule
3. Proximal convoluted tubule
4. Descending limb of loop of Henle

11.
Which one of the following correctly explains the function of a specific part of a human nephron?
1. Henle's loop – most re-absorption of the major substances from the glomerular filtrate
2. Distal convoluted tubule – reabsorption of ions into the surrounding blood capillaries
3. Afferent arteriole – carries the blood away from the glomerulus towards renal vein
4. Podocytes - create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule

12.
Which one of the following is not a part of a renal pyramid?
1. Convoluted tubules
2. Collecting ducts
3. Loops Henle
4. Peritubular capillaries

13.
Uricotelic mode of passing out nitrogenous wastes is found in
1. birds and annelids
2. amphibians and reptiles
3. insects and amphibians
4. reptiles and birds

14.
Which one of the following statements is correct with respect to kidney function regulation?
1. Exposure to cold temperature stimulates ADH release
2. An increase in glomerular blood flow stimulates formation of angiotensin II
3. During summer when body loses lot of water by evaporation, the release of ADH is suppressed
4. When someone drinks a lot of water, ADH release is suppressed.

15. Which one of the following statements regards to the excretion by the human kidneys is correct –
(1) Descending limb of Loop of Henly is impermeable to water
(2) Distal convoluted tubule is incapable in reabsorbing HCO_3
(3) nearly 99 percent of the glomerular filtrate is reabsorbed by the renal tube
(4) Ascending limb of Loop of Henly is impermeable to electrolytes

16. The principal nitrogenous excretory compound in humans is synthesised
1. in kidneys but eliminated mostly through liver
2. in kidneys as well as eliminated by kidneys
3. in liver and also eliminated by the same through bile
4. in the liver, but eliminated mostly through kidneys

17. Uric acid is the chief nitrogenous component of the excretory products of
1. man
2. earthworm
3. cockroach
4. frog

18. What will happen if the stretch receptors of the urinary bladder wall are totally removed?
1. Urine will not collect in the bladder
2. Micturition will continue
3. Urine will continue to collect normally in the bladder
4. There will be no micturition

19.
Consider the following four statements (A-D) about certain desert animals such as kangaroo rat
(A) they have dark colour and high rate of reproduction and excrete solid urine.
(B) they do not drink water, breathe at a slow rate to conserve water and have their body covered with thick hairs.
(C) they feed on dry seeds and do not require drinking water.
(D) they excrete very concentrated urine and do not use water to regulate body temperature.
Which two of the above statements for such animals are true?
1. C and D
2. B and C
3. C and A
4. A and B

20. Which of the following factors is responsible for the formation of concentrated urine?
1. Hydrostatic pressure during glomerular filtration.
2. Low levels of antidiuretic hormone.
3. Maintaining hyperosmolarity towards inner medullary interstitium in the kidneys.
4. Secretion of erythropoietin by Juxtaglomerular complex.

21. Match the following parts of a nephron with their function:

(a)	Descending limb of Henle's loop	(i)	Reabsorption of salts only
(b)	Proximal convoluted tubule	(ii)	Reabsorption of water only
(c)	Ascending limb of Henle's loop	(iii)	Conditional reabsorption of sodium ions
(d)	Distal convoluted tubule	(iv)	Reabsorption of ions, water and organic nutrients

Select the correct option from the following:
1. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
2. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
3. (a)-(i), (b)-(iv), (c)-(ii), (d)-(iii)
4. (a)-(iv), (b)-(i),(c)-(iii), (d)-(ii)

22. Match the items in Column - I with those in Column - II :

Column - I	Column - II
(a) Podocytes	(i) Crystallised oxalate
(b) Protonephridia	(ii) Annelids
(c) Nephridia	(iii) Amphioxus
(d) Renal calculi	(iv) Filtration slits

Select the correct option from the following:
1. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
2. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
3. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
4. (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)

23. Presence of which of the following conditions in urine is indicative of Diabetes Mellitus:
1. Uremia and Renal Calculi
2. Ketonuria and Glycosuria
3. Renal Calculi and Hyperglycaemia
4. Uremia and Ketonuria

24. Which of the following would help in prevention of diuresis?
1. Reabsorption of Na^+ and water from renal tubules to aldosterone
2. Atrial natriuretic factor causes vasoconstriction
3. Decrease in secretion of renin by JG cells
4. More water reabsorption due to under secretion of ADH

25. The increase in osmolarity from outer to inner medullary interstitium is maintained due to :
(i) Close proximity between Henle's loop and vasa recta
(ii) Counter current mechanism
(iii) Selective secretion of HCO 3^- and hydrogen ions in PCT
(iv) Higher blood pressure in glomerular capillaries
1. Only (ii)
2. (iii) and (iv)
3. (i), (ii), and (iii)
4. (i) and (ii)

26. Select the correct statement :
1. Atrial Natriuretic Factor increases the blood pressure.
2. Angiotensin II is a powerful vasodilator.
3. Counter current pattern of blood flow is not observed in vasa recta.
4. Reduction in Glomerular Filtration Rate activates JG cells to release renin.

27. A fall in glomerular filtration rate (GFR) activates -
1. Adrenal cortex to release aldosterone
2. Adrenal medulla to release adrenaline
3. Posterior pituitary to release vasopressin
4. Juxta glomerular cells to release renin

28. Which one of the following option gives the correct categorization of six animals according to the type of nitrogenous wastes (A, B, C) they give out?

	A AMMONOTELIC	B UREOTELIC	C URICOTELIC
1.	Frog, Lizards	Aquatic Amphibia, Humans	Cockroach, Pigeon
2.	Aquatic Amphibia	Frog, humans	Pigeon, Lizards, Cockroach
3.	Aquatic Amphibia	Cockroach, Humans	Frog, Pigeon, Lizards
4.	Pigeon, Humans	Aquatic Amphibia, Lizards	Cockroach, Frog

29. Which one of the following characteristics is common both in humans and adult
frogs ?
1. Internal fertilization
2. Nucleated RBCs
3. Ureotelic mode of excretion
4. Four – chambered heart

30. Uricotelism is found in -
1. Fishes and Fresh water protozoans
2. Birds, reptiles and insects
3. Frogs and toads
4. Mammals and birds

31. Concentration of urine depends upon which organ :
1. Bowman's capsule
2. Length of Henle's loop
3. P.C.T.
4. Network of capillaries arising from glomerulus

32. Which pair is correct :
1. Sweat = temperature regulation
2. Saliva = sense of food taste
3. Sebum = sexual attraction
4. Humerus = Hind leg

33. If Henle's loop was absent from mammalian nephron, which of the following is to be expected
1. There will be no urine formation
2. There will be hardly any change in the quality and quantity of urine formed
3. The urine will be more concentrated

Selected Questions (Only NCERT based) from AIPMT 1998 to NEET 2021

Locomotion & Movement

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Disorders of Muscular and Skeletal System	10
Sternum & Ribs	5
Appendicular Skeleton: Girdle	4
Skeletal Muscle: Myofilaments	4
Synovial Joint	4
Fibrous & Catilaginous Joints	3
Skeletal Muscle: Sarcomere	3
Sliding Filament Theory	2
Appendicular Skeleton: Upper Limb	1
Axial Skeleton	1
Excitation Contraction Coupling	1
Human Skeleton: Introduction, Function, Parts	1
Muscle Contraction: Other Considerations	1
Skeletal Muscle: Basic Anatomy	1

1. The pivot joint between atlas and axis is a type of:
1. Cartilaginous joint
2. Synovial joint
3. Saddle joint
4. Fibrous joint

2.
Which of the following hormones can play a significant role in osteoporosis?
1. Aldosterone and Prolactin
2. Progesterone and Aldosterone
3. Estrogen and Parathyroid hormone
4. Parathyroid hormone and Prolactin

3. Name the ion responsible for unmasking of active sites for myosin for cross-bridge activity during muscle contraction.
1. Calcium
2. Magnesium
3. Sodium
4. Potassium

4.
Osteoporosis, an age-related disease of skeletal system, may occur due to
1. junction leading to fatigue
2. high concentration of ca^{++} and Na^{+}
3. decreased level of oestrogen
4. accumulation of uric acid leading to inflammation of joints

5.
Calcium is important in skeletal muscle contraction because it:-
1. binds to troponin to remove the masking of active sites on actin for myosin.
2. activates the myosin ATPase by binding to it.
3. detaches the myosin head from the actinfilament.
4. prevents the formation of bonds between the myosin cross bridges and the actin filament.

6. Out of 'X' pairs of ribs in humans only 'Y' pairs are true ribs. Select the option that correctly represents values of X and Y and provides their explanation:
1. X=12, Y=5 True ribs are attached to vertebral column and sternum on the two ends.
2. X=24, Y=7 True ribs are dorsally attached to vertebral column but are free on ventral side.
3. X=24, Y=12 True ribs are dorsdally attached to vertebral column but are free on ventral side.
4. X=12, Y=7 True ribs are attached dorsally to vertebral column and ventrally to the sternum.

7.
Lack of relaxation between successive stimuli in sustained muscle contraction is known as
1. fatigue
2. tetanus
3. tonus
4. spasm

8. Which of the following joints would allow no movement?
1. Fibrous joint
2. Cartilaginous joint
3. Synovial joint
4. Ball and socket joint

9. Which of the following is not a function of the skeletal system?
1. Production of erythrocytes
2. Storage of minerals
3. Production of body heat
4. Locomotion

10.

Sliding filament theory can be best explained as
1. when myofilaments slide pass each other actin filaments shorten while myosin filament do not shorten
2. actin and myosin filaments shorten and slide pass each other
3. actin and myosin filaments do not shorten but rather slide pass each other
4. when myofilament slide pass each other myosin filament shorten while actin filaments do not shorten

11.

Glenoid cavity articulates
1. clavicle with acromion
2. scapula with acromion
3. clavicle with scapula
4. humerus with scapula

12. The characteristics and an example of a synovial joint in humans is

	Characteristics	Examples
(1)	Fluid filled between two joints, provide cushion	Skull Bones
(2)	Lymph filled between two bones, limited motion	Gliding joint between carpals.
(3)	Fluid filled synovial cavity between two bones	Joint between atlas and axis.
(4)	Fluid cartilage between two bones, limited motion	Knee joint

1. (1)
2. (2)
3. (3)
4. (4)

13. Select the correct matching of the types of the joint with the example in human skeletal system:

	Types of joint	Examples
(1)	Cartilaginous joint	between frontal and pariental
(2)	Pivot joint	between third and fourth cervical vertebrae
(3)	Hinge joint	between humerus and pectoral girdle
(4)	Gliding joint	between carpals

1. 1
2. 2
3. 3
4. 4

14. Stimulation of a muscle fiber by a motor neuron occurs at:
1. the neuromuscular junction
2. the transverse tubules
3. the myofibril
4. the sacroplasmic reticulum

15. Select the correct statement with respect to locomotion in humans:
1. Accumulation of uric crystals in joints causes their inflammation
2. The vertebral column has 10 thoracic vertebae.
3. The joint between adjacent vertebrae is a fibrous joint
4. The decreased level of progesterone causes osteoporosis in old people

16. The H-zone in the skeletal muscle fibre is due to:
1. The central gap between myosin filaments in the A-band.
2. The central gap between actin filaments extending through myosin filaments in the A-band.
3. Extension of myosin filaments in the central portion of the A-band
4. The absence of myofibrils in the central portion of A-band.

17. Select the correct statement regarding the specific disorder of muscular or skeletal system.
1. Mascular dystrophy age related shortening of muscles
2. Osteoporosis- decrease in bone mass and higher chances of fructures with advancing age
3. Myasthenia gravis- auto immune disorder which inhibits sliding of myosin filaments
4. Gout- inflammation of joints due to extra deposition of calcium

18. Low Ca^{2+} in the body fluid may be the cause of
1. tetany
2. anaemia
3. angina pectoris
4. gout

19. Which one of the following is the correct matching of three items and their grouping category?

Items	Group
(a) Malleus, incus cochlea	Ear ossicles
(b) Ilium, ischium, pubis	Coxal bones of pelvic girdle
(c) Actin, myosin rhodopsin	Muscle proteins
(d) Cytosine, uracil thiamine	pyrimidines

1. (a)
2. (b)
3. (c)
4. (d)

20. In human body, which one of the following is anatomically correct?
1. Floating ribs-2 pairs
2. Collar bones-3 pairs
3. Salivary glands-1 pair
4. Cranial nerves-10 pairs

21.
Which one of the following item gives its correct total number?
1. Floating ribs in humans - 4
2. Amino acids found in proteins - 16
3. Types of diabetes - 3
4. Cervical vertebrae in humans - 8

22. The contractile protein of skeletal muscle involving ATPase activity is :
1. tropomyosin
2. myosin
3. a-actinin
4. toponin

23. Which of the following muscular disorders is inherited?
1. Botulism
2. Tetany
3. Muscular dystrophy
4. Myasthenia gravis

24. Select the correct option.
1. There are seven pairs of vertebrosternal, three pairs of vertebrochondral and two pairs of vertebral ribs.
2. 8^{th}, 9^{th} and 10^{th} pairs of ribs articulate directly with the sternum.
3. 11^{th} and 12^{th} pairs of ribs are connected to the sternum with the help of hyaline cartilage.
4. Each rid is a flat thin bone and all the ribs are connected dorsally to the thoracic vertebrae and ventrally to the sternum.

25. Match the following joints with the bones involved:

	Column-I		**Column-II**
(a)	Gliding joint	(i)	Between carpal and metacarpal of thumb
(b)	Hinge joint	(ii)	Between Atlas and Axis
(c)	Pivot joint	(iii)	Between the Carpals
(d)	Saddle joint	iv	Between Humerus and Ulna

Select the correct option from the following:
1. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
2. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
3. (a)-(iv), (b(-(ii), (c)-(iii), (d)-(i)
4. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)

26. Which of the following diseases is an auto-immune disorder?
1. Myasthenia gravis
2. Arthritis
3. Osteoporosis
4. Gout

27. Match the following columns and select the correct option.

Column-I	Column-II
(a) Floating Ribs	(i) Located between second and seventh ribs
(b) Acromion	(ii) Head of the Humerus
(c) Scapula	(iii) Clavicle
(d) Glenoid cavity	(iv) Do not connect with the sternum

	(a)	(b)	(c)	(d)
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iii)	(ii)	(iv)	(i)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(ii)	(iv)	(i)	(iii)

28. Match the following columns and select the correct option

Column - I	**Column - II**
(a) Gout	(i) Decreased levels of estrogen
(b) Osteoporosis	(ii) Low Ca^{++} ions in the blood
(c) Tetany	(iii) Accumulation of uric acid crystals
(d) Muscular dystrophy	(iv) Autoimmune disorder
	(v) Genetic disorder

1. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
2. (a)-(iii), (b)-(i), (c)-(ii), (d)-(v)
3. (a)-(iv), .(b)-(v), (c)-(i), (d)-(ii)
4. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

29. Which one of the following pairs of chemical substances, is correctly categorised ?
1. Pepsin and prolactin - Two digestive enzymes secreted in stomach
2. Troponin and myosin - Complex proteins in striated muscles
3. Secretin and rhodopsin - Polypeptide hormones
4. Calcitonin and thymosin - Thyroid hormones

30. Which one of the following is the correct description of a certain part of a normal human skeleton-
1. First vertebra is axis which articulates with the occipital condyles
2. The 9th and 10th pairs of ribs are called the floating ribs
3. Glenoid cavity is a depression to which the thigh bone articulates
4. Parietal bone and the temporal bone of the skull are joined by fibrous joint

31. The type of muscles present in our :
1. upper arm are smooth muscle fibres fusiform in shape
2. heart are involuntary and unstriated smooth muscles
3. intestine are striated and involuntary
4. thigh are striated and voluntary

32. Three of the following pairs of the human skeletal parts are correctly matched with their respective inclusive skeletal category and one pair is not matched. Identify the non-matching pair.

	Pairs of skeletal parts	Category
1.	Malleus and stapes	Ear ossicles
2.	Sternum and Ribs	Axial skeleton
3.	Clavicle and Glenoid cavity	Pelvic girdle
4.	Humerus and ulna	Appendicular skeleton

33. An acromian process is characteristically found in the -
(1) Skull of frog
(2) Sperm of mammals
(3) Pelvic girdle of mammals
(4) Pectoral girdle of mammals

34. Number of bones in hind limb of man :
1. 14
2. 24
3. 26
4. 30

35. Unit of contraction in a muscle fiber is
1. Sarcomere
2. Muscle fiber
3. Actin
4. None

36. ATPase enzyme needed for muscle contraction is located in -
(1) Troponin
(2) Myosin
(3) Actin
(4) Actinin

37. Name of the joint between ribs and sternum is
1. Cartilaginous joint
2. Angular joint
3. Gliding joint
4. Fibrous joint

38. What is sarcomere : -
1. Part between two H-line
2. Part between two A-line
3. Part between two I-band
4. Part between two Z-line

39. Chronic auto immune disorder affecting neuro muscular junction leading to fatigue, weakening and paralysis of skeletal muscle is called as:
(1) Myasthenia gravis
(2) Gout
(3) Arthritis
(4) Muscular dystrophy

40. Match List-I with List-II

List-I	List-II
(a) Scapula	(i) Cartilaginous joints
(b) Cranium	(ii) Flat bone
(c) Sternum	(iii) Fibrous joints
(d) Vertebral column	(iv) Triangular flat bone

Choose the correct answer from the options given below.

	(a)	(b)	(c)	(d)
1.	(iv)	(ii)	(iii)	(i)
2.	(iv)	(iii)	(ii)	(i)
3.	(i)	(iii)	(ii)	(iv)
4.	(ii)	(iii)	(iv)	(i)

41. During muscular contraction which of the following events occur?
(a) 'H' zone disappears
(b) 'A' band widens
(c) 'I' band reduces in width
(d) Myosin hydrolyzes ATP, releasing the ADP and Pi
(e) Z-lines attached to actins are pulled inwards
Choose the correct answer from the options given below.
1. (b), (c), (d), (e) only
2. (b), (d), (e), (a) only
3. (a), (c), (d), (e) only
4. (a), (b), (c), (d) only

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Neural Control & Coordination

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Basic Anatomy of Human Eye	6
Diencephalon	6
Human Eye: Adaptation	6
Origin of Resting Membrane Potential	4
Inner Ear: Vestibular Apparatus	3
Hind & Mid Brain	2
Synapse	2
Action Potential	1
Inner Ear: Cochlea	1
Nervous System	1
Outer & Middle Ear	1

1. Myelin sheath is produced by:
1. Astrocytes and Schwann cells
2. Oligodendrocytes and Osteoclasts
3. Osteoclasts and Astrocytes
4. Schwann cells and Oligodendrocytes

2. Receptor sites for neurotransmitters are present on:
1. Pre-synaptic membrane
2. Tips of axons
3. Post-synaptic membrane
4. Membrane of synaptic vesicles

3. Good vision depends on adequate intake of carotene rich food.
Select the best option from the following statements:
(i) Vitamin A derivatives are formed from carotene
(ii) The photopigments are embedded in the membrane discs of the inner segment
(iii) Retinal is a derivative of Vitamin A
(iv) Retinal is a light absorbing part of all the visual photopigments
1. (i),(iii) and (iv)
2. (i) and (iii)
3. (ii), (iii) and (iv)
4. (i) and (iv)

4.
Which of the following structures or regions is incorrectly paired with its function ?
1. Medulla oblongata: controls respiration and cardiovascular reflexes.
2. Limbic system: consists of fibre tracts that interconnect different regions of brain; controls movement.
3. Hypothalamus: production of releasing hormones and regulation of temperature, hunger and Thirst.
4. Corpus callosum: band of fibers connecting left and right cerebral hemispheres.

5.
The transparent lens in the human eye is held in its place by
1. ligaments attached to the ciliary body
2. ligaments attached to the iris
3. smooth muscles attached to the iris
4. smooth muscles attached to the ciliary body

6. Choose the correct statement.
1. Nociceptors respond to changes in pressure
2. Meissner' s corpuscles are thermoreceptors
3. Photoreceptors in the human eye are depolarised during darkness and become hyperpolarised in response to the light stimulus
4. Receptors do not produce graded potentials

7.
Photosensitive compound in human eye is made up of
1. opsin and Retinal
2. opsin and Retinol
3. transducin and Retinene
4. guanosine and Retinol

8. In mammalian eye, the ‘fovea’ is the center of the visual field, where
1. Highly density of cones occurs, but has no rods
2. The optic nerve leaves the eye
3. Only rods are present
4. More rods than cones are found

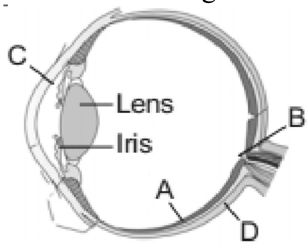
9.
Which of the following regions of the brain is incorrectly paired with its function
1. Medulla oblongata-Homeostatic control
2. Cerebellum-Language comprehension
3. Corpus callosum-Communication between the left and right cerebral cortices
4. Cerebrum-Calculation and contemplation

10.
A gymnast is able to balance his body upside down even in the total darkness because of
1. cochlea
2. vestibular apparatus
3. tectorial membrane
4. organ of Corti

11. Injury localized to the hypothalamus would most likely disrupt
1. short-term memory
2. co-ordination during locomotion
3. executive functions, such as decision making
4. regulation of body temperature

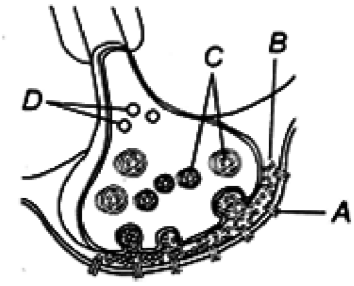
12. Which one of the following statements is not correct?
1. Retinal is the light absorbing portion of visual photo pigments
2. In retina the rods have the photopigments rhodospin while cones have three different photopigments.
3. Retinal is a derivative of Vitamin C
4. Rhodospin is the purplish protein present in rods only.

13. Parts A, B, C and D of the human eye are shown in the diagram. Select the option which gives correct identification along with its functions/characteristics:



1. B-blind spot-has only a few rods and cones
2. C-Aqueous chamber-reflects the light which does not pass through the lens
3. D-choroid- is anterior part forms ciliary body
4. A-retina - contains photo receptors - rods and cones

14. A diagram showing axon terminal and synapse is given. Identify correctly at least two of A-D.



1. B- Synaptic connection D- K^+
2. A- Neurotransmitter B- Synaptic cleft
3. C- Neurotransmitter D- Ca^{++}
4. A- Receptor C- Synaptic vesicles

15. The human hind brain comprises three parts, one of which is
1. Cerebellum
2. Hypothalamus
3. Spinal
4. Corpus callosum

16. Which part of the human ear plays no role in hearing as such but is otherwise very much required?
1. Eustachian tube
2. Organ of Corti
3. Vestibular apparatus
4. Ear ossicles

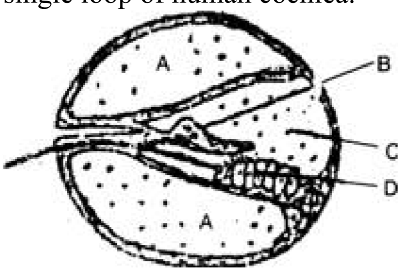
17.
The purplish-red pigment rhodopsin contained in the rods type of photoreceptor cells of the human eyes is a derivative of
1. vitamin-C
2. vitamin-D
3. vitamin-A
4. vitamin-B

18.
When a neuron is in resting state, i.e., not conducting any impulse, the axonal membrane is
1. equally permeable to both Na + and K+ ions
2. impermeable to both Na+ and K+ ions
3. comparatively more permeable to K+ ions and nearly impermeable to Na + ions
4. comparatively more permeable to Na + ions and nearly impermeable to K+ ions

19. The nerve centres which control the body temperature and the urge for eating are contained in
1. hypothalamus
2. pons
3. cerebellum
4. thalamus

20. Which part of human brain is concerned with the regulation of body temperature?
1. Medulla oblongata
2. Cerebellum
3. Cerebrum
4. Hyprothalamus

21. Given below is a diagrammatic cross section of a single loop of human cochlea.



Which one of the following options correctly represents the names of three different parts?

1. B: Tectorial membrane
   C: Perilymph
   D: Secretory cells
2. C: Endolymph
   D: Sensory hair cells
   A: Serum
3. D: Sensory hair cells
   A: Endolymph
   B: Tectorial membrane
4. A: Perilymph
   B: Tectorial membrane
   C: Endolymph

22.
Which one of the following is the correct difference between rod cells and cone cells of our retina?

Features	Rod cells	Cone cells
(a) visual acuity	High	Low
(b) Visual pigment contained	Iodopsin	Rhodopsin
(c) Overall function	Vision in poor light	Colour vision and detailed vision in bright light
(d) Distribution	More concentrated in centre of retina	Evenly distributed all over retina

1. a
2. b
3. c
4. d

23.
During the propagation of a nerve impulse, the action potential results from the movement of
1. K+ ions from extracellular fluid to intracellular fluid
2. Na+ ions from intracellular fluid to extracellular fluid
3. K+ ions from intracellular fluid to extracellular fluid
4. Na+ ions from extracellular fluid to intracellular fluid

24. During the transmission of nerve impulse through a nerve fibre, the potential on the inner side of the plasma membrane has which type of electric charge ?
1. First negative, then positive and again back to negative
2. First positive, then negative and continue to be negative
3. First negative, then positive and continue to be positive
4. First positive, them negative and again back to positive

25. Which part of the brain is responsible for thermoregulation?
1. Medulla oblongata
2. Cerebrum
3. Hypothalamus
4. Corpus callosum

26. Which of the following statements is not correct?
1. An action potential in an axon does not move backward because the segment behind is in a refractory phase.
2. Depolarization of hair cells of cochlea results in the opening of the mechanically gated Potassium- ion channels.
3. Rods are very sensitive and contribute to daylight vision.
4. In the knee-jerk reflex, stimulus is the stretching of muscle and response is its contraction.

27. Which of the following receptors are specifically responsible for maintenance of balance of body and posture ?
1. Basilar membrane and otoliths
2. Hair cells and organ of corti
3. Tectorial membrane and macula
4. Crista ampullaris and macula

28. Match the following columns and select the correct option

Column - I	Column - II
(a) The organ of Corti	(i) Connects the middle ear and pharynx
(b) Cochlea	(ii) Coiled part of the labyrinth
(c) Eustachian tube	(iii) Attached to the oval window
(d) Stapes	(iv) Located on the basilar membrane

	(a)	(b)	(c)	(d)
1.	(iii)	(i)	(iv)	(ii)
2.	(iv)	(ii)	(i)	(iii)
3.	(i)	(ii)	(iv)	(iii)
4.	(ii)	(iii)	(i)	(iv)

29. Match the following columns and select the correct option :

Column - I	Column - II
(a) Rods and cones photoreceptor cells	(i) Absence of Cones
(b) Blind Spot	(ii) Cones are densely packed
(c) Fovea	(iii) Photoreceptor cells
(d) Iris	(iv) Visible coloured portion of the eye

1. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)
2. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)
3. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
4. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

30. Select the answer with correct matching of the structure, its location and function –

	A	B	C
1.	Cerebellum	Mid brain	Controls respiration and gastric secretions
2.	Hypothalamus	Fore brain	Controls body temperature, urge for eating and drinking
3.	Blinds spot	Near the place where optic nerve leaves the eye	Rods and cones are present but inactive here
4.	Eustachian tube	Anterior part of internal ear	Equalizes air pressure on either sides of tympanic membrane

31. In the resting state of the neural membrane, diffusion due to concentration gradients, if allowed, would drive :-

1. K^+ and Na^+ out of the cell
2. Na^+ into the cell
3. Na^+ out of the cell
4. K^+ into the cell

32. Suspensory ligaments are found in :

1. Brain
2. Eyes
3. Liver
4. Pancrease

33. Depolarization of axolema during nerve conduction takes place because of :

1. Equal amount of Na^+ & K^+ move out across axolema
2. Na^+ ions move inside
3. More Na^+ ions are outside
4. None of the above

34. Which of the following statement is correct for node of Ranvier of nerve : -

(1) Neurilemma is discontinuous
(2) Myelin sheath is discontinuous
(3) Both neurilemma & Myelin sheath are discontinuous
(4) Covered by myelin sheath

Chemical Coordination & Integration

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Adrenal Medulla	7
Mechanism of Hormone Action	7
Pituitary & Hypothalamus	6
Adenohypophysis & Hypothalamus	5
Parathyroid	5
Thyroid	5
Adrenal Cortex: Cortisol	3
Gonadotropin & Gonadal Hormones	3
Misc. Hormones	3
Pineal Gland	3
Prolactin & Posterior Pituitary	3
Gastrointestinal Hormones	2
Hormones of Heart, Kidney and Gastrointestinal Tract	2
Pancreas	2
Human Growth Hormone	1
Intro to Hormones & Endocrine Glands	1
Thymus	1

1. A temporary endocrine gland in the human body is:
1. Corpus cardiacum
2. Corpus luteum
3. Corpus allatum
4. Pineal gland

2.
Which of the following is an amino acid derived hormone?
1. Epinephrine
2. Ecdysone
3. Estradiol
4. Estriol

3. Which hormone stimulate the production of pancreatic juice and bicarbonate?
1. Angiotensin and epinephrine
2. Gastrin and insulin
3. Cholecystokinin and secretin
4. lnsulin and glucagon

4. Graves' disease is caused due to
1. hyposecretion of thyroid gland
2. hypersecretion of thyroid gland
3. hyposecretion of adrenal gland
4. hypersecretion of adrenal gland

5. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances cellular glucose uptake and utilisation.
1. Insulin
2. Glucagon
3. Secretin
4. Gastrin

6. The posterior pituitary gland is not a 'true' endocrine gland because
1. it is provided with a duct
2. it only stores and releases hormones
3. it is under the regulation of hypothalamus
4. it secretes enzymes

7. GnRH, a hypothalamic hormone, needed in reproduction, acts on:
1. Anterior pituitary gland and stimulates secretion of LH and FSH.
2. Posterior pituitary gland and stimulates secretion of oxytocin and FSH.
3. Posterior pituitary gland and stimulates secretion of LH and relaxin.
4. Anterior pituitary gland and stimulates secretion of LH and oxytocin.

8. Which one of the following hormones is not involved in sugar metabolism?
1. Cartisone
2. Aldosterone
3. Insulin
4. Glucagon

9. Which one of the following hormones though synthesised elsewhere, is stored and released by the master gland ?
(1) Melanocyte stimulating hormone
(2) Antidiuretic hormone
(3) Luteinizing hormone
(4) Prolactin

10.
A chemical signal that has both endocrine and neural roles is
1. melatonin
2. calcitonin
3. epinephrine
4. cortisol

11.
Which of the following statements is correct in relation to the endocrine system?
1. Organs in the body like gastrointestinal tract, heart, kidney and liver do not produce any hormones.
2. Non - nutrient chemicals produced by the body in trace amount that act as intercellular messenger are known as hormones.
3. Releasing and inhibitory hormones are produced by the pituitary gland.
4. Adenohypophysis is under direct neural regulation of the hypothalamus.

12.
A pregnant female delivers a baby who suffers from stunted growth, mental retardation/low intelligence quotient and abnormal skin. This is the result of :

1. Low secretion of growth hormone

2. Cancer of the thyroid gland

3. Over secretion of pars distalis

4. Deficiency of iodine in diet

13. Select the answer which correctly matches the endocrine gland with the hormone it secrets and its function/deficiency symptom:

	Endocrine	Hormone	Function/deficiency symptom
(1)	Posterior Pituitary	Growth Hormone (GH)	Oversec retion stimulates abnormal growth
(2)	Thyroid gland	Thyroxine	Lack of iodine in diet results in goitre
(3)	Corpus luteum	Testosterone	Stimulates spermatogenesis
(4)	Anterior pituatary	oxytocin	Stimulates uterus contraction during child birth

1. (1)
2. (2)
3. (3)
4. (4)

14. Identify the hormone with its correct matching of source and function:
1. Oxytocin- posterior pituitary, growth and maintenance of mammary glands.
2. Melatonin- pineal gland, regulates the normal rhythm of sleepwake cycle.
3. Progesterone- corpus-luteum, stimulation of growth and activities of female secondary sex organs.
4. atrial natriuretic factor- ventricular wall increases the blood pressure.

15. Fight - or - flight reaction cause activation of
1. the parathyroid glands, leading to increased metabolic rate.
2. the kidney, leading to suppression of rennin angiotensin-aldosterone pathway.
3. the adrenal medulla, leading to increased secretion of epinephrine and norepinephrene
4. the pancreas leading to a reduction in the blood sugar levels.

16. Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside it (mostly in the nucleus)?
1. Insulin and gucagon
2. Thyroxin and insulin
3. Somatosatin and oxytocin
4. Cortisol and testosterone

17. Match the source gland with its respective hormone as well as the function.

	Source gland	Hormone	Function
(a)	Posterior pituitary	Vasopressin	Stimulates reabsorption of water in the distal tubules in the nephron
(b)	Corpus luteum	Prolactin	Supports pregnancy
(c)	Thyroid	Thyroxine	Regulates blood calcium level
(d)	Anterior pituitary	Oxytocin	Contraction of uterus muscles during childbirth

1. (a)
2. (b)
3. (c)
4. (d)

18.
Given ahead is an incomplete table about certain hormone, their source glands and one major effect of each on the body in humans. Identify the correct option for the three blanks A, B and C

Gland	Secretion	Effect on Body
A	Oestrogen	Maintenance of secondary sexual characters
Alpha cells of islets of Langerhans	B	Raises blood sugar level
Anterior pituitary	C	Oversecretion leads to gigantism

	A	B	C
1.	Placenta	Insulin	Vasopressin
2.	Ovary	Insulin	Calcium
3.	Placenta	Glucagon	Calcitonin
4.	Ovary	Glucagon	Growth hormone

19. Injury to adrenal cortex is not likely to affect the secretion of which one of the following?
1. Aldosterone
2. Both androstenedione and dehydroepiandrosterone
3. Adrenalin
4. Cortisol

20. Which one of the following pairs is incorrectly matched?
1. Glucagon- Beta cells(source)
2. Somatostatin- Delta cells(source)
3. Corpus luteum- Relaxin(secretion)
4. Insulin- Diabetes mellitus(disease)

21.
In human adult females, oxytocin
1. is secreted by anterior pituitary
2. stimulates growth of mammary glands
3. stimulates pituitary to secrete vasopressin
4. causes strong uterine contractions during parturition

22.
The blood calcium level is lowered by the deficiency of
1. parathormone
2. thyroxine
3. calcitonin
4. Both 1 and 3

23.
Which one of the following pairs of organs includes only the endocrine glands?
1. Parathyroid and adrenal
2. Pancreas and parathyroid
3. Thymus and testes
4. Adrenal and ovary

24. Feeling the tremors of an earthquake a scared resident of seventh floor of a multistoryed building starts climbing down the stairs rapidly. Which hormone initiated this act?
1. Thyroxine
2. Adernaline
3. Glucagon
4. Gastrin

25. A steroid hormone which regulates glucose metabolism is :
1. cortisol
2. corticosterone
3. 11-deoxycorticosterone
4. cortisone

26. Which of the following is an accumulation and release centre of neurohormones?
1. Posterior pituitary lobe
2. Intermediate lobe of the pituitary
3. Hypothalamus
4. Anterior pituitary lobe

27. Which hormone causes dilation of blood vessels, increased oxygen consumption and gluco- genesis?
1. ACTH
2. Insulin
3. Adrenalin
4. Glucagon

28. Match the following hormones with the respective disease:

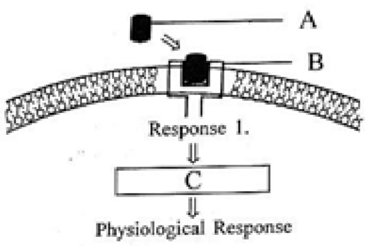
(a)	Insulin	(i)	Addison's disease
(b)	Thyroxin	(ii)	Diabetes insipidus
(c)	Corticoids	(iii)	Acromegaly
(d)	Growth Hormone	(iv)	Goitre
		(v)	Diabetes mellitus

Select the correct option.

	(a)	(b)	(c)	(d)
1.	(ii)	(iv)	(i)	(iii)
2.	(v)	(i)	(ii)	(iii)
3.	(ii)	(iv)	(iii)	(i)
4.	(v)	(iv)	(i)	(iii)

29. Which of the following hormones is responsible for both the milk ejection reflex and the foetal ejection reflex?
1. Estrogen
2. Prolactin
3. Oxytocin
4. Relaxin

30. Identify A, B and C in the diagrammatic representation of the mechanism of hormone action.



Select the correct option from the following:
1. A = Steroid Hormone; B = Hormone receptor Complex; C = Protein
2. A = Protein Hormone; B = Receptor; C = Cyclic AMP
3. A = Steroid Hormone; B = Receptor; C = Second Messenger
4. A = Protein Hormone; B = Cyclic AMP; C = Hormone-receptor Complex

31. Artificial light, extended work-time and reduced sleep-time disrupt the activity of
1. Thymus gland
2. Pineal gland
3. Adrenal gland
4. Posterior pituitary gland

32. Which of the following conditions will stimulate parathyroid gland to release parathyroid hormone ?
1. Fall in active Vitamin D levels
2. Fall in blood Ca^{+2} levels
3. Fall in bone Ca^{+2} levels
4. Rise in blood Ca^{+2} levels

33. Select the correct statement.
1. Glucagon is associated with hypoglycemia.
2. Insulin acts on pancreatic cells and adipocytes.
3. Insulin is associated with hyperglycemia.
4. Glucocorticoids stimulate gluconeogenesis.

34. Match the follwing columns and select the correct option.
(a) Pituitary gland (i) Grave's disease
(b) Thyroid gland (ii) Diabetes mellitus
(c) Adrenal gland (iii) Diabetes insipidus
(d) Pancreas (iv) Addison's diseae

	a	b	c	d
(1)	(iii)	(ii)	(i)	(iv)
(2)	(iii)	(i)	(iv)	(ii)
(3)	(ii)	(i)	(iv)	(iii)
(4)	(iv)	(iii)	(i)	(ii)

35. Match the following columns and select the correct option:-

Column-I	Column-II
(a) Pituitary hormone	(i) Steroid
(b) Epinephrine	(ii) Neuropeptides
(c) Endorphins	(iii) Peptides, proteins
(d) Cortisol	(iv) Biogenic amines

1. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
2. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
3. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
4. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

36. Hormones stored and released from neurohypophysis are:-
1. Thyroid-stimulating hormone and Oxytocin
2. Oxytocin and Vasopressin
3. Follicle-stimulating hormone and leutinizing hormone
4. Prolactin and Vasopressin

37. Select the correct matching of a hormone, its source and its function –

	Hormone	Source	Function
1.	Norepinephrine	Adrenal medulla	Increases heartbeat, rate of respiration and alert ness
2.	Glucagon	Beta-cells of Islets of Langerhans	Stimulates glycogenolysis
3.	Prolactin	Posterior pituitary	Regulates growth of mammary glands and milk formation in females
4.	Vasopressin	Posterior pituitary	Increases loss of water through urine

38. The 24 hours (diurnal) rhythm of our body such as the sleep-wake cycle is regulated by the hormone :
1. melatonin
2. calcitonin
3. prolactin
4. adrenaline

39. Secretin and cholecystokinin are digestive hormones. They are secreted in -
(1) Oesophagus
(2) Ileum
(3) Duodenum
(4) Pyloric stomach

40. Contraction in gall bladder stimulated by :
1. CCK
2. PZ
3. Secretin
4. Enterogastrin

41. Which of the following stimulates the secretion of gastric juice :
1. Gastrin
2. Enterogasterone
3. Secretin
4. Hepatocrinin

42. Function of thyrocalcitonin :
1. To reduce the calcium level in blood
2. To increase the calcium level in blood
3. Oppose the action of thyroxine
4. Maturation of gonads

43. Which of the following is a steroid hormone?
1. Progesterone
2. Cholesterol
3. ACTH

44. Which one of the following hormones is a modified amino acid?
1. Progesterone
2. Prostaglandin
3. Estrogen
4. Epinephrine

45. Duodenum has characteristic Brunner's glands which secrete two hormones called -
(1) Secretin, Cholecystokinin
(2) Prolactin, parathormone
(3) Extradiol, progesterone
(4) Kinase, estrogen

46. Which one of the following pair correctly matches a hormone with a disease resulting from its deficiency:-
1. Insulin – Diabetes insipidus
2. Thyroxine – Tetany
3. Parathyroid hormone – Diabetes mellitus
4. Luteinizing hormone – Failure of ovulation

47. CCK and secretin secreted by :
1. Stomach
2. Ileum
3. Duodenum
4. Colon

48. Parathormone deficiency leads to :
1. Decrease of Ca^{+2} level in blood
2. Increase of Ca^{+2} level in blood
3. Osteoporosis
4. Hypercalcemia

49. Chemically hormones are:-
(1) Proteins, steroids & biogenic amines
(2) Proteins only
(3) Steroids only
(4) Biogenic amines only

50. Oxytocin mainly helps in :
1. Milk production
2. Childbirth
3. Diuresis
4. Gametogenesis

51. Which hormone is concerned with the concentration of urine :
1. Oxytocin
2. Vasopressin
3. Prolactin
4. Cortisol

52. Insulin differs from Growth hormone in :
1. Increases activity of m-RNA and Ribosomes
2. Increase the permeability of cell membrane
3. Affects metabolism of fats by inducing lipogenesis

53. Which gland decreases in size with increasing age :
1. Thyroid
2. Adrenal
3. Thymus
4. Pituitary

54. Melatonin is secreted by :
1. Pineal gland
2. Skin
3. Pituitary Gland
4. Thyroid

55. MSH is secreted by :
1. Anteria lobe of pituitary
2. Middle lobe of pituitary
3. Posteria lobe of pituitary
4. Endostyle

56. When both ovaries of rat are removed then which hormone is decreased in blood: -
1. Oxytocin
2. Prolactin
3. Estrogen
4. Gonadotrophic releasing factor

57. Which of the following is used in the treatment of Thyroid cancer: -
(1) I_{131}
(2) U_{238}
(3) Ra_{224}
(4) C_{14}

58. Adrenalin direct affect on: -
(1) S.A. Node
(2) β-cells of Langerhans
(3) Dorsal root of spinal cord
(4) Epithelial cells of stomach

59. Which one of the following pairs correctly matches a hormone with a disease resulting from its deficiency: -
1. Relaxin – Gigantism
2. Prolactin – Cretinism
3. Parathyroid hormone – Tetany
4. Insulin – Diabetes insipidus

60. Erythropoietin hormone which stimulates R.B.C. formation is produced by:
1. The cells of bone marrow
2. Juxtaglomerular cells of the kidney
3. Alpha cells of the pancreas
4. The cells of the rostral adenohypophysis

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Reproduction in Organisms

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Asexual Reproduction	9
Sexual Reproduction	5
Events during Sexual reproduction	2

1. Which one of the following statements is not correct?
1. Offspring produced by the asexual reproduction are called clone
2. Microscopic motile asexual reproductive structures are called zoospores
3. In potato, banana and ginger, the plantlets arise from the internodes present in the modified stem
4. Water hyacinth growing in the standing water, drains oxygen from water that leads to the death of fishes

2.
Offsets are produced by
1. Meiotic divisions
2. Mitotic divisions
3. Parthenocarpy
4. Parthenogenesis

3.
Which of the following flowers only once in its life-time?
1. Bamboo species
2. Jackfruit
3. Mango
4. Papaya

4. Which one of the following generates new genetic combinations leading to variation?
1. Vegetative reproduction
2. Parthenogenesis
3. Sexual reproduction
4. Nucellar polyembryony

5. Match column I with column II and select the correct option using the codes given below

	Column I		**Column II**
A.	Pistils fused together	1.	Gametogenesis
B.	Formation of gametes	2.	Pistillate
C.	Hyphae of higher ascomycetes	3.	Syncarpous
D.	Unisexual female flower	4.	Dikaryotic

1. A-4 B-3 C-2 D-1
2. A-2 B-1 C-4 D-3
3. A-1 B-2 C-4 D-3
4. A-3 B-1 C-4 D-2

6. Flowers are unisexual in
1. Pea
2. Cucumber
3. china rose
4. onion

7. Which of the following pairs is not correctly match?

Mode of reproduction	Example
(a) Offset	Water hyacinth
(b) Rhizome	Banana
(c) Binary fission	Sargassum
(d) Conidia	Penicilium

1. a
2. b
3. c
4. d

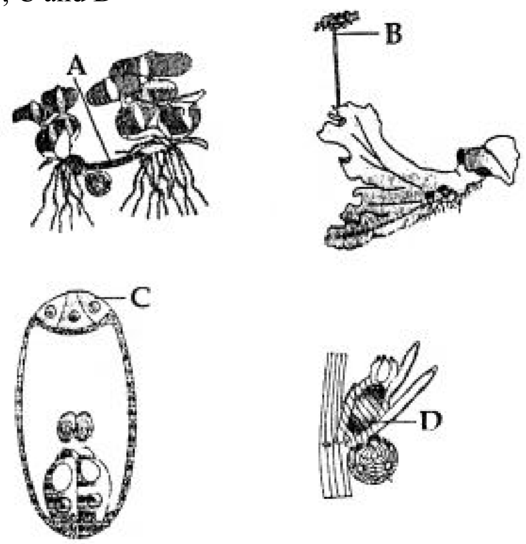
8.
In ginger vegetative propagation occurs through
1. rhizome
2. offsets
3. bulbils
4. runners

9. Product of sexual reproduction generally generates :
1. Prolonged dormancy
2. New genetic combination leading to variation
3. Large biomass
4. Longer viability of seeds

10. Select the correct sequence of events.
1. Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell division (Cleavage) → Cell differentiation → Organogenesis
2. Gametogenesis → Gamete transfer →Syngamy → Zygote → Cell division (Cleavage) →Organogenesis → Cell differentiation
3. Gametogenesis → Syngamy → Gamete transfer → Zygote → Cell division (Cleavage) → Cell differentiation → Organogenesis
4. Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell differentiation → Cell division (Cleavage) → Organogenesis

11. Vegetative propagule in Agave is as :
1. Rhizome
2. Bulbil
3. Offset
4. Eye

12. Examine the figure (A-D) given below and select the right option out of 1-4, in which all the four structures A, B, C and D –



Options

	A	B	C	D
1.	Runner	Archegoniophore	Synergid	Antheridium
2.	Offset	Antheridiophore	Antipodals	Oogonium
3.	Sucker	Seta	Megaspore mother cell	Gamma cup
4.	Rhizome	Sporangiophore	Polar cell	Globule

13. Which one of the following pairs is wrongly matched while the remaining three are correct ?
1. Agave - Bulbils
2. Penicillium - Conidia
3. Water hyacinth - Runner
4. Bryophyllum – Leaf buds

14. In which one pair both the plants can be vegetatively propagated by leaf pieces -
(1) Bryophyllum and Kalanchoe
(2) Agave and Kalanchoe
(3) Asparaguns and Bryophyllum
(4) Chrysanthemum and Agave

15. The chief advantage of encystment to an Amoeba is : -
(1) The ability to survive during adverse physical conditions
(2) The ability to live for some time without ingesting food
(3) Protection from parasites and predators
(4) The chance to get rid of accumulated waste products

16. Which of the following plants is monoecious?
1. Marchantia polymorpha
2. Cycas circinalis
3. Carica papaya
4. Chara

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*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Sexual Reproduction in Flowering Plants

(Expected Questions in NEET 2022: 4)

Subtopic Name	Number of Questions
Pollination & Outbreeding Devices	22
Pistil	15
Stamen	13
Apomixis & Polyembryony	4
Double Fertilization	3
Endosperm	3
Pollen - Pistil Interaction	3
Post Pollination Events	3
Fruit	2
Embryo	1

1. Functional megaspore in an angiosperm develops into?
1. Endosperm
2. Embryo sac
3. Embryo
4. Ovule

2. Which of the following has proved helpful in preserving pollens as fossils?
1. Pollenkit
2. Cellulosic intine
3. Oil content
4. Sporopollenin

3. Pollen grains can be stored for several years in liquid nitrogen having a temperature of
1. –120 °C
2. –80 °C
3. –196 °C
4. –160 °C

4.
Double fertilization is
1. Fusion of two male gametes of a pollen tube with two different eggs
2. Fusion of one male gamete with two polar nuclei
3. Fusion of two male gametes with one egg
4. Syngamy and triple fusion

5. In majority of angiosperms
1. egg has a filiform apparatus
2. there are numerous antipodal cells
3. reduction division occurs in the megaspore mother cells
4. a small central cell is present in the embryo sac

6. Pollination in water hyacinth and water lily is brought about by the agency of
1. water
2. insects or wind
3. birds
4. bats

7.
Which one of the following plants shows a very close relationship with a species of moth, where none of the two can complete its life cycle without the other?
1. Hydrilla
2. Yucca
3. Banana
4. Viola

8. The ovule of an angiosperm is technically equivalent to
1. megasporangium
2. megasporophyll
3. megaspore mother cell
4. megaspore

9. Flowers which have single ovule in the ovary and are packed into inflorescence are usually pollinated by:
1. Bee
2. Wind
3. Bat
4. Water

10. A dioecious flowering plant prevents both:
1. Autogamy and geitonogamy
2. Geitonogamy and xenogamy
3. Cleistogamy and xenogamy
4. Autogamy and xenogamy

11. Double fertilization is exhibited by:
1. Algae
2. Fungi
3. Angiosperms
4. Gymnosperms

12.
Which one of the following statements is not true?
1. Exine of pollen grains is made up of sporopollenin
2. Pollen grains of many species cause severe allergies
3. Stored pollen in liquid nitrogen can used in the crop breeding programs
4. Tapetum helps in the dehiscence of anther

13.
Proximal end of the filament of stamen is attached to the
1. connective
2. placenta
3. thalamus or petal
4. anther

14.
The coconut water from tender coconut represents
1. fleshy mesocarp
2. free – nuclear proembryo
3. free- nuclear endosperm
4. endocarp

15.
Which of the following statements is not correct?
1. Insects that consume pollen or nectar without bringing about pollination are called pollen nectar robbers
2. Pollen germination and pollen tube growth are regulated by chemical compound of pollen interacting with those of the pistil
3. Some reptiles have also been reported as pollinators in some plant species
4. Pollen grains of many species can germinate on the stigma of a flower, but only one pollen tube of the same species grows into the style.

16.
Seed formation without fertilization in flowering plants involves the process of
1. budding
2. somatic hybridization
3. apomixis
4. sporulation

17. Filiform apparatus is a characteristic feature of
1. Generative cell
2. nucellar embryo
3. aleurone cell
4. synergids

18. In angiosperms, microsporogenesis and megasporogenesis
1. Occur in anther
2. Form gametes without further divisions
3. Involve meiosis
4. Occur in ovule

19. Coconut water from a tender coconut is
1. Immature embryo
2. Free nuclear endosperm
3. Innermost layers of the seed coat
4. Degenerated nucellus

20. Which one of the following fruits is parthenocarpic?
1. Brinjal
2. Apple
3. Jackfruit
4. Banana

21. Male gametophyte in angiosperms produces
1. Two sperms and a vegetative cell
2. Single sperm and a vegetative cell
3. Single sperm and two vegetative cell
4. Three sperms

22.

Which one of the following may require pollinators, but is genetically similar to autogamy?
1. Geitonogamy
2. Xenogamy
3. Apogamy
4. Cleistogamy

23.

Which one of the following statements is not true?
1. Pollen grains are rich in nutrients and they are used in the form of tablets and syrups
2. Pollen grains of some plants cause severe allergies and bronchial afflictions in some people
3. The flowers pollinated by flies and bats secrete foul odour to attract them
4. Honey is made by bees by digesting pollen collected from flowers

24.

Which of the following are the important floral rewards to the animal pollinators?
1. Colour and large size of flower
2. Nectar and pollen grains
3. Floral fragrance and calcium crystals
4. Protein pellicle and stigmatic exudates

25. Geitonogamy involves
1. Pollination of a flower by the pollen from another flower of the same plant
2. Pollination of a flower by the pollen from another same flower.
3. Pollination of a flower by the pollen from a flower of another plant in the same population
4.Pollination of a flower by the pollen from a flower of another plant belonging to a distant population

26. Function of filiform apparutus is to :
1. Recognize the suitable pollen at stigma
2. Stimulate division of genrative cell
3. Producer nectar
4. Guide the entry of pollen tube

27. Non- albuminous seed is produced in:
1. Maize
2. Castor
3. Wheat
4. Pea

28.
Megasporangium is equivalent to :

1. Fruit

2. Nucellus

3. Ovule

4. Embryo sac

29. Advantage of cleistogamy is :
1. More vigorous offspring
2. No dependence of pollinator
3. Vivipary
4. Higher genetic variability

30. Which one of the following statements is correct?
1. Sporogenous tissue is haploid
2. Endothecium produces the microspores
3. Tapetum nourishes the developing pollen
4. Hard outer layer of pollen is called intine

31. Both, autogamy and geitonogamy are prevented in
1. Papaya
2. Cucumber
3. Castor
4. Maize

32. An organic substance that can withstand environmental extremes and cannot be degraded by any enzyme is :
1. Cuticle
2. Sporopollenin
3. Lignin
4. Cellulose

33. The gynoecium consists of many free pistils in flowers of
1. Aloe
2. Tomato
3. Papaver
4. Michelia

34. The coconut water and the edible part of coconut are equivalent to
1. Endosperm
2. Endocarp
3. Mesocarp

35. Apomictic embryos in Citrus arise from
1. synergids
2. maternal sporophytic tissue in ovule
3. antipodal cells
4. diploid egg

36.
Wind pollination is common
1. lilies
2. grasses
3. orchids
4. legumes

37.
Nucellar polyembryony is reported in species of
1. Gossypium
2. Triticum
3. Brassia
4. Citrus

38.
In which one of the following pollination is autogamous?
1. Xenogamy
2. Chasmogamy
3. Cleistogamy
4. Geitonogamy

39. Transfer of pollen grains from the anther to the stigma of another flower of the same plant is called
1. xenogamy
2. geitonogamy
3. karyogamy
4. autogamy

40. Wind pollinated flowers are –
(1) small, brightly coloured, producing large number of pollen grains
(2) small, proudcing large number of dry pollen grains
(3) large producing abundant nectar and pollen
(4) small, producing nectar and dry pollen

41.
Unisexuality of flowers prevents
1. autogamy, but not geitonogamy
2. Both geitonogamy and xenogamy
3. geitonogamy, but not xenogamy
4. autogamy and geitonogamy

42.
What does the filiform apparatus do at the entrance into ovule?
1. it helps in the entry of pollen tube into a synergid
2. it prevents entry of more than one pollen tube into the embryo sac
3. it brings about opening of the pollen tube
4. it guides pollen tube from a synergid to egg

43.
Which one of the following is resistant to enzyme action?
1. Cork
2. Wood fibre
3. Pollen exine
4. Leaf cuticle

44. In a cereal grain the single cotyledon of embryo is represented by :
1. coleorhiza
2. scutellum
3. prophyll
4. coleoptiles

45. Persistent nucellus in the seed is known as :
1. Tegmen
2. Chalaza
3. Perisperm
4. Hilum

46. In some plants, the female gamete develops into embryo without fertilization. This phenomenon is known as:
1. Parthenogenesis
2. Autogamy
3. Parthenocarpy
4. Syngamy

47. What is the fate of the male gametes discharged in the synergid?
1. One fuses with the egg and other fuses with central cell nuclei
2. One fuses with the egg other(s) degenerate (s) in the synergid
3. All fuse with the egg
4. One fuses with the egg other (s) fuse(s) with synergid nucleus

48. Which one of the following statements regarding post-fertilization development in flowering plants is incorrect?
1. Ovules develop into embryo sac
2. Ovary develops into fruit
3. Zygote develops into embryo
4. Central cell develops into endosperm

49. Which is the most common type of embryo sac in angiosperms?
1. Tetrasporic with one mitotic stage of divisions
2. Monosporic with three sequential mitotic divisions
3. Monosporic with two sequential mitotic divisions
4. Bisporic with two sequential mitotic divisions

50. What type of pollination takes place in Vallisneria ?
1. Pollination occurs in submerged condition by water.
2. Flowers emerge above surface of Water and pollination occurs by insects.
3. Flowers emerge above water surface and pollen is carried by wind.
4. Male flowers are carried by water currents to female flowers at surface of water.

51. In which one of the following, both autogamy and geitonogamy are prevented?
1. Wheat
2. Papaya
3. Castor
4. Maize

52. The body of the ovule is fused within the funicle at :
1. Micropyle
2. Nucellus
3. Chalaza
4. Hilum

53. In water hyacinth and water lily, pollination takes place by:
1. Water currents only
2. Wind and water
3. Insects and water
4. Insects or wind

54. In some plants, the thalamus contributes to fruit formation. Such fruits are termed as
1. False fruits
2. Aggregate fruits
3. True fruits
4. Parthenocarpic fruit

55. Which of the following is incorrect for wind-pollinated plants?
1. Well exposed stamens and stigma
2. Many ovules in each ovary
3. Flowers are small and not brightly colored
4. Pollen grains are light and non-sticky

56. Plants with ovaries having only one or a few ovules, are generally pollinated by :
1. Butterflies
2. Birds
3. Wind
4. Bees

57. What is the function of germ pore ?
1. Absorption of water for seed germination
2. Initiation of pollen tube
3. Release of male gametes
4. Emergence of radicle

58. Which one of the following statements is wrong?
1. Vegetative cell is larger than generative cell
2. Pollen grains in some plants remain viable for months
3. Intine is made up of cellulose and pectin
4. When pollen is shed at two-celled stage, double fertilization does not take place

59. What is common between vegetative reproduction and Apomixis ?
1. Both produce progeny identical to the parent
2. Both are applicable to only dicot plants
3. Both bypass the flowering phase
4. Both occur round the year

60. In angiosperms, functional megaspore develops into :
1. Pollen sac
2. Embryo sac
3. Ovule
4. Endosperm

61. Anthesis is a phenomenon which refers to -
(1) formation of pollen
(2) Development of anther
(3) Opening of flower bud
(4) Reception of pollen by stigma

62. Eight nucleated embryosac is a :
1. Only monosporic
2. Only bisporic
3. Only tetra sporic
4. Any of the above

63. Endosperm is formed during double fertilization by
1. Two polar nuclei & one male gamete
2. One polar nuclei & one male gamete
3. Ovum and male gamete
4. Two polar nuclei & two male gametes

64. Hair are found in the inflorescences of Zea mays are the modification of :
1. Style
2. Stigma
3. Spathe
4. Filaments

65. In Angiosperms, pollen tubes liberate their male gametes into the
1. Central cell
2. Antipodal cells
3. Egg cell
4. Synergids

66. What is the direction of micropyle in anatropous ovule :-
(1) Upward
(2) Downward
(3) Right
(4) Left

67. In a flowering plant, archesporium gives rise to : -
(1) Only the wall of the sporangium
(2) Both wall and the sporogenous cells
(3) Wall and the tapetum
(4) Only tapetum and sporogenous cells

68. Anemophilly type of pollination is found in
1. Salvia
2. Bottle brush
3. Vallisneria
4. Coconut

69. In grasses what happens in micro spore mother cell for the formation of mature pollen grains : -
1. One meiotic and two mitotic divisions
2. One meiotic & one mitotic divisions
3. One meiotic division
4. One mitotic division

70. The term used for transfer of pollen grains from anthers of one plant to stigma of a different plant which during pollination, brings genetically different types of pollen grains to stigma, is:
(1) Chasmogamy
(2) Cleistogamy
(3) Xenogamy
(4) Geitonogamy

71. A typical angiosperm embryo sac at maturity is:
(1) 7-nucleate and 7-celled
(2) 8-nucleate and 8-celled
(3) 8-nucleate and 7-celled
(4) 7-nucleate and 8-celled

72. In some members of which of the following pairs of families, pollen grains retain their viability for months after release?
1. Poaceae; Solanaceae
2. Rosaceae; Leguminosae
3. Poaceae; Rosaceae
4. Poaceae; Leguminosae

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*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Human Reproduction

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Menstrual Cycle	18
Fetal Development & Parturition	11
Seminiferous Tubules & Spermatogenesis	7
Male Reproductive Duct System	5
Embryonic Development till Gastrulation	4
Fertilization	4
Male Reproductive System	4
Ovary	3
Spermiogenesis/ Sperm Structure/Hormonal Regulation	3
Fertilization	2
Female Reproductive System	1
Implantation	1
Semen and Male Fertility	1
Basic Anatomy of Testis	1

1.
Hormones secreted by the placenta to maintain pregnancy are
1. hCG, hPL, progesterone, prolactin
2. hCG, hPL, estrogens, relaxin, oxytocin
3. hCG, hPL, progesterone, estrogens
4. hCG, progesterone, estrogens, glucocorticoids

2.
The difference between spermiogenesis and spermiation is
1. In spermiogenesis spermatids are formed, while in spermiation spermatozoa are formed.
2. In spermiogenesis spermatozoa are formed, while in spermiation spermatids are formed.
3. In spermiogenesis spermatozoa from Sertoli cells are released into the cavity of seminiferous tubules, while in spermiation spermatozoa are formed.
4. In spermiogenesis, spermatozoa are formed, while in spermiation spermatozoa are released from Sertoli cells into the cavity of seminiferous tubules.

3.
Question 174
Match the items given in Column I with those in Column II and select the correct option given below:-

Column I	Column II
a. Proliferative Phase	i. Breakdown of endometrial lining
b. Secretory Phase	ii. Follicular Phase
c. Menstruation	iii. Luteal Phase

1. a-iii b-ii c-i
2. a-i b-iii c-ii
3. a-ii b-iii c-i
4. a-iii b-i c-ii

4. Which of the following depicts the correct pathway of transport of sperms?
1. Rete testis → Efferent ductules → Epididymis → Vas deferens
2. Rete testis → Epididymis → Efferent ductules → Vas deferens
3. Rete testis → vas ductules → Efferent ductules → Epididymis
4. Efferent ductules → Rete testis → Vas deferens → Epididymis

5.
Match column I with column II and select the correct option using the codes given below

Column I	Column II
A. Mons pubis	1. Embryo formation
B. Antrum	2. Sperm
C. Trophectoderm	3. Female external genitalia
D. Nebenker	4. Graafian follicle

1. A-3 B-4 C-2 D-1
2. A-3 B-4 C-1 D-2
3. A-3 B-1 C-4 D-2
4. A-1 B-4 C-3 D-2

6. Several hormones like hCG, hPL, oestrogen, progesterone are produced by
1. ovary
2. placenta
3. fallopian tube
4. pituitary

7.
Changes in GnRH pulse frequency in females is controlled by circulating levels of
1. estrogen and inhibin
2. progesterone only
3. progesterone and inhibin
4. estrogen and progesterone

8.
Select the incorrect statement
1. LH and FSH triggers ovulation in ovary
2. LH and FSH decrease gradually during the follicular phase
3. LH triggers secretion of androgens from the Leydig cells.
4. FSH stimulates the sertoli cells which help in spermiogenesis

9.
Fertilisation in humans is practically feasible only if
1. the ovum and sperms are transported simultaneously to ampullary - isthmic junction of the fallopian tube
2. the ovum and sperms are transported simultaneously to ampullary-isthmic junction of the cervix
3. the sperms are transported into cervix within 48 hrs of release of ovum in uterus
4. the sperms are transported into vagin a just after the release of ovum in fallopian tube

10. Which of the following events in not associated with ovulation in human female?
1. Decrease in Oestradiol
2. Full development of Graafian follicle
3. Release of secondary oocyte
4. LH Surge

11. In human females, meiosis-II is not completed until?
1. Puberty
2. Fertilization
3. Uterine implantation
4. Birth

12.

Which of these is not an important component of initiation of parturition in humans?
1. Increase in oestrogen and progesterone ratio
2. Synthesis of prostaglandins
3. Release of oxytocin
4. Release of prolactin

13.

Which of the following cells during gametogenesis is normally diploid?
1. Primary polar body
2. Spermatid
3. Spermatogonia
4. Secondary polar body

14.
Menstrual flow occurs due to lack of:
1. FSH
2. Oxytocin
3. Vasopressin
4. Progesterone

15.
What is the correct sequence of sperm formation ?
1. spermatogonia, spermatocyte, spermatozoa, spermatid
2. Spermatogonia, spermatozoa, spermatocyte, spermatid
3. Spermatogonia, spermatocyte, spermatid, spermatozoa
4. Spermatid, spermatocyte, spermatogonia, spermatozoa

16. The shared terminal duct of the reproductive and urinary system in the human male is:
1. Urethra
2. Ureter
3. Vas deferens
4. Vasa efferentia

17. The main function of mammalian corpus luteum is to produce:
1. estrogen only
2. progesterone
3. human chorionic gonadotropin
4. relaxin only

18. Which one of the following is not the function of placenta?
1. Secretes estogen
2. Facilitates removal of carbon dioxide and waste material from embryo
3. Secretes oxytocin during parturition
4. Facilitates supply of oxygen and nutrients to embryo

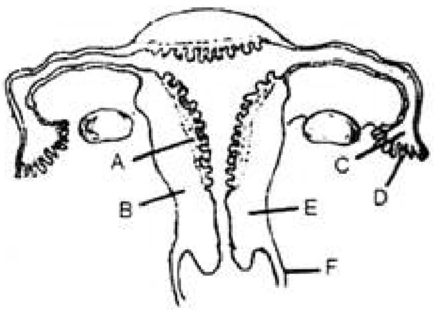
19. Signals for parturition originate from
1. Both placenta as wel as fully developed foetus
2. Oxytocin released from maternal pituitary
3. Placenta only
4. Fully developed foetus only

20. The Leydig cells as found in the human body are the secretory source of
1. Progesterone
2. Intestinal mucus
3. Glocagon
4. Androgens

21. Sertoli cells are found in
(1) ovaries and secrete progesterone
(2) adrenal cortex and secrete adrenaline
(3) seminiferous tubules and provide nutrition to germ cells
(4) pancreas and secrete cholecystokinin

22. If for some reason, the vasa efferentia in the human reproductive system get blocked, the gametes will not be transported from
1. epididymis to vas deferens
2. ovary to uterus
3. vagina to uterus
4. testes to epididymis

23.
The figure given below depicts a diagrammatic sectional view of the female reproductive system of humans. Which one set of three parts out of A-F have been correctly identified?



1. C-Infundibulum, D-Fimbriae, E-Cervix
2. D-Oviducal funnel, E-Uterus, F-Cervix
3. A-perimetrium, B-Myometrium, C-Fallopian tube
4. B-Endometrium, C-Infundibulum, D-Fimbriae

24.
The testes in humans are situated outside the abdominal cavity inside a pouch called scrotum. The purpose served is for
1. escaping any possible compression by the visceral organs
2. providing more space for the growth epididymis
3. providing a secondary sexual feature for exhibiting the male sex
4. maintaining the scrotal temperature low than the internal body temperature

25. Vasa efferentia are the ductules leading from:
(1) Testicular lobules to rete testis
(2) Rete testis to vas deferens
(3) Vas deferens to epididymis
(4) Epididymis to urethra

26. Seminal plasma in human males is rich in
1. fructose and calcium
2. glucose and calcium
3. DNA and testosterone
4. ribose and potassium

27. The signals for parturition originate from
1. placenta only
2. placenta as well as developed foetus
3. oxytocin released from maternal pituitary
4. fully developed foetus only

28. The first movements of the foetus and appearance of hair on its head are usually observed during which month of pregnancy?
1. Fourth month
2. Fifth month
3. Sixth month
4. Third month

29. The second maturation division of the mammalian ovum occurs
1. Shortly after ovulation before the ovum makes entry into the Fallopian tube
2. until after the ovum has been penetrated by a sperm
3. until the nucleus of the sperm has fused with that of the ovum
4. in the Graafian follicle following the first maturation division

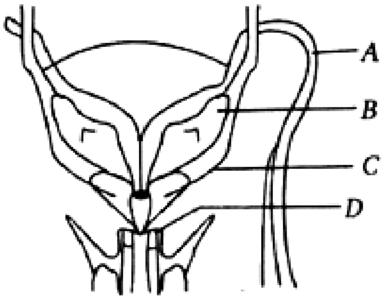
30. Which one of the following statements about human sperm is correct?
1. Acrosome has a conial pointed structure used for piercing and penetrating the egg, resulting in fertilization
2. The sperm lysins in the acrosome dissolve the egg envelop facilitating fertilization
3. Acrosome serves as a sensory structure leading the sperm towards the ovum
4. Acrosome serves no particular function

31. Foetal ejection reflex in human female is induced by
1. pressure exerted by aminotic fluid
2. release of oxytocin from pituitary
3. fully developed foetus and placenta
4. differentiation of mammary glands

32. Which one of the following is the most likely root cause why menstruation is not taking place in regularly cycling human female ?
1. Fertilization of the ovum
2. Maintenance of the hypertropical endometrial lining
3. Maintenance of high concentration of sex-hormones in the blood stream
4. Retention of well-developes corpus luteum

33. Seminal plasma in human is rich in
1. fructose, calcium and certain enzymes
2. fructose and calcium but has no enzymes
3. glucose and certain enzymes but has no calcium
4. fructose and certain enzymes but poor in calcium

34. Given below is a diagrammatic sketch of a portion of human male reproductive system. Select the correct set of the names of the parts labelled A, B, C, D



(a)	Ureter	Prostate	Seminal vesicle	Bulbourethral gland
(b)	Vas deferens	Seminal vesicle	Prostate	Bulbourethral gland
(c)	Vas deferens	Seminal vesicle trial gland	Bulboure	Prostate
(d)	Ureter	Seminal vesicle	Prostate	Bulbourethral gland

1. (a)
2. (b)
3. (c)
4. (d)

35. The correct sequence of spermatogenetic stages leading to the formation of sperms in a mature human testis is
1. spermatocyte-spermatogonia- spematid-sperms
2. spermatogonia-spermatocyte-spermatid-sperms
3. spermatid-spermatocyte-spermatogonia-sperms
4. spermatogonia-spermatid-spermatocyte-sperms

36. Which one of the following is the correct matching of the events occurring during menstrual cycle?
1. Ovulation-LH and FSH attain peak level and sharp fall in the secretion of progesterone
2. Proliferative phase-Rapid regeneration of myometrium and maturation of Graafian follicle
3. Development of corpus luteum-Secretory phase and increased secretion of progesterone
4. Menstruation-Breakdown of myometrium and ovum not fertilized

37.
In humans, at the end of the first meiotic division, the male germs cells differentiate into the
1. primary spermatocytes
2. secondary spermatocytes
3. spermatids
4. spermatogonia

38. Which part of ovary in mammals acts as an endocrine gland after ovulation ?
1. Graaffian follicle
2. Stroma
3. Germinal epithelium
4. Vitelline membrane

39. Withdrawal of which of the following hormones is the immediate cause of menstruation ?
1. Estrogen
2. FSH
3. FSH-RH
4. Progesterone

40. The part of Fallopian tube closest to the ovary is
(1) Isthmus
(2) Infundibulum
(3) Cervix
(4) Ampulla

41. Extrusion of second polar body from egg nucleus occurs:
1. simultaneously with first cleavage
2. after entry of sperm but before fertilization
3. after fertilization
4. before entry of sprm into ovum

42. Select the correct sequence for transport of sperm cells in male reproductive system.
1. Testis → Epididymis → Vasa efferentia → Vas deferens → Ejaculatory duct → Inguinal canal → Urethra → Urethral meatus
2. Testis → Epididymis → Vasa efferentia → Rete testis → Inguinal canal → Urethra
3. Seminiferous tubules → Rete testis → Vesa efferentia → Epididymus → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus
4. Seminiferous tubules → Vasa efferentia → Epididymis → Inguinal canal → Urethra

43. No new follicles develop in the luteal phase of the menstrual cycle because :
1. Follicles do not remain in the ovary after
2. FSH levels are high in the luteal phase
3. LH levels are high in the luteal phase
4. Both FSH and LH levels are low in the luteal phase

44. Meiotic division of the secondary oocyte is completed:
(1) At the time of copulation
(2) After zygote formation
(3) At the time of fusion of a sperm with an ovum
(4) Prior to ovulation

45. Match the follwing columns and select the correct option .

Column-l	Column-ll
(a) Placenta	(i) Androgens
(b) Zona pellucida	(ii) Human chroinic Gonadotropin
(c) Bulbo-urethral glands	(iii) Layer of the ovum
(d) Leydig cells	(iv) Lubrication of the Penis

	a	b	c	d
(1)	(i)	(iv)	(ii)	(iii)
(2)	(iii)	(ii)	(iv)	(i)
(3)	(ii)	(iii)	(iv)	(i)
(4)	(iv)	(iii)	(i)	(ii)

46. In human beings, at the end of 12 weeks (first trimester) of pregnancy, the following is observed:
1. Eyelids and eyelashes are formed
2. Most of the major organ systems are formed
3. The head is covered with fine hair
4. Movement of the fetus

47. Select the correct option of haploid cells from the following groups :
1. Primary oocyte, Secondary oocyte, Spermatid
2. Secondary spermatocyte, First polar body, Ovum
3. Spermatogonia, Primary spermatocyte, Spermatid
4. Primary spermatocyte, Secondary spermatocyte, Second polar body

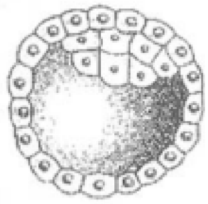
48. Match the following columns and select the correct option :

Column - I	**Column - II**
(a) Ovary	(i) Human chorionic Gonadotropin
(b) Placenta	(ii) Estrogen & Progesterone
(c) Corpus luteum	(iii) Androgens
(d) Leydig cells	(iv) Progesterone only

1. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
2. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
3. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
4. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

49. The secretory phase in the human menstrual cycle is also called :
1. Follicular phase lasting for about 6 days
2. Luteal phase and lasts for about 13 days
3. Follicular phase and lasts for about 13 days
4. Luteal phase and lasts for about 6 days

50. Identify the human development stage shown below as well as the related right place of its occurrence in a normal pregnant women and select the right option for the two together -



	Developmental stage	**Site of occurrence**
1.	Blastula	End part of Fallopian tube
2.	Blastocyst	Uterine wall
3.	8-celled morula	Starting point of Fallopian tube
4.	Late morula	Middle part of Fallopian tube

51. In human female, the blastocyst
1. gets implanted into uterus three days after ovulation
2. gets nutrition from uterine endometrial secretion only after implanation
3. gets implanted in endometrium by the trophoblast cells
4. forms placenta even before implantation

52. Secretions from which one of the following are rich in fructose, calcium and some enzymes -
1. Liver
2. Pancreas
3. Salivary glands
4. Male accessory glands

53. Signals from fully developed foetus and placenta ultimately lead to parturition which requires the release of -
1. Oxytocin from maternal pituitary
2. Oxytocin from foetal pituitary
3. Relaxin from placenta
4. Estrogen from placenta

54. What happens during fertilisation in humans after many sperms reach close to the ovum?
1. Only two sperms nearest the ovum penetrate zona pellucida
2. Secretions of acrosome helps one sperm enter cytoplasm of ovum through zona pellucida
3. All sperms except the one nearest to the ovum lose their tails
4. Cells of corona radiata trap all the sperms except one

55. About which day in a normal human menstrual cycle does rapid secretion of LH (popularly called LH-surge) normally occurs ?
1. 11^{th} day
2. 14^{th} day
3. 20^{th} day
4. 5^{th} day

56. If mammalian ovum fails to get fertilized, which one of the following is unlikely -
(1) Estrogen secretion further decreases
(2) Progesterone secretion rapidly declines
(3) Corpus luteum will disintegrate
(4) Primary follicle starts developing

57. Ovulation in the human female normally takes place during the menstrual cycle -
1. Just before the end of the secretory cycle
2. At the beginning of the proliferative phase
3. At the end of the proliferative phase
4. At the mid secretory phase

58. Which of the following hormones is not a secretion product of human placenta -
1. Prolactin
2. Estrogen
3. Progesterone
4. Human chorionic gonadotropin

59. Which induces the development of corpus Luteum :
1. LH
2. Oestrogen
3. FSH
4. LTH

60. After ovulation, follicles convert into :
1. Corpus luteum
2. Corpus albicans
3. Corpus cavernosa
4. Corpus callosum

61. Mainly which hormones control menstrual cycle in human beings : -
(1) FSH
(2) LH
(3) FSH, LH, Estrogen
(4) Progesteron

62. Which set is similar: -
1. Corpus luteum – Graafian follicles
2. Sebum-sweat
3. Bundle of his – Pace maker
4. Vita B_7 - Niacin

63. Receptors for sperm binding in mammals are present on:
1. Perivitelline space
2. Zona pellucida
3. Corona radiata
4. Vitelline membrane

64. Which of the following secretes the hormone, relaxin, during the later phase of pregnancy?
1. Foetus
2. Uterus
3. Graafian follicle
4. Corpus luteum

65. Which of these is not an important component of initiation of parturition in humans?
1. Release of Oxytocin
2. Release of Prolactin
3. Increase in estrogen and progesterone ratio
4. Synthesis of prostaglandins

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Reproductive Health

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Infertility	10
Hormonal Contraceptives, Emergency Contraception & Terminal Methods	9
Contraception: Barrier Methods & IUDs	8
Sexually Transmitted Infections	5
Introduction	3
Contraception: Natural Methods	2
Medical Termination of Pregnancy	1

1. The function of copper ions in copper releasing IUD's is:
1. They inhibit gametogenesis
2. They make uretus unsuitable for implantation
3. The inhibit ovulation
4. The suppress sperm motility and fertilizing capacity of sperms

2. In case of a couple where the male is having a very low sperm count, which technique will be suitable for fertilization?
1. Gamete intracytoplasmic fallopian transfer
2. Aritificial insemination
3. Intracytoplasmic sperm injection
4. Intrauterine transfer

3. Which of the following is hormone-releasing IUD?
1. LNG-20
2. Multiload-375
3. Lippes loop
4. Cu-7

4. Which of the following is incorrect regarding vasectomy?
1. No sperm occurs in seminal fluid
2. No sperm occurs in epididymis
3. Vasa deferentia is cut and tied
4. Irreversible sterility

5. Embryo with more than 16 blastomeres formed due to in vitro fertilisation is transferred into
1. uterus
2. fallopian tube
3. fimbriae
4. cervix

6.
Which of the following approaches does not give the defined action of contraceptive?

(a)	Intra uterine devices	Increase phagocytosis of sperms, suppress sperm motility and fertilizing capacity of sperms
(b)	Hormonal	Prevent/retard entry of sperms, prevent ovulation and fertilization
(c)	Vasectomy	Prevents spermatogenesis
(d)	Barrier methods	Prevent fertilisation

1. a
2. b
3. c
4. d

7.
In context of amniocentesis which of the following statements is incorrect?
1. it is used for prenatal sex determination
2. it can be used for detection of down syndrome
3. it can be used for detection of cleft palate
4. it is usually done when a women is between 14-16 weeks pregnant.

8. A childless couple can be assisted to have a child through a technique called GIFT. The full form of this technique is
1. Gamete Inseminated Fallopian Transfer
2. Gamete Intra Fallopian Transfer
3. Gamete Internal Fertilisation and Transfer
4. Germ Cell Internal Transfer

9.

Which of the following is not a sexually transmitted disease?
1. Syphilis
2. Acquired lmmuno Deficiency Syndrome (AIDS)
3. Trichomoniasis
4. Encephalitis

10.
Which of the following cannot be detected in a developing foetus by amniocentesis?

1. Sex of the foetus

2. Down syndrome

3. Jaundice

4. Klinefelter syndrome

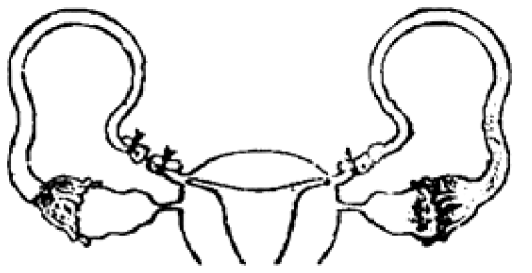
11. Tubectomy is method of sterilization in which
1. small part of fallopian tube is removed or tied up.
2. ovaries are removed surgically
3. small part of vas deferens is removed or tied up
4. uretuis is removed surgically

12. Which of the following is a hormone releasing intra Uterine Device (IUD) ?
1. Multiload 375
2. LNG - 20
3. Cervical cap
4. Vault

13. Assisted reproductive technology, IVF involves transfer of
1. Ovum into the fallopian tube.
2. Zygote into the fallopian tube.
3. Zygote into the uterus
4. Embryo with 16 blastomeres into the fallopian tube.

14. Artificial insemination mean
1. Transfer of sperms of husband to a test tube containing ova
2. Artificial introduction of sperms of a healthy donor into the vagina
3. Introduction of sperms of a healthy donor directly into the ovary
4. Transfer of sperms of healthy donor to a test tube containing ova

15. What is the figure given below showing in particular?



1. Ovarian cancer
2. Uterine cancer
3. Tubectomy
4. Vasectomy

16. The test-tube baby programme employs which one of the following techniques?
1. Intra Cytoplasmic Sperm Injection (ICSI)
2. Intra Uterine Insemination (IUI)
3. Gamete Intra Fallopian Transfer (GIFT)
4. Zygote Intra Fallopian Transfer(ZIFT)

17.
Medical Termination of Pregnancy (MTP) is considered safe up to have many weeks of pregnancy?
1. Twelve weeks
2. Eighteen weeks
3. Six weeks
4. Eight weeks

18. In vitro fertilization is a technique that involves transfer of which one of the following into the Fallopian tube?
1. Embryo only, up mto 8 cell stage
2. Either zygote or early embryo up to 8 cell stage
3. Embryo of 32 cell stage
4. Zygote only

19.
Which one of the following is the most widely accepted method of contraception in India, as present?
1. Tubectomy
2. Diaphragms
3. IUDs (Intra Uterine Devices)
4. Cervical caps

20. The permissible use of the technique amniocentesis is for
1. detecting sex of the unborn foetus
2. artificial insemination
3. transfer of enbryo into the uterus of a surrogate mother
4. detecting any genetic abnormality

21. Copper ions released from copper-releasing Intra Uterine Devices (IUDs)
1. make uterus unsuitable for implantation
2. increase phagocytosis of sperms
3. suppress sperm motility
4. prevent ovulation

22.
Given below are four methods(A-D) and their modes of action(1--4) in achieving contraception. Select their correct matching from the four options that follow

	Method		Mode of action
A.	The pill	1.	Prevents sperms reaching cervix
B.	Condom	2.	Prevents implantation
C.	Vasectomy	3.	Prevents ovulation
D.	Copper-T	4.	Semen contain no sperms

1. A-3 B-1 C-4 D-2
2. A-4 B-1 C-2 D-3
3. A-3 B-4 C-1 D-2
4. A-2 B-3 C-1 D-4

23.
Consider the statements given below regarding contraception and answer as directed thereafter
(A) Medical Termination of Pregnancy(MTP) during first trimester is generally safe
(B) Generally chances of conception are nil until the mother breast-feeds the infant up to two year
(C) Intrauterine devices like copper-T are effective contraceptives
(D) Contraception pills may be taken up to one week after coitus to prevent conception
Which two of the above statements are correct?
1. B, C
2. C, D
3. A, C
4. A, B

24. Which of the following contraceptive methods do involve a role of hormone?
1. Pills, Emergency contraceptives, barrier methods
2. Lactational amenorrhea, Pills, Emergency contraceptives
3. Barrier method, Lactational amenorrhea, pills
4. CuT, Pills, barrier methods

25. Select the hormone-releasing Intra-Uterine Devices.
1. Lippes Loop, Multitoad 375
2. Vaults, LNG-20
3. Multiload 375, Progestasert
4. Progestasert, LNG-20

26. Which of the following sexually transmitted diseases is not completely curable?
1. Chlamydiosis
2. Gonorrhoea
3. Genital warts
4. Genital herpes

27. Which of the following is a correct statement?
1. IUDs once inserted need not be replaced.
2. IUDs are generally inserted by the user herself.
3. IUDs increase phagocytosis of sperms in the uterus.
4. IUDs suppress gametogenesis.

28. Select the option including all sexually transmitted diseases.
1. Gonorrhoea, Malaria, Genital herpes
2. AIDS, Malaria, Filaria
3. Cancer, AIDS, Syphilis
4. Gonorrhoea, Syphilis, Genital herpes

29. In Which of the following techniques, the embryos are transferred to assist those females who cannot conceive?
1. GIFT and ZIFT
2. ICSI and ZIFT
3. GIFT and ICSI
4. ZIFT and IUT

30. Progestogens alone or in combination with estrogens can be used as a contraceptive in the form of -
1. Implants only
2. Injections only
3. Pills, injections and implants
4. Pills only

31. Which of the following STDs are not curable?
1. Genital herpes, Hepatitis B, HIV infection
2. Chlamydiasis, Syphilis, Genital warts
3. HIV, Gonorrhoea, Trichomoniasis
4. Gonorrhoea, Trichomoniasis, Hepatitis B

32. The technique called gamete intrafallopian transfer (GIFT) is recommended for those females :
1. who cannot provide suitable environment for fertilisation
2. who cannot produce an ovum
3. who cannot retain the foetus inside uterus
4. whose cervical canal is too narrow to allow passage for the sperms

33. Oral contraceptives contain :
1. Progesterone
2. LH
3. Oxytocin
4. Steroles

34. What is the work of progesteron which is present in oral contraceptive pills :
1. To inhibit ovulation
2. To check oogenesis
3. To check entry of sperms in to cervix & to make them inactive
4. To check sexual behaviour

35. Test tube baby means a baby born when
(1) It is developed in a test tube
(2) It is developed through tissue culture method
(3) The ovum is fertilised externally and thereafter implanted in the uterus
(4) It develops from a non-fertilized egg

36. Which one of the following is an example of Hormone releasing IUD?
(1) Cu 7
(2) Multiload 375
(3) CuT
(4) LNG 20

37. Veneral diseases can spread through:
(a) Using sterile needles
(b) Transfusion of blood from infected person
(c) Infected mother to foetus
(d) Kissing
(e) Inheritance
Choose the correct answer from the options given below.
(1) (b) and (c) only
(2) (a) and (c) only
(3) (a), (b) and (c)
(4) (b), (c) and (d)

38. Match List-I with List-II

List-I	List-II
(a) Vaults	I. Entry of sperm through the Cervix is blocked
(b) IUDs	II. Removal of Vas deferens
(c) Vasectomy	III. Phagocytosis of sperms within the Uterus
(d) Tubectomy	IV. Removal of the fallopian tube

Choose the correct answer from the options given below.
(a) (b) (c) (d)
1. (ii) (iv) (iii) (i)
2. (iii) (i) (iv) (ii)
3. (iv) (ii) (i) (iii)
4. (i) (iii) (ii) (iv)

Principles of Inheritance & Variations

(Expected Questions in NEET 2022: 4)

Subtopic Name	Number of Questions
Dominance Deviation from Mendel	15
Monohybrid Cross	14
Mendelian Disorders	12
Chromosomal Disorders	11
Introduction to Genetics	10
Linkage	6
Dihybrid Cross	5
Sex Determination	5
Sex Linked Inheritance	5
Mutation	4
Polygenic Inheritance & Pleiotropy	4
Recombination & Gene Mapping	3
Pedigree Analysis	2
Chromosomal Basis of Inheritance	2

1. Thalassemia and sickle cell anaemia are caused due to a problem in globin molecule synthesis. Select the correct statement
1. both are due to a quantitative defect in globin chain synthesis
2. Thalassemia is due to less synthesis of globin molecules
3. Sickle cell anemia is due to a quantitative problem of globin molecules
4. Both are due to a qualitative defect in globin chain synthesis

2. The genotypes of a husband and Wife are I^AI^B and I^Ai.
Among the blood types of their children, how many different genotypes and phenotypes are possible?
1. 3 genotypes; 4 phenotypes
2. 4 genotypes; 3 phenotypes
3. 4 genotypes; 4 phenotypes
4. 3 genotypes; 3 phenotypes

3.
Select the correct statement:
1. Franklin Stahl coined the term "linkage".
2. Punnett square was developed by a British scientist.
3. Spliceosomes take part in translation.
4. Transduction was discovered by S. Altman.

4.
Which of the following pairs is *wrongly* matched?
1. Starch synthesis in pea: Multiple alleles
2. ABO blood grouping: Co-dominance
3. XO type sex determination: Grasshopper
4. T.H Morgan: Linkage

5. A true breeding plant is
1. one that is able to breed on its own
2. produced due to cross-pollination among unrelated plants
3. near homozygous and produces offspring of its own kind
4. always homozygous recessive in its genetic constitution

6. Among the following characters, which one was not considered by Mendel in his experiments on pea?
1. Trichomes-Gladular or non-gladular
2. Seed-green or yellow
3. Pod-inflated or constricted
4. Stem-Tall or Dwarf

7. Which of the following characteristics represent 'Inheritance of blood groups' in humans?
a. Dominance
b. Co-dominance
c. Multiple allelism
d. Incomplete dominance
e. Polygenic inheritance
1. b, c and e
2. a, b and c
3. b, d and e
4. a, c and e

8.
A woman has an X-linked condition on one of her X chromosomes. This chromosome can be inherited by:-
1. Only daughters
2. Only sons
3. Only grandchildren
4. Both sons and daughters

9. Which one from those given below is the period for Mendel's hybridization experiments?
1. 1840-1850
2. 1857-1869
3. 1870-1877
4. 1856-1863

10.
A tall true breeding garden pea plant is crossed with a dwarf true breeding garden pea plant. When the F1 plants were selfed the resulting genotypes were in the ratio of
1. 1:2:1 :: Tall heterozygous : Tall homozygous : Drawf
2. 3:1 :: Tall : Dwarf
3. 3:1:: Dwarf : Tall
4. 1:2:1:: Tall homozygous : Tall heterozygous : Dwarf

11.
Pick out the correct statements.
I. Haemophilia is a sex-linked recessive disease.
II. Down’s syndrome is due to aneuploidy.
III. Phenylketonuria is an autosomal recessive gene disorder.
IV. Sickle cell anaemia is an X-linked recessive gene disorder
1. II and IV are correct
2. I, III and IV are correct
3. I, II and III are correct
4. I and IV are correct

12.
In a test cross involving F1 dihybrid flies, more parental-type offspring were produced than the recombinant type offspring. This indicates
1. chromosomes failed to separate during meiosis
2. the two genes are linked and present on the same chromosome
3. both of the characters are controlled by more than one gene
4. the two genes are located on two different chromosomes

13.
Match the terms in Column I with their description in Column II and choose the correct option.

Column I	Column II
A. Dominance	1. Many govern a single character
B. Codominance	2. In a heterozygous organism only one allele expresses itself
C. Pleiotropy	3. In a heterozygous organism both alleles express themselves fully
D. Polygenic inheritance	4. A single gene influences many characters

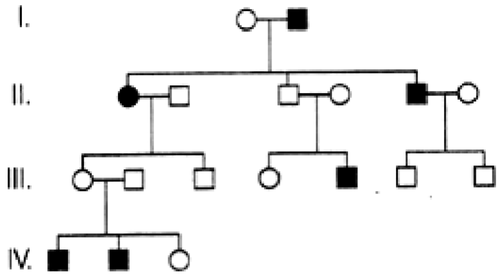
1. A-2 B-3 C-4 D-1
2. A-4 B-1 C-2 D-3
3. A-4 B-3 C-1 D-2
4. A-2 B-1 C-4 D-3

14. A cell at telophase stage is observed by a student in a brought from the field. He tells his teacher that this cell is not like other cells at telophase stage. There is no formation of cell plate and thus the cell is containing more number of chromosomes as compared to other dividing cells. This would result in
1. polyploidy
2. somaclonal variation
3. polyteny
4. aneuploidy

15.
Which of the following most appropriately describes haemophilia?
1. X-linked recessive gene disorder
2. Chromosomal disorder
3. Dominant gene disorder
4. Recessive gene disorder

16. The term "linkage" was coined by
1. T.H. Morgan
2. T.Boveri
3. G.Mendel
4. W.Sutton

17. In the following human pedigree, the filled symbols represent the affected individuals. Identify the type of given pedigree



1. Autosomal dominant
2. X-linked recessive
3. Autosomal recessive
4. X-linked dominant

18. In his classic experiments on pea plants Mendel did not use
1. Seed color
2. Pod length
3. Seed shape
4. Flower position

19. A pleiotropic gene
1. Is expressed only in primitive plants
2. Is a gene evolved during Pliocene
3. Controls a trait only in combination with another gene
4. Controls multiple traits in an individual

20. How many pairs of contrasting characters in pea plants were studied by Mendel in his experiments?
1. Five
2. Six
3. Eight
4. Seven

21.

Alleles are
1. different phenotype
2. true breeding homozygotes
3. different molecular forms of a gene
4. heterozygotes

22.
If two persons with' AB' blood group marry and have the sufficiently large number of children, these children could be classified as 'A' blood group: 'AB' blood group: 'B' blood group in 1: 2: 1 ratio. The modern technique of protein electrophoresis reveals the presence of both' A' and 'B' type proteins in 'AB' blood group individuals. This is an example of:

1. Incomplete dominance

2. Partial dominance

3. Complete dominance

4. Codominance

23.
Which Mendelian idea is depicted by a cross in which the F_1 generation resembles both the parents?
1. law of dominance
2. inheritance of one gene
3. co-dominance
4. incomplete dominance

24. A human female with Turner's syndrome:
1. has 45 chromosomes with XO
2. has one additional chromosome.
3. exhibit male character
4. is able to produce children with normal husband.

25. Which of the following statements is not true of two genes that show 50% recombination frequency?
1. The genes are tightly linked
2. The genes shows independent assortment.
3. If the genes are present on the same chromosome, they undergo more than one crossing over in every meiosis.
4. The genes may be on different chromosomes.

26. The incorrect statement with regard to Haemophilia is :
1. It is a recessive disease
2. It is a dominant disease
3. A single protein involved in the clotting of blood is affected
4. it is a sex-linked disease.

27. F_2 generation in a Mendelian cross showed that both genotypic and phenotypic ratios are same as 1: 2: 1. It represents a case of
1. Co - dominance
2. Dihybrid crosses
3. Monohybrid crosses with complete dominane
4. Monohybrid cross with incomplete dominance

28. Which one of the following cannot be explained on the basis of Mendel's Law of Dominance?
(1) The discrete unit controlling a particular character is called a factor
(2) Out of one pair of factors one is dominant, and the other recessive
(3) Alleles do not show any blending and both the characters recover as such in F_2 generation
(4) Factors occur in pairs

29.
Which one of the following conditions correctly describes the manner of determining the sex in the given example?
1. XO type of sex chromosomes determine male sex in grasshopper
2. XO condition in humans as found in Turner syndrome, determines female sex
3. Homozygous sex chromosomes (XX) produce male in Drosophila
4. Homozygous sex chromosomes (ZZ) determine female sex in birds.

30. The genotype of a plant showing the dominant phenotype can be determined by
1. test cross
2. dihybrid cross
3. pedigree analysis
4. back cross

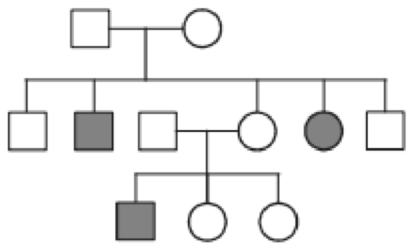
31. ABO blood groups in humans are controlled by the gene I. It has three alleles – I^A I^B and i. Since there are three different alleles, six different genotypes are possible. How many phenotypes can occur?
1. Three
2. One
3. Four
4. Two

32. Select the correct statement from the ones given below with respect to dihybrid cross –
(1) Tightly linked genes on the same chromosome show higher recombinations
(2) Genes far apart on the same chromosome show very few recombinations
(3) Genes loosely linked on the same chromosome show similar recombinations as the tightly linked ones
(4) Tightly linked genes on the same chromosome show very few recombination

33. Sickle cell anaemia is:
1. an autosomal linked dominant trait
2. caused by substitution of valine by glutamic acid in the globin chain of haemoglobin
3. caused by a change in base pair of DNA
4. characterized by elongated sickle like RBCs with a nucleus

34. Point mutation involves
1. insertion
2. change in single base pair
3. duplication
4. deletion

35. Study the pedigree chart given below



What does it show?
1. Inheritance of a sex-linked inborn error of metabolism
2. Inheritance of a condition like phenylketonuria as an autosomal recessive trait
3. The pedigree chart is wrong as this is not possible
4. Inheritance of a recessive sex-linked disease like haemophilia

36.
Which one of the following condition in humans is correctly matched with its chromosomal abnormality/linkage?
1. Klinefelter's syndrome-44 autosomes + XXY
2. Colourblindness – Y-linked
3. Erythroblastosis foetalis-- X-linked
4. Down syndrome--44 autosomes + XO

37. Inheritance of skin colour in humans is an example of:
1. chromosomal aberration
2. point mutation
3. polygenic inheritance

38. Two genes R and Y are located very close on the chromosomal linkage map of maize plant. When RRYY and rryy genotypes are hybridized, then F_2 segregation will show:
1. higher number of the recombinant types
2. segregation in the expected 9:3:3:1 ratio
3. segregation in 3:1 ratio
4. higher number of the parental types

39. A common test to find the genotype of a hybrid is by:
1. crossing of one F_2 progency with male parent
2. crossing of one F_2 progency with female parent
3. studying the sexual behaviour of F_1 progenies
4. crossing of one F_1 progeny with male parent

40. In pea plants, yellow seeds are dominant to green. If a heterozygous yellow seeded plant is crossed with a green seeded plant, what ratio of yellow and green seeded plants would you expect in F_1generation ?
1. 50:50
2. 9:1
3. 1:3
4. 3:1

41. Which one of the following is an example of polygenic inheritance?
1. Flower colour in Mirabilis jalapa
2. Production of male honey bee
3. Pod shape in garden pea
4. Skin colour in humans

42. In Mendel's experiments with garden pea, round seed shape (RR) was dominant over wrinkled seeds (rr), yellow cotyledon (YY) was dominant over green cotyledon (yy). What are the expected phenotypes in the F_2 generation of the cross RRYY x rryy ?
1. Only round seeds with green cotyledons
2. Only wrinkled seeds with yellow cotyledons
3. Only wrinkled seeds with green cotyledons
4. Round seeds with yellow cotyledons and wrinkled seeds with yellow cotyledons

43. Test cross involves:
1. crossing between two genotypes with recessive trait
2. crossing between two F1 hybrids
3. crossing the F1 hybrid with a double recessive genotype
4. crossing between two genotypes with the trait

44. In Antirrhinum (Snapdragon), a red flower was crossed with a white flower and in F_1 generation, pink flowers were obtained. When pink flowers were selfed, the F_2 generation showed white, red and pink flowers. Choose the incorrect statement from the following:
1. Law of Segregation does not apply in this experiment
2. This experiment does not follow the Principle of Dominance
3. Pink colour in F_1 is due to incomplete dominance
4. Ratio of F_2 is 1/4(red):2/4(pink):1/4(white)

45. Select the incorrect statement.
1. Human males have one of their sex-chromosome much shorter than the other.
2. Male fruit fly is heterogametic.
3. In male grasshoppers, 50% of sperms have no sex-chromosome.
4. In domesticated fowls, sex of progeny depends on the type of sperm rather than egg.

46. The frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes was explained by:
1. Sutton Boveri
2. T.H. Morgan
3. Gregor J. Mendel
4. Alfred Sturtevant

47. What is the genetic disorder in which an individual has an overall masculine development gynaecomastia, and is sterile?
1. Down's syndrome
2. Turner's syndrome
3. Klinefelter's syndrome
4. Edward syndrome

48. Match the items of Column - I with Column - II :

	Column-I		Column-II
(a)	XX-XO method of sex determination	(i)	Turner's syndrome
(b)	XX-XY method of sex Determination	(ii)	Female heterogametic
(c)	Karyotype-45	(iii)	Grasshopper
(d)	ZW-ZZ method of Sex Determination	(iv)	Female homogametic

Select the correct option from the following:
1. (a) - (ii), (b)- (iv), (c)- (i), (d)-(iii)
2. (a) - (i), (b)- (iv), (c)- (ii), (d)-(iii)
3. (a) - (iii), (b)- (iv), (c)- (i), (d)-(ii)
4. (a) - (iv), (b)- (ii), (c)- (i), (d)-(iii)

49. In a marriage between male with blood group A and female with blood group B, the progeny had either blood group AB or B. What could be the possible genotype of parents?
1. I^A i (Male) ; I^B I^B (Female)
2. I^A I^A (Male) ; I^B I^B (Female)
3. I^A I^A (Male) ; I^B i (Female)
4. I^A i (Male) ; I^B i(Female)

50. In which genetic condition, each cell in the affected person, has three sex chromosomes XXY?
1. Thalassemia
2. Klinefelter's Syndrome
3. Phenylketonuria
4. Turner's Syndrome

51. The production of gametes by the parents the formation of zygotes, the F_1 and F_2 plants can be understood using
1. Pie diagram
2. A pyramid diagram
3. Punnett square
4. Wenn diagram

52. Experimental verification of the chromosomal theory of inheritance was done by:
(1) Sutton
(2) Boveri
(3) Morgan
(4) Mendel

53. Select the correct match
1. Phenylketonuria - Autosomal dominant trait
2. Sickle cell anemia - Autosomal recessive trait chromosome - 11
3. Thalassemia - X linked
4. Haemophilia - Y linked

54. Identify the wrong statement with reference to the gene 'I' that controls ABO blood groups.
1. A person will have only two of the 3 alleles.
2. When I^A and I^B are present together, they express same type of sugar.
3. Allele 'i' does not produce any sugar.
4. The gene (I) has three alleles.

55. How many true-breeding pea plant varieties did Mendel select as pairs, which were similar except in one character with contrasting traits?
1. 2
2. 14
3. 6
4. 4

56. Chromosomal theory of inheritance was proposed by :
1. Sutton and Boveri
2. Bateson and Punnet
3. T. H. Morgan
4. Watson and Crick

57. The number of contrasting characters studied by Mendel for his experiments was :
1. 14
2. 4
3. 2
4. 7

58. The best example for pleiotropy is:-
1. Skin color
2. Phenylketonuria
3. Colour Blindness
4. ABO Blood group

59. A test cross is carried out to:
1. Predict whether two traits are linked
2. Assess the number of alleles of a gene
3. Determine whether two species or varieties will breed successfully
4 Determine the genotype of a plant at F_2

60. In antirrhinum two plants with pink flowers were hybridized. The F_1 plants produced red, pink and white flowers in the proportion of 1 red, 2 pink and 1 white. What could be the genotype of the two plants used for hybridization ? Red flower colour is determined by RR, and White by rr genes -
1. RR
2. Rr
3. rr
4. rrrr

61. A cross in which an organism showing a dominant phenotype in crossed with the recessive parent in order to know its genotype is called -
1. Back cross
2. Test cross
3. Dihybrid cross
4. Monohybrid cross

62. ABO blood grouping is controlled by gene I which has three alleles and show co-dominance. There are six genotypes. How many phenotypes in all are possible -
1. three
2. four
3. five
4. six

63. The fruit fly Drosophila melanogaster was found to be very suitable for experimental verification of chromosomal theory of inheritance by Morgan and his collegues because –
1. a single mating produces two young flies
2. smaller female is easily reconisable from large male
3. it completes life cycle in about two weeks
4. it reproduces parthenogenetically

64. Which one of the following conditions of the zygotic cell would lead to the birth of a normal human female child ?
1. one X and one Y chromosome
2. two X chromosomes
3. only one Y chromosome
4. only one X chromosome

65. Test cross in plants or in Drosophila involves crossing :
1. between two genotypes with dominant trait
2. between two genotypes with recessive trait
3. between two F_1 hybrids
4. the F_1 hybrid with a double recessive genotype

66. In order to find out the different types of gametes produced by a pea plants having the genotype AaBb, it should be crossed to a plant with the genotype -
(1) AaBb
(2) aabb
(3) AABB
(4) aaBB

67. Which of the following is not a hereditary disease -
(1) Haemophilia
(2) Cretinism
(3) Cystic fibrosis
(4) Thalasasemia

68. Haemophilia is more commonly seen in human males than in human females because -
(1) This disease is due to a Y-linked recessive mutation
(2) This disease is due to an X-linked recessive mutation
(3) This disease is due to an X-linked dominant mutation
(4) A greater proportion of girls die in infancy

69. A women with 47 chromosomes due to three copies of chromosome 21 is characterized by -
(1) Turner syndrome
(2) Down syndrome
(3) Superfemaleness
(4) Triploidy

70. A man and a women, who do not show any apparent signs of a certain inherited disease, have seven children (2 daughter and 5 sons). Three of the sons suffer from the given disease but none of the daughters are affected. Which of the following mode of inheritance do you suggest for this disease
(1) Sex-limited recessive
(2) Autosomal dominant
(3) Sex-linked recessive
(4) Sex-linked dominant

71. If a female having gene for haemophilia and colour-blindness on its one X-chromosome marries a normal male then what are the chances in their offsprings :
1. 50% son diseased and 50% normal
2. All normal offsprings
3. 100% daughters are carrier
4. 100% son diseased

72. Reason for trisomy in Down's syndrome is
1. Non-disjunction during sperm formation
2. Non-disjunction during egg formation
3. Non-disjunction at the time of egg or sperm formation
4. Addition of one extra chromosome during mitosis

73. Mental retardness in man occur due to :
1. Loss of one X chromosome
2. Addition of one X chromosome
3. Slight growth in Y
4. Overgrowth in Y

74. ABO blood group have :
1. Two codominant and one recessive allele
2. Two codominant and two recessive allele
3. Two incompletely dominant genes
4. Two pseudo alleles

75. A normal woman, whose father was colour-blind is married to a normal man. The sons would be :-
(1) 50% colour-blind
(2) All normal
(3) All colour-blind
(4) 75 % colour-blind

76. Lack of independent assortment of two genes A and B in fruit fly Drosophila is due to :-
(1) Recombination
(2) Linkage
(3) Crossing over
(4) Repulsion

77. In a plant red fruit (R) is dominant over yellow fruit (r) and tallness (T) is dominant over shortness (t). If a plant with RRTt genotype is crossed with a plant that is rrtt
(1) 50% will be tall with red fruit
(2) 75% will be tall with red fruit
(3) All the offspring will be tall with red fruit
(4) 25% will be tall with red fruit

78. What change occurs by changing one base in DNA :
1. Always a change of one amino acid in protein
2. Change in complex sequence of amino acid
3. Always a change in property of protein
4. Does not necessarily change the phenotype

79. The allele for tallness is dominant over that of dwarfness. This is called :
1. Law of independent assortment
2. Law of segregation
3. Law of unit character
4. Law of dominance

80. What ratio is expected in offsprings if father is colour blind and mother's father was colour blind:
1. 50% daughter – colour blind
2. All the sons are colour blind
3. All the daughters colour blind
4. All the sons are normal

81. Fraternal twin one baby is haemophilic while baby's brother is normal then which statement is true :
1. Baby is male
2. Baby is female
3. Mother is heterozygous
4. Mother is homozygous

82. Minor change in gene's structure is called :
1. Reversible mutation
2. Point mutation
3. Forward mutation
4. Back ward mutation

83. According to mendelism which character is showing dominance :
1. Terminal position of flower
2. Green colour in seed coat
3. Wrinkled seed
4. Green pod colour

84. Which of the following is correct match -
(1) Down Syndrome = 21st Chromosome
(2) Sickel cell anaemia = X – Chromosome
(3) Haemophilia = Y – Chromosome
(4) Parkinson Disease = X & Y Chromosome

85. Change in sequence of nucleotide in DNA is called as -
(1) Mutagen
(2) Mutation
(3) Recombination
(4) Translation

86. Which of the following is the example of sex linked disease : -
(1) AIDS
(2) Colour blindness
(3) Syphilis
(4) Gonorrhoea

87. A gene said to be dominant if : -
(1) It express it's effect only in homozygous stage
(2) It expressed only in heterozygous condition
(3) It expressed both in homozygous and heterozygous condition
(4) It never expressed in any condition

88. Mangolian idiots are due to trisomy in 21^{st} chromosome is called :
1. Down's syndrome
2. Turner's syndrome
3. Kleinfelters syndrome
4. Triplex syndrome

89. In Drosophila the XXY condition leads to femaleness whereas in human beings the same condition leads to Klienfelter's syndrome in male. It proves :
1. In human beings Y chromosome is active in sex determination
2. Y chromosome is active in sex determination in both human beings and Drosophila
3. In Drosophila Y-chromosome decides femaleness
4. Y chromosome of man have genes for syndrome

90. The linkage map of X-chromosome of fruitfly has 66 units, with yellow body gene (y) at one end and bobbed hair (b) gene at the other end. The recombination frequency between these two genes (y and b) should be : -
(1) 60%
(2) > 50%
(3) ≤ 50%
(4) 100%

91. Which one of the following traits of garden pea studied by Mendel was a recessive feature : -
(1) Axial flower position
(2) Green seed colour
(3) Green pod colour
(4) Round seed shape

92. When a cluster of genes show linkage behaviour they : -
(1) Do not show a chromosome map
(2) Show recombination during meiosis
(3) Do not show independent assortment
(4) Induce cell division

93. Genetic Map is one that : -
(1) Establishes sites of the genes on a chromosome
(2) Establishes the various stages in gene evolution
(3) Shows the stages during the cell division
(4) Shows the distribution of various species in a region

94. Independent assortment of genes does not takes place when : -
1. Genes are located on homologous chromosomes
2. Genes are linked and located on same chromosome
3. Genes are located on non-homologous chromosome
4. All the above

95. When dominant and recessive alleles express itself together it is called : -
1. Co-dominance
2. Dominance
3. Amphidominance
4. Pseudo dominance

96. Probability of four son to a couple is : -
1. $\frac{1}{4}$
2. $\frac{1}{8}$
3. $\frac{1}{16}$
4. $\frac{1}{32}$

97. Sickle cell anaemia is due to : -
1. Change of Amino Acid in α-chain of Haemoglobin
2. Change of Amino Acid in β-chain of Haemoglobin
3. Change of Amino acid in both α and β chain of Haemoglobin
4. Change of Amino acid either α or β chain of Haemoglobin

98. The production of gametes by the parents, formation of zygotes, the F_1 and F_2 plants, can be understood from a diagram called:
(1) Punnett square
(2) Net square
(3) Bullet square
(4) Punch square

99. In a cross between a male and female, both heterozygous for sickle cell anaemia gene, what percentage of the progeny will be diseased?
1. 25%
2. 100%
3. 50%
4. 75%

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Molecular Basis of Inheritance

(Expected Questions in NEET 2022: 6)

Subtopic Name	Number of Questions
Transcription	25
DNA Double Helix	17
Gene Regulation	16
Genetic Code	14
The DNA	8
Translation	8
DNA Fingerprinting	7
DNA Replication	7
Search for Genetic Material	6
Human Genome Project	4
DNA Packaging	3
DNA vs RNA as Genetic Material	2

1. The experimental proof for semiconservative replication of DNA was first shown in a
1. Fungus
2. Bacterium
3. Plant
4. Virus

2. Select the *correct* match:
1. Alec Jeffreys – Streptococcus pneumoniae
2. Alfred Hershey and Martha Chase – TMV
3. Matthew Meselson and F. Stahl – Pisum sativum
4. Francois Jacob and Jacques Monod – Lac operon

3. Select the *correct* Match:
1. Ribozyme - Nucleic acid
2. F2 × Recessive parent - Dihybrid cross
3. T.H. Morgan - Transduction
4. G. Mendel - Transformation

4. Taylor conducted the experiments to prove semi-conservative mode of chromosome replication on
1. Vinca rosea
2. Vicia faba
3. Drosophila melanogaster
4. E. Coli

5. The equivalent of a structural gene is
1. muton
2. cistron
3. operon
4. recon

6. Which of the following rRNA acts as structural RNA as well as ribozyme in bacteria?
1. 5S rRNA
2. 18S rRNA
3. 23S rRNA
4. 5.8S rRNA

7. The final proof for DNA as the genetic material came from the experiments of:
1. Hershey and chase
2. Avery, McLeod and McCarty
3. Har Gobind Khorana
4. Griffith

8. If there are 999 bases in an RNA that codes for a protein with 333 amino acids, and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered?
1. 11
2. 33
3. 333
4. 1

9.
AGGTATCGCAT is a sequence from the coding strand of a gene. What will be the corresponding sequence of the transcribed mRNA?
1. AGGUAUCGCAU
2. UGGTUTCGCAT
3. ACCUAUGCGAU
4. UCCAUAGCGUA

10.
All of the following are part of an operon except:-
1. an operator
2. structural genes
3. an enhancer
4. a promoter

11. A molecule that can act as a genetic material must fulfil the traits given below, except
1. it should be able to express itself in the form of 'Mendelian characters'
2. it should be able to generate its replica
3. it should be unstable structurally and chemically
4. it should provide the scope for slow changes that are required for evolution

12. DNA-dependent RNA polymerase catalyses transcription on one strand of the DNA which is called the
1. template strand
2. coding strand
3. alpha strand
4. anti strand

13. The association of histone H1 with a nucleosome indicates:
1. DNA replication is occurring
2. The DNA is condensed into a chromatin fibre
3. The DNA double helix is exposed
4. Transcription is occurring

14.
Which of the following s required as inducer (s) for the expression of lac operon ?
1. galactose
2. lactose
3. lactose and galactose
4. glucose

15.
Which one of the following is the starter codon?
1. UGA
2. UAA
3. UAG
4. AUG

16. Which one of the following is not applicable to RNA?
1. Complementary base pairing
2. 5' phosphoryl and 3' hydroxyl ends
3. Heterocyclic nitrogenous bases
4. Chargaff's rule

17. Satellite DNA is important because it
1. Codes for proteins needed in cell cycle
2. Shows high degree of polymorphism in population and also the same degree of polymorphism in an idividual which is inheritable from parents to children
3. Does not code for proteins and is same in all members of the population
4. Codes for enzymes needed for DNA replication.

18. Which one of the following is wrongly matched?
1. Transcription- Writing information from DNA to t-RNA
2. Translation- Using information in m-RNA to make protein
3. Repressor protein- Binds to a operator to stop enzyme synthesis
4. Operon- Structural genes, operator and promoter

19. Transformation was discovered by :
1. Meseson and Stahl
2. Hershey and chase
3. Griffith
4. Waston and crick

20.
The diagram shows an important concept in the genetic implication of DNA. Fill in the blanks A to C

$$\text{DNA} \xrightarrow{A} \text{mRNA} \xrightarrow{B} \text{Protein} \xrightarrow[C]{\text{Proposed by}}$$

1. A - translation B - transcription C - Erevin Chargaff

2. A -transcription B - translation C - Francis Crick

3. A - translation B - extension C - Rosalind Franklin

4. A - transcription B - replication C - James Watson

21.
Select the correct option:

	Directionof RNA synthesis	Direction of reading of the template DNA strand
(1)	5' - 3'	3' - 5'
(2)	3' - 5'	5' - 3'
(3)	5' - 3'	5' - 3'
(4)	3' - 5'	3' - 5'

1. 1
2. 2
3. 3
4. 4

22. Commonly used vectors for human genome sequencing are:
1. T-DNA
2. BAC and YAC
3. Expression Vectors
4. T/A cloning Vectors

23. Which enzyme/s will be produced in a cell in which there is a nonsense mutation in the lac Y gene?
1. Lactose permease
2. Transacetylase
3. Lactose permease and transacetylase
4. β- galactosidase

24. Removal of RNA polymerase III from nucleoplasm will affect the synthesis of
1. tRNA
2. hnRNA
3. mRNA
4. rRNA

25. PCR and Restriction Fragment Length Polymorphism are the methods for
1. Study of enzymes
2. Genetic transformation
3. DNA sequencing
4. Genetic fingerprinting

26. Which one of the following is not a part of a transcription unit in DNA?
1. The inducer
2. A terminator
3. A promoter
4. The structural gene

27. If one strand of DNA has the nitrogenous base sequence as ATCTG, what would be the complementary RNA strand sequence?
1. TTAGU
2. UAGAC
3. AACTG
4. ATCGU

28. Removal of introns and joining of exons in a defined order during transcription is called
1. Looping
2. Inducing
3. Slicing
4. Splicing

29.
What are those structures that appear as 'beads-on-string' in the chromosomes when viewed under electron microscope?
1. Nucleotides
2. Nucleosomes
3. Base pairs
4. Uracil

30.
Which one of the following also acts as a catalyst in a bacterial cell?
1. sn RNA
2. hn RNA
3. 23 S rRNA
4. 5 S rRNA

31. Select the two correct statements out of the four (a-d) given below about lac operon.
(a) Glucose or galactose may bind with the repressor and inactivate it
(b) In the absence of lactose the repressor binds with the operator region
(c) The z-gene codes for permease
(d) This was elucidated by Francois Jacob and Jacque Monod
The correct statements are :
(1) (b) and (c)
(2) (a) and (c)
(3) (b) and (d)
(4) (a) and (b)

32. The one aspect which is not a salient feature of genetic code, is its being
1. degenerate
2. ambigous
3. universal
4. specific

33. DNA or RNA segment tagged with a radioactive molecule is called
1. vector
2. probe
3. clone
4. plasmid

34. Satellite DNA is useful tool in –
(1) Organ transplantation
(2) Sex determination
(3) Forensic science
(4) Genetic engineering

35. Removal of introns and joining the exons in a defined order in a transcription unit is called
1. splicing
2. tailing
3. transformation
4. capping

36. Semiconservative replication of DNA was first demonstrated in
1. Drosophila melanogaster
2. Escherichia coli
3. Streptococcus pneumoniae
4. Salmonella typhimurium

37. What is not true for genetic code?
1. A codon in mRNA is read in non-contiguous fashion
2. It is nearly universal
3. It is degenerate
4. It is unambiguous

38.
In the DNA molecule
1. the total amount of purine nucleotides and pyrimidine nucleotides is not always equal
2. there are two strands, which run parallel in the 5 -+ 3 direction
3. the proportion of adenine in relation to thymine. varies with the organism
4. there are two strands, which run antiparallel - one in 5' → 3' direction and other in 3'→ 5'

39.
Which one of the following pairs of codons is correctly matched with their function or the signal for the particular amino acid?
1. GUU, GCU - Alanine
2. UAG, UGA - Stop
3. AUG, ACG - Start/methionine
4. UUA, UCA -Leucine

40.
Which one of the following pairs of nitrogenous bases of nucleic acids is wrongly matched with the category mentioned against it?
1. Thymine, Uracil - Pyrimidines
2. Uracil, Cytosine - Pyrimidines
3. Guanine, Adenine - Purines
4. Adenine, Thymine - Purines

41. The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells. How is this DNA accommodated?
1. Deletion of non-essential genes
2. Super-coiling in nucleosomes
3. DNAse digestion
4. Through elimination of repetitive DNA

42. Differentiation of organs and tissues in a developing organism is associated with:
1. developmental mutations
2. differential expression of genes
3. lethal mutations
4. deletion of gene

43. The two polynucleotide chains in DNA are:
1. parallel
2. discontinuous
3. antiparallel
4. semiconservative

44. Amino acid sequence, in protein synthesis is decided by the sequence of:
1. t-RNA
2. m-RNA
3. c-DNA
4. r-RNA

45. One turn of the helix in a B-form DNA is approximately:
1. 20 nm
2. 0.34 nm
3. 3.4 nm
4. 2 nm

46. Antiparallel strands of a DNA molecule means that:
1. one strand turns anti-clockwise
2. the phosphate groups of two DNA strands, at their ends, share the same position
3. the phosphate groups at the start of two DNA strands are in opposite position(pole)
4. one strand turns clockwise

47. Match the following genes of Lac operon with their respective products :

(a) i gene (i) β-galactosidase

(b) Z gene (ii) Permease

(c) A gene (iii) Repressor

(d) Y gene (iv) transacetylase

Select the correct option

	(a)	(b)	(c)	(d)
1.	(iii)	(iv)	(i)	(ii)
2.	(i)	(iii)	(ii)	(iv)
3.	(iii)	(i)	(ii)	(iv)
4.	(iii)	(i)	(iv)	(ii)

48.
Purines found both in DNA and RNA are:
1. Cytosine and thymine
2. Adenine and thymine
3. Adenine and guanine
4. Guanine and cytosine

49. Under which of the following conditions will there be no change in the reading frame of the following mRNA?
5'AACAGCGGUGCUAUU 3'
1. Deletion of GGU from 7th, 8th and 9th positions
2. Insertion of G at 5th position
3. Deletion of G from 5th position
4. Insertion of A and G at 4th and 5th positions respectively

50. Expressed Sequence Tags (ESTs) refers to:
1. Novel DNA sequence
2. Genes expressed as RNA
3. Polypeptide expression
4. DNA polymorphsim

51. What will be the sequence of mRNA produced by the following stretch of DNA?
3' ATGCATGCATGCATG 5' TEMPLATE STRAND
5' TACGTACGTACGTAC 3' CODING STRAND
1. 3' AUGCAUGCAUGCAUG 5'
2. 5' UACGUACGUACGUAC 3'
3. 3' UACGUACGUACGUAC 5'
4. 5' AUGCAUGCAUGCAUG 3'

52. Match the following RNA polymerases with their transcribed products:

	Column-I		Column-II
(a)	RNA polymerase I	(i)	tRNA
(b)	RNA polymerase II	(ii)	rRNA
(c)	RNA polymerase III	(iii)	hnRNA

Select the correct option from the following:
1. (a)-(i), (b)-(iii), (c)-(ii)
2. (a)-(i), (b)-(ii), (c)-(iii)
3. (a)-(ii), (b)-(iii), (c)-(i)
4. (a)-(iii), (b)-(ii), (c)-(i)

53. From the following, identify the correct combination of salient features of Genetic Code
1. Universal, Non-ambiguous,Overlapping
2. Degenerate, Overlapping, Commaless
3. Universal, Ambiguous, Degenerate
4. Degenerate, Non-overlapping, Non ambiguous

54. Which scientist experimentally proved that DNA is the sole genetic material in bacteriophage ?
1. Beadle and Tatum
2. Messelson and Stahl
3. Hershey and Chase
4. Jacob and Monod

55. In the process of transcription in Eukaryotes, the RNA polymerase I transcribes -
1. mRNA with additional processing, capping and tailing
2. tRNA, 5 S rRNA and snRNAs
3. rRNAs - 28 S, 18 S and 5.8 S
4. Precursor of mRNA, hnRNA

56. What initiation and termination factors are involved in transcription in prokaryotes ?
1. σ and ρ, respectively
2. α and β, respectively
3. β and γ, respectively
4. α and σ, respectively

57. Name the enzyme that facilitates opening of DNA helix during transcription.
1. DNA helicase
2. DNA polymerase
3. RNA polymerase
4. DNA ligase

58. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6×10^9 bp, then the length of the DNA is approximate:
1. 2.5 meters
2. 2.2 meters
3. 2.7 meters
4. 2.0 meters

59. Which of the following statements is correct?
1. Adenine pairs with thymine through one H-bond
2. Adenine pairs with thymine through three H-bonds
3. Adenine does not pair with thymine
4. Adenine pairs with thymine through two H-bonds

60. Choose the correct pair from the following :

1.	Polymerases	-	Break the DNA into fragments
2.	Nucleases	-	Separate the two strands of DNA
3.	Exonucleases	-	Make cuts at specific positions within DNA
4.	Ligases	-	Join the two DNA molecules

61. The first phase of translation is:
1. Recognition of DNA molecule
2. Aminoacylation of tRNA
3. Recognition of an anti-codon
4. Binding of mRNA to ribosome

62. The term 'Nuclein' for the genetic material was used by :
1. Franklin
2. Meischer
3. Chargaff
4. Mendel

63. In the polynucleotide chain of DNA, a nitrogenous base is linked to the –OH of:
1. 2'C pentose sugar
2. 3'C pentose sugar
3. 5'C pentose sugar
4. 1'C pentose sugar

64. E.coli has only 4.6×10^6 base pairs and completes the process of replication within 18 minutes; then the average rate of polymerization is approximate-
1. 2000 base pairs/second
2. 3000 base pairs/second
3. 4000 base pairs/second
4. 1000 base pairs/second

65. Which is the basis of genetic mapping of the human genome as well as DNA fingerprinting ?
1. Polymorphism in the DNA sequence
2. Single nucleotide polymorphism
3. Polymorphism in hnRNA sequence
4. Polymorphism in the RNA sequence

66. What is it that forms the basis of DNA Fingerprinting?
1. The relative difference in the DNA occurrence in blood, skin and saliva
2. The relative amount of DNA in the ridges and grooves of the fingerprints
3. Satellite DNA occurring as highly repeated short DNA segments
4. The relative proportions of purines and pyrimidines in DNA

67. Which one of the following is a wrong statement regarding mutations ?
1. Cancer cells commonly show chromosomal aberrations
2. UV and Gamma rays are mutagens
3. Change in a single base pair of DNA does not cause mutation
4. Deletion and insertion of base pairs cause frame-shift mutations

68. In eukaryotic cell transcription, RNA splicing and RNA capping take place inside the -
1. Nucleus
2. Dictyosomes
3. ER
4. Ribosomes

69. The lac Operon consists of -
1. One regulatory gene and three structural genes
2. Two regulatory genes and two structural genes
3. Three regulatory genes and three structure genes
4. Four regulatory genes only

70. The 3'-5' phosphodiester linkages inside a polynucleotide chain serve to join -
1. One nucleoside with another nucleoside
2. One nucleotide with another nucleotide
3. One nitrogenous base with pentose sugar
4. One DNA strand with the other DNA strand

71. In history of biology, human genome project led to the development of :
1. Biosystematics
2. Biotechnology
3. Biomonitoring
4. Bioinformatics

72. The unequivocal proof of DNA as the genetic material came from the studies on a :
1. Bacterial virus
2. Bacterium
3. Fungus
4. Viroid

73. E. coli cells with a mutated z gene of the lac operon cannot grow in medium containing only lactose as the source of energy because -
(1) They cannot synthesize functional beta galactosidase
(2) They cannot transport lactose from the medium into the cell
(3) The lac operon is constitutively active in these cells
(4) In the presence of glucose, E. coli cells do not utilize lactose

74. Production of a human protein in bacteria by genetic engineering is possible because
(1) Bacterial cell can carry out the RNA splicing reactions
(2) The mechanism of gene regulation is identical in humans and bacteria
(3) The human chromosome can replicate in bacterial cell
(4) The genetic code is universal

75. Which of the following exercises control over transcription:
1. Operator
2. Regulator
3. Promoter
4. Recon

76. Variations in proteins are due to :
1. Sequence of amino acids
2. Number of amino acids
3. R–group
4. None

77. DNA fingerprinting refers to :-
(1) Anlysis of DNA samples using imprinting devices
(2) Techniques used for molecular analysis of different specimens of DNA
(3) Techniques used for identification of fingerprints of individuals
(4) Molecular analysis of profiles of DNA samples

78. During transcription, if the nucleotide sequence of the DNA strand that is being coded is ATACG, then the nucleotide sequence in the mRNA would be-
(1) TCTGG
(2) UAUGC
(3) UATGC
(4) TATGC

79. Number of base pairs in human chromosomes are:
1. 3×10^9
2. 3×10^7
3. 6×10^8
4. 6×10^7

80. The following ratio is generally constant for a given species :-
(1) T + C / G + A
(2) G + C / A+ T
(3) A + C / T + G
(4) A + G / C +T

81. Initiation codon in eukaryotes is
1. UGA
2. CCA
3. AGA
4. AUG

82. During replication of a bacterial chromosomes DNA synthesis starts from a replication origin site and :-
(1) Is facilitated by telomerase
(2) Moves in one direction of the size
(3) Moves in bi-directional way
(4) RNA primers are involved

83. After a mutation at a genetic locus the character of an organism changes due to the change in :-
(1) DNA replication
(2) Protein synthesis pattern
(3) RNA transcription pattern
(4) Protein structure

84. Gene composed of :
1. Amino acids
2. Polynucleotide
3. Fatty acid
4. Nitrogen bases

85. Which form of RNA has a structure resembling clover leaf ?
(1) hn-RNA
(2) m-RNA
(3) t-RNA
(4) r-RNA

86. In inducible operon, regulatory gene synthesizes:
1. Promoter
2. Operator
3. Repressor
4. Aporepressor

87. Simillarity in DNA and RNA is that both
1. are polymers of nucleotides
2. have similar pyrimidine
3. have similar sugars
4. genetic material

88. Length of one loop of B- DNA :
1. 3.4 nm.
2. 0.34 nm.
3. 20 nm.
4. 10 nm

89. Anticodon occurs in :
1. t-RNA
2. m-RNA
3. r-RNA
4. DNA

90. In three dimensional view, the molecule of t-RNA is :
1. L-shaped
2. S-shaped
3. Y-shaped
4. E-shaped

91. Transformation experiment was first performed on which bacteria : -
(1) E. coli
(2) Diplococcus pneumoniae
(3) Salmonella
(4) Pasteurella pestis

92. In E. Coli, during lactose metabolism, repressor binds to
1. Regulator gene
2. Operator gene
3. Structural gene
4. Promoter gene

93. In a DNA percentage of thymine is 20% then what is the percentage of guanine : -
(1) 20%
(2) 40%
(3) 30%
(4) 60%

94. Out of 64 codons, 61 codons code for 20 types of amino acids. This is often called as
1. Degeneracy of genetic code
2. Overlapping of gene
3. Wobbling of codon
4. University of codons

95. Jacob and Monad studied lactose metabolism in E.Coli and proposed operon concept. Operon concept applicable for : -
(1) All prokaryotes
(2) All prokaryotes and some eukaryotes
(3) All prokaryotes and all eukaryotes
(4) All prokaryotes and some protozoanes

96. Exon part of m-RNAs have code for : -
(1) Protein
(2) Lipid
(3) Carbohydrate
(4) Phospholipid

97. Which of the following is initiation codon :
1. UAG
2. AUC
3. AUG
4. CCU

98. Method of DNA replication in which two strands of DNA separate and synthesize new strands is called
1. Dispersive
2. Conservative
3. Semiconservative
4. Non conservative

99. Chargaff's rule states that in an organism: -
(1) Amount of adenine (A) is equal to that of thymine (T) and the amount of guanine (G) is equal to that of cytosine (C)
(2) Amount of adenine (A) is equal to that of guanine (G) and the amount of thymine (T) is equal to that of cytosine (C)
(3) Amount of adenine (A) is equal to that of cytosine (C) and the amount of thymine (T) is equal to that of guanine (G)
(4) Amounts of all bases are equal

100. In the genetic code dictionary, how many codons are used to code for all the 20 essential amino acids : -
(1) 20
(2) 64
(3) 61
(4) 60

101. What does "lac" refer to in what we call the lac operon : -
(1) Lactose
(2) Lactase
(3) Lac insect
(4) The number 1,00,000

102. During transcription, the DNA site at which RNA polymerase binds is called : -
(1) Promoter
(2) Regulator
(3) Receptor
(4) Enhancer

103. Which one of the following triplet codes, is correctly matched with its specificity for an amino acid in protein synthesis or as 'start' or 'stop' codon: -
(1) UCG – Start
(2) UUU – Stop
(3) UGU – Leucine
(4) UAC – Tyrosine

104. In Negative operon : -
1. Inducer binds with repressor
2. Co-repressor does not binds with repressor
3. Corepressor binds with inducer
4. CAMP have negative effect on lac operon

105. Due to discovery of which of the following in 1980, the evolution was termed as RNA world :
1. m-RNA, t-RNA- r-RNA synthesise proteins
2. In some virus RNA is genetic material
3. RNA have enzymatic property
4. RNA is not found in all cells

106. E. Coli about to replicate was placed in a medium containing radioactive thymidine for five minutes. Then it was made to replicate in a normal medium. Which of the following observation shall be correct: -
1. Both the strands of DNA will be radioactive
2. One strand radioactive
3. Each strand half radioactive
4. None is radioactive

107. Types of RNA polymerase required in nucleus for RNA synthesis : -
1. 1
2. 2
3. 3
4. 4

108. mRNA is synthesised on DNA template in which direction: -
1. 5' → 3'
2. 3' → 5'
3. Both
4. Any

109. Complete the flow chart on central dogma

(a) DNA $\xrightarrow{(b)} mRNA \xrightarrow{(c)} \left(d\right)$

(1) (a) - Replication; (b) - Transcription; (c) - Translation; (d) - Protein
(2) (a) - Transduction; (b) - Translation; (c) - Replication; (d) - Protein
(3) (a) - Replication; (b) - Transcription; (c) - Transduction; (d) - Protein
(4) (a) - Transcription; (b) - Replication; (c) - Transcription; (d) - Transduction

110. What is the role of RNA polymerase III in the process of transcription in eukaryotes?
1. Transcribes precursor of mRNA
2. Transcribes only snRNAs
3. Transcribes rRNAs (28S, 18S and 5.8S)
4. Transcribes tRNA, 5s rRNA and snRNA

111. DNA fingerprinting involves identifying differences in some specific regions in DNA sequence, called as
1. Single nucleotides
2. Polymorphic DNA
3. Satellite DNA
4. Repetitive DNA

112. Identify the correct statement.
1. The coding strand in a transcription unit is copied to an mRNA.
2. Split gene arrangement is characteristic of prokaryotes.
3. In capping, methylguanosine triphosphate is added to the 3' end of hnRNA.
4. RNA polymerase binds with the Rho factor to terminate the process of transcription in bacteria.

113. If Adenine makes 30% of the DNA molecule, what will be the percentage of Thymine, Guanine and Cytosine in it?
(1) T:30 ; G:20 ; C:20
(2) T:20 ; G:25 ; C:25
(3) T:20 ; G:30 ; C:20
(4) T:20 ; G:20 ; C:30

114. Which of the following RNAs is not required for the synthesis of protein?
(1) rRNA
(2) siRNA
(3) mRNA
(4) tRNA

115. Which is the "Only enzyme" that has "Capability to catalyze Initiation, Elongation, and Termination in the process of transcription in prokaryotes?
1. DNA Ligase
2. DNase
3. DNA dependent DNA polymerase
4. DNA dependent RNA polymerase

116. Which one of the following statements about Histones is wrong?
1. Histones are rich in amino acids - Lysine and Arginine.
2. Histones carry a positive charge in the side chain.
3. Histones are organized to form a unit of 8 molecules.
4. The pH of histones is slightly acidic.

117. Statement I: The codon 'AUG codes for methionine and phenylalanine.
Statement II: AAA' and 'AAG are both codons that code for the amino acid lysine.
In the light of the above statements, choose the correct answer from the options given below.
1. Statement I is correct but Statement II is false
2. Statement I is incorrect but Statement II is true
3. Both Statement I and Statement II are true
4. Both Statement I and Statement II are false

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*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

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Selected Questions (Only NCERT based) from AIPMT 1998 to NEET 2021

Evolution

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Concept of Organic Evolution: Evidence	17
Darwin's Theory	6
Types of Natural Selection	6
Evolution Prior to Ape Man	5
Palentological Evidences of Evolution	5
Hardy Weinberg Law	4
Hugo De Vries Theory of Evolution	4
Introduction to Human Evolution	4
Theory of Evolution & Lamarckism	4
Evolution of Homo Sapiens	3
Definition & Types of Evolution	2
Embryological Evidence of Evolution	2
Urey & Miller Experiment	2
Concept of Speciation	1
Cosmic Evolution	1
Difference Between Drift & Selection	1
Genetic Basis of Adaptation	1
Origin of Life	1
Origin of Life: Chemical Evolution	1
Sources of Variation	1

1. Artificial selection to obtain cows yielding higher milk output represents:
1. Directional as it pushes the mean of the charcter in one direction
2. Disruptive as it splits the population into two, one yeilding output and the other lower output
3. Stabilizing followed by disruptive as it stablizes the population to produce higher yielding cows
4. Stabilizing selection as it stabilizes this character in the population

2.
The similarity of bone structure in the forelimbs of many vertebrates is an example of
1. evolution
2. Analogy
3. Convergent evolution
4. Adaptive radiation

3.
Among the following sets of examples for divergent evolution, select the incorrect option:
1. Forelimbs of man, bat and cheetah
2. Heart of bat, man and cheetah
3. Brain of bat, man and cheetah
4. Eye of octopus, bat and man

4.
According to Hugo de Vries, the mechanism of evolution is:-
1. Multiple step mutations
2. Saltation
3. Phenotypic variations
4. Minor mutations

5. In Hardy-Weinberg equation, the frequency of heterozygous individual is represented by
1. p^2
2. 2pq
3. pq
4. q^2

6. The chronological order of human evolution from early to the recent is
1. Australopithecus→Ramapithecus→Homo habilis→Homo erectus
2. Ramapithecus→Australopithecus→ Homo habilis→Homo erectus
3. Ramapithecus→Homo habilis→ Australopithecus →Homo erectus
4. Australopithecus→Homo habilis→Ramapithecus →Homo erectus

7.
Analogous structure are results of
1. convergent evolution
2. shared ancestry
3. stabilizing selection
4. divergent evolution

8.
Which of the following structure is homologous to the wing of a bird?
1. Wing of a moth
2. Hind limb of rabbit
3. Flipper of whale
4. Dorsal fin of a shark

9. The wings of a bird and the wings of an insect are
1. Homologous structures and represent divergent evolution
2. Analogous structures and represent convergent evolution
3. Phylogenetic structures and represents divergent evolution
4. Homologous structures and represent convergent evolution

10. Industrial melanism is an example of
1. Neo Darwinism
2. Natural Selection
3. Mutation
4. Neo Lamarckism

11.

Which of the following had the smallest brain capacity?
1. Homo erectus
2. Homo sapiens
3. Homo neanderthalensis
4. Homo habilis

12.
The eye of octopus and eye of cat show different patterns of structure, yet they perform similar function. This is an example of :

1. Homologous organs that have evolved due to divergent evolution.

2. Analogous organs that have evolved due to convergent evolution.

3. Analogous organs that have evolved due to divergent evolution.

4. Homologous organs that have evolved due to convergent evolution.

13.
The process by which organisms with different evolutionary history evolve similar phenotypic adaptations in response to a common environmental challenge, is called:

1. Convergent evolution

2. Non-random evolution

3. Adaptive radiation

4. Natural selection

14. In a population of 1000 individuals 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa, Based on this data, the frequency of allele A in the population is :
1. 0.4
2. 0.5
3. 0.6
4. 0.7

15. Forelimbs of cat, lizard used in walking; forelimbs of whale used in swimming and forelimbs of bats used in flying are an example of :
1. Analogous organs
2. Adaptive radiation
3. Homologous organs
4. Convergent evolution

16. Variation in gene frequencies within populations can occur by chance rather than by natural selection.
This is referred to as:
1. Genetic drift
2. Random mating
3. Genetic load
4. Genetic flow

17. Evolution of different species in a given area starting from a point and spreading to other geographical areas is known as
1. Adaptive radiation
2. natural selection
3. Migration
4. divergent evolution

18. Which one of the following options give one correct example each of convergent evolution and divergent evolution?

	Convergent Evolution	Divergent Evolution
(a)	Eyes of octopus and mammals	Bones of forelimbs of vertebrates
(b)	Thorns of Bougain-villia and tendrils Cucurbita	Wings of butterflies and birds
(c)	Bones of forelimbs of vertebrates	Wings of butterfly and birds
(d)	Thorns of Bougain-villia and tendrils of Cucurbita	Eyes of Octopus and mammals

1. (a)
2. (b)
3. (c)
4. (d)

19. What was the most significant trend in the evolution of modem man (Homo sapiens) from his ancestors?
1. Shortening of jaws
2. Binocular vision
3. Increasing cranial capacity
4. upright posture

20. The extinct human who lived 100000 to 40000 years ago, in Europe, Asia and parts of Africa, with short stature, heavy eye brows, retreating for heads, large jaws with heavy teeth, stocky bodies, a lumbering gait and stooped posture was
1. Homo habilis
2. Neanderthal human
3. Cro-Magnon humans
4. Ramapithecus

21.
What was the most significant trend in the evolution of modem man (Homo sapiens) from his ancestors?
1. Shortening of jaws
2. Binocular vision
3. Increasing brain capacity
4. Upright posture

22. Darwin's finches are a good example of
1. industrial melanism
2. connecting link
3. adaptive radiation
4. convergent evolution

23. In the case of peppered moth (Biston betularia) the black-coloured form became dominant over the light-coloured form in England during the industrial revolution. This is an example of
1. natural selection whereby the darker forms were selected
2. appearance of the darker coloures individuals due to very poor sunlight
3. protective mimicry
4. inheritance of darker colour character acquired due to the darker environment

24.
Darwin's finches are an excellent example of
1. adaptive radiation
2. seasonal migration
3. brood parasitism
4. connecting links

25.
Thorn of Bougainvillea and tendril of Cucurbita are examples of
1. analogous organs
2. homologous organs
3. vestigial organs
4. retrogressive evolution

26. Among the human ancestors the brain size was more than 1000 CC in :
1. Homo neaderthalensis
2. Homo erectus
3. Ramapithecus
4. Homo habilis

27. The concept of chemical evolution is based on:
1. crystallization of chemicals
2. interaction of water, air and clay under intense heat
3. effect of solar radiation on chemicals
4. possible origin of life by combination of chemicals under suitable environment conditions

28. Industrial melanism as observed in peppered moth proves that:
1. The true blackmelanic forms arise by a recurring Natural selection
2. The melanic form of the moth has no selective advantage over lighter form in industrial area
3. The lighter-form moth has no selective advantage either in polluted industrialarea or non-polluted area
4. Melanism is a pollution-generated feature

29.
Which one of the following pair of items correctly belongs to the category of organs mentioned against it?
1. Thorn of Bougainvillea and tendrils of Cucurbita – Analogous organs
2. Nictitating membrane and blind spot in human eye – vestigial organs
3. Nephridia of earthworm and Malpighian tubules of cockroach - Excretory organs
4. Wings of honey bee and wings of crow - Homologous organs

30. Select the correct statement from the following:
1. Darwin variations are small and directionless
2. fitness is the end result of the ability to adapt and gets selected by nature
3. all mammals except whales and have seven cervical vertebrae
4. Mutations are random and directional

31. The finches of Galapagos islands provide an evidence in favour of:
1. special creation
2. evolution due to mutation
3. retrogressive evolution
4. biogeographical evolution

32. Adaptive radiation refers to :
1. adaptations due to geographical isolation
2. evolution of different species from a common ancestor
3. migration of members of a species to different geographical areas
4. power of adaptation in an individual to a variety of environments

33. When two species of different genealogy come to resemble each other as a result of adaptation, the phenomenon is termed :
1. divergent evolution
2. microevolution
3. co-evolution
4. convergent evolution

34. An important evidence in favour of organic evolution is the occurrence of:
1. homologous and vestigial organs
2. analogous and vestigial organs
3. homologous organ only
4. analogous organ only

35. Variations caused by mutation, as proposed by Hugo de Vries, are:
1. small and directionless
2. random and directional
3. random and directionless
4. small and directional

36. A gene locus has two alleles A, a. If the frequency of dominant allele A is 0.4, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in the population?
1. 0.16 (AA); 0.36 (Aa); 0.48 (aa)
2. 0.36 (AA); 0.48 (Aa); 0.16 (aa)
3. 0.16 (AA); 0.24 (Aa); 0.36 (aa)
4. 0.16 (AA); 0.48 (Aa); 0.36 (aa)

37. In a species, the weight of newborn ranges from 2 to 5 kg. 97% of the newborn with an average weight between 3 to 3.3 kg survive whereas 99% of the infants born with weights from 2 to 2.5 kg or 4.5 kg to 5 kg die. Which type of selection process is taking place?
1. Cyclical selection
2. Directional selection
3. Stabilizing selection
4. Disruptive selection

38. Match the hominids with their correct brain size:

(a)	Homo habilis	(i)	900 cc
(b)	Homo neanderthalensis	(ii)	1250 cc
(c)	Homo erectus	(iii)	650-800 cc
(d)	Homo sapiens	(iv)	1400 cc

Select the correct option.

	(a)	(b)	(c)	(d)
1.	(iv)	(iii)	(i)	(ii)
2.	(iv)	(i)	(iv)	(ii)
3.	(iii)	(ii)	(i)	(iv)
4.	(iii)	(iv)	(i)	(ii)

39. In Australia, marsupials and placental mammals have evolved to share many similar characteristics. This type of evolution may be referred to as -
1. Adaptive Radiation
2. Divergent Evolution
3. Cyclical Evolution
4. Convergent Evolution

40. A population of a species invades a new area. Which of the following condition will lead to Adaptive Radiation?
1. Area with large number of habitats having very low food supply.
2. Area with a single type of vacant habitat
3. Area with many types of vacant habitats.
4. Area with many habitats occupied by a large number of species.

41. Which of the following statements is correct about the origin and evolution of men ?
1. Agriculture came around 50,000 years back.
2. The Dryopithecus and Ramapithecus primates existing 15 million years ago, walked like men.
3. Homo habilis probably ate meat.
4. Neanderthal men lived in Asia between 100000 and 40000 years back

42. From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask :
1. CH_3, H_2, NH_4 and water vapour at $800^\circ C$
2. CH_4, H_2, NH_3 and water vapour at $600^\circ C$
3. CH_3, H_2, NH_3 and water vapour at $600^\circ C$
4. CH_4, H_2, NH_3 and water vapour at $800^\circ C$

43. Flippers of Penguins and Dolphins are examples of:
1. Convergent evolution
2. Industrial melanism
3. Natural selection
4. Adaptive radiation

44. Embryological support for evolution was disapproved by:
1. Alfred Wallace
2. Charles Darwin
3. Oparin
4. Karl Ernst von Baer

45. Embryological support for evolution was proposed by
1. Ernst Heckel
2. Karl Ernst von Baer
3. Charles Darwin
4. Alfred Wallace

46. After about how many years of the formation of the earth, life appeared on this planet?
1. 500 billion years
2. 50 million years
3. 500 million years
4. 50 billion years

47. The phenomenon of the evolution of different species in a given geographical area starting from a point and spreading to other habitats is called:-
1. Saltation
2. Co-evolution
3. Natural selection
4. Adaptive radiation

48. A Hominid fossil discovered in Java in 1891, now extinct, having a cranial capacity of about 900 ccs was:
1. Homo erectus
2. Neanderthal man
3. Homo sapiens
4. Australopithecus

49. The idea of mutations was brought forth by :
1. Gregor Mendol, who worked on Pisum sativum
2. Hardy Weinberg, who worked on allele frequencies in a population
3. Charles Darwin, who observed a wide variety of organisms during sea voyage
4. Hugo do Vries, who worked on evening primrose

50. The most apparent changes during the evolutionary history of Homo sapiens is traced in
1. Walking upright
2. Shortening of the jaws
3. Remarkable increase in the brain size
4. Loss of body hair

51. Given below are four statements (A-D) each with one or two blanks. Select the option which correctly fills up the blanks in two statements – Statements :
(A) Wings of butterfly and birds look alike and are the results of $\underline{\quad (i) \quad}$, evolution
(B) Miller showed that CH_4, H_2, NH_3 and $\underline{\quad (i) \quad}$, when exposed to electric discharge in a flask resulted in the formation of $\underline{\quad (ii) \quad}$.
(C) Vermiform appendix is a $\underline{\quad (i) \quad}$ organ and an $\underline{\quad (ii) \quad}$ evidence pf evolution.
(D) According to Darwin evolution took place due to $\underline{\quad (i) \quad}$and $\underline{\quad (ii) \quad}$ of the fittest.
Options :
1. (A) - (i) convergent,
(B) - (ii) oxygen, (ii) nucleosides
2. (B) - (i) water vapour, (ii) amino acids,
(C) - (i) rudimentary (ii) anatomical
3. (C) - (i) vestigial, (ii) anatomical,
(D) - (i) mutations, (ii) multiplication
4. (D) - (i) small variations, (ii) survival,
(A) - (i) convergent

52. Which one of the following phenomena supports Darwin's concept of natural selection in organic evolution -
(1) production of 'Dolly', the sheep by cloning
(2) Development of organs from 'stem' cells for organ transplantation
(3) Development of transgenic animals
(4) Prevalence of pesticide resistant insects

53. Which of the following is not true for a species -
1. Members of a species can interbreed
2. Variations occur among members of a species
3. Gene flow does not occur between the populations of a species
4. Each species is reproductively isolated from every other species.

54. Which of the following statement is true :
1. Homo erectus is direct ancestor of Homo sapiens
2. Neanderthal man is direct ancestor of modern man
3. Australopithecous is direct ancestor of modern man
4. Fossils of cromagnon man first found in Ethiopia

55. In present times the origin of life is not possible from inorganic compounds due to :
1. Raw material not available
2. High conc. Of O_2 in atmosphere
3. Decrease in temperature
4. Excess of pollution

56. On Galapagos island Darwin observed variation in beaks of birds (Darwin's finches) and he concluded :
1. Inter species variation
2. Intraspecies variation
3. Natural selection according to food
4. Inheritance of acquired characters

57. Diversification in plant life appeared :-
1. Due to abrupt mutations
2. Suddenly on earth
3. By seed dispersal
4. Due to long periods of evolutionary changes

58. According to Oparin, which one of the following was not present in the primitive atmosphere of the earth ?
1. Oxygen
2. Hydrogen
3. Water vapour
4. Methane

59. Reptiles like mammals originated in :
1. Jurassic
2. Triassic
3. Cretaseus
4. Permian

60. Industrial melanism is example of :
1. Natural selection
2. Mutation
3. Racial difference
4. Predation

61. Which one is obtained by S. Miller in his experiments on origin of life before 1953 :
1. Simple sugars
2. Amino acids
3. Nucleotide
4. Peptides

62. Which evidence of evolution related to Darwin's finches :
1. Evidences from biogeographical distribution
2. Evidences from comparative anatomy
3. Evidences from embryology
4. Evidences from palaeontological

63. According to fossils which have been discovered till now, origin and evolution of man started from which country?
1. France
2. Java
3. Africa
4. China

64. Which one of the following sequences was proposed by Darwin and Wallace for organic evolution: -
1. Overproduction, variations, constancy of population size, natural selection
2. Variations, constancy of population size, overproduction, natural selection
3. Overproduction, constancy of population size, variations, natural selection
4. Variations, natural selection, overproduction, constancy of population size

65. Industrial melanism is an example of : -
1. Drug resistance
2. Darkening of skin due to smoke from industries
3. Protective resemblance with the surroundings
4. Defensive adaptation of skin against ultraviolet radiations

66. In a random mating population in equilibrium, which of the following brings about a change in gene frequency in a non-directional manner : -
1. Mutations
2. Random drift
3. Selection
4. Migration

67. Which one of the following describes correctly the homologous structures : -
1. Organs with anatomical similarities, but performing different functions
2. Organs with anatomical dissimilarities but performing same function
3. Organs that have no function now, but had an important function in ancestors
4. Organs appearing only in embryonic stage and disappearing later in the adult

68. Similarities in organism with different genotype indicates : -
1. Microevolution
2. Macroevolution
3. Convergent evolution
4. Divergent evolution

69. Occurence of endemic species in south america and Australia due to : -
1. These species has been extinct from other regions
2. Continental separation
3. These is no terrestrial route to these places
4. Retrogressive evolution

70. The factor that leads to Founder effect in a population is:
1. Mutation
2. Genetic drift
3. Natural selection
4. Genetic recombination

71. Match List-I with List-II

List-I	List-II
(a) Adaptive radiation	(i) Selection of resistant varieties due to excessive use of herbicides and pesticides
(b) Convergent evolution	(ii) Bones of forelimbs in Man and Whale
(c) Divergent evolution	(iii) Wings of Butterfly and Bird
(d) Evolution by anthropogenic action	(iv) Darwin Finches

Choose the correct answer from the options given below.

	(a)	(b)	(c)	(d)
1.	(ii)	(i)	(iv)	(iii)
2.	(i)	(iv)	(iii)	(ii)
3.	(iv)	(iii)	(ii)	(i)
4.	(iii)	(ii)	(i)	(iv)

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Human Health & Disease

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
AIDS	9
Active & Passive Immunity	8
Drugs & Alcohol Abuse	8
Details of Immunity	7
Human Immune System	7
Typhoid Fever	7
Allergies & Autoimmunity	4
Treatment & Life Cycle of Malaria	4
Common Cold & Malaria Introduction	3
Pneumonia & Related Questions	3
Ascariasis & Filariasis	2
Cancer	2
Fungal Infection & Concept of Immunity	1

1.
Which part of poppy plant is used to obtain the drug Smack?
1. Flowers
2. Latex
3. Roots
4. Leaves

2.
In which disease does mosquito transmitted pathogen cause chronic inflammation of lymphatic vessels?
1. Elephantiasis
2. Ascariasis
3. Ringworm disease
4. Amoebiasis

3. Transplantation of tissues/organs fails often due to non-acceptance by the patient's body. Which type of immune-response is responsible for such rejections?
1. Cell-mediated immune response
2. Hormonal immune response
3. Physiological immune response
4. Autoimmune response

4. Which of the following is correct regarding AIDS causative agent HIV?
1. HIV is enveloped virus containing one molecule of single-stranded RNA and one molecule of reverse transcriptase
2. HIV is enveloped virus that contains two identical molecules of single-stranded RNA and two molecules of reverse transcriptase
3. HIV is unenveloped retrovirus
4. HIV does not escape but attacks the acquired immune response

5. MALT constitutes about _______ percent of the lymphoid tissue in human body.
1. 20%
2. 70%
3. 10%
4. 50%

6.
In higher vertebrates, the immune system can distinguish self-cells and non-self. If this property is lost due to genetic abnormality and it attacks self –cells, then it leads to
1. graft rejection
2. auto – immunity disease
3. active immunity
4. allergic response

7.
Antivenom injection contains performed antibodies while polio drops that are administered into the body contain
1. harvested antibodies
2. gamma globulin
3. attenuated pathogens
4. activated pathogens

8. Which of the following immunoglobulins does constitute the largest percentage in human milk?
1. IgD
2. IgM
3. IgA
4. IgG

9. Grafted kidney may be rejected in a patient due to
1. Humonal immune response
2. Cell-mediated immune response
3. Passive immune response
4. Innate immune response

10.

HIV that causes AIDS, first starts destroying
1. B-lymphocytes
2. leucocytes
3. helper T-lymphocytes
4. thrombocytes

11.
Infection of Ascaris usually occurs by :

1. Eating imperfectly cooked pork.

2. Tse - tse fly.

3. mosquito bite.

4. drinking water containing eggs of Ascaris.

12.
The cell-mediated immunity inside the human body is carried out by :

1. B-lymphocytes

2. Thrombocytes

3. Erythorcytes

4. T-lymphocytes

13. Which is the particular type of drug that is obtained from the plants whose one flowering branch is shown below?

1. Hallucinogen
2. Depressant
3. Stimulant
4. Pain - Killer

14. At which stage of HIV infection does one usually show symptoms of AIDS?
1. Within 15 days of sexual contact with an infected person
2. When the infected retro virus enters host cells
3. When HIV damage large number of helper T - Plymphocytes.
4. When the viral DNA is produced by reverse transcriptase.

15. Motile zygote of Plasmodium occurs in
1. Gut of female Anopheles
2. Salivary glands of Anopheles
3. Human RBCs
4. Human liver

16. Widal test is carried out to test
1. Malaria
2. Diabetes mellitus
3. HIV/AIDS
4. typhoid fever

17. Common cold differs from pneumonia in, that
1. Pneumonia is a communicable disease, whereas the common cold is a nutritional deficiency disease
2. Pneumonia can be prevented by a live attenuated bacterial vaccine, whereas the comon cold has no effective vaccine
3. Common cold is caused by a virus, while the Pneumonia is caused by the bacterium.
4. Pneumonia pathogen infects alveoli whereas the common cold affects nose and respiratory passage but not the lungs

18. Which one of the following is not a property of cancerous cells, whereas the remaining three are?
1. They compete with normal cells for vital nutrients
2. They do not remain confined in the area of formation
3. They divine in an uncontrolled manner
4. They show contact inhibition

19. In which one of the following options the two examples are correctly matched with their particular type of immunity?

Examples	Type of immunity
(a) Polymorphonuclear leukocytes and monocytes	Cellular barriers
(b) Anti-tetanus and anti-snake bite injection	Active immunity
(c) Saliva in mouth and tears in eyes	Physical barriers
(d) Mucus coating of epithelium lining the urinogenital tract and the HCl in stomach	Physiological barriers

1. (a)
2. (b)
3. (c)
4. (d)

20. Cirrhosis of liver is caused by the chronic intake of
1. Opium
2. Alcohol
3. Tobacco (chewing)
4. Cocaine

21.
A certain X patient is suspected to be suffering from acquired immune deficiency syndrome. Which diagnostic technique will you recommend for its detection?
1. MRI
2. Ultra Sound
3. WIDAL
4. ELISA

22.
At which stage of HIV infection does one usually shows symptoms of AIDS?
1. When viral DNA is produced by reverse transcriptase
2. When HIV replicates rapidly in helper T-lymphocytes and damages large number of these
3. With 15 days of sexual contact with an infected person
4. When the infecting retrovirus enters host cells

23.
Which one of the following acts as a physiological barrier to the entry of microorganisms in human body?
1. Tears
2. Monocytes
3. Skin
4. Epithelium of urogenital tract

24.
Where will you look for the sporozoites of the malarial parasite?
1. Red blood corpuscles of humans suffering from malaria
2. Spleen of infected humans
3. Salivary glands of freshly moulted female anopheles mosquito
4. Saliva of infected female anopheles mosquito

25. Select the correct statement from the ones given below
1. Barbiturates when given to criminals make them tell the truth
2. Morphine is often given to persons who have under gone surgery as a pain killer
3. Chweing tobacco lowers blood pressure and heart rate
4. Cocaine is given to patients after surgery as it stimulates recovery

26. Ringworm in humans is caused by
1. bacteria
2. fungi
3. nematodes
4. viruses

27. Widal test is used for the diagnosis of
1. malaria
2. pneumonia
3. tuberculosis
4. typhoid

28. Which one of the following statements is correct with respect to AIDS?
1. The HIV can be transmitted through eating food together with an infected person
2. Drug addicts are least susceptible to HIV infection
3. AIDS patients are being fully cured cent percent with proper care and nutrition
4. The causative HIV retrovirus enters helper T-lymphocytes thus reducing their numbers

29. Which of the following is a pair of viral diseases?
1. Ringworm, AIDS
2. Common cold, AIDS
3. Dysentery, common cold
4. Thyphoid, tuberculosis

30. Use of anti - histamine and steroids give a quick relief from
1. allergy
2. nausea
3. cough
4. headache

31. A person likely to develop tetanus is immunised by administering
1. dead germs
2. preformed antibodies
3. wide spectrum antibiotics
4. weakened germs

32. Which one of the following statements is correct ?
1. Patients, who had undergone surgery are given cannabinoids to relieve pain
2. Benign tumours show the property of metastasis
3. heroin accelerates body fuctions
4. Malignant tumours may exhibit metastasis

33. The letter T , in T- lymphocyte refers to
1. thyroid
2. thalamus
3. tonsil
4. thymus

34.
Which one of the following is the correct statement regarding the particular psychotropic drug specified?
1. Hashish causes alter thought perceptions and hallucinations
2. Opium stimulates nervous system and causes hallucinations
3. Morphine leads to delusions and disturbed emotions
4. Barbiturates cause relaxation and temporary euphoria

35.
To which type of barriers under innate immunity, do the saliva in the mouth and the tears from the eyes, belong?
1. Cytokine barriers
2. Cellular barriers
3. Physiological barriers
4. Physical barriers

36. HIV that causes AIDS, first starts destroying:
1. B-lymphocytes
2. leucocytes
3. thrmobocytes
4. helper T-lymphocytes

37. Which of the following immune responses is responsible for rejection of kidney graft?
1. Cell mediated immune response
2. Auto-immune response
3. Humoral immune response
4. Inflammatory immune response

38. Colostrum, the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the newborn infants because it contains:
1. Immunoglobulin A
2. Natural killer cells
3. Monocytes
4. Macrophages

39. Identify the correct pair representing the causative agent of typhoid fever and the confirmatory test for typhoid.
1. Salmonella typhi/Widal test
2. Plasmodium vivax/UTI test
3. Streptococcus pneumoniae/Widal test
4. Salmonella typhi/Anthrone test

40. Drug called 'Heroin' is synthesized by:
1. nitration of morphine
2. methylation of morphine
3. acetylation of morphine
4. glycosylation of morphine

41. Coca alkaloid or cocaine is obtained from
1. Papaver somniferum
2. Atropha belladona
3. Erythroxylum coca
4. Datura

42. The infectious stage of plasmodium that enters the human body is:
1. Sporozoites
2. female gametocytes
3. Male gametocytes
4. Trophozoites

43. Match the following diseases with the causative organism and select the correct option.

Column -I	Column- II
(a) Typhoid	(i) Wuchereria
(b) Pneumonia	(ii) Plasmodium
(c) Filariasis	(iii) Salmonella
(d) Malaria	(iv) Haemophilus

	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(i)	(ii)
(2)	(ii)	(i)	(iii)	(iv)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(i)	(iii)	(ii)	(iv)

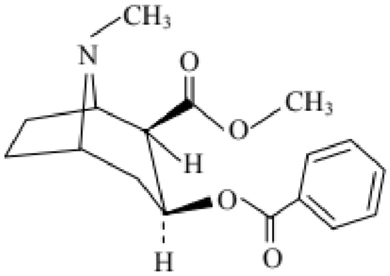
44. Match the following columns and select the correct option :

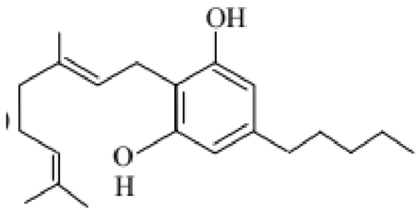
Column - I	Column - II
(i) Typhoid	(a) Haemophilus influenzae
(ii) Malaria	(b) Wuchereria bancrofti
(iii) Pneumonia	(c) Plasmodium vivax
(iv) Filariasis	(d) Salmonella typhi

1. (i)-(d), (ii)-(c), (iii)-(a), (iv)-(b)
2. (i)-(c), (ii)-(d), (iii)-(b), (iv)-(a)
3. (i)-(a), (ii)-(c), (iii)-(b), (iv)-(d)
4. (i)-(a), (ii)-(b), (iii)-(d), (iv)-(c)

45. The yellowish fluid "colostrum" secreted by mammary glands of the mother during the initial days of lactation has abundant antibodies (IgA) to protect the infant. This type of immunity is called as :
1. Passive immunity
2. Active immunity
3. Acquired immunity
4. Autoimmunity

46. Identify the molecules (a) and (b) shown below and select the right option giving their source and use.

(I)


(II)


	Molecule	Source	Use
1	(II) Heroin	Cannabis sativa	Depressent and slows down body functions
2	(II) Cannabinoid	Atropa belladona	Produces hallucination
3	(I) Morphine	Papaver somniferum	Sedative and pain killer
4	(I) Cocaine	Erythroxylum coca	Accelerates the transport of dopamine

47. Which one of the following organisms is scientifically correctly named, correctly printed according to the International Rules of Nomenclature and correctly described ?
1. Plasmodium falciparum – a protozoan pathogen causing the most serious type of malaria
2. Felis tigris – The Indian tiger, well protected in Gir forests.
3. E.Coli – Full name Entamoeba coli, a commonly occurring bacterium in human intestine
4. Musca domestica – The common house lizards, a reptile

48. Read the following four statements (I-IV) :
(I) Colostrum is recommended for the new born because it is rich in antigen
(II) Chikungunya is caused by a Gram negative bacterium
(III) Tissue culture has proved useful in obtaining virus-free plants
(IV) Beer is manufactured by distillation of fermented grape juice
How many of the above statements are wrong ?
1. Three
2. Four
3. One
4. Two

49. Which one of the following statements is correct with respect to immunity ?
1. The antibodies against small pox pathogen are produced by T-lymphocytes
2. Antibodies are protein molecules each of which has four light chains
3. Rejection of a kidney graft is the function of B-lymphocytes
4. Preformed antibodies need to be injected to treat the bite by a viper snake

50. A person suffering from a disease caused by Plasmodium, experiences recurring chill and fever at the time when -
1. the trophozoites reach maximum growth and give out certain toxins
2. the parasite after its rapid multiplication inside RBCs ruptures them, releasing the
stage to enter fresh RBCs.
3. the microgametocytes and megagametocytes are being destroyed by the WBCs.
4. the sporozoites released from RBCs are being rapidily killed and broken down inside spleen

51. Which one of the following options gives the correct matching of a disease with its causative organism and mode of infection :

	Disease	Causative Organisms	Mode of Infection
1.	Malaria	Plasmodium vivax	Bite of male Anopheles mosquito
2.	Typhoid	Salmonella typhi	With inspired air
3.	Pneumonia	Streptococcus pneumoniae	Droplet infection
4.	Elephantiasis	Wuchereria bancrofti	With infected water and food

52. Select the correct statement with respect to disease and immunisation :
1. Injection of snake antivenom against snake bite is an example of active immunisation.
2. If due to some reason B-and T-lymphocytes are damaged, the body will not produce antibodies against a pathogen.
3. Injection of dead/inactivated pathogens causes passive immunity
4. Certain protozoans have been used to mass produce hepatitis B vaccine

53. Damage to thymus in a child may lead to
(1) A reduction in haemoglobin content of blood
(2) A reduction in stem cell production
(3) Loss of antibody mediated immunity
(4) Loss of cell mediated immunity

54. Nucleic acid in HIV :
1. ss RNA
2. ds RNA
3. ss DNA
4. ds DNA

55. Typhoid caused by :
1. Rickettssiae
2. Chlamydia
3. Salmonella typhi
4. Mycobacterium

56. Histamine secreted by :
1. Mast cells
2. Fibroblast
3. Histiocytes
4. Plasma cells

57. HIV infects :
1. RBC
2. T – helper cells
3. B - cells
4. Basophils

58. During injury mast cells secrete :
1. Histamine
2. Heparin
3. Prothrombin
4. Antibodies

59. What is vaccine :
1. Treated bacteria, virus & protein
2. Treated algae
3. Treated fungi
4. Treated plasmodium

60. During viral infection the protein formed in host cells to resist is :
1. Interferons
2. Antitoxin
3. Antibody
4. Histone

61. Short-lived immunity acquired from mother to foetus across placenta or through mother's milk to the infant is categorised as :-
(1) Active immunity
(2) Passive immunity
(3) Cellular immunity
(4) Innate non-specific immunity

62. Which fish selectively feed on larva of mosquito : -
1. Gambusia
2. Rohu
3. Clarias
4. Exocoetus

63. Salmonella is related with : -
1. Typhoid
2. Polio
3. T.B.
4. Tetanus

64. Interferons are synthesized in response to
1. Mycoplasma
2. Bacteria
3. Viruses
4. Fungi

65. Match List-I with List-II

List-I	List-II
(a) Filariasis	(i) Haemophilus influenzae
(b) Amoebiasis	(ii) Trichophyton
(c) Pneumonia	(iii) Wuchereria bancrofti
(d) Ringworm	(iv) Entamoeba histolytica

Choose the correct answer from the options given below.

	(a)	(b)	(c)	(d)
1.	(i)	(ii)	(iv)	(iii)
2.	(ii)	(iii)	(i)	(iv)
3.	(iv)	(i)	(iii)	(ii)
4.	(iii)	(iv)	(i)	(ii)

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Biotechnology: Principles & Processes

(Expected Questions in NEET 2022: 4)

Subtopic Name	Number of Questions
Restriction Enzymes	13
Tools: Enzymes	12
Tools: Vectors	12
Separation and Isolation of DNA fragments	9
Polymerase Chain Reaction :PCR	7
Selectable Markers	5
Cloning Vector	4
Bioreactors/Downstream Processing	3
Process of Biotech	2
Selection of Recombinant Transformants	2
Transforming Plant & Animal Cell	2
Introduction & History	2
Large Scale Production	2
General Design of an rDNA experiment	1
Obtaining Copy of Gene from Donor DNA	1
Host & Desired DNA	1

1. The DNA molecule to which the gene of interest is integrated for cloning is called
1. Transformer
2. Vector
3. Template
4. Carrier

2. The DNA fragments separated on an agarose gel can be visualized after staining with:
1. Acetocarmine
2. Aniline blue
3. Ethidium bromide
4. Bromophenol blue

3.
The correct order of steps in Polymerase Chain Reaction (PCR) is
1. Extension, Denaturation, Annealing
2. Annealing, Extension, Denaturation
3. Denaturation, Extension, Annealing
4. Denaturation, Annealing, Extension

4. The process of separation and purification of expressed protein before marketing is called:
1. Downstream processing
2. Bioprocessing
3. Postproduct processing
4. Upstream processing

5. Stirred-tank bioreactors have been designed for
1. purification of product
2. addition of preservatives to the product
3. availability of oxygen throughout the process
4. ensuring anaerobic conditions in the culture vessel

6. A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using
1. Eco Rl
2. taq polymerase
3. polymerase lll
4. ligase

7. Which of the following is not a component of downstream processing?
1. Separation
2. Purification
3. Preservation
4. Expression

8. DNA fragments are:
1. Negatively charged
2. Neutral
3. Either positively charged depending on their size
4. Positively charged

9. A gene whose expression helps to identify transformed cell is known as:
1. Vector
2. Plasmid
3. Structural gene
4. Selectable marker

10. What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis?
1. The smaller the fragment size, the farther it moves
2. Positively charged fragment move to farther end
3. Negatively charged fragment do not move
4. The larger the fragment size, the farther it moves

11.
Which of the following is a restriction endonuclease?
1. Protease
2. DNase I
3. RNase
4. Hind II

12.
Which of the following is not a feature of the plasmids ?
1. Circular structure
2. Transferable
3. Single-stranded
4. Independent replication

13.
The Taq polymerase enzyme is obtained from
1. Thiobacillus ferroxidans
2. Bacillius subtilis
3. Pseudomonas putida
4. Thermus aquaticus

14. The cutting of DNA at specific locations became possible with the discovery of
1. Restriction enzymes
2. probes
3. Selectable markets
4. ligases

15. The introduction of t-DNA into plants involves
1. Infection of the plant by Argobacterium tumefaciens
2. Altering the pH of soil, heat-shocking the plants
3. Exposing the plants to Cold for a brief period
4. Allowing the plant roots to stand in water

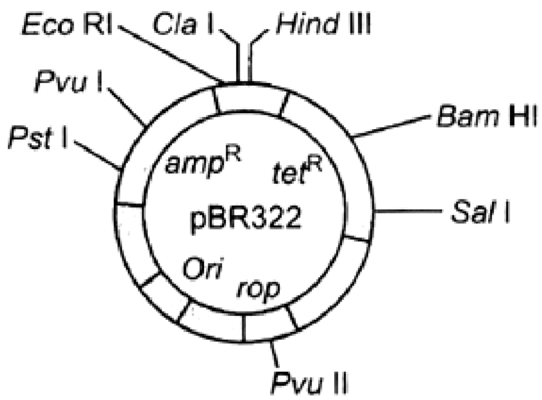
16. Which vector can clone only a small fragment of DNA?
1. Bacterial artificial chromosome
2. Yeast artificial chromosome
3. plasmid

17. Which of the following is not correctly matched for the organism and its cell wall degrading enzyme?
1. Plant cells- cellulose
2. Algae - Methylase
3. Fungi - Chitinase
4. Bacteria - Lysozyme

18. DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by :
1. Polymerase chain reaction
2. Electrophoresis
3. Restriction mapping
4. Centrifugation

19. The colonies of recombinant bacteria appear because of :
1. Insertional inactivation of alpha-galactosidase in non-recombinant bacteria
2. Insertional inactivation of beta-galactosidase in recombinant bacteria
3. Inactivation of glycosidase enzyme in recombinant bacteria
4. Non-recombinant bacteria containing beta-galactosidase

20.
The figure below is the diagrammatic representation of the E. coli vector pBR 322. Which one of the given options correctly identifies its certain components (s)?



1. Ori-original restriction enzyme
2. rap-reduced osmotic pressure
3. Hind III, Eco RI-selectable markers
4. amp^R, $teti^R$-antibiotic resistance genes

21. Which one of the following is a case of wrong matching?
1. Somatic hybridization- Fusion of two diverse cells
2. Vector DNA- Site for tRNS synthesis
3. Micropropagation- In vitro production of plants in large numbers
4. Callus - Unorganized mass of cells produced in tissue culture

22. Which one is a true statement regarding DNA polymerase used in PCR?
1. It is used to ligate introduces DNA in recipient cells
2. It serves as a selectable marker
3. It is isolated from a virus
4. It remains active at high temperature

23. For transformation, microparticles coated with DNA to be bombarded with gene gun are made up of
1. Silver or platinum
2. Platinum or zinc
3. Silicon or platinum
4. Gold or tungsten

24.
Given below is a sample of portion of DNA strand giving the base sequence on the opposite strands. What is so, special shown in it?
5’___GAATTC___3’
3’___CTTAAG__5’
1. Deletion mutation
2. Start codon at the 5' end
3. Palindromic sequence of base pairs
4. Replication completed 26

25.
There is a restriction endonuclease called Eco RI.
What does 'co' part in it stand for?
1. Coelom
2. Coenzyme
3. Coli
4. Colon

26.
Agarose extracted from seaweeds finds use in
1. tissue culture
2. PCR
3. gel electrophoresis
4. spectrophotometry

27. Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme?
1. 5'-CGTTCG-3'
3'-ATGGTA-5'
2. 5'-GATATG-3'
3'-CTACTA-5'
3. 5'-GAATTC-3'
3'-CTTAAG-5'
4. 5'-CACGTA-3'
3'-CTCAGT-5'

28. Restriction endonucleases are enzymes which
1. make cuts at specific positions within the DNA molecule
2. recognize a specific nucleotide sequence for binding of DNA ligase
3. restrict the action of the enzyme DNA polymerase
4. remove nucleotides from the ends of the DNA molecule

29. Stirred-tank bioreactors have been designed for –
(1) Addition of preservatives to the product
(2) Purification of the product
(3) Ensuring anaerobic conditions in the culture vessel
(4) Availability of oxygen throughout the process

30.
Gel electrophoresis is used for
1. cutting of DNA into fragments
2. separation of DNA fragments according to their size
3. construction of recombinant DNA by joining with cloning vectors
4. isolation of DNA molecule

31.
The linking of the antibiotic resistance gene with the plasmid vector became possible with
1. DNA ligase
2. endonucleases
3. DNA polymerase
4. exonucleases

32. Restriction endonuclease:
1. cuts the DNA molecule randomly
2. cuts the DNA molecule at specific sites
3. restricts the synthesis of DNA inside the nucleus
4. synthesis DNA

33. Following statements describe the characteristics of the enzyme Restriction Endonuclease. Identify the incorrect statement
1. The enzyme recognizes a specific palindromic nucleotide sequence in the DNA
2. The enzyme cuts DNA molecules at identified position within the DNA
3. The enzyme binds DNA at specific sites and cuts only one of the two strands
4. The enzyme cuts the sugar-phosphate backbone at specific sites on each strand

34. DNA precipitation out of a mixture of biomolecules can be achieved by treatment with:
1. Chilled chloroform
2. isopropanal
3. Chilled ethanol

35. Which of the following equipments is essentially required for growing microbes on a large scale for industrial production of enzymes?
1. Bioreactor
2. BOD incubator
3. Sludge digester
4. Industrial oven

36. Match the following enzymes with their functions:

	Column-I		Column-II
(a)	Restriction endonuclease	(i)	joins the DNA fragments
(b)	Exonuclease	(ii)	extends primers on genomic DNA template
(c)	DNA ligase	(iii)	cuts DNA at specific position
(d)	Tag polymerase	(iv)	removes nucleotides from the ends of DNA

Select the correct option from the following:
1. (a) - (iii), (b)- (i), (c)- (iv), (d)-(ii)
2. (a) - (iii), (b)- (iv), (c)- (i), (d)-(ii)
3. (a) - (iv), (b)- (iii), (c)- (i), (d)-(ii)
4. (a) - (ii), (b)- (iv), (c)- (i), (d)-(iii)

37. The two antibiotic resistance genes on vector pBR 322 are for
1. Ampicillin and Tetracycline
2. Ampicillin and Chloramphenicol
3. Chloramphenicol and Tetracycline
4. Tetracycline and Kanamycin

38. A selectable marker is used to :
1. help in eliminating the non transformants so that the transformants can be regenerated
2. identify the gene for a desired trait in an alien organism
3. select a suitable vector for transformation in a specific crop
4. mark a gene on a chromosome for isolation using restriction enzyme

39. Given below are four statements pertaining to separation of DNA fragments using Gel electrophoresis. Identify the incorrect statements.
(a) DNA is negatively charged molecule and so it is loaded on gel towards the Anode terminal.
(b) DNA fragments travel along the surface of the gel whose concentration does not affect movement of DNA.
(c) Smaller the size of DNA fragment, larger is the distance it travels through it.
(d) Pure DNA can be visualized directly by exposing to UV radiation.
Choose correct answer from the options given below:
1. (a), (c) and (d)
2. (a), (b) and (c)
3. (b), (c) and (d)
4. (a), (b) and (d)

40. An enzyme catalysing the removal of nucleotides from ends of DNA is :
1. DNA ligase
2. Endonuclease
3. Exonuclease
4. Protease

41. The sequence that controls the copy number of the linked DNA in the vector, is termed :
1. Ori site
2. Palindromic sequence
3. Recognition site
4. Selectable marker

42. In-gel electrophoresis, separated DNA fragments can be visualized with the help of:
1. Ethidium bromide in UV radiation
2. Acetocarmine in UV radiation
3. Ethidium bromide in infrared radiation
4. Acetocarmine in bright blue light

43. Identify the wrong statement with regards to restriction enzyme
1. They cut the strength at palindromic sites.
2. They are useful in genetic engineering.
3. Sticky ends can be joined by using DNA ligases.
4. Each restriction enzyme functions by inspecting the length of a DNA sequence.

44. The specific palindromic sequence which is recognized by EcoRI is :
1. 5' -GGAACC-3'
   3'-CCTTGG-5'
2. 5'-CTTAAG-3'
   3'-GAATTC-5'
3. 5'-GGATCC-3'
   3'-CCTAGG-5'
4. 5'-GAATTC-3'
   3'-CTTAAG-5'

45. First discovered restriction endonuclease that always cuts DNA molecule at a particular point by recognizing a specific sequence of six base pairs is:
1. EcoR1
2. Adenosine deaminase
3. Thermostable DNA polymerase
4. Hind II

46. In recombinant DNA technology antibiotics are used :
1. to keep medium bacteria-free
2. to detect alien DNA
3. to impart disease-resistance to the host plant
4. as selectable markers

47. Match the following techniques or instruments with their usage :

(a) Bioreactor	(i) Separation of DNA fragments
(b) Electrophoresis	(ii) Production of large quantities of products
(c) PCR	(iii) Detection of pathogen, based on antigen - antibody reaction
(d) ELISA	(iv) Amplification of nucleic acids

Select the correct option from following:
1. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
2. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
3. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
4. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

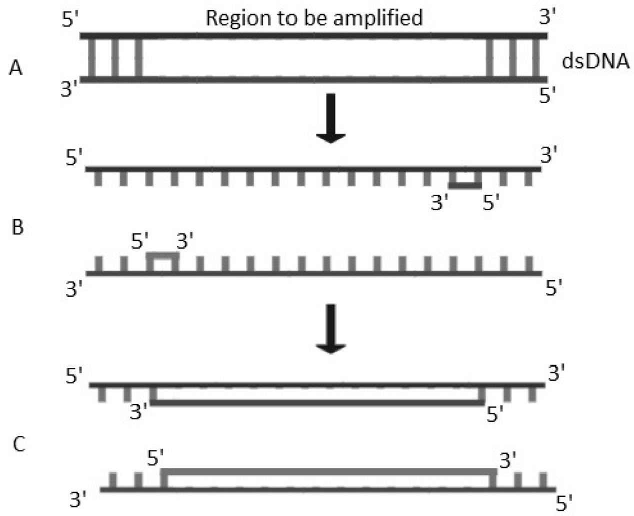
48. In a mixture, DNA fragments are separated by-
1. Bioprocess engineering
2. Restriction digestion
3. Electrophoresis
4. Polymerase chain reaction

49. Spooling is :-
1. Amplification of DNA
2. Cutting of separated DNA bands from the agarose gel
3. Transfer of separated DNA fragments to synthetic membranes
4. Collection of isolated DNA

50. Select the correct statement from the following :
1. Gel electrophoresis is used for the amplification of a DNA segment.
2. The polymerase enzyme joins the gene of interest and the vector DNA.
3. Restriction enzyme digestions are performed by incubating purified DNA molecules with the restriction enzymes of optimum conditions.
4. PCR is used for isolation and separation of genes of interest.

51. In genetic engineering, the antibiotic resistance gene are used :
1. To select healthy vectors
2. As sequences from where replication starts
3. To keep the cultures free of infection
4. As selectable markers

52. The figure below shows three steps (A, B, C) of Polymerase Chain Reaction (PCR). Select the option giving correct identification together with what it represents?



1. A - Denaturation at a temperature of about 50ºC
2. C - Extension in the presence of heat stable DNA polymerase
3. A - Annealing with two sets of primers
4. B - Denaturation at a temperature of about 98ºC separating the two DNA strands

53. Which one of the following represents a palindromic sequence in DNA ?
1. 5'-CCAATG-3'
   3'-GAATCC-5'
2. 5'-CATTAG-3'
   3'-GATAAC-5'
3. 5'-GATACC-3'
   3'-CCTAAG-5'
4. 5'-GAATTC-3'
   3'-CTTAAG-5'

54. Biolistics (gene-gun) is suitable for -
1. Transformation of plant cells
2. Constructing recombinant DNA by joining with vectors
3. DNA finger printing
4. Disarming pathogen vectors

55. Which of the following are used in gene cloning-
1. Lomasomes
2. Mesosomes
3. Plasmids

56. In genetic engineering, a DNA segment (gene) of interest,is transferred to the host cell through a vector. Consider the following four agents (A-D) in this regard and select the correct option about which one or more of these can be used as a vecotr / vectors –
A. a bacterium
B. plasmid
C. plasmodium
D. bacteriophage
Options :
1. (A) only
2. (A) and (C) only
3. (B) and (D) only
4. (A), (B) and (D) only

57. Which one of the following techniques made it possible to genetically engineer living organisms ?
1. Hybridization
2. Recombinant DNA techniques
3. X-ray diffraction
4. Heavier isotope labeling

58. Which one of the following hydrolyses internal phosphodiester bonds in a polynucleotide chain-
(1) Lipase
(2) protease
(3) Exonuclease
(4) Endonuclease

59. Knife of DNA :
1. DNA–ligase
2. Restriction endonuclease
3. Exonuclease
4. Peptidase

60. Genetic engineering involves :
1. Use of restriction endonuclease on bacterial DNA and formation of new traits
2. Use of Ligase for cutting DNA
3. Developing instruments
4. Use of statistic in genetics

61. Which of the following is most used in genetic engineering :
1. E. coil and Agrobacterium
2. Mycobacteria and Salmonella
3. Aspergillus
4. Penicillium

62. Restriction endonucleases :-
(1) Are used in genetic engineering for ligating two DNA molecules
(2) Are used for in vitro DNA synthesis
(3) Are synthesized by bacteria as part of their defense mechanism
(4) Are present in mammalian cells for degradation of

63. The Ti plasmid is often used for making transgenic plants. This plasmid is found in
(1) Rhizobium of the roots of leguminous plants
(2) Agrobacterium
(3) Yeast as a 2 µm plasmid
(4) Azotobacter

64. Function of Nucleases :
1. Break the polynucleotide chain by breaking the each terminal nucleotide
2. Breaks phosphodiester bond
3. Breaks peptide bonds
4. Breaks ester bonds

65. The bacteria generally used for genetic engineering is :
1. Agrobacterium
2. Bacillus
3. Pseudomonas
4. Clostridium

66. In bacteria, plasmid is : -
(1) Extra chromosomal material
(2) Main DNA
(3) Non functional DNA
(4) Repetative gene

67. Which of the following enzymes are used to join bits of DNA : -
(1) Ligase
(2) Primase
(3) DNA polymerase
(4) Endonuclease

68. Manipulation of DNA in genetic engineering became possible due to the discovery of : -
(1) Restriction endonuclease
(2) DNA ligase
(3) Transcriptase
(4) Primase

69. Which one of the following bacteria has found extensive use in genetic engineering work in plants : -
(1) Clostridium septicum
(2) Xanthomonas citri
(3) Bacillus coagulens
(4) Agrobacterium tumefaciens

70. What is true for plasmid : -
1. Plasmids are widely used in gene transfer
2. These are found in virus
3. Plasmid contain gene for vital activities
4. These are main part of chromosome

71. Which of the following cut the DNA from specific places : -
1. Restriction endonuclease (EcoRI)
2. Ligase
3. Exonuclease
4. Alkaline phosphate

72. In lederberg's replica plating experiment what shall be used to obtain streptomycin resistant strain : -
1. Minimal medium and streptomycine
2. Complete medium and streptomycine
3. Only minimal medium
4. Only complete medium

73. DNA strands on a gel stained with ethidium bromide when viewed under UV radiation, appear as:
(1) Dark red bands
(2) Bright blue bands
(3) Yellow bands
(4) Bright orange bands

74. Which of the following is a correct sequence of steps in a PCR (Polymerase Chain Reaction)?
(1) Extension, Denaturation, Annealing
(2) Annealing, Denaturation, Extension
(3) Denaturation, Annealing, Extension
(4) Denaturation, Extension, Annealing

75. During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out:
(1) Histones
(2) Polysaccharides
(3) RNA
(4) DNA

76. Plasmid pBR322 has a PstI restriction enzyme site within gene amp^R that confers ampicillin resistance. If this enzyme is used for inserting a gene for β-galactoside production and the recombinant plasmid is inserted in an E.coli strain,
1. it will lead to the lysis of host cells.
2. it will be able to produce a novel protein with dual abilities.
3. it will not be able to confer ampicillin resistance to the host cell.
4. the transformed cells will have the ability to resist ampicillin as well as produce β-galactoside.

77. A specific recognition sequence identified by endonucleases to make cuts at specific positions within the DNA is:
1. Palindromic Nucleotide sequences
2. Poly(A) tail sequences
3. Degenerate primer sequence
4. Okazaki sequences

78. During the process of gene amplification using PCR, very high temperature is not maintained in the beginning, then which of the following PCR will be affected first?
1. Denaturation
2. Ligation
3. Annealing
4. Extension

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Biotechnology & its Applications

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Bt Crops	10
Interference RNA Tech	9
Gene Therapy	6
Ethical Issues	5
Med Applications & Humulin	5
Other GM Crops	5
Molecular Diagnosis	4
Intro to Agri Applications	3
Transgenic Microbes & Animals	3

1.
Which of the following is commonly used as a vector for introducing a DNA fragment in human Lymphocytes?
1. Retrovirus
2. Ti plasmid
3. λ phage
4. pBR 322

2.
In India, the organization responsible for assessing the safety of introducing genetically modified Organisms for public use is
1. Indian Council of Medical Research (ICMR)
2. Council for Scientific and Industrial Research (CSIR)
3. Research Committee on Genetic Manipulation (RCGM)
4. Genetic Engineering Appraisal Committee (GEAC)

3. A 'new variety of rice was patented by a foreign company though such varieties have been present in India for a long time. This is related to
1. Co-667
2. Sharbati Sonora
3. Lerma Rojo
4. Basmati

4.
Use of bioresources by multinational companies and organizations without authorization from the
Concerned country and its people is called
1. Bio-infringement
2. Biopiracy
3. Biodegradation
4. Bioexploitation

5. Which kind of therapy was given in 1990 to a four-year-old girl with Adenosine Deaminase (ADA) deficiency?
1. Gene therapy
2. Chemotherapy
3. Immunotherapy
4. Radiation therapy

6.
The two polypeptides of human insulin are linked together by
1. phosphodiester bonds
2. covalent bonds
3. disulphide bridges
4. hydrogen bonds

7.
Which part of the tobacco plant is infected by Meloidegyne incognitia?
1. Leaf
2. Stem
3. Root
4. Flower

8. Golden rice is a genetically modified Crop plant where the incorporated gene is meant for biosynthesis of
1. Vitamin-B
2. Vitamin-C
3. Omega 3
4. Vitamin-A

9.
In Bt cotton, the Bt toxin present in plant tissue as pro-toxin is converted into active toxin due to
1. alkaline pH of the insect gut
2. acidic pH of the insect gut
3. action of gut microorganisms
4. presence of conversion factors in insect gut

10. Which of the following Bt crops is being grown in India by the farmers?
1. Cotton
2. Brinjal
3. Soybean
4. Maize

11. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin-A deficiency?
1. Flaver savr tomato
2. Canolla
3. Golden rice
4. Bt-brinjal

12. A single strand of nucleic acid tagged with a radioactive molecule is called
1. vector
2. selectable marker
3. Plasmid
4. Probe

13.
The process of RNA interference has been used in the development of plants resistant to
1. fungi
2. viruses
3. insects
4. nematodes

14.
Maximum number of existing transgenic animals is of
1. mice
2. cow
3. pig
4. fish

15. Genetic engineering has been successfully used for producing –
(1) transgenic mice for testing safety of polio vaccine before use in humans
(2) transgenic models for studying new treatments for certain cardiac disease
(3) transgenic Cow-Rosie which produces high fat milk for making ghee
(4) Animals like bulls for farm work as they have super power

16. Some of the characteristics of Bt cotton are
1. long fibre and resistance to aphids
2. medium yield, log fibre and resistance to beetle pests
3. high yield and production of toxic protein crystals which kill dipteran pests
4. high yield and resistance to bollworms

17. An improved variety of transgenic basmati rice
1. does not require chemical fertilizers and growth hormones
2. gives high yield and is rich in vitamin-A
3. is completely resistant to all insect pests and diseases of paddy
4. gives high yield but has no characteristic aroma

18. The bacterium Bacillus thuringiensis is widely used in contemporary biology as a/an
1. indicator of water pollution
2. insecticide
3. agent for production of dairy products
4. source of industrial enzyme

19. The genetic defect-Adenosine Deaminase (ADA) deficiency may be cured permanently by
1. periodic infusion of genetically engineered lymphocytes having functional ADA cDNA
2. administering adenosine deaminase activators
3. introducing bone marrow cells producing ADA into cells at early embryonic stages
4. Invitro Cell culture therapy.

20. Which one of the following is commonly used in transfer of foreign DNA into crop plants?
1. Trichoderma harzianum
2. Meloidogyne incognita
3. Agro bacterium tumefaciens
4. Penicillium expansum

21. What is true about Bt toxin?
1. the inactive protoxin gets converted into active form in the insect gut
2. Bt protein exists as active toxin in the Bacillus
3. The activated toxin enters the ovaries of the pest to sterilize it and thus prevent its multiplication
4. the concerned Bacillus has antitoxins

22. Transgenic plants are
1. produced by a somatic embryo in artificial medium
2. generated by introducing foreign DNA into a cell and regenerating a plant from that cell
3. Produced after protoplast fusion in artificial medium
4. grown in artificial medium after hybridization in the field

23.
Human insulin is being commercially produced from a transgenic species of
1. Escherichia
2. Mycobacterium
3. Rhizobium
4. Saccharomyces

24.
Cry-I endotoxins obtained from Bacillus thuringiensis are elective against
1. mosquitoes
2. flies
3. nematodes
4. bollworms

25.
What is antisense technology?
1. A cell displaying a foreign antigen used for synthesis of antigens.
2. Production of somaclonal variants in tissue cultures.
3. When a piece of RNA that is complementary in sequence is used to stop expression of a specific gene
4. RNA polymerase producing DNA

26. Golden rice is a promising transgenic crop. When released for cultivation, it will help in:
1. alleviation of vitamin-A deficiency
2. pest resistance
3. herbicide tolerance
4. producing a petrol-like fuel from rice

27. Microbes found to be very useful in genetic engineering are:
1. Escherichia coli and Agrobacterium tumefaciens
2. Vibrio cholerae and a tailed bacteriophage
3. Diplococcus sp. and Pseudomonas sp.
4. Crown gall bacterium and caenorhabditis elegans

28. What triggers activation of protoxin to active Bt toxin of Bacillus thuringiensis in boll worm?
1. Acidic pH of stomach
2. Body temperature
3. Moist surface of midgut
4. Alkaline pH of gut

29. Which of the following is true for Golden rice?
1. It has yellow grains, because of gene introduced from a primitive variety of rice
2. It is Vitamin A enriched, with a gene from daffodil
3. It is pest resistant, with a gene from Bacillus thuringiensis
4. It is drought tolerant, developed using Agrobacterium vector

30. Exploitation of bioresources of a nation by multinational companies without authorization from the concerned country is referred to as
1. Bioweapon
2. Biopiracy
3. Bioethics
4. Biowar

31. In RNAi, the genes are silenced using :
1. dsRNA
2. ssDNA
3. ssRNA
4. dsDNA

32. Which of the following statements is not correct?
1. The proinsulin has an extra peptide called C-peptide
2. The functional insulin has A and B chains linked together by hydrogen bonds.
3. Genetically engineered insulin is produced in E-Coli.
4. In man, insulin is synthesized as proinsulin.

33. Bt cotton variety that was developed by the introduction of toxin gene of Bacillus thuringiensis (BT) is resistant to
1. Fungal diseases
2. Plant nematodes
3. Insect predators
4. Insect pests

34. Match the organism with its use in biotechnology.

(a) Bacillus thuringiensis	(i) Cloning vector
(b) Thermus aquaticus	(ii) Construction of first rDNA molecule
(c) Agrobacterium tumefaciens	(iii) DNA polymerase
(d) Salmonella typhimurium	(iv) Cry proteins

Select the correct option from the following:

	(a)	(b)	(c)	(d)
1.	(iv)	(iii)	(i)	(ii)
2.	(iii)	(ii)	(iv)	(i)
3.	(iii)	(iv)	(i)	(ii)
4.	(ii)	(iv)	(iii)	(i)

35. Match the following columns and select the correct option.

Column - I	Column - II
a. Bt cotton	(i) Gene therapy
b. Adenosine deaminase deficiency	(ii) Cellular defence
c. RNAi	(iii) Detection of HIV infection
d. PCR	(iv) Bacillus thuringiensis

	(a)	(b)	(c)	(d)
1.	(iii)	(ii)	(i)	(iv)
2.	(ii)	(iii)	(iv)	(i)
3.	(i)	(ii)	(iii)	(iv)
4.	(iv)	(i)	(ii)	(iii)

36. RNA interference is used for which of the following purposes in the field of biotechnology?
1. to develop a plant tolerant to abiotic stresses
2. to develop a pest-resistant plant against infestation by nematode
3. to enhance the mineral usage by the plant
4. to reduce post-harvest losses

37. The laws and rules to prevent unauthorized exploitation of bio-resources are termed as -
1. Biopatenting
2. Bioethics
3. Bioengineering
4. Biopiracy

38. Tobacco plants resistant to a nematode have been developed by the introduction of DNA that produced (in the host cells) :
1. A particular hormone
2. An antifeedant
3. A toxic protein
4. Both sense and anti-sense RNA

39. The first clinical gene therapy was given for treating -
1. Chicken pox
2. Rheumatoid arthritis
3. Adenosine deaminase deficiency
4. Diabetes mellitus

40. Which one of the following is now being commercially produced by biotechnological procedures -
1. Morphine
2. Quinine
3. Insulin
4. Nicotine

41. Read the following four statements (A-D) about certain mistakes in two of them :
(A) The first transgenic buffalo, Rosie produced milk which was human alpha-lactalbumin enriched.
(B) Restriction enzymes are used in isolation of DNA from other macro-molecules
(C) Downstream processing is one of the steps of R-DNA technology
(D) Disarmed pathogen vectors are also used in transfer of R-DNA into the host
Which are the two statements having mistakes ?
1. Statements (A) and (B)
2. Statements (B) and (C)
3. Statements (C) and (D)
4. Statements (A) and (C)

42. Silencing of mRNA has been used in producing transgenic plants resistant to :
1. Bacterial blights
2. Bollworms
3. Nematodes
4. White rusts

43. Bacillus thuringiensis forms protein crystals which contain insecticidal protein.
This protein :
1. does not kill the carrier bacterium which is itself resistant to this toxin
2. binds with epithelial cells of midgut of the insect pest ultimately killing it
3. is coded by several genes including the gene cry
4. is activated by acid pH of the foregut of the insect pest.

44. Golden rice is a transgenic crop of the future with the following improved trait -
(1) High protein content
(2) High vitamin – A content
(3) High lysine (essential amino acid) content
(4) Insect resistance

45. Which of the following is not an application of PCR (Polymerase Chain Reaction)?
(1) Purification of isolated protein
(2) Detection of gene mutation
(3) Molecular diagnosis
(4) Gene amplification

46. When gene targetting involving gene amplification is attempted in an individual's tissue to treat disease, it is known as:
1. Molecular diagnosis
2. Safety testing
3. Biopiracy
4. Gene therapy

47. Now a days it is possible to detect the mutated gene causing cancer by allowing the radioactive probe to hybridise its complementary DNA in clone of cells, followed by its detection using autoradiography because:
1. mutated gene does not appear on a photographic film as the probe has no complementarity with it.
2. mutated gene does not appear on photographic film as the probe has complementarity with it.
3. mutated gene partially appears on a photographic film.
4. mutated gene completely and clearly appears on a photographic film.

48. With regard to insulin choose correct options.
(a) C-peptide is not present in mature insulin.
(b) The insulin produced by rDNA technology has C-peptide.
(c) The pro-insulin has C-peptide.
(d) A-peptide and B-peptide of insulin are interconnected by disulphide bridges.
Choose the correct answer from the options given below.
(1) (a), (c) and (d) only
(2) (a) and (d) Only
(3) (b) and (d) only
(4) (b) and (c) only

49. For effective treatment of the disease, early diagnosis and understanding its pathophysiology is very important. Which of the following molecular diagnostic techniques is very useful for early detection?
1. ELISA Technique
2. Hybridization Technique
3. Western Blotting Technique
4. Southern Blotting Technique

50. The Adenosine deaminase deficiency results into:
1. Digestive disorder
2. Addison's disease
3. Dysfunction of Immune system
4. Parkinson's disease

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Organisms & Populations

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Population Interactions	17
Population Characters	7
Adaptations	3
Population: Logistic Growth Model	3
Introduction to Ecology	2
Population: Exponential Growth Model	2
Response of Organisms to Abiotic Factors	2
Introduction to the Chapter	1

1. Asymptote in a logistic growth curve is obtained when:
1. K=N
2. K>N
3. K<N
4. The value of 'r' approaches zero

2.
Niche is
1. All the biological factors in the organism environment
2. The physical space where an organism live
3. The range of temperature that the organism needs to live
4. The functional role played by the organism where it lives

3.
Natality refers to
1. Death rate
2. Birth rate
3. Number of individuals leaving the habitat
4. Number of individuals entering the habitat

4.
In a growing population of a country

1. pre-reproductive individuals are more than reproductive individuals.
2. reproductive individuals are less than post-reproductive individuals.
3. reproductive and pre-reproductive individuals are equal in number.
4. pre-reproductive individuals are less than reproductive individuals.

5. If '+' sign is assigned to beneficial interaction, '-' sign to detrimental and '0' sign to neutral interaction, then the population interaction represented by'+"-' refers to
1. mutualism
2. amensalism
3. commensalism
4. parasitism

6. The principle of competitive exclusion was stated by
1. C. Darwin
2. G. F. Gause
3. MacArthur
4. Verhulst and Pearl

7. Mycorrhizae are the example of:
1. Amensalism
2. Antibiosis
3. Mutualism
4. Fungistasis

8.
When does the growth rate of a population following the logistic model equal zero? The logistic model is given as dN/dt = rN(1-N/K)
1. when N nears the carrying capacity of the habitat
2. when N/K equals zero
3. when death rate is greater than birth rate
4. when N/K is exactly one

9. An association of individuals of different species living in the same habitat and having functional interactions is
1. Ecological niche
2. Biotic community
3. Ecosystem
4. Population

10. In which of the following interactions both partners are adversely affected?
1. Competition
2. Predation
3. Parasitism
4. Mutualism

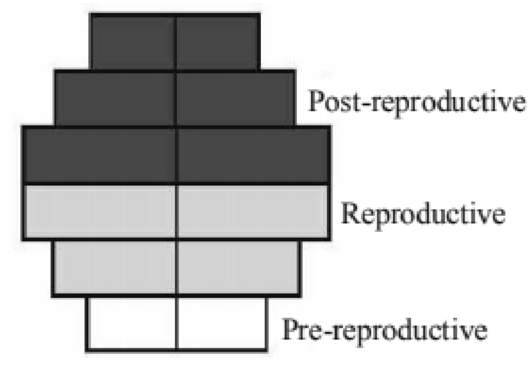
11. Just as a person moving from Delhi to Shimla to escape the heat for the duration of hot summer, thousands of migratory birds from Siberia and other extremely cold northern regions move to:
1. Western Ghat
2. Meghalaya
3. Corbett National Park
4. Keoladeo National Park

12. A biologist studied the population of rats in a barn. He found that the average natality was 250, average mortality 240, immigration 20 and emigration 30. The net increase in population is :
1. 15
2. 05
3. zero
4. 10

13. According to Darwin, organic evolution is due to:
1. Interspecific competition
2. Competition within closely related species.
3. Reduced feeding efficiency in one species due to the presence of interfering species.
4. Intraspecific competition

14.
Consider the following four conditions (I-IV) and select the correct pair of them as adaption to environment in desert lizards.
The conditions:
I. Burrowing in soil to escape high temperature
II. Losing heat rapidly from the body during high temperature
III. Bask in sun when temperature is low
IV. Insulating body due to thick fatty dermis
1. (I) and (III)
2. (II) and (IV)
3. (I) and (II)
4. (III) and (IV)

15. What type of human population is represented by the following age pyramid?

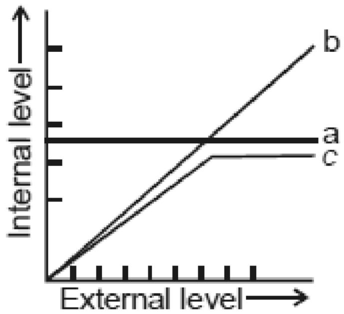


1. Stable population
2. Declining population
3. Expanding population
4. Vanishing population

16.
Which one of the following is categorized as a parasite in true senses?
1. Human foetus developing inside the uterus draws nourishment from the mother
2. Head louse living on the human scalp as laying eggs on human hair
3. The cuckoo (koel) lays its eggs in crow's nest
4. The female Anopheles bites and sucks blood from humans

17. Study the four statements (a–d) given below and select the two correct ones out of them –
(a) A lion eating a deer and a sparrow feeding on grain are ecologically similar in being consumers
(b) Predator star fish Pisaster helps in maintaining species diversity of some invertebrates
(c) Predators ultimately lead to the extinction of prey species
(d) Production of chemicals such as nicotine, strychnine by the plants are metaboilic disorders
The two correct stament are-
(1) a and d (2) a and b
(3) b and c (4) c and d

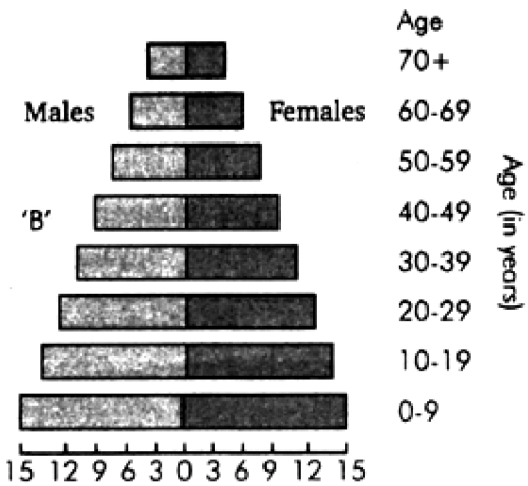
18. The figure given below is a diagrammatic representation of response of organisms toabiotic factors. What do A, B and C represent respectively?



	(a)	(b)	(c)
1.	Regulator	Conformer	Partial regulator
2.	Conformer	Regulator	Partial regulator
3.	Regulator	Partial regulator	Conformer
4.	Partial regulator	Regulator	Conformer

1. (1)
2. (2)
3. (3)
4. (4)

19. A country with a high rate of population growth took measures to reduce it. The figure below shows age sex pyramids of populations. A and B twenty years apart. Select the correct interpretation about them



Interpretations
1. 'A' is more recent and shows slight reduction in the growth rate
2. 'B' is more earlier pyramid and shows stabilised growth rate
3. 'B' is more recent showing that population is very young
4. 'A' is the earlier pyramid and no change has occured in the growth rate

20. Geometric representation of age structure is a characteristic of:
1. Biotic community
2. Population
3. Lanscape
4. Ecosystem

21. The formula for exponential population growth is :
1. dt/dN= rN
2. dN/rN= dt
3. rN/dN= dt
4. dN/dt= rN

22. Carnivorous animals - lions and leopards, occupy the same niche but lions predate mostly larger animals and leopards take smaller ones. This mechanism of competition is referred to as -
1. Character displacement
2. Altruism
3. Resource partitioning
4. Competitive exclusion

23. Between which among the following, the relationship is not an example of commensalism?
1. Orchid and the tree on which it grows
2. Cattle Egret and grazing cattle
3. Sea Anemone and Clown fish
4. Female wasp and fig species

24. Match the items in Column-I with those in Column-II :

Column I	Column II
(a) Herbivores-Plants	(i) Commensalism
(b) Mycorrhiza-Plants	(ii) Mutualism
(c) Sheep-Cattle	(iii) Predation
(d) Orchid-Tree	(iv) Competition

Select the correct option from following :
1. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
2. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
3. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
4. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

25. The impact of immigration on population density is:-
1. Negative
2. Both positive and negative
3. Neutralized by natality
4. Positive

26. Which one of the following is most appropriately defined -
1. Amensalism is a relationship in which one species is benefited where as the other is unaffected
2. Predator is an organism that catches and kills other organism for food.
3. Parasite is an organism which always lives inside the body of other organism and may kill it.
4. Host is an organism which provides food to another organism.

27. The logistic population growth is expressed by the equation :
1. $\frac{dN}{dt} = rN\left(\frac{N-K}{N}\right)$
2. $\frac{dt}{dN} = Nr\left(\frac{K-N}{K}\right)$
3. $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$
4. $\frac{dN}{dt} = rN$

28. Consider the following statements (A)-(D) each with one or two blanks :
(A) Bears go into ________(1) _ during winter to ________(2) _ cold weather.
(B) A conical age pyramid with a broad base represents _________(3) human population.
(C) A wasp pollinating a fig flower is an example of ________(4) _ .
(D) An area with high levels of species richness is known as _________(5) .
Which of the following options, gives the correct fill ups for the respective blank numbers from(1) to (5) in the statements ?
1. (1) - hibernation, (2) - escape, (3) - expanding, (5) - hot spot
2. (3) - stable, (4) - commensalism, (5) - marsh
3. (1) - aestivation, (2) - escape, (3) - stable, (4) - mutualism
4. (3) - expanding, (4) - commensalism, (5) - biodiversity park

29. A male insect mistakes an orchid flower to be female due to its shape and performs the act of copulation and induces pollination. This is an example of
1. Mimicry
2. Pseudocopulation
3. Pseudo pollination
4. None

30. Two different species cannot live for long duration in the same niche or habitat. This is
1. Allen's law
2. Gloger's rule
3. Competitive exclusion principle
4. Weismann's theory

31. Which of the following is a correct pair : -
1. Cuscuta – parasite
2. Dischidia – insectivorous
3. Opuntia – predator
4. Capsella – hydrophyte

32. Mycorrhiza is an example of
1. Symbiotic relationship
2. Ectoparasitism
3. Endoparasitism
4. Decomposers

33. Inspite of interspecific competition in nature, which mechanism the competing species might have evolved for their survival?
(1) Mutualism
(2) Predation
(3) Resource partitioning
(4) Competitive release

34. Amensalism can be represented as:
(1) Species A (-) : Species B (-)
(2) Species A (+) : Species B (0)
(3) Species A (-) : Species B (0)
(4) Species A (+) : Species B (+)

35. In the exponential growth equation $N_t = N_0 e^{rt}$, e represents :
1. The base of natural logarithms
2. The base of geometric logarithms
3. The base of number logarithms
4. The base of exponential logarithms

36. Match List-I with List-II

List-I	List-II
(a) Allen's Rule	(i) Kangaroo rat
(b) Physiological adaptation	(ii) Desert lizard
(c) Behavioural adaptation	(iii) Marine fish at depth
(d) Biochemical adaptation	(iv) Polar seal

Choose the correct answer from the options given below.

	(a)	(b)	(c)	(d)
1.	(iv)	(i)	(ii)	(iii)
2.	(iv)	(iii)	(ii)	(i)
3.	(iv)	(ii)	(iii)	(i)
4.	(iv)	(i)	(iii)	(ii)

37. **Assertion (A) :**
A person goes to high altitude and experiences 'altitude sickness' with symptoms like breathing difficulty and heart palpitations.
Reason (R) :
Due to low atmospheric pressure at high altitude, the body does not get sufficient oxygen.
In the light of the above statements, choose the correct answer from the options given below.
1. (A) is true but (R) is false
2. (A) is false but (R) is true
3. Both (A) and (R) are true and (R) is the correct explanation of (A)
4. Both (A) and (R) are true but (R) is not the correct explanation of (A)

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Ecosystem

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Mineral Cycling & Ecosystem Services	9
Ecosystem Productivity	8
Ecological Pyramids	7
Decomposition	5
Ecological Succession	5
Energy Flow	3
Introduction	3
Ecological Flow	2

1. What type of ecological pyramid would be obtained with the following data?
Secondary consumer: 120 g
Primary consumer: 60 g
Primary producer: 10 g
1. Inverted pyramid of biomass
2. Pyramid of energy
3. Upright pyramid of numbers
4. Upright pyramid of biomass

2.
Which of the following would appear as the pioneer organisms on bare rocks?
1. Liverworts
2. Mosses
3. Green algae
4. Lichens

3.
In which of the following both pairs have correct combination?

(a) Gaseous nutrient cycle	Carbon and nitrogen
Sedimentary nutrient cycle	Sulphur and phosphorous
(b) Gaseous nutrient cycle	Carbon and sulphur
Sedimentary nutrient cycle	Nitrogen and phosphorus
(c) Gaseous nutrient cycle	Nitrogen and sulphur
Sedimentary nutrient cycle	Carbon and Phosphorous
(d) Gaseous nutrient cycle	Sulphur and phosphorous
Sedimentary nutrient cycle	Carbon and nitrogen

1. a
2. b
3. c
4. d

4. During ecological succession
1. The gradual and predictable change in species Composition occurs in a given area
2. The establishment of a new biotic community very fast in its primary phase
3. The number and types of animals re constant
4. The changes lead to a community that is in equilibrium with the environment and is called pioneer community.

5.
Vertical distribution of different species occupying different levels in a biotic community is known as
1. divergence
2. stratification
3. zonation
4. pyramid

6.
Secondary succession takes place on/in
1. bare rock
2. degraded forest
3. newly created pond
4. newly cooled lava

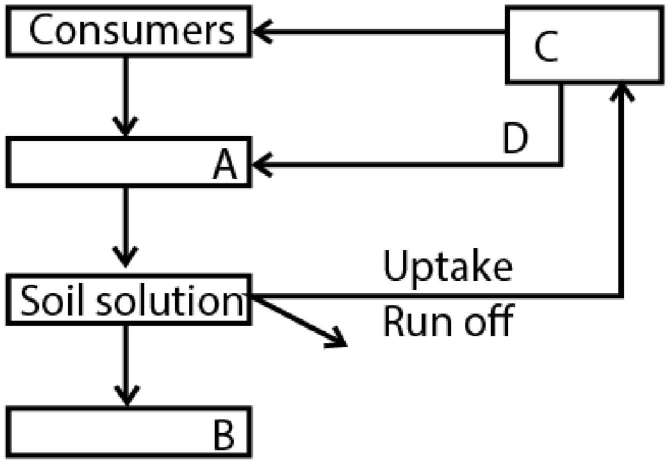
7.
The mass of living material at a tropic level at a particular time is called
1. gross primary productivity
2. standing state
3. net primary productivity
4. standing crop

8.
In an ecosystem the rate of production of organic matter during photosynthesis is termed as
1. net primary productivity
2. gross primary productivity
3. secondary productivity
4. net productivity

9. Match the following and select the correct option :
List - I
(a) Earthworm
(b) Succession
(c) Ecosystem service
(d) Population growth
List – II
(i) Pioneer species
(ii) Detrivore
(iii) Natality
(iv) Pollination
1. A-(i) B-(ii) C-(iii) D-(iv)
2. A-(i) B-(ii) C-(iii) D-(iv)
3. A-(iii) B-(ii) C-(iv) D-(i)
4. A-(ii) B-(i) C-(iv) D-(iii)

10.
Natural reservoir of phosphorus is:
1. Animal bones
2. Rock
3. Fossils
4. Sea water

11. Given below is a simplified model of phosphorus cycling in a terrestrial ecosystem with four blanks (A-D). Identify the blanks.



	A	B	C	D
1.	Rock minerals	Detritus	Litter fall	Producers
2.	Litter	Producers	Rock minerals	Detritus
3.	Detritus	Rock minerals	Producers	Litter fall
4	Producers	Litter fall	Rock minerals	Detritus

1. 1
2. 2
3. 3
4. 4

12. If 20 J of energy is trapped at producer level, then how much energy will be available to peacock as food in the following chain?
Plant → mice →snake→ peacock\
1. 0.02 J
2. 0.002 J
3. 0.2 J
4. 0.0002 J

13. Which one of the following processes during decomposition is correctly described?
1. Humanification-Leads to the accumulation of a dark coloured substance humans which undergoes microbial acton at every fast rate
2. Catabolism-Last step decomposition under fully anaerobic condition
3. Leaching-Water soluble inorganic nutrients rise to the top layers of soil
4. Fragmentation-Carried out by organisms such as earthworm

14. Secondary productivity is rate of formation of new organic matter by:
1. Parasite
2. Consumer
3. Decomposer
4. Producer

15. Pheretima and its close relatives derive nourishment from
1. Sugarcane roots
2. Decaying fallen leaves and soil organic matter
3. Soil insects
4. Small pieces of fresh fallen leaves of maize

16. Which one of the following is not a gaseous biogeochemical cycle in ecosystem?
1. Sulphur cycle
2. Phosphorus cycle
3. Nitrogen cycle
4. Carbon cycle

17. Which one of the following is not a functional unit of an ecosystem?
1. Energy flow
2. Decomposition
3. Productivity
4. Stratification

18.
Which one of the following statements is correct for secondary succession?
1. It occurs on a deforested site
2. It follows primary succession
3. It is similar to primary succession except that it has a relatively slow pace
4. All of the above

19.
Which one of the following statements for pyramid of energy is incorrect, whereas the remaining three are correct?
1. It shows energy content of different trophic level organisms
2. It is inverted in shape
3. It is upright in shape
4. Its base is broad

20.
Mass of living matter at a tropic level in an area at any times is called
1. Detritus
2. Humus
3. Standing state
4. Standing crop

21.
Of the total incident solar radiation proportion of PAR is
1. about 60%
2. about 50%
3. more than 80%
4. about 70%

22. The biomass available for consumption by the herbivores and the decomposers is called
1. net primary productivity
2. secodnary productivity
3. standing crop
4. gross primary productivity

23. Which one of the following is one of the characteristics of a biological community?
1. Stratification
2. Natality
3. Mortality
4. Sex-ratio

24.
About 70% of total global carbon is found in
1. grasslands
2. agro-ecosystems
3. oceans
4. forests

25. Which one of the following is not used for construction of ecological pyramids ?
1. Dry weight
2. Number of individuals
3. Rate of energy
4. Fresh weight

26. Which of the following ecological pyramids is generally inverted?
1. Pyramid of biomass in a sea
2. Pyramid of numbers in grassland
3. Pyramid of energy
4. Pyramid of biomass in a forest

27. Which of the following statements is incorrect?
1. Biomass decreases from first to fourth trophic level
2. Energy content gradually increases from first to fourth trophic level
3. Number of individuals decreases from first trophic level to fourth trophic level
4. Energy content gradually decreases from first to fourth trophic level

28. Which of the following statements is incorrect regarding the phosphorus cycle?
1. Phosphates are the major form of phosphorus reservoir
2. Phosphorus solubilizing bacteria facilitate the release of phosphorus from organic remains
3. There is the appreciable respiratory release of phosphorus into the atmosphere
4. It is a sedimentary cycle

29. The rate of decomposition is faster in the ecosystem due to the following factors EXCEPT:-
1. Detritus rich in sugars
2. Warm and moist environment
3. Presence of aerobic soil microbes
4. Detritus richer in lignin and chitin

30. Both, hydrarch and xerarch successions lead to :
1. Excessive wet conditions
2. Medium water conditions
3. Xeric conditions
4. Highly dry conditions

31. Which one of the following animals may occupy more than one trophic levels in the same ecosystem at the same time ?
1. Frog
2. Sparrow
3. Lion
4. Goat

32. The breakdown of detritus into smaller particles by earthworm is a process called :
1. Catabolism
2. Humification
3. Fragmentation
4. Mineralisation

33. Total amount of energy trapped by green plants in food is called :
1. Gross primary production
2. Net primary production
3. Standing crop
4. Standing state

34. Bacteria are essential in carbon cycle as :
1. Decomposer
2. Synthesizer
3. Consumer
4. Pri. Producer

35. The total amount of carbon fixed annually by plants is:
1. 4×10^{23} kg
2. 4×10^{13} kg
3. 4×10^{10} kg
4. 4×10^{11} kg

36. Which of the following is expected to have the highest value (gm/m^2 /yr) in a grassland ecosystem : -
(1) Tertiary production
(2) Gross production (GP)
(3) Net production (NP)
(4) Secondary production

37. Percentage energy transferred to higher tropic level in food chain is :
1. 1%
2. 10%
3. 90%
4. 100%

38. Which is the reason for highest biomass in aquatic ecosystem :
1. Nano plankton, blue green algae, green algae
2. Sea grass, and slime molds
3. Benthonic and brown algae
4. Diatoms

39. Bamboo plant is growing in a far forest then what will be the trophic level of it : -
(1) First trophic level (T_1)
(2) Second trophic level (T_2)
(3) Third trophic level (T_3)
(4) Fourth trophic level (T_4)

40. In the equation GPP - R = NPP
R represents:
(1) Environment factor
(2) Respiration losses
(3) Radiant energy
(4) Retardation factor

41. Which of the following statements is not correct?
1. Pyramid of energy is always upright.
2. Pyramid of numbers in a grassland ecosystem is upright.
3. Pyramid of biomass in sea is generally inverted.
4. Pyramid of biomass in sea is generally upright.

42. The amount of nutrients, such as carbon, nitrogen, phosphorus, and calcium present in the soil at any given time, is referred as:
1. Standing state
2. Standing crop
3. Climax
4. Climax community

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Biodiversity & Conservation

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
In Situ Conservation of Biodiversity	11
Loss of Biodiversity	11
Ex Situ Conservation of Biodiversity	10
Magnitude of Biodiversity	7
Biodiversity Patterns	3
Introduction & Types	2
Importance of Biodiversity	1

1. Which one of the following is related to Ex-situ conservation of threatened animals and plants?
1. Biodiversity hot spots
2. Amazon rainforest
3. Himalayan region
4. Wildlife safari parks

2. How many hotspots of biodiversity in the world have been identified till date by Norman Myers?
1. 17
2. 25
3. 34
4. 43

3.
All of the following are included in 'Ex-situconservation' except
1. Wildlife safari parks
2. Sacred groves
3. Botanical Gardens
4. Seed banks

4. Which of the following is correctly matched?
1. aerenchyma - opuntia
2. age pyramid - biome
3. parthenium hysterophorus - threat to biodiversity
4. stratification - population

5. Red List contains data or information on
1. all economically important plants
2. plants whose products are in international trade
3. threatened species
4. marine vertebrates only

6. Alexander Von Humboldt described for the first time:
1. Laws of limiting factor
2. Species-Area relationships
3. Population Growth equations
4. Ecological Biodiversity

7.
Which of the following is the most important cause of animals and plants being driven to extinction ?
1. Alien species invasion
2. Habitat loss and fragmentation
3. Co-extinctions
4. Over-exploitation

8. The species confined to a particular region and not found elsewhere is termed as
1. Keystone
2. Alien
3. Endemic
4. Rare

9.

In which of the following both pairs have correct combination?
1. In situ conservation/National park
   Ex situ conservation/Botanical garden
2. In situ conservation/Cryopreservation
   Ex situ conservation/Wildlife sanctuary
3. In situ conservation/Seed bank
   Ex situ conservation/ National park
4. In situ conservation/Tissue culture
   Ex situ conservation/Sacred groves

10.

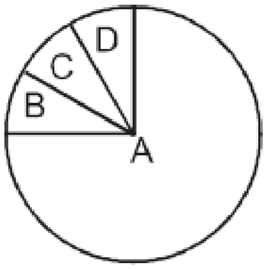
Cryopreservation of gametes of threatened species in viable and fertile condition can be referred to as:-
(1) Advanced ex-situ conservation of biodiversity
(2) In situ conservation by sacred groves
(3) In situ cryo-conservation of biodiversity
(4) In situ conservation of biodiversity

11. An example of ex situ conservation is :
1. National park
2. Seed bank
3. Wildlife sactuary
4. Sacred grove

12. A species facing extremely high risk of extinction in the immediate future is called
1. Vulnerable
2. Endemic
3. Critically Endangered
4. Extinct

13. The organization which published the Red List of species is
1. ICFRE
2. IUCN
3. UNEP
4. WWF

14. The extent of global diversity of *invertebrates* is represented in the image below. Choose the correct combination of groups (A-D) respectively?



	A	B	C	D
1.	Insects	Crustaceans	Other animal groups	Molluscs
2.	Crustaceans	Insects	Molluscs	Other animal groups
3.	Molluscs	Other animal groups	Crustaceans	Insects
4	Insects	Molluscs	Crustaceans	Other animal groups

1. 1
2. 2
3. 3
4. 4

15. Which of the following represent maximum number of species among global biodiversity?
1. Litchens
2. Fungi
3. Mosses and Ferns
4. Algae

16. Which one of the following is not used for ex situ plant conservation?
1. Seed banks
2. Shifting cultivation
3. Botanical Gardens
4. Field gene banks

17. Which one of the following areas in India is a hot spot of biodiversity?
1. Eastern Ghats
2. Gangetic plain
3. Sunder bans
4. Western Ghats

18. The highest number of species in the world is represented by
1. Fungi
2. Mosses
3. Algae
4. Lichens

19.
Which one of the following has the highest number of species in nature?
1. Insects
2. Birds
3. Angiosperms
4. Fungi

20.
Which one of the following shows maximum genetic diversity in India?
1. Rice
2. Maize
3. Mango
4. Groundnut

21. Which one of the following is an example of ex-situ conservation?
1. Wildlife santuary
2. Seed bank
3. Sacred groves
4. National park

22.
Which one of the following is not observed in biodiversity hot spots?
1. Endemism
2. Accelerated species loss
3. Lesser inter specific competition
4. Species richness

23.
World Summit on Sustainable Development (2002) was held in
1. Brazil
2. Sweden
3. Argentina
4. South Africa

24. Which one of the following pairs of organisms are exotic species introduced in India?
1. Ficus religiosa. Lantana camara
2. Lantana camara, Water hyacinth
3. Water hyacinth, Prosopis cinereria
4. Nile perch, Fricus religiosa

25. Which one of the following is not included under in situ conservation?
1. Sanctuary
2. Botanical garden
3. Biosphere reserve
4. National park

26. Which of the following is considered a hot-spot of biodiversity in India?
1. Western ghats
2. Indo-Gangetic plain
3. Eastern ghats
4. Aravalli hills

27. The Earth Summit held in Rio de Janeiro in 1992 was called:
1. for immediate steps to discontinue use of CFCs that were damaging the ozone layer
2. to reduce CO_2 emissions and global warming
3. for conservation of biodiversity and sustainable utilization of its benefits
4. to asess threat posed to native species by invasive weed species

28. Which one of the following is not a method of in situ conservation of biodiversity?
1. Sacred Grove
2. Biosphere Reserve
3. Wildlife Sanctuary
4. Botanical Garden

29. Which of the following is the most important cause for animals and plants being driven to extinction?
1. Alien species invasion
2. Habitat loss and fragmentation
3. Drought and floods
4. Economic exploitation

30. Decline in the population of Indian native fishes due to introduction of *Clarias gariepinus* in river Yamuna can be categorised as
1. Co-extinction
2. Habitat fragmentation
3. Over exploitation
4. Alien species invasion

31. Western Ghats have a large number of plant and animal species that are not found anywhere else. Which of the following terms will you use to notify such species ?
1. Endemic
2. Vulnerable
3. Threatened
4. Keystone

32. Exploration of molecular, genetic and species level diversity for novel products of economic importance is known as :
1. Biopiracy
2. Bioenergetics
3. Bioremediation
4. Bioprospecting

33. Which of the following regions of the globe exhibits highest species diversity ?
(1) Madagascar
(2) Himalayas
(3) Amazon forests
(4) Western Ghats of India

34. According to Robert May, the global species diversity is about:
1. 20 Million
2. 50 Million
3. 7 Million
4. 1.5 Million

35. According to Alexander von Humboldt :
1. Species richness decreases with increasing area of exploration
2. Species richness increases with the increasing area, but only up to limit
3. There is no relationship between species richness and area explored.
4. Species richness goes on increasing with increasing area of exploration

36. In the following, in each set, a conservation approach and an example of a method of conservation are given
(a) In situ conservation - Biosphere Reserve
(b) Ex situ conservation - Sacred groves
(c) In situ conservation - Seed bank
(d) Ex situ conservation - Cryopreservation `
Select the option with the correct match of approach and method :
1. (a) and (c)
2. (a) and (d)
3. (b) and (d)
4. (a) and (b)

37. Sacred groves are specially useful in -
1. preventing soil erosion
2. year-round flow of water in rivers
3. conserving rare and threatened species
4. generating environmental awareness

38. Biodiversity of a geographical region represents :
1. Species endemic to the region
2. Endangered species found in the region
3. The diversity in the organisms living in the region
4. Genetic diversity present in the dominant species of the region.

39. One of the most important functions of botanical gardens is that -
(1) They allow ex-situ conservation of germ plasm
(2) They provide the natural habitat for wild life
(3) One can observe tropical plants there
(4) They provide a beautiful area for recreation

40. Reason for elimination of wild life is :
1. Deforestation
2. Forest fire
3. Floods
4. Less Rain fall

41. Main reason for disturbance of biological diversity :
1. Green house effect
2. Hunting
3. Soil erosion
4. Destruction of natural habitats

42. Best method to preserve the wild relatives of plants :
1. By growing them in natural habitats
2. Gene library
3. By storing seeds
4. Cryopreservation

43. Species diversity is maximum in :
1. Tropical rain forests
2. Temperate forests
3. Deserts
4. Hill slopes

44. Number of wild life is continuously decreasing. What is the main reason of this : -
(1) Predation
(2) Cutting down of forest
(3) Destruction of habitat
(4) Hunting

45. Viable material of endangered species can be preserved by :
1. Gene bank
2. Gene library
3. Herbarium
4. Gene pool

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Environmental Issues

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Water Pollution	16
Ozone Layer Depletion	12
Green House Effect & Global Warming	9
Air Pollution	7
Improper Resource Utilisation & Maintenance	3
Agrochemical & Radioactive Waste	2
Solid Waste Pollution	2

1.
In stratosphere, which of the following element acts as a catalyst in degradation of ozone and release of molecular oxygen?
1. Carbon
2. Cl
3. Fe
4. Oxygen

2. Match the items given in Column I with those inColumn II and select the correct option givenbelow:

Column I	Column II
a. Eutrophication	i. UV-B radiation
b. Sanitary landfill	ii. Deforestation
c. Snow blindness	iii. Nutrient enrichment
d. Jhum cultivation	iv. Waste disposal

1. a-ii b-i c-iii d-iv
2. a-i b-iii c-iv d-ii
3. a-iii b-iv c-i d-ii
4. a-i b-ii c-iv d-iii

3. Biochemical Oxygen Demand (BOD) may not be a good index for pollution in water bodies receiving effluents from
1. domestic sewage
2. dairy industry
3. petroleum industry
4. sugar industry

4. A lake which is rich in organic waste may result in
1. increased population of aquatic organisms due to minerals
2. drying of the lake due to algal bloom
3. increased population of fish due to lots of nutrients
4. mortality of fish due to lack of oxygen

5. The 'highest DDT concentration in aquatic food chain shall occur in
1. phytoplankton
2. seagull
3. crab
4. eel

6. Which one of the following statements is not valid for aerosols?
1. They alter rainfall and monsoon patterns
2. They caused increased agricultural productivity.
3. They have negative impact on agricultural land.
4. They are harmful to human health.

7.
Depletion of which gas in the atmosphere can lead to an increased of skin cancers
1. ozone
2. ammonia
3. methane
4. nitrous oxide

8.
Joint Forest Management Concept was introduced in India during
1. 1970s
2. 1980s
3. 1990s
4. 1960s

9.
A river with an inflow of domestic sewage rich in organic waste may result in
1. increased population of aquatic food web organisms
2. an increased production of fish due to biodegradable nutrients
3. death of fish due to lack of oxygen
4. drying of the river very soon due to algal bloom

10. Increase in concentration of the toxicant at successive trophic levels is known as
1. Biomagnifications
2. Biodeterioration
3. Biotransformation
4. Biogeochemical cycling

11. Eutrophication of water bodies leading to killing of fishes is mainly due to non-availability of
1. Food
2. Light
3. Essential minerals
4. Oxygen

12. The zone of atmosphere in which the ozone layer is present is called
1. Ionosphere
2. Mesosphere
3. Stratosphere
4. Troposphere

13.
The Air Prevention and Control of Pollution Act came into force in:

1. 1981

2. 1985

3. 1990

4. 1975

14. A scrubber in the exhaust of a chemical industrial plant removes:
1. Gases like sulphue dioxide
2. Particulate matter of the size 5 micrometer or above
3. Gases like ozone and methane
4. Particulate matter of the size 2.5 micrometer or less

15. Global warming can be controlled by:
1. Reducing reforestation, increasing the use of fossil fuel.
2. Increasing deforestation, slowing down the growth of human population
3. Increasing deforestation , reducing efficiency of energy usage.
4. Reducing deforestation, cutting down use of fossil fuel.

16. In an area where DDT had been used extensively, the population of birds declined significantly because
1. Birds stopped laying eggs
2. Earthworms in the area got eradicated
3. Cobras were feeding exclusively on birds
4. Many of the birds laid eggs, but eggs did not hatch

17. Which one of the following is a wrong statement?
1. Most of the forests have been lost in tropical areas
2. Ozone in upper part of atmosphere is harmful to animals
3. Greenhouse effect is a natural phenomenon
4. Eutrophication is a natural phenomenon in freshwater bodies

18. Which one of the following pairs of gases are the cause of 'Green house effect'?
1. CO_2 and CO
2. CFC_s and SO_2
3. CO_2 and N_2O
4. CO_2 and O_3

19. dB is a standard abbreviation used for the quantitative expression of
1. the density of bacteria in a medium
2. a particular pollutant
3. the dominant Bacillus in a culture
4. a certain pesticide

20. The two gases making highest relative contribution to the greenhouse gases are
1. $CO_2\ and\ CH_4$
2. $CH_4\ and\ \ NO_2$
3. CFCs and N_2O
4. $CO_2\ and\ N_2O$

21. Chipko movement was launched for the protection of
1. grasslands
2. forests
3. livestock
4. wet lands

22. Montreal protocol aims at
1. reduction of ozone depleting substances
2. biodiversity conservation
3. control of water pollution
4. control of CO_2 emission

23. Biochemical Oxygen Demand (BOD) in a river water
1. remains unchanged when algal bloom occurs
2. has no relationship with concentration of oxygen in the water
3. gives a measure of Salmonella in the water
4. increases when sewage gets mixed with river water

24. Global agreement in specific control strategies to reduce the release of ozone depleting substance, was adopted by
1. Rio de Janeiro Conference
2. The Montreal Protocol
3. The Koyoto Protocol
4. The Vienna Convention

25.
According to Central Pollution Control Board (CPCB), which particulate size in diameter(in micrometres) of the air pollutants is responsible for greatest harm to human health?
1. 2.5 or less
2. 1.5 or less
3. 1.0 or less
4. 5.2 or 2.5

26. Which one of the following statements is correct?
1. Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies
2. Both Azotobacter and Rhizobium in root nodules of plants
3. Cyanobacteria such as Anabaena and Nostoc are important mobilizers of phosphates and potassium for plant nutrition in soil
4. At present it is not possible to grow maize without chemical fertilizers

27.
Which one of the following is the correct percentage of the two (out of the total of 4) green-house gases that contribute to the total global warming?
1. CFCs 14%, CH4 20%
2. CO2 40%, CFCs 30%
3. N2O 6%, CO2 86%
4. CH4 20%, N2O 18%

28. Montreal protocol which calls for appropriate action to protect the ozone layer from human activities was passed in the year:
1. 1986
2. 1987
3. 1988
3. 1985

29. Which of these following methods is the most suitable for disposal of nuclear waste?
1. Bury the waste within rocks deep below the Earth's surface
2. Shoot the waste into space
3. Bury the waste under Antarctic ice-cover
4. Dump the waste within rocks under deep ocean

30. Which of the following pairs of gases is mainly responsible for green house effect?
1. Carbon dioxide and methane
2. Ozone and Ammonia
3. Oxygen and Nitrogen
4. Nitrogen and Sulphur dioxide

31. Polyblend, a fine powder of recycled modified plastic, has proved to be a good material for:
1. making tubes and pipes
2. making plastic sacks
3. use as a fertilizer
4. construction of roads

32. Which of the following protocols did aim for reducing emission of chlorofluorocarbons into the atmosphere?
1. Geneva protocol
2. Montreal protocol
3. Kyoto protocol
4. Gothenburg protocol

33. Which of the following statements about ozone is correct ?
1. Tropospheric ozone protects us from UV radiations.
2. Stratospheric ozone is 'bad'.
3. Tropospheric ozone is 'good'
4. Stratospheric ozone protects us from UV radiations.

34. Which of the following is an innovative remedy for plastic waste ?
1. Burning in the absence of oxygen
2. Burrying 500 m deep below soil surface
3. Polyblend
4. Electrostatic precipitator

35. If an agricultural field is liberally, irrigated for a prolonged period of time, it is likely to face a problem of :
1. Metal toxicity
2. Alkalinity
3. Acidity
4. Salinity

36. Snow-blindness in Antarctic regions is due to:
1. Inflammation of cornea due to high doses of UV-B radiation
2. High reflection of light from snow
3. Damage to the retina caused by infra-red rays
4. Freezing of fluids in the eye by low temperature

37. A species that was introduced for ornamentation but has become a troublesome weed in India :
1. Parthenium hysterophorus
2. Eichhornia crassipes
3. Prosopis juliflora
4. Trapa Spinosa

38. Air (Prevention and Control of Pollution) Act was amended in 1987 to include among pollutants
1. Vehicular exhaust
2. Allergy causing pollen
3. Noise
4. Particulates of size 2.5 micrometer or below

39. According to the Central Pollution Control Board [CPCB] what size (in diameter) of particulate is responsible for causing greater harm to human health?
1. 3.5 micrometers
2. 2.5 micrometers
3. 4.0 micrometers
4. 3.0 micrometers

40. When domestic sewage mixes with river water -
1. The increased microbial activity releases micro-nutrients such as iron
2. The increased microbial activity uses up dissolved oxygen
3. The river water is still suitable for drinking as impurities are only about 0.1%
4. Small animals like rats will die after drinking river water

41. "Good ozone" is found in the :
1. Ionosphere
2. Mesosphere
3. Troposphere
4. Stratosphere

42. Consider the following statements (A-D) about organic farming :
(A) Utilizes genetically modified crops like Bt cotton
(B) Uses only naturally produced inputs like compost
(C) Does not use pesticides and urea
(D) Produces vegetables rich in vitamins and minerals
Which of the above statements are correct?
1. (A) and (B) only
2. (B), (C) and (D)
3. (C) and (D) only
4. (B) and (C) only

43. If CO_2 is absent in the atmosphere of the earth then :
1. Temperature will decrease
2. Temperature will increase
3. Plants will flourish well
4. No effect

44. Besides other green house gas is :
1. SO_2
2. NH_3
3. N_2O
4. CFC

45. Temperature variation in Pacific ocean in present time is called :
1. Cyclone effect
2. El Nino effect
3. Green house effect
4. Gaudikov's effect

46. Sewage purification is performed by :
1. Microbes
2. Fertilisers
3. Antibiotics
4. Antiseptics

47. Concentration of DDT is highest in :
1. Primary consumer
2. Producers
3. Top consumer
4. Decomposers

48. Large scale death of fishes occur in :
1. Saline lake
2. Oligotrophic lake
3. Eutrophic lake
4. Shallow lake

49. Maximum DDT is present in birds feeding on
1. Fishes
2. Meat
3. Insects
4. Seeds

50. Green house effect is :
1. Gardening outside the house
2. Global cooling
3. Global warming
4. Green colour house

51. Dobson units are used to measure thickness of:
(1) Ozone
(2) Troposphere
(3) CFCs
(4) Stratosphere

Units & Measurements

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Dimensions	22
Errors	6
Measurement & Measuring Devices	5
Significant Figures	1

1. A physical quantity of the dimensions of length that can be formed out of c, G and $\frac{e^2}{4\pi\varepsilon_o}$ is [c is the velocity of light, G is the universal constant of gravitation and e is charge]:

1. $c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{\frac{1}{2}}$
2. $\frac{1}{c^2}\left[\frac{e^2}{4G\pi\varepsilon_0}\right]^{\frac{1}{2}}$
3. $\frac{1}{c}G\frac{e^2}{4\pi\varepsilon_0}$
4. $\frac{1}{c^2}\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{\frac{1}{2}}$

2. Planck's constant (h), speed of light in the vacuum (c) and Newton's gravitational constant (G) are three fundamental constants. Which of the following combinations of these has the dimension of length?

1. $\frac{\sqrt{hG}}{c^{3/2}}$
2. $\frac{\sqrt{hG}}{c^{5/2}}$
3. $\frac{\sqrt{hG}}{G}$
4. $\frac{\sqrt{Gc}}{h^{3/2}}$

3. A student measured the diameter of a small steel ball using a screw gauge of least count 0.001 cm. The main scale reading is 5 mm and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero error of –0.004 cm, the correct diameter of the ball is:

1. 0.521 cm
2. 0.525 cm
3. 0.053 cm
4. 0.529 cm

4. If dimensions of critical velocity v_c of a liquid flowing through a tube are expressed as $[\eta^x\rho^y r^z]$, where η, ρ and r are the coefficient of viscosity of the liquid, the density of liquid and radius of the tube respectively, then the values of x, y and z are given by:

1. 1, -1, -1
2. -1, -1, 1
3. -1, -1, -1
4. 1, 1, 1,

5.

If energy (E), velocity (v) and time (T) are chosen as the fundamental quantities, the dimensional formula of surface tension will be:

1. $[Ev^{-2}T^{-1}]$
2. $[Ev^{-1}T^{-2}]$
3. $[Ev^{-2}T^{-2}]$
4. $[E^{-2}v^{-1}T^{-3}]$

6. If force (F), velocity (v) and time (T) are taken as fundamental units, the dimensions of mass are:

1. $[FvT^{-1}]$
2. $[FvT^{-2}]$
3. $[Fv^{-1}T^{-1}]$
4. $[Fv^{-1}T]$

7.

In an experiment four quantities a, b, c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows :

P = $\frac{a^3b^2}{cd}$ % error in P is :

1. 10%
2. 7%
3. 4%
4. 14%

8. The dimensions of $(\mu_0\varepsilon_0)^{-1/2}$ are

1. $[L^{-1}\ T]$
2. $[LT^{-1}]$
3. $[L^{-1/2}\ T^{1/2}]$
4. $[L^{-1/2}\ T^{-1/2}]$

9. The dimensions of $\frac{1}{2}\varepsilon_0E^2$ where ε_0 is the permittivity of free space and E is the electric field, are:

1. $[ML^2T^{-2}]$
2. $[ML^{-1}T^{-2}]$
3. $[ML^2T^{-1}]$
4. $[MLT^{-1}]$

10.
If the dimensions of a physical quantity are given by $M^aL^bT^c$, then the physical quantity will be:
1. Pressure if a = 1, b = -1, c = - 2
2. Velocity if a = 1, b = 0, c = - 1
3. Acceleration if a = 1, b = 1, c = - 2
4. Force if a = 0, b =-1, c = - 2

11. If the error in the measurement of the radius of a sphere is 2%, then the error in the determination of the volume of the sphere will be:
1. 4%
2. 6%
3. 8%
4. 2%

12.
Which two of the following five physical parameters have the same dimensions?
(1) Energy density
(2) Refractive index
(3) Dielectric constant
(4) Young's modulus
(5) Magnetic field

1. 2 and 4

2. 3 and 5

3. 1 and 4

4. 1 and 5

13. Dimensions of resistance in an electrical circuit, in terms of dimension of mass M, length L, time T and current I, would be:
1. $\left[ML^2T^{-3}I^{-1}\right]$
2. $\left[ML^2T^{-2}\right]$
3. $\left[ML^2T^{-1}I^{-1}\right]$
4. $\left[ML^2T^{-3}I^{-2}\right]$

14. The velocity v of a particle at time t is given by $v = at + \frac{b}{t+c}$, where a, b and c are constants. The dimensions of a, b, and c are respectively:
1. $\left[LT^{-2}\right]$, $\left[L\right]$ and $\left[T\right]$
2. $\left[L^2\right]$, $\left[T\right]$ and $\left[LT^2\right]$
3. $\left[LT^2\right]$, $\left[LT\right]$ and $\left[L\right]$
4. $[L]$, $[LT]$ and $[T^2]$

15. The unit of thermal conductivity is:
1. $W\ m^{-1}K^{-1}$
2. $J\ m\ K^{-1}$
3. $J\ m^{-1}K^{-1}$
4. $W\ m\ K^{-1}$

16. In an experiment, the percentage errors that occured in the measurement of physical quantities A, B, C and D are 1%, 2%, 3% and 4% respectively. Then the maximum percentage of error in the measurement of X, where $X = \frac{A^2B^{\frac{1}{2}}}{C^{\frac{1}{3}}D^3}$, will be:
1. 10%
2. $\left(\frac{3}{13}\right)\%$
3. 16%
4. -10%

17. The main scale of a vernier calliper has n divisions/cm. n divisions of the vernier scale coincide with (n-1) divisions of the main scale. The least count of the vernier callipers is:
(1) $\frac{1}{(n+1)(n-1)}cm$
(2) $\frac{1}{n}\ cm$
(3) $\frac{1}{n^2}\ cm$
(4) $\frac{1}{n(n+1)}cm$

18. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.
The pitch of the screw gauge is:
(1) 0.25 mm
(2) 0.5 mm
(3) 1.0 mm
(4) 0.01 mm

19. Taking into account the significant figures, what is the value of (9.99m - 0.0099m)?
1. 9.98 m
2. 9.980 m
3. 9.9 m
4. 9.9801 m

20. The energy required to break one bond in DNA is 10^{-20} J. This value in eV is nearly :
(1) 0.6
(2) 0.06
(3) 0.006
(4) 6

21. Dimensions of stress are:
(1) $\left[ML^2 T^{-2}\right]$
(2) $\left[ML^0 T^{-2}\right]$
(3) $\left[ML^{-1} T^{-2}\right]$
(4) $\left[MLT^{-2}\right]$

22. The angle of 1' (minute of arc) in radian is nearly equal to:
1. 2.91×10^{-4} rad
2. 4.85×10^{-4} rad
3. 4.80×10^{-6} rad
4. 1.75×10^{-2} rad

23. Time intervals measured by a clock give the following readings :
1.25 sec, 1.24 sec, 1.27sec, 1.21 sec and 1.28 sec.
What is the percentage relative error of the observations?
1. 2 %
2. 4 %
3. 16 %
4. 1.6 %

24. The dimensions of $(\mu_0\varepsilon_0)^{-1/2}$ are -
1. $\left[L^{-1}T\right]$
2. $\left[LT^{-1}\right]$
3. $\left[L^{1/2}T^{1/2}\right]$
4. $\left[L^{1/2}T^{-1/2}\right]$

25. The density of a material in CGS system of units is 4 g/cm^3. In a system of units in which unit of length is 10 cm and unit of mass is 100g, the value of density of material will be
1. 0.04
2. 0.4
3. 40
4. 400

26. A student measures the distance traversed in free fall of a body, initially at rest in a given time. He uses this data to estimate g, the accelration due to gravity. If the maximum percentage errors in measurement of the distance and the time are e_1 and e_2 respectively, the percentage error in the estimation of g is -
1. $e_1 + 2e_2$
2. $e_1 + e_2$
3. $e_1 - 2e_2$
4. $e_2 - e_1$

27. The ratio of the dimension of Planck's constant and that of the moment of inertia is the dimension of :
(1) Velocity
(2) Angular momentum
(3) Time
(4) Frequency

28. Which pair have not equal dimensions :
1. Energy and torque
2. Force and impulse
3. Angular momentum and Plank's constant
4. Elastic modulus and pressure

29. The error in measurement of radius of a sphere is 0.1% then error in its volume is -
1. 0.3%
2. 0.4%
3. 0.5%
4. 0.6%

30. The dimensions of universal gravitational constant are :-
(1) $ML^2\ T^{-1}$
(2) $M^{-2}\ L^3\ T^{-2}$
(3) $M^{-2}\ L^2\ T^{-1}$
(4) $M^{-1}\ L^3\ T^{-2}$

31. The dimension of Planck constant equals to that of :
1. Energy
2. Momentum
3. Angular momentum
4. Power

32. If force [F], acceleration [A] and time [T] are chosen as the fundamental physical quantities. Find the dimensions of energy.
1. [F][A][T^{-1}]
2. [F][A^{-1}][T]
3. [F][A][T]
4. [F][A][T^2]

33. A screw gauge gives the following readings when used to measure the diameter of a wire.
Main scale reading: 0 mm
Circular scale reading: 52 divisions
Given that 1 mm on the main scale corresponds to 100 divisions on the circular scale. The diameter of the wire from the above data is:
1. 0.26 cm
2. 0.052 cm
3. 0.52 cm
4. 0.026

34. If E and G respectively denote energy and gravitational constant, then $\frac{E}{G}$ has the dimensions of:
1. $[M]\left[L^0\right]\left[T^0\right]$
2. $\left[M^2\right]\left[L^{-2}\right]\left[T^{-1}\right]$
3. $\left[M^2\right]\left[L^{-1}\right]\left[T^0\right]$
4. $[M]\left[L^{-1}\right]\left[T^{-1}\right]$

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Motion in a Straight Line

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Uniformly Accelerated Motion	16
Average Speed & Average Velocity	5
Instantaneous Speed & Instantaneous Velocity	5
Non Uniform Acceleration	3
Relative Motion in One Dimension	3
Distance & Displacement	1
Graphs	1

1. Two cars P and Q start from a point at the same time in a straight line and their positions are represented by $x_P(t) = at + bt^2$ and $x_Q(t) = ft - t^2$. At what time do the cars have the same velocity?

1. $\frac{a-f}{1+b}$
2. $\frac{a+f}{2(b-1)}$
3. $\frac{a+f}{2(b+1)}$
4. $\frac{f-a}{2(1+b)}$

2. Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time t_1. On other days, if she remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk upon the moving escalator will be:

1. $\frac{t_1 t_2}{t_2 - t_1}$
2. $\frac{t_1 t_2}{t_2 + t_1}$
3. $t_1 - t_2$
4. $\frac{t_1 + t_2}{2}$

3. If the velocity of a particle is $v = At + Bt^2$, where A and B are constants, then the distance travelled by it between 1s and 2s is:

1. $3A + 7B$
2. $\frac{3}{2}A + \frac{7}{3}B$
3. $\frac{A}{2} + \frac{B}{3}$
4. $\frac{3}{2}A + 4B$

4. A particle of unit mass undergoes one-dimensional motion such that its velocity varies according to $v(x) = \beta x^{-2n}$ where, β and n are constants and x is the position of the particle. The acceleration of the particle as a function of x is given by-

1. $-2n\beta^2 x^{-2n-1}$
2. $-2n\beta^2 x^{-4n-1}$
3. $-2\beta^2 x^{-2n+1}$
4. $-2n\beta^2 x^{-4n+1}$

5. A particle is moving such that its position coordinates (x, y) are (2m, 3m) at time t = 0, (6m,7m) at time t = 2s and (13m, 14m) at time t = 5 s,
Average velocity vector $\left(\vec{v}_{avg}\right)$ from t = 0 to t = 5 s is :

1. $\frac{1}{5}\left(13\hat{i} + 14\vec{j}\right)$
2. $\frac{7}{3}\left(\hat{i} + \vec{j}\right)$
3. $2\left(\hat{i} + \vec{j}\right)$
4. $\frac{11}{5}\left(\hat{i} + \vec{j}\right)$

6. A stone falls freely under gravity. It covers distances h_1, h_2 and h_3 in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h_1, h_2 and h_3 is :

1. $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$
2. $h_2 = 3h_1$ and $h_3 = 3h_2$
3. $h_1 = h_2 = h_3$
4. $h_1 = 2h_2 = 3h_3$

7. A particle has initial velocity $\left(2\hat{i} + 3\hat{j}\right)$ and acceleration $\left(0.3\hat{i} + 0.2\hat{j}\right)$. The magnitude of velocity after 10 sec will be:

1. $9\sqrt{2}$ units
2. $5\sqrt{2}$ units
3. 5 units
4. 9 unit

8. The motion of a particle along a straight line is described by equation
$x = 8 + 12t - t^3$ where x is in meter and t in second. The retardation of the particle when its velocity becomes zero is

1. 24 ms^{-2}
2. zero
3. 6 ms^{-2}
4. 12 ms^{-2}

9.
A boy standing at the top of a tower of 20 m height drops a stone. Assuming g = 10 ms^{-2}, the velocity with which it hits the ground is

1. 20 m/s
2. 40 m/s
3. 5 m/s
4. 10 m/s

10. A ball is dropped from a high rise platform at t = 0 starting from rest. After 6 seconds another ball is thrown downwards from the same platform with a speed v. The two balls meet at t = 18 s. What is the value of v?
1. 75 ms^{-1}
2. 55 ms^{-1}
3. 40 ms^{-1}
4. 60 ms^{-2}

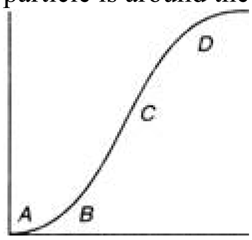
11. A particle moves a distance x in time t according to equation X = $(t + 5)^{-1}$ The acceleration of particle is proportional to
1. $(\text{velocity})^{3/2}$
2. $(\text{distance})^{2}$
3. $(\text{distance})^{-2}$
4. $(\text{velocity})^{2/3}$

12.
A bus is moving with a speed of 10 ms^{-1} on a straight road. A scooterist wishes to overtake the bus in 100 s. If the bus is at a distance of 1 km from the scooterist, with what speed should the scooterist chase the bus?
1. 20 ms^{-1}
2. 40 ms^{-1}
3. 25 ms^{-1}
4. 10 ms^{-1}

13.
A particle starts its motion from rest under the action of a constant force. If the distance covered in the first 10 sec is S_1 and that covered in the first 20 sec is S_2, then
1. $S_2 = 2S_1$
2. $S_2 = 3S_1$
3. $S_2 = 4S_1$
4. $S_2 = S_1$

14. The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3}ms^{-2}$, in the third second is:
1. 6 m
2. 4 m
3. $\frac{10}{3}$ m
4. $\frac{19}{3}$ m

15. A particle shows the distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is around the point:



1. B
2. C
3. D
4. A

16. A particle moves in a straight line with a constant acceleration. It changes its velocity from 10 ms^{-1} to 20 ms^{-1} while covering a distance 135 m in 't' seconds. The value of 't' is
1. 10
2. 1.8
3. 12
4. 9

17. The position x of a particle with respect to time t along the x-axis is given by $x = 9t^2 - t^3$ where x is in metre and t in second. What will be the position of this particle when it achieves maximum speed along the +x direction?
1. 32 m
2. 54 m
3. 81 m
4. 24 m

18. A car moves from X to Y with a uniform speed v_u and returns to X with a uniform speed v_d. The average speed for this round trip is :
1. $\frac{2v_d v_u}{v_d+v_u}$
2. $\sqrt{v_u v_d}$
3. $\frac{v_d v_u}{v_d+v_u}$
4. $\frac{v_u+v_d}{2}$

19. A particle moving along the x-axis has acceleration f, at time t, given by $f=f_0\left(1-\frac{t}{T}\right)$, where f_0 and T are constants. The particle at t=0 has zero velocity. In the time interval between t = 0 and the instant when f = 0, the particle's velocity (v_x) is:
1. f_0T
2. $\frac{1}{2}f_0T^2$
3. f_0T^2
4. $\frac{1}{2}f_0T$

20. A particle moves along a straight line OX. At a time t (in seconds), the displacement x (in metres) of the particle from O is given by $x= 40 + 12t - t^3$.
How long would the particle travel before coming to rest?
1. 24 m
2. 40 m
3. 56 m
4. 16 m

21. Two bodies, A (of mass 1 kg) and B (of mass 3 kg) are dropped from heights of 16 m and 25 m, respectively. The ratio of the time taken by them to reach the ground is:
1. 5/4
2. 12/5
3. 5/12
4. 4/5

22. A person standing on the floor of an elevator drops a coin. The coin reaches the floor in time t_1 if the elevator is moving uniformly and time t_2 if the elevator is stationary. Then:
1. $t_1 < t_2$ or $t_1 > t_2$ depending upon whether the lift is going up or down.
2. $t_1 < t_2$
3. $t_1 > t_2$
4. $t_1 = t_2$

23. A person travelling in a straight line moves with a constant velocity v_1 for a certain distance 'x' and with a constant velocity v_2 for the next equal distance. The average velocity v is given by the relation:
1. $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2}$
2. $\frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$
3. $\frac{v}{2} = \frac{v_1+v_2}{2}$
4. $v = \sqrt{v_1 v_2}$

24. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with the velocity of 80 m/s . The height of the tower is: $\left(g = 10\ m/s^2\right)$
1. 340 m
2. 320 m
3. 300 m
4. 360 m

25. A person sitting on the ground floor of a building notices through the window, of height 1.5 m, a ball dropped from the roof of the building crosses the window in 0.1 sec. What is the velocity of the ball when it is at the topmost point of the window? $\left(g = 10\ m/s^2\right)$
1. 15.5 m/s
2. 14.5 m/s
3. 4.5 m/s
4. 20 m/s

26. A particle covers half of its total distance with speed v_1 and the rest half distance with speed v_2.
Its average speed during the complete journey is :'
1. $\frac{v_1+v_2}{2}$
2. $\frac{v_1v_2}{v_1+v_2}$
3. $\frac{2v_1v_2}{v_1+v_2}$
4. $\frac{v_1^2v_2^2}{v_1^2+v_2^2}$

27. Motion of a particle is given by equation $S = \left(3t^3 + 7t^2 + 14t + 8\right)m$, The value of acceleration of the particle at t = 1 sec. is :
1. 10 m/s^2
2. 32 m/s^2
3. 23 m/s^2
4. 16 m/s^2

28. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$, where a, b, α and β are positive constants. The velocity of the particle will:
(1) be independent of α and β.
(2) go on increasing with time.
(3) drop to zero when $\alpha = \beta$.
(4) go on decreasing with time.

29. A car is moving with velocity v. If stop after applying break at a distance of 20 m. If velocity of car is doubled, then how much distance it will cover (travel) after applying break :
1. 40 m
2. 80 m
3. 160 m
4. 320 m

30. A body starts falling from height 'h' and travels distance h/2 during last second of motion then time of flight is (in second) -
1. $\sqrt{2} - 1$
2. $2 + \sqrt{2}$
3. $\sqrt{2} + \sqrt{3}$
4. $\sqrt{3} + 2$

31. For a particle displacement time relation is $t = \sqrt{x} + 3$. Its displacement when its velocity is zero -
1. 2m
2. 4m
3. 0
4. None of these

32. A ball of mass 2 kg and another of mass 4 kg are dropped together from a 60 feet tall building. After a fall of 30 feet each towards earth, their respective kinetic energies will be in the ratio of-
(1) 1: 4
(2) 1: 2
(3) 1: $\sqrt{2}$
(4) $\sqrt{2}$:1

33. A particle starts from rest with constant acceleration. The ratio of space-average velocity to the time-average velocity is :
where space-average velocity and time-average velocity is defined as follows:

$$< v >_{time} = \frac{\int v dt}{\int dt}$$

$$< v >_{space} = \frac{\int v ds}{\int ds}$$

1. $\frac{1}{2}$
2. $\frac{3}{4}$
3. $\frac{4}{3}$
4. $\frac{3}{2}$

34. A particle is thrown vertically upward. Its velocity at half of the height is 10 m/s. Then the maximum height attained by it : -(g = 10 m/s^2)
1. 8 m
2. 20 m
3. 10 m
4. 16 m

35. If a ball is thrown vertically upwards with speed u, the distance covered during the last ‘t’ seconds of its ascent is :
1. ut
2. $\frac{1}{2}gt^2$
3. $ut - \frac{1}{2}gt^2$
4. $(u + gt)t$

36. A man throws ball with the same speed vertically upwards one after the other at an interval of 2 seconds. What should be the speed of the throw so that more than two balls are in the sky at any time ? (Given g = 9.8 m/s^2)
(1) More than 19.6 m/s
(2) At least 9.8 m/s
(3) Any speed less than 19.6 m/s
(4) Only with speed 19.6 m/s

37. A small block slides down on a smooth inclined plane starting from rest at time t=0. Let S_n be the distance travelled by the block in the interval t= n-1 to t=n. Then the ratio $\frac{S_n}{S_n+1}$ is:
1. $\frac{2n+1}{2n-1}$
2. $\frac{2n}{2n-1}$
3. $\frac{2n-1}{2n}$
4. $\frac{2n-1}{2n+1}$

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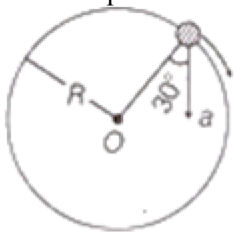
Motion in a Plane

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Projectile Motion	14
Circular Motion	11
Relative Motion	8
Acceleration	6
Position & Displacement	1
Speed & Velocity	1

1. In the given figure, a = 15m /s^2 represents the total acceleration of a particle moving in the clockwise direction in a circle of radius R = 2.5 m at a given instant of time. The speed of the particle is:



1. 4.5 m/s
2. 5.0 m/s
3. 5.7 m/s
4. 6.2 m/s

2. The x and y coordinates of the particle at any time are $x = 5t - 2t^2$ and y= 10t respectively, where x and y are in meters and t in seconds. The acceleration of the particle at t= 2sec is:
1. $5\hat{i}\ \mathrm{m/s^2}$
2. $-4\hat{i}\ \mathrm{m/s^2}$
3. $-8\hat{j}\ \mathrm{m/s^2}$
4. 0

3.
A particle moves so that its position vector is given by $\vec{r} = \cos\omega t\ \hat{x} + \sin\omega t\ \hat{y}$, where ω is a constant. Which of the following is true?
1. Velocity and acceleration both are parallel to $\vec{r}$.
2. Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards to origin.
3. Velocity is parallel to $\vec{r}$ and acceleration is directed away from the origin.
4. Velocity and acceleration both are perpendicular to $\vec{r}$.

4.
A particle of mass 10 g moves along a circle of radius 6.4 cm with a constant tangential acceleration. What is the magnitude of this acceleration, if the kinetic energy of the particle becomes equal to 8 x 10^{-4} J by the end of the second revolution after the beginning of the motion?
1. 0.15 m/s^2
2. 0.18 m/s^2
3. 0.2 m/s^2
4. 0.1 m/s^2

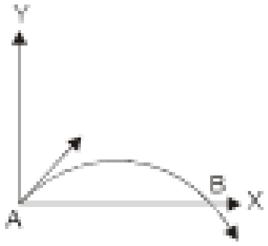
5. A ship A is moving Westwards with a speed of 10 kmph and a ship B 100 km South of A, is moving Northwards with a speed of 10 kmph. The time after which the distance between them becomes the shortest is:
1. 0 h
2. 5 h
3. $5\sqrt{2}$h
4. $10\sqrt{2}$h

6. Two particles A and B, move with constant velocities v_1 and v_2 respectively. At the initial moment, their position vectors are r_1 and r_2 respectively. The condition for particles A and B for their collision is:
1. $\frac{r_1 - r_2}{|r_1 - r_2|} = \frac{v_2 - v_1}{|v_2 - v_1|}$
2. $r_1 \cdot v_1 = r_2 \cdot v_2$
3. $r_1 \times v_1 = r_2 \times v_2$
4. $r_1 - r_2 = v_1 - v_2$

7. The position vector of a particle R as a function of time t is given by
$\vec{R} = 4\sin[2\pi t]\hat{i} + 4\cos[2\pi t]\hat{j}$
Where R is in meters, t is in seconds and $\hat{i}$, $\hat{j}$ denote unit vectors along x and y-directions, respectively. Which one of the following statements is wrong for the motion of the particle?
1. Acceleration is along $-\vec{R}$.
2. Magnitude of the acceleration vector is $\frac{v^2}{R}$, where v is the velocity of the particle.
3. Magnitude of the velocity of the particle 8 m/s.
4. Path of the particle is a circle of radius 4m.

8. A projectile is fired from the surface of the earth with a velocity of 5ms^{-1} and at an angle θ with the horizontal. Another projectile fired from another planet with a velocity of 3ms^{-1} at the same angle follows a trajectory which is identical with the trajectory of the projectile fired from the earth. The value of the acceleration due to gravity on the planet is: (given = 9.8 ms^{-2})
1. 3.5
2. 5.9
3. 16.3
4. 110.8

9. The velocity of a projectile at the initial point A is $\left(2\hat{i}+3\hat{j}\right)$m/s. Its velocity (in m/s) at point B is:



1. $-2\hat{i}+3\hat{j}$
2. $2\hat{i}-3\hat{j}$
3. $2\hat{i}+3\hat{j}$
4. $-2\hat{i}-3\hat{j}$

10. The horizontal range and the maximum height of a projectile are equal. The angle of projection of the projectile is:
1. $\theta=\tan^{-1}\left(\frac{1}{4}\right)$
2. $\theta=\tan^{-1}(4)$
3. $\theta=\tan^{-1}(2)$
4. $\theta=45^{0}$

11. A particle moves in a circle of radius 5 cm with constant speed and time period 0.2π sec. The acceleration of the particle is:
1. 25 m/s^2
2. 36 m/s^2
3. 5 m/s^2
4. 15 m/s^2

12. A body is moving with a velocity of 30 m/s towards the east. After 10 sec, its velocity becomes 40 m/s towards the north. The average acceleration of the body is:
1. $7\ \mathrm{m/s^2}$
2. $\sqrt{7}\ \mathrm{m/s^2}$
3. $5\ \mathrm{m/s^2}$
4. $1\ \mathrm{m/s^2}$

13. A missile is fired for maximum range with an initial velocity of 20 m/s. If g= 10 m/s^2, the range of the missile is:
1. 50 m
2. 60 m
3. 20 m
4. 40 m

14. A particle has initial velocity $\left(3\hat{i}+4\hat{j}\right)$ and has acceleration $\left(0.4\hat{i}+0.3\hat{j}\right)$. Its speed after 10 s is
1. 7 units
2. $7\sqrt{2}$units
3. 8.5 units
4. 10 units

15. A particle of mass m is projected with velocity v making an angle of 45° with the horizontal. When the particle lands on the level ground, the magnitude of change in its momentum will be:
1. $2\,\mathrm{mv}$
2. $\mathrm{mv}/\sqrt{2}$
3. $\mathrm{mv}\sqrt{2}$
4. zero

16. A particle starting from the origin (0, 0) moves in a straight line in the (x, y) plane. Its coordinates at a later time are ($\sqrt{3}$, 3). The path of the particle makes with the *x*-axis an angle of:
1. 30°
2. 45°
3. 60°
4. 0°

17. For a projectile projected at angles (45°-θ) and (45°+θ), the horizontal ranges described by the projectile are in the ratio of:
1. 1:1
2. 2:3
3. 1:2
4. 2:1

18. A car turns at a constant speed on a circular track of radius 100 m, taking 62.8 s for every circular lap. The average velocity and average speed for each circular lap respectively is :
1. 0,0
2. 0, 10 m/s
3. 10 m/s, 10 m/s
4. 10 m/s, 0

19. The speed of a swimmer in still water is 20 m/s. The speed of river water is 10 m/s and is flowing due east. If he is standing on the south bank and wishes to cross the river along the shortest path, the angle at which he should make his stroke w.r.t north is given by:
1. 45° west of north
2. 30° west of north
3. 0° west of north
4. 60° west of north

20. Two particles A and B are moving in a uniform circular motion in concentric circles of radii r_A and r_B with speeds v_A and v_B respectively. Their time periods of rotation are the same. The ratio of angular speed of A to that of B will be:
1. 1: 1
2. $r_A : r_B$
3. $v_A : v_B$
4. $r_B : r_A$

21. A particle starting from rest moves in a circle of radius 'r'. It attains a velocity of v_0 m/s on completion of n rounds. Its angular acceleration will be:
(1) $\frac{v_0}{n}$ rad/s^2
(2) $\frac{v_0^2}{2\pi nr^2}$ rad/s^2
(3) $\frac{v_o^2}{4\pi nr^2}$ rad/s^2
(4) $\frac{v_0^2}{4\pi nr}$ rad/s^2

22. Two bullets are fired horizontally and simultaneously towards each other from rooftops of two buildings 100 m apart and of the same height of 200 m, with the same velocity of 25 m/s. When and where will the two bullets collide? (g = 10 m/s^2)
1. after 2s at a height of 180 m
2. after 2s at a height of 20 m
3. after 4s at a height of 120 m
4. they will not collide.

23. A projectile is fired at an angle of 45º with the horizontal. Elevation angle of the projectile at its highest point as seen from the point of projection, is :
1. 45º
2. 60º
3. $\tan^{-1}\frac{1}{2}$
4. $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$

24. The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is -
1. 15º
2. 30º
3. 45º
4. 60º

25. A particle moves in the x – y plane according to the rule x = a sin ωt and y = a cos ωt. The particle follows:
1. a circular path.
2. a parabolic path.
3. a straight line path inclined equally to x and y-axes.
4. an elliptical path.

26. Two projectiles of same mass and with same velocity are thrown at an angle 60º & 30º with the horizontal, then which quantity will remain same :
1. Time of flight
2. Horizontal range of projectile
3. Max height acquired
4. All of them

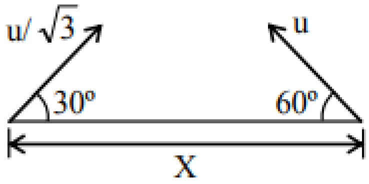
27. The width of river is 1 km. The velocity of boat is 5 km/hr. The boat covered the width of river with shortest will possible path in 15 min. Then the velocity of river stream is :
1. 3 km/hr
2. 4 km/hr
3. $\sqrt{29}$ km/hr
4. $\sqrt{41}$ km/hr

28. The speed of a boat is 5 km/hr in still water. It crosses a river of width 1 km along the shortest possible path in 15 minutes. The velocity of river water is :
1. 3 km/hr
2. 4 km/hr
3. 5 km/hr
4. 2 km/hr

29. A stone tied to the end of a string of 1 m long is whirled in a horizontal circle at a constant speed. If the stone makes 22 revolutions in 44 seconds, what is the magnitude and direction of acceleration of the stone:
(1) π^2 ms^{-2} and direction along the tangent to the circle.
(2) π^2 ms^{-2} and direction along the radius towards the centre.
(3) $\frac{\pi^2}{4}$ ms^{-2} and direction along the radius towards the centre.
(4) π^2 ms^{-2} and direction along the radius away from the centre.

30. Two boys are standing at the ends A and B of a ground where AB = a. The boy at B starts running in a direction perpendicular to AB with velocity v_1. The boy at A starts running simultaneously with velocity v and catches the other boy in a time t, where t is -
1. $\frac{a}{\sqrt{v^2+v_1^2}}$
2. $\frac{a}{\sqrt{v^2-v_1^2}}$
3. $\frac{a}{(v-v_1)}$
4. $\frac{a}{(v+v_1)}$

31. Two particles separated at a horizontal distance X as shown in fig. They are projected at the same line as shown in fig. with different initial speeds. The time after which the horizontal distance between them become zero-



1. $\frac{x}{u}$
2. $\frac{u}{2x}$
3. $\frac{2u}{x}$
4. None of these

32. Two particles are projected with same initial velocity one makes angle θ with horizontal while other makes an angle θ with vertical. If their common range is R then product of their time of flight is directly proportional to :
1. R
2. R^2
3. $\frac{1}{R}$
4. R^0

33. A particle (A) is droped from a height and another particle (B) is projected in horizontal direction with speed of 5 m/s from the same height then correct statement is : -
(1) Particle (A) will reach at ground first with respect to particle (B)
(2) Particle (B) will reach at ground first with respect to particle (A)
(3) Both particles will reach at ground simultaneously
(4) Both particles will reach at ground with same speed

34. A particle is projected making angle 45° with horizontal having kinetic energy K. The kinetic energy at highest point will be : -
1. $\frac{K}{\sqrt{2}}$
2. $\frac{K}{2}$
3. 2K
4. K

35. Two particles having mass 'M' and 'm' are moving in a circular path having radius R & r respectively. If their time periods are the same, then the ratio of angular velocities will be:
1. $\frac{r}{R}$
2. $\frac{R}{r}$
3. 1
4. $\sqrt{\frac{R}{r}}$

36. A particle moves along a circle of radius $\frac{20}{\pi}m$ with constant tangential acceleration. If the velocity of the particle is 80 m/s at the end of the second revolution after motion has begun, the tangential acceleration is : -
(1) 40 ms^{-2}
(2) 640π ms^{-2}
(3) 160π ms^{-2}
(4) 40π ms^{-2}

37. A car starts from rest and accelerates at $5\ \mathrm{m/s^2}$. At t = 4s, a ball is dropped out of a window by a person sitting in the car. What is the velocity and acceleration of the ball at t = 6 s?
(Take g = 10 m/s^2)
1. $20\sqrt{2}\ \mathrm{m/s},\ 0\ \mathrm{m/s^2}$
2. $20\sqrt{2}\ \mathrm{m/s},\ 10\ \mathrm{m/s^2}$
3. $20\ \mathrm{m/s},\ 5\ \mathrm{m/s^2}$
4. $20\ \mathrm{m/s},\ 0$

38. A particle moving in a circle of radius R with a uniform speed takes a time T to complete one revolution. If this particle were projected with the same speed at an angle 'θ' to the horizontal, the maximum height attained by it equals 4R. The angle of projection, θ, is then given by:
1. $\theta=\sin^{-1}\left(\frac{\pi^2 \mathrm{R}}{\mathrm{gT}^2}\right)^{1/2}$
2. $\theta=\sin^{-1}\left(\frac{2\,\mathrm{gT}^2}{\pi^2 \mathrm{R}}\right)^{1/2}$
3. $\theta=\cos^{-1}\left(\frac{\mathrm{gT}^2}{\pi^2 \mathrm{R}}\right)^{1/2}$
4. $\theta=\cos^{-1}\left(\frac{\pi^2 \mathrm{R}}{\mathrm{gT}^2}\right)^{1/2}$

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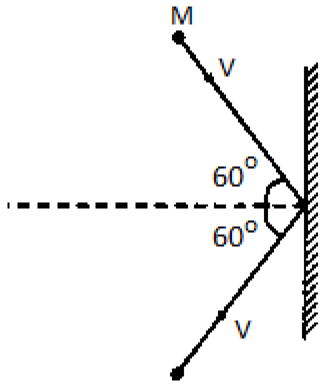
Laws of Motion

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Application of Laws	22
Friction	17
Newton's Laws	11
Uniform Circular Motion	5
Non Uniform Vertical Circular Motion	4
Banking of Roads	2
String Constraint	1
Variable Mass System	1

1. A person of mass 60 kg is inside a lift of mass 940 kg and presses the button on control panel. The lift starts moving upwards with an acceleration $1.0\ \mathrm{m/s^2}$. If $\mathrm{g} = 10\ \mathrm{m/s^2}$, the tension in the supporting cable is:
1. 9680 N
2. 11000 N
3. 1200 N
4. 8600 N

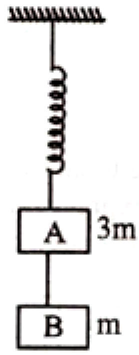
2. A rigid ball of mass M strikes a rigid wall at 60^0 and gets reflected without loss of speed as shown in the figure. The value of impulse imparted by the wall on the ball will be:



1. Mv
2. 2Mv
3. Mv/2
4. Mv/3

3. Which one of the following statements is incorrect?
1. Rolling friction is smaller than sliding friction.
2. Limiting value of static friction is directly proportional to normal reaction.
3. Frictional force opposes the relative motion.
4. Coefficient of sliding friction has dimensions of length.

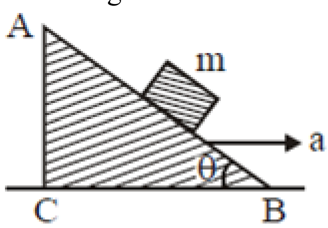
4. Two blocks A and B of masses 3m and m respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in the figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively:



1. $\frac{g}{3}, g$
2. g, g
3. $\frac{g}{3}, \frac{g}{3}$
4. $g, \frac{g}{3}$

5. One end of the string of length ‘l’ is connected to a particle of mass ‘m’ and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in a circle with speed 'v', the net force on the particle (directed towards the centre) will be: (T represents the tension in the string)
1. $T + \frac{mv^2}{l}$
2. $T - \frac{mv^2}{l}$
3. Zero
4. T

6. A block of mass m is placed on a smooth inclined wedge ABC of inclination θ as shown in the figure. The wedge is given an acceleration 'a' towards the right. The relation between a and θ for the block to remain stationary on the wedge is:

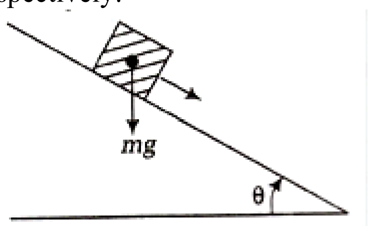


1. $a = \frac{g}{\cos ec\theta}$
2. $a = \frac{g}{\sin\theta}$
3. $a = g\cos\theta$
4. $a = g\tan\theta$

7.
A car is negotiating a curved road of radius R. The road is banked at angle θ. The coefficient of friction between the tyre of the car and the road is μ_s. The maximum safe velocity on this road is.

1. $\sqrt{gR\left(\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}\right)}$
2. $\sqrt{\frac{g}{R}\left(\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}\right)}$
3. $\sqrt{\frac{g}{R^2}\left(\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}\right)}$
4. $\sqrt{gR^2\left(\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}\right)}$

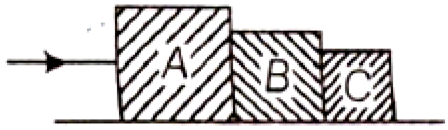
8. A plank with a box on it at one end is gradually raised about the other end. As the angle of inclination with the horizontal reaches 30°, the box starts to slip and slides 4.0 m down the plank in 4.0 s. The coefficients of static and kinetic friction between the box and the plank will be, respectively:



1. 0.6 and 0.6
2. 0.6 and 0.5
3. 0.5 and 0.6
4. 0.4 and 0.3

9. Two stones of masses m and 2m are whirled in horizontal circles, the heavier one in a radius $\frac{r}{2}$ and the lighter one in radius r. The tangential speed if lighter stone is n times that of the value of heavier stone when they experience same centripetal forces. The value of n is-
1. 2
2. 3
3. 4
4. 1

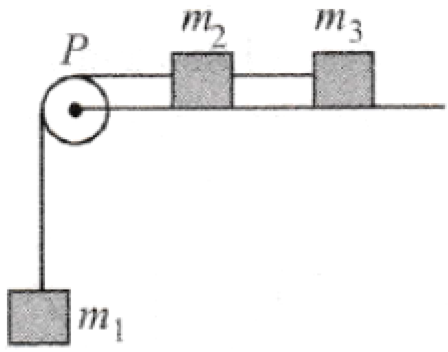
10.
Three blocks A, B, and C of masses 4 kg, 2 kg, and 1 kg respectively, are in contact on a frictionless surface, as shown. If a force of 14 N is applied on the 4kg block, then the contact force between A and B is:



1. 2 N
2. 6 N
3. 8 N
4. 18 N

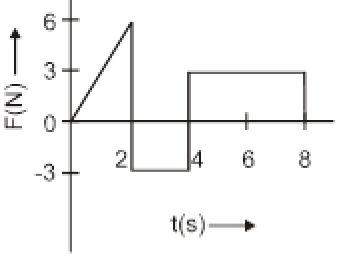
11. A block A of mass m_1 rests on a horizontal table. A light string connected to it passes over a frictionless pulley at the edge of the table and from its other end, another block B of mass m_2 is suspended. The coefficient of kinetic friction between block A and the table is μ_k. When block A is sliding on the table, the tension in the string is:
1. $\frac{(m_2+\mu_k m_1)g}{(m_1+m_2)}$
2. $\frac{(m_2-\mu_k m_1)g}{(m_1+m_2)}$
3. $\frac{m_1 m_2(1-\mu_k)g}{(m_1+m_2)}$
4. $\frac{m_1 m_2(1+\mu_k)}{m_1+m_2}g$

12. A system consists of three masses m_1, m_2, and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table (the coefficient of friction = μ). The pulley is frictionless and of negligible mass. The downward acceleration of mass m_1 is : (Assume $m_1 = m_2 = m_3 = m$)



1. $\frac{g(1-g\mu)}{9}$
2. $\frac{2g\mu}{3}$
3. $\frac{g(1-2\mu)}{3}$
4. $\frac{g(1-2\mu)}{2}$

13. The force 'F' acting on a particle of mass 'm' is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from 0 to 8 s is :



1. 24 Ns
2. 20 Ns
3. 12Ns
4. 6 Ns

14. A balloon with mass 'm' is descending down with an acceleration 'a' (where a < g). How much mass should be removed from it so that it starts moving up with an acceleration 'a'?

1. $\frac{2ma}{g+a}$
2. $\frac{2ma}{g-a}$
3. $\frac{ma}{g+a}$
4. $\frac{ma}{g-a}$

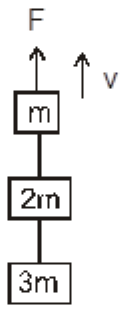
15. A body of mass (4m) is lying in the x-y plane at rest. It suddenly explodes into three pieces. Two pieces, each of mass (m) move perpendicular to each other with equal speeds (u). The total kinetic energy generated due to explosion is:

1. mu^2
2. $1.5mu^2$
3. $2mu^2$
4. $3mu^2$

16.
The upper half of an inclined plane of inclination θ is perfectly smooth while the lower half is rough. A block starting from rest at the top of the plane will again come to rest at the bottom if the coefficient of friction between the block and lower half of the plane is given by:

1. μ = 2/tanθ
2. μ = 2tanθ
3. μ = tanθ
4. μ = 1/tanθ

17. Three blocks with masses m, 2m, and 3m are connected by strings as shown in the figure. After an upward force, F is applied on block m, the masses move upward at constant speed v. What is the net force on the block of mass 2m? (g is the acceleration due to gravity).



1. 2mg
2. 3mg
3. 6mg
4. zero

18.
An explosion breaks a rock into three parts in a horizontal plane. Two of them go off at right angles to each other. The first part of mass 1kg moves with a speed of 12 ms^{-1} and the second part of mass 2 kg moves with 8 ms^{-1} speed. If the third part flies off with 4 ms^{-1} speed, then its mass is:
1. 5 kg
2. 7 kg
3. 17 kg
4. 3 kg

19. A car of mass 1000 kg negotiates a banked curve of radius 90 m on a frictionless road. If the banking angle is 45^o, the speed of the car is:
1. 20 ms^{-1}
2. 30 ms^{-1}
3. 5 ms^{-1}
4. 10 ms^{-1}

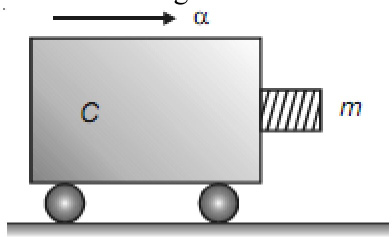
20.
A person of mass 60 kg is inside a lift of mass 940 kg and presses the button on control panel. The lift starts moving upwards with an acceleration of 1.0 ms^{-2}. If g = 10 ms^{-2}, the tension in the supporting cable is

1. 9680 N
2. 11000N
3. 1200N
4. 8600 N

21.
A body of mass M hits normally a rigid wall with velocity v and bounces back with the same velocity. The impulse experienced by the body is:

1. 1.5Mv
2. 2Mv
3. zero
4. Mv

22. A block of mass m is in contact with the cart C as shown in the figure.



The coefficient of static friction between the block and the cart is μ. The acceleration α of the cart that will prevent the block from falling satisfies:
1. $\alpha > \frac{mg}{\mu}$
2. $\alpha > \frac{g}{\mu m}$
3. $\alpha \geq \frac{g}{\mu}$
4. $\alpha < \frac{g}{\mu}$

23. A gramophone record is revolving with an angular velocity ω. A coin is placed at a distance r from the centre of the record. The static coefficient of friction is μ. The coin will revolve with the record if:
1. $r = \mu g \omega^2$
2. $r < \frac{\omega^2}{\mu g}$
3. $r \leq \frac{\mu g}{\omega^2}$
4. $r \geq \frac{\mu g}{\omega^2}$

24.
An explosion blows a rock into three parts. Two parts go off at right angles to each other. These two are, the first part 1 kg moving with a velocity of 12 ms^{-1} and the second part 2 kg moving with a velocity of 8 ms^{-1}. If the third part flies off with a velocity of 4 ms^{-1}, its mass would be:
1. 5 kg
2. 7 kg
3. 17 kg
4. 3 kg

25.
The mass of a lift is 2000 kg. When the tension in the supporting cable is 28000 N, then its acceleration is: (g=10 m/s^2)
1. 30 ms^{-2} downwards
2. 4 ms^{-2} upwards
3. 4 ms^{-2} downwards
4. 14 ms^{-2} upwards

26. A body, under the action of a force $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$, acquires an acceleration of 1 ms^{-2}. The mass of this body must be:
1. 2 √10 kg
2. 10 kg
3. 20 kg
4. 10 √2 kg

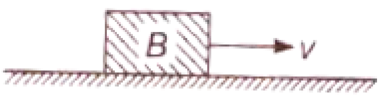
27.
A roller coaster is designed such that riders experience "weightlessness" as they go round the top of a hill whose radius of curvature is 20 m. The speed of the car at the top of the hill is between:

1. 14 m/s and 15 m/s
2. 15 m/s and 16 m/s
3. 16 m/s and 17 m/s
4. 13 m/s and 14 m/s

28.
Sand is being dropped on a conveyor belt at the rate of M kg/s. The force necessary to keep the belt moving with a constant velocity of v m/s will be:

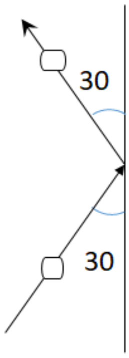
1. Mv Newton
2. 2Mv Newton
3. $\frac{Mv}{2}$ Newton
4. zero

29. A block B is pushed momentarily along a horizontal surface with an initial velocity v. If μ is the coefficient of sliding friction between B and the surface, the block B will come to rest after a time:



1. $\frac{v}{g\mu}$
2. $\frac{g\mu}{v}$
3. $\frac{g}{v}$
4. $\frac{v}{g}$

30. A 0.5 kg ball moving with a speed of 12 m/s strikes a hard wall at an angle of 30° with the wall. It is reflected with the same speed and at the same angle. If the ball is in contact with the wall for 0.25 s, the average force acting on the wall is:

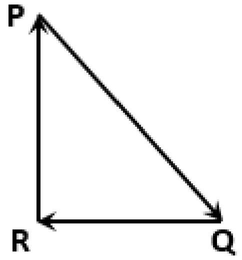


1. 48 N
2. 24 N
3. 12 N
4. 96 N

31. A tube of length L is filled completely with an incompressible liquid of mass M and closed at both ends. The tube is then rotated in a horizontal plane about one of its ends with a uniform angular velocity ω. The force exerted by the liquid at the other end is:
1. $\frac{ML\omega^2}{2}$
2. $\frac{ML^2\omega}{2}$
3. $ML\omega^2$
4. $\frac{ML^2\omega^2}{2}$

32. A block of mass 10 kg is in contact against the inner wall of a hollow cylindrical drum of radius 1 m. The coefficient of friction between the block and the inner wall of the cylinder is 0.1. The minimum angular velocity needed for the cylinder which is vertical and rotating about its axis will be:
(g=10 m/s^2)
1. 10π rad/s
2. $\sqrt{10}\pi$ rad/s
3. $\frac{10}{2\pi}$ rad/s
4. 10 rad/s

33. A particle moving with velocity $\vec{v}$ is acted by three forces shown by the vector triangle PQR. The velocity of the particle will:

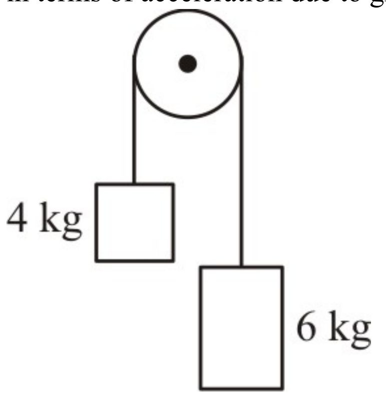


1. change according to the smallest force $\overrightarrow{QR}$.
2. increase.
3. decrease.
4. remain constant.

34. A truck is stationary and has a bob suspended by a light string in a frame attached to the truck. The truck suddenly moves to the right with an acceleration of a. In the frame of the truck, the pendulum will tilt:
(1) to the left and angle of inclination of the pendulum with the vertical is $\sin^{-1}\left(\frac{a}{g}\right)$
(2) to the left and angle of inclination of the pendulum with the vertical is $\cos^{-1}\left(\frac{a}{g}\right)$
(3) to the left and angle of inclination of the pendulum with the vertical is $\tan^{-1}\left(\frac{a}{g}\right)$
(4) to the left and angle of inclination of the pendulum with the vertical is $\tan^{-1}\left(\frac{g}{a}\right)$

35. A body of mass m is kept on a rough horizontal surface (coefficient of friction= μ). A horizontal force is applied to the body but it does not move. The resultant of normal reaction and the frictional force acting on the object is given by $\vec{F}$, where:
1. $\left|\vec{F}\right| = mg + \mu mg$
2. $\left|\vec{F}\right| = \mu mg$
3. $\left|\vec{F}\right| \leq mg\sqrt{1+\mu^2}$
4. $\left|\vec{F}\right| = mg$

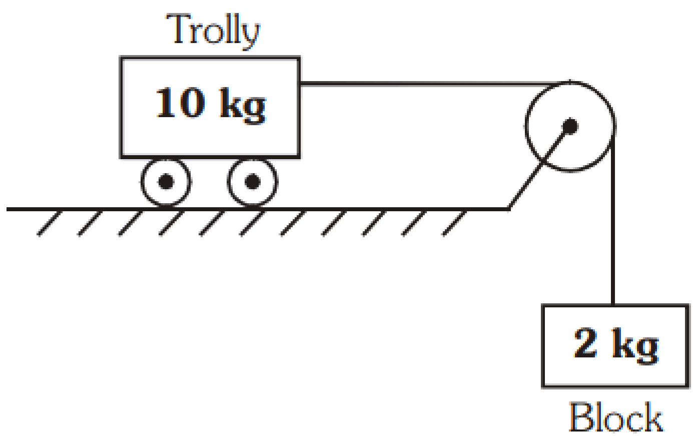
36. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is:



1. g/2
2. g/5
3. g/10
4. g

37. A point mass 'm' is moved in a vertical circle of radius 'r' with the help of a string. The velocity of the mass is $\sqrt{7\,gr}$ at the lowest point. The tension in the string at the lowest point is:
1. 6mg
2. 7mg
3. 8mg
4. 1mg

38. Calculate the acceleration of the block and trolly system shown in the figure. The coefficient of kinetic friction between the trolly and the surface is 0.05. ($g = 10\,m/s^2$, mass of the string is negligible and no other friction exists).

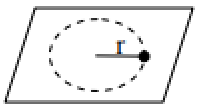


1. $1.25\,m/s^2$
2. $1.50\,m/s^2$
3. $1.66\,m/s^2$
4. $1.00\,m/s^2$

39. A car of mass m is moving on a level circular track of radius R. If μ_s represents the static friction between the road and tyres of the car, the maximum speed of the car in circular motion is given by -
1. $\sqrt{Rg/\mu_s}$
2. $\sqrt{mRg/\mu_s}$
3. $\sqrt{\mu_s Rg}$
4. $\sqrt{\mu_s mRg}$

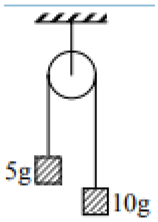
40. A conveyor belt is moving at a constant speed of 2 m/s. A box is gently dropped on it. The coefficient of friction between them is μ = 0.5. The distance that the box will move relative to belt before coming to rest on it, taking $g = 10\ ms^{-2}$ is
1. 0.4 m
2. 1.2 m
3. 0.6 m
4. Zero

41. A small mass attached to a string rotates on a frictionless table top as shown. If the tension in the string is increased by pulling the string causing the radius of the circular motion to decrease by a factor of 2, the kinetic energy of the mass will



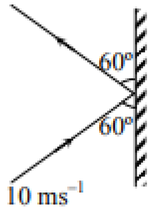
1. decrease by a factor of 2
2. remain constant
3. increase by a factor of 2
4. increase by a factor of 4

42. Two masses as shown are suspended from a massless pulley. Calculate the acceleration of the system when masses are left free :



1. 2g/3
2. g/3
3. g/9
4. g/7

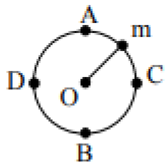
43. A body of mass 3 kg hits a wall at an angle of 60º & returns at the same angle. The impact time was 0.2 s. Calculate the force exerted on the wall :



1. 150 $\sqrt{3}$ N
2. 50 $\sqrt{3}$ N
3. 100 N
4. 75 $\sqrt{3}$ N

44. A mass of 1 kg is thrown up with a velocity of 100 m/s. After 5 seconds, it explodes into two parts. One part of mass 400 g comes down with a velocity of 25 m/s. Calculate the velocity of another part:
1. 40 m/s upward
2. 40 m/s downward
3. 100 m/s upward
4. 60 m/s downward

45. A mass is performing vertical circular motion (see figure). If The average velocity of the particle is increased, then at which point the string will break :



1. A
2. B
3. C
4. D

46. If force F = 500 – 100t, then function of impulse with time will be :
1. $500t - 50t^2$
2. $50t - 10$
3. $50 - t^2$
4. $100\ t^2$

47. A man is slipping on a frictionless inclined plane & a bag falls down from the same height. Then the speed of both is related as :
1. $V_B > V_m$
2. $V_B < V_m$
3. $V_B = V_m$
4. V_B and V_m can't be related

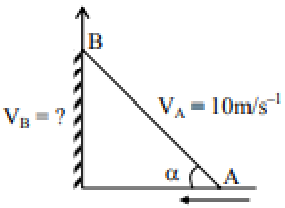
48. A particle of mass m is tied to a string of length L and whirled into a horizontal plane. If the tension in the string is T, then the speed of the particle will be:
1. $\sqrt{\frac{Tl}{m}}$
2. $\sqrt{\frac{2Tl}{m}}$
3. $\sqrt{\frac{3Tl}{m}}$
4. $\sqrt{\frac{T}{ml}}$

49. A small ball is suspended from a thread. It is lifted up with an acceleration 4.9 ms^{-2} and lowered with an acceleration 4.9 ms^{-2}, then the ratio of tensions in the thread in both cases will be :
1. 1 : 3
2. 3 : 1
3. 1 : 1
4. 1 : 5

50. If a ladder is not in balance condition against a smooth vertical wall, then it can be made in balance condition by :
(1) Decreasing the length of ladder
(2) Increasing the length of ladder
(3) Increasing the angle of inclination
(4) Decreasing the angle of inclination

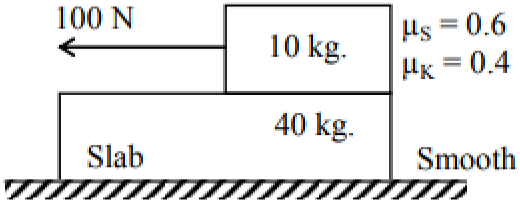
51. For a rocket propulsion velocity of exhaust gases relative to rocket is 2 km/s. If mass of rocket system is 1000 kg, then the rate of fuel consumption for a rocket to rise up with acceleration 4.9 m/s^2 will be :
1. 12.25 kg/s
2. 17.5 kg/s
3. 7.35 kg/s
4. 5.2 kg/s

52. A rigid rod is placed against the wall as shown in figure. When its velocity of lower end is 10 ms^{-1} and its base makes an angle α= 60° with horizontal, then the vertical velocity of its end B will be :



1. $10\sqrt{3}$
2. $10/\sqrt{3}$
3. $5\sqrt{3}$
4. $5 / \sqrt{3}$

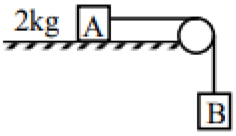
53. If 100N force is applied to 10 kg. block as shown in diagram then acceleration produced for slab -



1. 1.65 m/s^2
2. 0.98 m/s^2
3. 1.2 m/s^2
4. 0.25 m/s^2

54. A block of mass m is placed on a smooth wedge of inclination θ. The whole system is accelerated horizontally so that the block does not slip on the wedge. The force exerted by the wedge on the block (g is the acceleration due to gravity) will be:
(1) mg sin θ
(2) mg
(3) mg/cosθ
(4) mg cosθ

55. The coefficient of static friction, μ_s, between block A of mass 2 kg and the table as shown in the figure is 0.2. What would be the maximum mass value of block B so that the two blocks do not move? The string and the pulley are assumed to be smooth and massless. (g = 10 m/s^2)



(1) 4.0 kg
(2) 0.2 kg
(3) 0.4 kg
(4) 2.0 kg

56. An object of mass 3kg is at rest. Now a force of $\vec{F} = 6t^2\hat{i} + 4t\hat{j}$ is applied on the object then velocity of object at t = 3 second is : -
1. $18\hat{i} + 3\hat{j}$
2. $18\hat{i} + 6\hat{j}$
3. $3\hat{i} + 18\hat{j}$
4. $18\hat{i} + 4\hat{j}$

57. A block of mass 10 kg placed on rough horizontal surface having coefficient of friction μ = 0.5, if a horizontal force of 100 N acting on it then acceleration of the block will be : -
(1) 10 m/s^2
(2) 5 m/s^2
(3) 15 m/s^2
(4) 0.5 m/s^2

58. A lift of mass 1000 Kg is moving with acceleration of 1 m/s^2 in upward direction, then the tension developed in string which is connected to the lift is : -
(1) 9800 N
(2) 10, 800 N
(3) 11000 N
(4) 10, 000 N

59. A cricketer catches a ball of mass 150 gm. in 0.1 second moving with speed 20 ms^{-1}. Then he experiences force of : -
1. 300 N
2. 30 N
3. 3 N
4. 0.3 N

60. On the horizontal surface of a truck a block of mass 1 kg is placed (μ = 0.6) and truck is moving with acceleration 5 m/s^2 then the frictional force on block will be:
1. 5 N
2. 6 N
3. 5.88 N
4. 8 N

61. A monkey of mass 20 kg is holding a vertical rope. The rope will not break when a mass of 25 kg is suspended from it but will break if the mass exceeds 25 kg. What is the maximum acceleration with which the monkey can climb up along the rope? (g = 10 m/s^2)
(1) 5 m/s^2
(2) 10 m/s^2
(3) 25 m/s^2
(4) 2.5 m/s^2

62. A man weighs 80 kg. He stands on a weighing scale in a lift which is moving upwards with a uniform acceleration of 5m/s^2. What would be the reading on the scale? (g = 10 m/s^2)
(1) Zero
(2) 400 N
(3) 800 N
(4) 1200 N

63. A 1 kg stationary bomb is exploded in three parts having mass 1 : 1 : 3 respectively. Parts having same mass move in perpendicular direction with
velocity 30 ms^{-1}, then the velocity of bigger part will be : -
1. $10\sqrt{2}\,ms^{-1}$
2. $\frac{10}{\sqrt{2}}ms^{-1}$
3. $15\sqrt{2}\,ms^{-1}$
4. $\frac{15}{\sqrt{2}}ms^{-1}$

64. A ball of mass 0.15 kg is dropped from a height 10 m, strikes the ground and rebounds to the same height. The magnitude of impulse imparted to the ball is $\left(g=10\ m/s^2\right)$ nearly:
1. 2.1 kg m/s
2. 1.4 kg m/s
3. 0 kg m/s
4. 4.2 kg m/s

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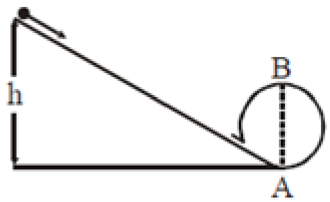
Work, Energy & Power

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Work Energy Theorem	13
Power	10
Elastic Potential Energy	8
Gravitational Potential Energy	7
Concept of Work	5
Work Done by Variable Force	5
Conservation of Mechanical Energy	3
Potential Energy: Relation with Force	2

1. Consider a drop of rainwater having a mass of 1gm falling from a height of 1 km. It hits the ground with a speed of 50 m/s. Take 'g' constant with a value 10 m/s^2. The work done by the
(i) gravitational force and the
(ii) resistive force of air is:
1. (i) 1.25 J (ii) -8.25 J
2. (i) 100 J (ii) 8.75 J
3. (i) 10 J (ii) -8.75 J
4. (i) -10 J (ii) -8.75 J

2. A body initially at rest and sliding along a frictionless track from a height h (as shown in the figure) just completes a vertical circle of diameter AB = D. The height h is equal to :-



1. $\frac{3}{2}D$
2. D
3. $\frac{7}{4}D$
4. $\frac{5}{4}D$

3.
A body of mass 1 kg begins to move under the action of a time-dependent force $\overrightarrow{F} = \left(2t\hat{i} + 3t^2\hat{j}\right)$ N, where $\hat{i}$ and $\hat{j}$ are unit vectors along the X and Y-axis. What power will be developed by the force at the time (t)?
1. $(2t^2 + 4t^4)$ W
2. $(2t^3 + 3t^3)$ W
3. $(2t^3 + 3t^5)$ W
4. $(2t^3 + 3t^4)$ W

4. What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop?
1. $\sqrt{2gR}$
2. $\sqrt{3gR}$
3. $\sqrt{5gR}$
4. $\sqrt{gR}$

5. A ball is thrown vertically downwards from a height of 20 m with an initial velocity v_0. It collides with the ground, losses 50% of its energy in a collision, and rebounds to the same height. The initial velocity v_0 is:
[Take, g = 10 ms^{-1}]
1. 14 ms^{-1}
2. 20 ms^{-1}
3. 28 ms^{-1}
4. 10 ms^{-1}

6.
Two similar springs P and Q have spring constants k_P and k_Q, such that $k_P > k_Q$. They are stretched, first by the same amount (case a), then by the same force (case b). The work done by the springs W_P and W_Q are related as, in case (a) and case (b), respectively.
1. $W_P = W_Q$; $W_P > W_Q$
2. $W_P = W_Q$; $W_P = W_Q$
3. $W_P > W_Q$; $W_P < W_Q$
4. $W_P < W_Q$; $W_P < W_Q$

7.
A block of mass 10 kg, moving in the x-direction with a constant speed of 10 ms^{-1} is subjected to a retarding force F = 0.1x J/m during its travel from x = 20 m to 30 m. Its final K.E. will be:
1. 475 J
2. 450 J
3. 275 J
4. 250 J

8.

A particle of mass m is driven by a machine that delivers a constant power k watts. If the particle starts from rest, the force on the particle at time t is
1. $\sqrt{\frac{mk}{2}}t^{-1/2}$
2. $\sqrt{mk}t^{-1/2}$
3. $\sqrt{2mk}t^{-1/2}$
4. $\frac{1}{2}\sqrt{mk}t^{-1/2}$

9. Two particles of masses m_1 and m_2 move with initial velocities u_1 and u_2 respectively. On collision, one of the particles gets excited to a higher level, after absorbing energy E. If the final velocities of particles are v_1 and v_2, then we must have:
1. $m_1^2u_1 + m_2^2u_2 - E = m_1^2v_1 + m_2^2v_2$
2. $\frac{1}{2}m_1u_1^2 + \frac{1}{2}m_2u_2^2 = \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2$
3. $\frac{1}{2}m_1u_1^2 + \frac{1}{2}m_2u_2^2 - E = \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2$
4. $\frac{1}{2}m_1^2u_1^2 + \frac{1}{2}m_2^2u_2^2 + E = \frac{1}{2}m_1^2v_1^2 + \frac{1}{2}m_2^2v_2^2$

10. On a frictionless surface, a block of mass M moving at speed v collides elastically with another block of the same mass M which is initially at rest. After the collision, the first block moves at an angle θ to its initial direction and has a speed $\frac{v}{3}$. The second block's speed after the collision is:
1. $\frac{2\sqrt{2}}{3}v$
2. $\frac{3}{4}v$
3. $\frac{3}{\sqrt{2}}v$
4. $\frac{\sqrt{3}}{2}v$

11.
A uniform force of $\left(3\hat{i} + \hat{j}\right)$ newton acts on a particle of mass 2 kg. Hence the particle is displaced from position $\left(2\hat{i} + \hat{k}\right)$ meter to position $\left(4\hat{i} + 3\hat{j} - \hat{k}\right)$ meter. The work done by the force on the particle is:
1. 6 J
2. 13 J
3. 15 J
4. 9 J

12. The potential energy of a particle in a force field is U= $\frac{A}{r^2} - \frac{B}{r}$ where A and B are positive constants and r is the distance of the particle from the center of the field. For stable equilibrium, the distance of the particle is:
1. B/A
2. B/2A
3. 2A/B
4. A/B

13. Two spheres A and B of masses m_1 and m_2 respectively collide. A is at rest initially and B is moving with velocity v along the x-axis. After collision B has a velocity $\frac{v}{2}$ in a direction perpendicular to the original direction. The mass A moves after collision in the direction:

1. same as that of B.
2. opposite to that of B.
3. $\theta = \tan^{-1}\left(\frac{1}{2}\right)$ to the positive x-axis.
4. $\theta = \tan^{-1}\left(\frac{-1}{2}\right)$ to the positive x-axis

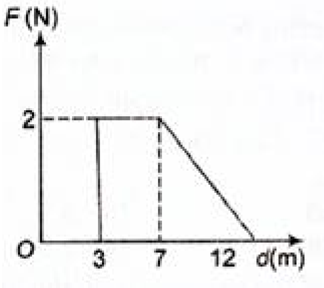
14.
A body projected vertically from the earth reaches a height equal to earth's radius before returning to the earth. The power exerted by the gravitational force is greatest:

1. at the instant just before the body hits the earth.
2. it remains constant all throughout.
3. at the instant just after the body is projected.
4. at the highest position of the body.

15.
The potential energy of a system increases if work is done

1. by the system against a conservative force
2. by the system against a non-conservative force
3. upon the system by a conservative force
4. upon the system by a non-conservative force

16. Force F on a particle moving in a straight line varies with distance d as shown in the figure. The work done on the particle during its displacement of 12 m is:



1. 21 J
2. 26 J
3. 13 J
4. 18 J

17. An engine pumps water through a hose pipe. Water passes through the pipe and leaves it with a velocity of 2 ms^{-1}. The mass per unit length of water in the pipe is 100 $kg\ m^{-1}$.What is the power of the engine?
1. 400 W
2. 200 W
3. 100 W
4. 800 W

18.
A body of mass 1 kg is thrown upwards with a velocity 20 ms^{-1}. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction? (g =10 ms^{-2})

1. 20 J
2. 30 J
3. 40 J
4. 10 J

19. An engine pumps water continuously through a hose. Water leaves the hose with a velocity v and m is the mass per unit length of the water jet. What is the rate at which kinetic energy is imparted to water?
1. $\frac{1}{2}mv^3$
2. mv^3
3. $\frac{1}{2}mv^2$
4. $\frac{1}{2}m^2v^2$

20.
A block of mass M is attached to the lower end of a vertical spring. The spring is hung from a ceiling and has force constant value k. The mass is released from rest with the spring initially upstretched. The maximum extension produced in the length of the spring will be:
1. Mg/k
2. 2Mg/k
3. 4Mg/k
4. Mg/2k

21.
Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. The losses due to frictional forces are 10% of energy. How much power is generated by the turbine? (g = 10 m/s^2)
1. 8.1 kW
2. 10.2 kW
3. 12.3 kW
4. 7.0 kW

22.
A shell of mass 200 g is ejected from a gun of mass 4 kg by an explosion that generates 1.05 kJ of energy. The initial velocity of the shell is:

1. 100 ms^{-1}
2. 80 ms^{-1}
3. 40 ms^{-1}
4. 120 ms^{-1}

23. A vertical spring with force constant k is fixed on a table. A ball of mass m at a height h above the free upper end of the spring falls vertically on the spring so that the spring is compressed by a distance d. The net work done in the process is:
1. $mg\left(h+d\right)+\frac{1}{2}kd^2$
2. $mg\left(h+d\right)-\frac{1}{2}kd^2$
3. $mg\left(h-d\right)-\frac{1}{2}kd^2$
4. $mg\left(h-d\right)+\frac{1}{2}kd^2$

24. The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm the potential energy stored in it is :
1. 4 U
2. 8 U
3. 16 U
4. U/4

25. A body of mass 3 kg is under a constant force which causes a displacement s in metres in it, given by the relation $s = \frac{1}{3} t^2$, where t is in sec. Work done by the force in 2 sec is :
1. $\frac{5}{19} J$
2. $\frac{3}{8} J$
3. $\frac{8}{3} J$
4. $\frac{19}{5} J$

26. 300 J of work is done in sliding a 2 kg block up an inclined plane of height 10 m. Taking g = 10 m/s^2, work done against friction is :
1. 200 J
2. 100 J
3. zero
4. 1000 J

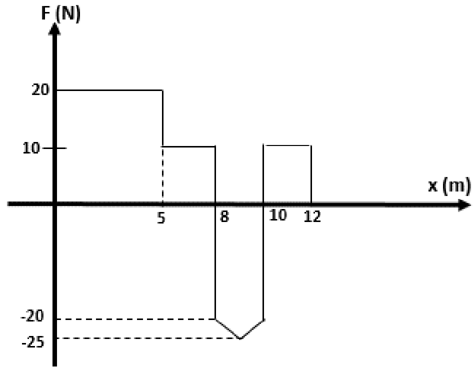
27. When an object is shot from the bottom of a long smooth inclined plane kept at an angle of 60° with horizontal, it can travel a distance x_1 along the plane. But when the inclination is decreased to 30° and the same object is shot with the same velocity, it can travel x_2 distance. Then x_1:x_2 will be:
1. $1 : 2\sqrt{3}$
2. $1 : \sqrt{2}$
3. $\sqrt{2} : 1$
4. $1 : \sqrt{3}$

28. A force F= 20+10y acts on a particle in the y-direction where F is in Newton and y in meter. Work done by this force to move the particle from y=0 to y= 1m is:
1. 20 J
2. 30 J
3. 5 J
4. 25 J

29. A mass m is attached to a thin wire and whirled in a vertical circle. The wire is most likely to break when:
1. inclined at an angle of 60^0 from vertical.
2. the mass is at the highest point.
3. the wire is horizontal.
4. the mass is at the lowest point.

30.
A disc of radius 2 m and mass 100 kg rolls on a horizontal floor. Its centre of mass has speed of 20 cm/s. How much work is needed to stop it?
1. 1 J
2. 3 J
3. 30 J
4. 2 J

31. An object of mass 500 g initially at rest is acted upon by a variable force whose x-component varies with x in the manner shown. The velocities of the object at the points x = 8 m and x = 12 m would have the respective values of nearly:



1. 18 m/s and 24.4 m/s
2. 23 m/s and 24.4 m/s
3. 23 m/s and 20.5 m/s
4. 18 m/s and 20.5 m/s

32. A mass m moving horizontally (along the x-axis) with velocity v collides and sticks to a mass of 3m moving vertically upward (along the y-axis) with velocity 2 v. The final velocity of the combination is :
1. $\frac{3}{2}v\hat{i} + \frac{1}{4}v\hat{j}$
2. $\frac{1}{4}v\hat{i} + \frac{3}{2}v\hat{j}$
3. $\frac{1}{3}v\hat{i} + \frac{2}{3}v\hat{j}$
4. $\frac{2}{3}v\hat{i} + \frac{1}{3}v\hat{j}$

33. A car of mass m starts from rest and accelerates so that the instantaneous power delivered to the car has a constant magnitude P_0. The instantaneous velocity of this car is proportional to -
1. $t^{1/2}$
2. $t^{-1/2}$
3. $t/\sqrt{m}$
4. $t^2 P_0$

34. A stone is dropped from a height h. It hits the ground with a certain momentum P. If the same stone is dropped from a height 100 % more than the previous height, the momentum when it hits the ground will change by -
1. 41 %
2. 200%
3. 100%
4. 68%

35. A particle of mass M starting from rest undergoes uniform acceleration. If the speed
acquired in time T is V, the power delivered to the particle is -
1. $\frac{1}{2}\frac{MV^2}{T^2}$
2. $\frac{MV^2}{T^2}$
3. $\frac{1}{2}\frac{MV^2}{T}$
4. $\frac{MV^2}{T}$

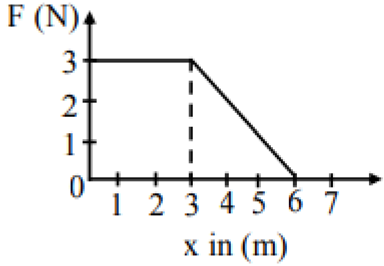
36. If $x = 3 - 4t^2 + t^3$, then work done in the first 4s will be (Mass of the particle is 3 gram) :
1. 384 mJ
2. 168 mJ
3. 192 mJ
4. None of these

37. The bob of simple pendulum having length l, is displaced from mean position to an angular position θ with respect to vertical. If it is released, then velocity of bob at lowest position :
1. $\sqrt{2gl(1-\cos\theta)}$
2. $\sqrt{2gl(1+\cos\ \theta)}$
3. $\sqrt{2gl\ \cos\theta}$
4. $\sqrt{2gl}$

38. If $\vec{F} = \left(60\hat{i} + 15\hat{j} - 3\hat{k}\right)\ N\ and\ \vec{V} = \left(2\hat{i} - 4\hat{j} + 5\hat{k}\right)\ m/s$, then instantaneous power is:
1. 195 watt
2. 45 watt
3. 75 watt
4. 100 watt

39. A ball is dropped from a height of 5 m, if it rebounds up to a height of 1.8 m, then the ratio of velocities of the ball after and before rebound is:
1. $\frac{3}{5}$
2. $\frac{2}{5}$
3. $\frac{1}{5}$
4. $\frac{4}{5}$

40. A force F acting on an object varies with distance x as shown here.



The force is in N and x in m. The work done by the force in moving the object from x = 0 to x = 6 m is
(1) 18.0 J
(2) 13.5 J
(3) 4.5 J
(4) 9.0 J

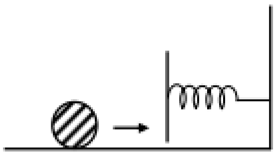
41. A ball is thrown vertically upward. It has a speed of 10m/sec when it has reached one-half of its maximum height. How high does the ball rise? Take g = 10 m/s^2 -
(1) 5m
(2) 15m
(3) 10 m
(4) 20 m

42. The K.E. of a person is just half of K.E. of a boy whose mass is just half of that person. If person increases its speed by 1 m/s, then its K.E. equals to that of boy, then initial speed of person was -
1. $\left(\sqrt{2} + 1\right)\ m/s$
2. $\left(2 + \sqrt{2}\right)\ m/s$
3. $2\left(\sqrt{2} + 2\right)\ m/s$
4. None

43. A particle of mass m_1 is moving with a velocity v_1 and another particle of mass m_2 is moving with a velocity v_2. Both of them have the same momentum but their different kinetic energies are E_1 and E_2 respectively. If $m_1 > m_2$ then:
1. $\frac{E_1}{E_2} = \frac{m_1}{m_2}$
2. $E_1 > E_2$
3. $E_1 = E_2$
4. $E_1 < E_2$

44. A stone is tied to a string of length 'l' and is whirled in a vertical circle with the other end of the string as the centre. At a certain instant of time, the stone is at its lowest position and has a speed 'u'. The magnitude of the change in velocity as it reaches a position where the string is horizontal (g being acceleration due to gravity) is:
1. $\sqrt{u^2 - g\ell}$
2. $u - \sqrt{u^2 - 2g\ell}$
3. $\sqrt{2\,\mathrm{g}\ell}$
4. $\sqrt{2\left(\mathrm{u}^2 - \mathrm{g}\ell\right)}$

45. A mass of 0.5 kg moving with a speed of 1.5 m/s on a horizontal smooth surface, collides with a nearly weightless spring of force constant k = 50 N/m. The maximum compression of the spring would be :-



(1) 0.12 m
(2) 1.5 m
(3) 0.5 m
(4) 0.15 m

46. Two springs A and B $\left(K_A = 2\,K_B\right)$ are stretched by the same suspended weights, then the ratio of work done in stretching is:
1. 1 : 2
2. 2 : 1
3. 1 : 1
4. 1 : 4

47. When spring is subjected to 4N force its length is a metre and if 5N is applied length is b metre. If 9N is applied its length is :
1. 4b – 3a
2. 5b – a
3. 5b – 4a
4. 5b – 2a

48. If kinetic energy of a body is increased by 300% than percentage change in momentum will be
(1) 100%
(2) 150%
(3) 265%
(4) 73.2%

49. A child is sitting on a swing. Its minimum and maximum heights from the ground is 0.75 m and 2 m respectively, its maximum speed will be
1. 10 m/s
2. 5 m/s
3. 8 m/s
4. 15 m/s

50. Two springs A and B having spring constant $K_A\ and\ K_B$ $\left(K_A = 2K_B\right)$ are stretched by applying force of equal magnitude. If energy stored in spring A is E then energy stored in B will be : -
1. 2E
2. $\frac{E}{4}$
3. $\frac{E}{2}$
4. 4E

51. When a long spring is stretched by 2 cm, its potential energy is U. If the spring is stretched by 10 cm, the potential energy stored in it will be :
(1) U/5
(2) 5U
(3) 10U
(4) 25U

52. 250 N force is required to raise 75 kg mass from a pulley. If rope is pulled 12 m then the load is lifted to 3m, the efficiency of pulley system will
be : -
1. 25%
2. 33.3%
3. 75%
4. 90%

53. A particle is released from height S from the surface of the earth. At a certain height, its kinetic energy is three times its potential energy. The height from the surface of the earth and the speed of the particle at that instant are respectively:
1. $\frac{\mathrm{S}}{2}, \frac{\sqrt{3\,\mathrm{gS}}}{2}$
2. $\frac{\mathrm{S}}{4}, \sqrt{\frac{3\,\mathrm{gS}}{2}}$
3. $\frac{\mathrm{S}}{4}, \frac{3\,\mathrm{gS}}{2}$
4. $\frac{\mathrm{S}}{4}, \frac{\sqrt{3\,\mathrm{gS}}}{2}$

54. Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. The losses due to frictional force are 10% of the input energy. How much power is generated by the turbine? $\left(g = 10\ m/s^2\right)$
1. 12.3 kW
2. 7.0 kW
3. 10.2 kW
4. 8.1 kW

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System of Particles & Rotational Motion

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Moment of Inertia	17
Rolling Motion	16
Angular Momentum	15
Collisions	13
Torque	12
Center of Mass	11
Rotational Motion: Kinematics	6
Linear Momentum	5
Rotational Motion: Dynamics	3

1. A bullet of mass 10 g moving horizontal with a velocity of 400 m/s strikes a wood block of mass 2 kg which is suspended by light inextensible string of length 5 m. As result, the centre of gravity of the block found to rise a vertical distance of 10 cm. The speed of the bullet after it emerges of horizontally from the block will be
1. 100 m/s
2. 80 m/s
3. 120 m/s
4. 160 m/s

2. Two identical balls A and B having velocities of 0.5 m/s and -0.3 m/s respectively collide elastically in one dimension. The velocities of B and A after the collision respectively will be
1. -0.5 m/s and 0.3 m/s
2. 0.5 m/s and -0.3 m/s
3. -0.3 m/s and 0.5 m/s
4. 0.3 m/s and 0.5 m/s

3. Two rotating bodies A and B of masses m and 2m with moments of inertia I_A and I_B ($I_B > I_A$) have the equal kinetic energy of rotation. If L_A and L_B be their angular momenta respectively, then:
1. $L_A = \frac{L_B}{2}$
2. $L_A = 2L_B$
3. $L_B > L_A$
4. $L_A > L_B$

4. A solid sphere of mass m and radius R is rotating about its diameter. A solid cylinder of the same mass and same radius is also rotating about its geometrical axis with an angular speed twice that of the sphere. The ratio of their kinetic energies of rotation (Sphere/cylinder) will be:
1. 2:3
2. 1:5
3. 1:4
4. 3:1

5. A light rod of length l has two masses m_1 and m_2 attached to its two ends. The moment of inertia of the system about an axis perpendicular to the rod and passing through the centre of mass is:
1. $\frac{m_1 m_2}{m_1+m_2} l^2$
2. $\frac{m_1+m_2}{m_1 m_2} l^2$
3. $(m_1+m_2) l^2$
4. $\sqrt{m_1+m_2 l^2}$

6. A moving block having mass m collides with another stationary block having a mass of 4m. The lighter block comes to rest after the collision. When the initial velocity of the lighter block is v, then the value of the coefficient of restitution (e) will be:
1. 0.5
2. 0.25
3. 0.8
4. 0.4

7. Three objects, A : (a solid sphere), B : (a thin circular disk) and C = (a circular ring), each have the same mass M and radius R. They all spin with the same angular speed about their own symmetry axes. The amounts of work (W) required to bring them to rest, would satisfy the relation:
1. $W_C > W_B > W_A$
2. $W_A > W_B > W_C$
3. $W_B > W_A > W_C$
4. $W_A > W_C > W_B$

8. A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force of 30 N?
1. $0.25\ rad/s^2$
2. $25\ rad/s^2$
3. $5\ m/s^2$
4. $25\ m/s^2$

9. Two discs of the same moment of inertia are rotating about their regular axis passing through centre and perpendicular to the plane of disc with angular velocities $\omega_1$and ω_2. They are brought into contact face to face with their axis of rotation coinciding. The expression for loss of energy during this process is:-
1. $\frac{1}{4} I(\omega_1 - \omega_2)^2$
2. $I(\omega_1 - \omega_2)^2$
3. $\frac{1}{8} I(\omega_1 - \omega_2)^2$
4. $\frac{1}{2} I(\omega_1 - \omega_2)^2$

10. Which of the following statements are correct?
(a) Centre of mass of a body always coincides with the centre of gravity of the body
(b) Centre of gravity of a body is the point about which the total gravitational torque on the body is zero
(c) A couple on a body produce both translational and rotation motion in a body
(d) Mechanical advantage greater than one means that small effort can be used to lift a large load
1. (a) and (b)
2. (b) and (c)
3. (c) and (d)
4. (b) and (d)

11. The moment of the force, $\overrightarrow{F} = 4\hat{i} + 5\hat{j} - 6\hat{k}$ at point (2, 0, -3) about the point (2, -2, -2) is given by:
1. $-8\hat{i} - 4\hat{j} - 7\hat{k}$
2. $-4\hat{i} - \hat{j} - 8\hat{k}$
3. $-7\hat{i} - 8\hat{j} - 4\hat{k}$
4. $-7\hat{i} - 4\hat{j} - 8\hat{k}$

12. A solid sphere is in rolling motion. In rolling motion, a body possesses translational kinetic energy (K_t) as well as rotational kinetic energy (K_r) simultaneously. The ratio $K_t : (K_t + K_r)$ for the sphere is:
1. 7:10
2. 5:7
3. 10:7
4. 2:5

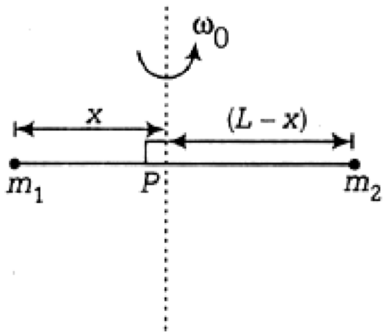
13. A solid sphere is rotating freely about its symmetry axis in free space. The radius of the sphere is increased keeping its mass the same. Which of the following physical quantities would remain constant for the sphere?
1. Angular velocity
2. moment of inertia
3. rotational kinetic energy
4. Angular momentum

14.
From a disc of radius R and mass M, a circular hole of diameter R, whose rim passes through the centre is cut. What is the moment of inertia of the remaining part of the disc about a perpendicular axis, passing through the centre?
1. $13MR^2/32$
2. $11MR^2/32$
3. $9MR^2/32$
4. $15MR^2/32$

15. A disc and a solid sphere of the same radius but different masses roll off on two inclined planes of the same altitude and length. Which one of the two objects gets to the bottom of the plane first?
1. Sphere
2. Both reach at the same time
3. Depends on their masses
4. Disc

16.
A uniform circular disc of radius 50 cm at rest is free to turn about an axis that is perpendicular to its plane and passes through its centre. It is subjected to a torque that produces a constant angular acceleration of 2.0 rad s^{-2}. Its net acceleration in ms^{-2} at the end of 2.0 s is approximately:
1. 7
2. 6
3. 3
4. 8

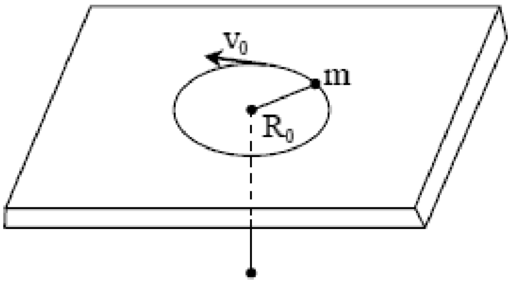
17.
Point masses m_1 and m_2, are placed at the opposite ends of a rigid rod of length L and negligible mass. The rod is to be set rotating about an axis perpendicular to it. The position of point P on this rod through which the axis should pass so that the work required to set the rod rotating with angular velocity ω_0 is minimum is given by:



1. $x = \frac{m_1 L}{m_1 + m_2}$
2. $x = \frac{m_1}{m_2} L$
3. $x = \frac{m_2}{m_1} L$
4. $x = \frac{m_2 L}{m_1 + m_2}$

18. A rod of weight w is supported by two parallel knife edges A and B and is in equilibrium in a horizontal position. The knives are at a distance d from each other. The Centre of mass of the rod is at a distance x from A. The normal reaction on A is:
1. $\frac{wx}{d}$
2. $\frac{wd}{x}$
3. $\frac{w(d-x)}{x}$
4. $\frac{w(d-x)}{d}$

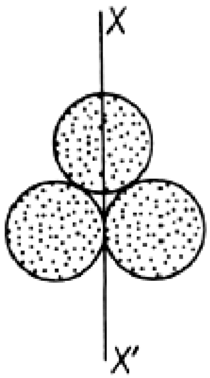
19.
A mass m moves in a circle on a smooth horizontal plane with velocity v_0 at a radius R_0. The mass is attached to a string that passes through a smooth hole in the plane as shown.



The tension in the string is increased gradually and finally m moves in a circle of radius $\frac{R_0}{2}$. The final value of the kinetic energy is:
1. mv_0^2
2. $\frac{1}{4}mv_0^2$
3. $2mv_0^2$
4. $\frac{1}{2}mv_0^2$

20.

Three identical spherical shells, each of mass m and radius r are placed as shown in the figure. Consider an axis XX', which is touching two shells and passing through the diameter of the third shell. The moment of inertia of the system consisting of these three spherical shells about the XX' axis is:



1. $\frac{11}{5}mr^2$
2. $3mr^2$
3. $\frac{16}{5}mr^2$
4. $4mr^2$

21. A force $\vec{F} = \alpha\hat{i} + 3\hat{j} + 6\hat{k}$ is acting at a point $\vec{r} = 2\hat{i} - 6\hat{j} - 12\hat{k}$. The value of α for which angular momentum about the origin is conserved is:
1. -1
2. 2
3. zero
4. 1

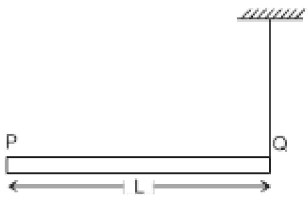
22. An automobile moves on a road with a speed of 54 kmh^{-1}. The radius of its wheels is 0.45 m and the moment of inertia of the wheel about its axis of rotation is 3 kg-m^2. If the vehicle is brought to rest in 15 s, the magnitude of average torque transmitted by its brakes to the wheel is:
1. 6.66 kg m^2 s^{-2}
2. 8.58 kg m^2 s^{-2}
3. 10.86 kg m^2 s^{-2}
4. 2.86 kg m^2 s^{-2}

23. A solid cylinder of mass 50 kg and radius 0.5 m is free to rotate about the horizontal axis. A massless string is wound around the cylinder with one end attached to it and the other hanging freely. Tension in the string required to produce an angular acceleration of 2 revolutions s^{-2} is:
1. 25 N
2. 50 N
3. 78.5 N
4. 157 N

24. The ratio of the acceleration for a solid sphere (mass 'm' and radius 'R') rolling down an incline of angle 'θ' without slipping and slipping down the incline without rolling is:
1. 5:7
2. 2:3
3. 2:5
4. 7:5

25.
A small object of uniform density rolls up a curved surface with an initial velocity ‘v’. It reaches up to a maximum height $\frac{3v^2}{4g}$ with respect to the initial position. The object is:
1. Solid sphere
2. Hollow sphere
3. Disc
4. Ring

26. A rod PQ of mass M and length L is hinged at end P. The rod is kept horizontal by a massless string tied to point Q as shown in the figure. When the string is cut, the initial angular acceleration of the rod is:



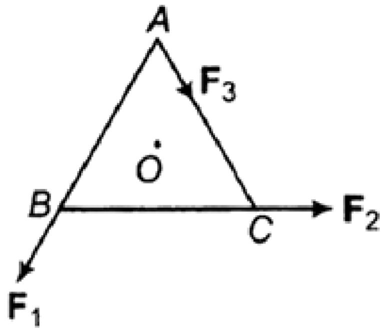
1. g/L
2. 2g/L
3. 2g/3L
4. 3g/2L

27. When a mass is rotating in a plane about a fixed point, its angular momentum is directed along:
1. a line perpendicular to the plane of rotation
2. the line making an angle of 45^{o} to the plane of rotation
3. the radius
4. the tangent to the orbit

28. Two persons of masses 55 kg and 65 kg respectively, are at the opposite ends of a boat. The length of the boat is 3.0 m and weighs 100 kg. The 55 kg man walks up to the 65 kg man and sits with him. If the boat is in still water the center of mass of the system shifts by:
1. 3.0 m
2. 2.3 m
3. zero
4. 0.75 m

29. A solid cylinder of mass 3 kg is rolling on a horizontal surface with a velocity of 4 ms^{-1}. It collides with a horizontal spring of force constant 200 Nm^{-1}. The maximum compression produced in the spring will be:
1. 0.5 m
2. 0.6 m
3. 0.7 m
4. 0.2 m

30. ABC is an equilateral triangle with O as its centre. F_1, F_2 and F_3 represent three forces acting along the sides AB, BC and AC respectively. If the total torque about O is zero, then the magnitude of F_3 is:



1. $F_1 + F_2$
2. $F_1 - F_2$
3. $\frac{F_1+F_2}{2}$
4. $2(F + F_2)$

31.
The instantaneous angular position of a point on a rotating wheel is given by the equation,
$\theta(t) = 2t^3 - 6t^2$
The torque on the wheel becomes zero at:
1. t= 0.5 s
2. t= 0.25 s
3. t= 2 s
4. t= 1 s

32. The moment of inertia of a thin uniform rod of mass M and length L about an axis passing through its mid-point and perpendicular to its length is I_0. Its moment of inertia about an axis passing through one of its ends and perpendicular its length is:
1. $I_0 + ML^2/4$
2. $I_0 + 2ML^2$
3. $I_0 + ML^2$
4. $I_0 + ML^2/2$

33. A circular disk of a moment of inertia I_t is rotating in a horizontal plane, about its symmetric axis, with a constant angular speed ω_i. Another disk of a moment of inertia I_b is dropped coaxially onto the rotating disk. Initially, the second disk has zero angular speed. Eventually, both the disks rotate with a constant angular speed ω_f. The energy lost by the initially rotating disc due to friction is:
1. $\frac{1}{2}\frac{I_b^2}{(I_t+I_b)}\omega_i^2$
2. $\frac{1}{2}\frac{I_t^2}{(I_t+I_b)}\omega_i^2$
3. $\frac{1}{2}\frac{I_b-I_t}{(I_t+I_b)}\omega_i^2$

34. A ball moving with velocity 2 ms^{-1} collides head-on with another stationary ball of double the mass. If the coefficient of restitution is 0.5, then their velocities (in ms^{-1}) after the collision will be:
1. 0, 1
2. 1, 1
3. 1, 0.5
4. 0, 2

35. Two particles that are initially at rest, move towards each other under the action of their mutual attraction. If their speeds are v and 2v at any instant, then the speed of the centre of mass of the system will be:
1. 2v
2. 0
3. 1.5v
4. v

36. A man of 50 kg mass is standing in a gravity-free space at a height of 10 m above the floor. He throws a stone of 0.5 kg mass downwards with a speed of 2 ms^{-1}. When the stone reaches the floor, the distance of the man above the floor will be:
1. 9.9 m
2. 10.1 m
3. 10 m
4. 20 m

37.
If $\vec{F}$ is the force acting on a particle having position vector $\vec{r}$ and $\vec{\tau}$ be the torque of this force about the origin, then:
1. $\vec{r}\cdot\vec{\tau} \neq 0$ and $\vec{F}\cdot\vec{\tau} = 0$
2. $\vec{r}\cdot\vec{\tau} > 0$ and $\vec{F}\cdot\vec{\tau} < 0$
3. $\vec{r}\cdot\vec{\tau} = 0$ and $\vec{F}\cdot\vec{\tau} = 0$
4. $\vec{r}\cdot\vec{\tau} = 0$ and $\vec{F}\cdot\vec{\tau} \neq 0$

38. A thin circular ring of mass M and radius R is rotating in a horizontal plane about an axis vertical to its plane with a constant angular velocity ω. If two objects each of mass m be attached gently to the opposite ends of a diameter of the ring, the ring will then rotate with an angular velocity:
1. $\frac{\omega(M-2m)}{M+2m}$
2. $\frac{\omega M}{M+2m}$
3. $\frac{\omega(M+2m)}{M}$
4. $\frac{\omega M}{M+m}$

39.
Two bodies of mass 1 kg and 3 kg have position vectors $\hat{i}+2\hat{j}+\hat{k}$ and $-3\hat{i}-2\hat{j}+\hat{k}$ respectively. The centre of mass of this system has a position vector:

1. $-2\hat{i}+2\hat{k}$
2. $-2\hat{i}-\hat{j}+\hat{k}$
3. $2\hat{i}-\hat{j}-2\hat{k}$
4. $-\hat{i}+\hat{j}+\hat{k}$

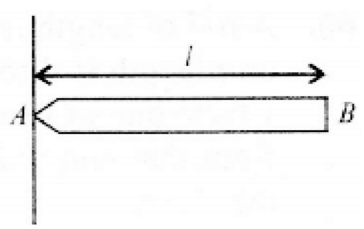
40.
Four identical thin rods each of mass M and length l form a square frame. The moment of inertia of this frame about an axis through the centre of the square and perpendicular to its plane is:
1. $\frac{4}{3}Ml^2$
2. $\frac{2}{3}Ml^2$
3. $\frac{13}{3}Ml^2$
4. $\frac{1}{3}Ml^2$

41. The ratio of the radii of gyration of a circular disc to that of a circular ring, each of the same mass and radius, around their respective axes is:
1. $\sqrt{3} : \sqrt{2}$
2. $1 : \sqrt{2}$
3. $\sqrt{2} : 1$
4. $\sqrt{2} : \sqrt{3}$

42. A thin rod of length L and mass M is bent at its midpoint into two halves so that the angle between them is 90^o. The moment of inertia of the bent rod about an axis passing through the bending point and perpendicular to the plane defined by the two halves of the rod is:
1. $\frac{ML^2}{24}$
2. $\frac{ML^2}{12}$
3. $\frac{ML^2}{6}$
4. $\frac{\sqrt{2}ML^2}{24}$

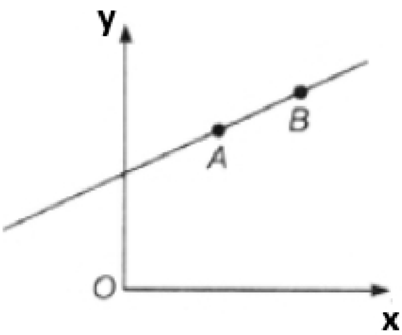
43. A wheel has an angular acceleration of 3.0 rad/s^2 and an initial angular speed of 2.00 rad/s. In a time of 2 s, it has rotated through an angle (in radian) of:
1. 6
2. 10
3. 12
4. 4

44. A uniform rod AB of length l and mass m is free to rotate about point A. The rod is released from rest in the horizontal position. Given that the moment of inertia of the rod about A is $\frac{ml^2}{3}$, the initial angular acceleration of the rod will be:



1. $\frac{2g}{3l}$
2. mgl/2
3. $\frac{3}{2}g * l$
4. $\frac{3g}{2l}$

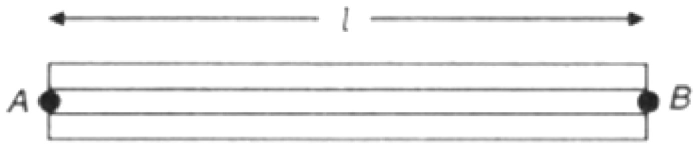
45. A particle of mass m moves in the XY plane with a velocity v along the straight line AB. If the angular momentum of the particle with respect to origin O is L_A when it is at A and L_B when it is at B, then:



1. $L_A > L_B$
2. $L_A = L_B$
3. the relationship between L_A and L_B depends upon the slope of the line AB
4. $L_A < L_B$

46. The moment of inertia of a uniform circular disc of radius R and mass M about an axis touching the disc at its diameter and normal to the disc is:
1. MR^2
2. $\frac{2}{5}MR^2$
3. $\frac{3}{2}MR^2$
4. $\frac{1}{2}MR^2$

47. A uniform rod of length l and mass M is free to rotate in a vertical plane about A. The rod initially in the horizontal position is released. The initial angular acceleration of the rod is: (Moment of inertia of the rod about A is $\frac{Ml^2}{3}$)



1. $\frac{3g}{2l}$
2. $\frac{2l}{3g}$
3. $\frac{3g}{2l^2}$
4. $mg\frac{1}{2}$

48. Body A of mass 4m moving with speed u collides with another body B of mass 2m at rest. The collision is head-on and elastic in nature. After the collision, the fraction of energy lost by the colliding body A is:
1. $\frac{5}{9}$
2. $\frac{1}{9}$
3. $\frac{8}{9}$
4. $\frac{4}{9}$

49. A solid cylinder of mass 2 kg and radius 4 cm is rotating about its axis at the rate of 3 rpm. The torque required to stop after 2π revolutions is:
1. $2 \times 10^6\ N\,m$
2. $2 \times 10^{-6}\ N\,m$
3. $2 \times 10^{-3}\ N\,m$
4. $12 \times 10^{-4}\ N\,m$

50. An object flying in the air with velocity $\left(20\hat{i} + 25\hat{j} - 12\hat{k}\right)$ suddenly breaks into two pieces whose masses are in the ratio of 1:5. The smaller mass flies off with a velocity $\left(100\hat{i} + 35\hat{j} + 8\hat{k}\right)$. The velocity of the larger piece will be:
1. $4\hat{i} + 23\hat{j} - 16\hat{k}$
2. $-100\hat{i} - 35\hat{j} - 8\hat{k}$
3. $20\hat{i} + 15\hat{j} - 80\hat{k}$
4. $-20\hat{i} - 15\hat{j} - 80\hat{k}$

51. A particle of mass 5m at rest suddenly breaks on its own into three fragments. Two fragments of mass m each move along with mutually perpendicular directions with speed v each. The energy released during the process is,
(1) $\frac{3}{5}mv^2$
(2) $\frac{5}{3}mv^2$
(3) $\frac{3}{3}mv^2$
(4) $\frac{4}{3}mv^2$

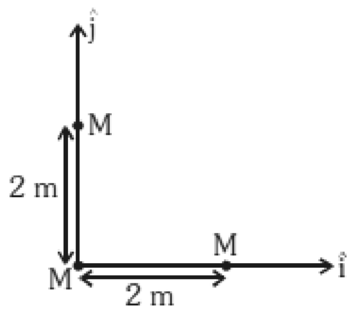
52. A solid cylinder of mass 2 kg and radius 50 cm rolls up an inclined plane of the angle of inclination 30°. The centre of mass of the cylinder has a speed of 4 m/s. The distance travelled by the cylinder on the inclined surface will be, $[take\ g = \ 10\ m/s^2]$
1. 2.2 m
2. 1.6 m
3. 1.2 m
4. 2.4 m

53. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1m with negligible mass. The centre of mass of the system from the 5 kg particle is nearly at a distance of :
1. 50 cm
2. 67 cm
3. 80 cm
4. 33 cm

54. Find the torque about the origin when a force $3\hat{j}$ N acts on a particle whose position vector $2\hat{k}$ m.
1. $6\hat{j}$ N m
2. $-6\hat{i}$ N m
3. $6\hat{k}$ N m
4. $6\hat{i}$ N m

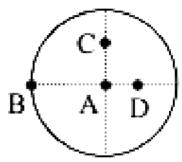
55. The angular speed of the wheel of a vehicle is increased from 360 rpm to 1200 rpm in 14 seconds. Its angular acceleration is:
1. $2\pi\ rad/s^2$
2. $28\pi\ rad/s^2$
3. $120\pi\ rad/s^2$
4. $1\ rad/s^2$

56. Three identical spheres, each of mass M, are placed at the corners of a right-angle triangle with mutually perpendicular sides equal to 2 m (see figure). Taking the point of intersection of the two mutually perpendicular sides as the origin, find the position vector of the centre of mass.



1. $2\left(\hat{i}+\hat{j}\right)$
2. $\left(\hat{i}+\hat{j}\right)$
3. $\frac{2}{3}\left(\hat{i}+\hat{j}\right)$
4. $\frac{4}{3}\left(\hat{i}+\hat{j}\right)$

57. The moment of inertia of a uniform circular disc is maximum about an axis perpendicular to the disc and passing through -



1. C
2. D
3. A
4. B

58. A circular platform is mounted on a frictionless vertical axle. Its radius R = 2m and its moment of intertia about the axle is 200 $kg\ m^2$. It is initially at rest. A 50 kg man stands on the edge of the platform and begins to walk along the edge at the speed of 1 ms^{-1} relative to the ground. Time taken by the man to complete one revolution is -
1. $\frac{3\pi}{2}s$
2. $2\pi\ s$
3. $\frac{\pi}{2}s$
4. $\pi\ s$

59. Three masses are placed on the x-axis : 300 g at origin, 500 g at x = 40 cm and 400 g at x = 70 cm. The distance of the centre of mass from the origin is -
1. 45 cm
2. 50 cm
3. 30 cm
4. 40 cm

60. A thin circular ring of mass M and radius r is rotating about its axis with constant angular velocity ω. Two objects each of mass m are attached gently to the opposite ends of a diameter of the ring. The ring now rotates with angular velocity given by -
1. $\frac{2M\omega}{M+2m}$
2. $\frac{(M+2m)\omega}{M}$
3. $\frac{M\omega}{M+2m}$
4. $\frac{(M+2m)\omega}{2m}$

61. From a circular disc of radius R and mass 9M, a small disc of mass M and radius R / 3 is removed concentrically. The moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through its centre is -
1. MR^2
2. $4MR^2$
3. $\frac{4}{9}MR^2$
4. $\frac{40}{9}MR^2$

62. A solid cylinder and a hollow cylinder both of the same mass and same external diameter are released from the same height at the same time on an inclined plane. Both roll down without slipping. Which one will reach the bottom first-
1. Both together
2. Hollow cylinder
3. Solid cylinder
4. Both together only when angle of inclination of plane is 45°

63. (a) Centre of gravity (C, G) of a body is the point at which the weight of the body acts.
(b) Centre of mass coincides with the centre of gravity if the eath is assumed to have
infinitely large radius.
(c) To evaluate the gravitational field intensity due to any body at an external point, the entire mass of the body can be considered to be concentrated at its C.G.
(d) The radius of gyration of any body rotation about an axis is the length of the
perpendicular dropped from the C.G. of the body to the axis.
Which one of the following pairs of statements is correct -
1. (a) and (b)
2. (b) and (c)
3. (c) and (d)
4. (d) and (a)

64. A circular ring of mass M and radius R is rotating about its axis with constant angular velocity ω. Two particle each of mass m are attached gently to the opposite ends of a diameter of the ting. The angular velocity of the ring will now become :
1. $\frac{m\omega}{M+2m}$
2. $\frac{m\omega}{M-2m}$
3. $\frac{M\omega}{M+2m}$
4. $\frac{M+2m}{M\omega}$

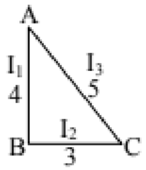
65. For a hollow cylinder & a solid cylinder rolling without slipping on an inclined plane, then which of these reaches earlier on the ground :
1. Solid cylinder
2. Hollow cylinder
3. Both simultaneously
4. Can't say anything

66. Two identical balls A and B are moving with velocity $+0.5\, ms^{-1}$ and $-0.3\, ms^{-1}$ respectively. They collide head on elastically, then their velocities after collision will be :
1. $-0.3\, ms^{-1}\; and\; 0.5\, ms^{-1}$
2. $+0.5\, ms^{-1}\; and\; +\; 0.3\, ms^{-1}$
3. $-0.4\, ms^{-1}\; and\; 0.3\, ms^{-1}$
4. $-0.3\, ms^{-1}\; and\; -0.4\, ms^{-1}$

67. A bomb of mass 30kg at rest explodes into two pieces of masses 18 kg and 12 kg. The velocity of 18kg mass is $6ms^{-1}$. The kinetic energy of the other mass is :
(1) 524 J
(2) 256 J
(3) 486 J
(4) 324 J

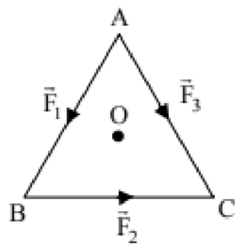
68. The moment of inertia of a uniform circular disc of radius 'R' and mass 'M' about an axis passing from the edge of the disc and normal to the disc is:
1. $\frac{1}{2}MR^2$
2. $\frac{7}{2}MR^2$
3. $\frac{3}{2}MR^2$
4. MR^2

69. For the adjoining diagram, a triangular lamina is shown the correct relation between I_1, I_2 & I_3 is (I – moment of inertia)



1. $I_1 > I_2$
2. $I_2 > I_1$
3. $I_3 > I_1$
4. $I_3 > I_2$

70. O is the centre of an equilateral triangle ABC $\vec{F}_1$, $\vec{F}_2$, $\vec{F}_3$ are three forces acting along the sides AB, BC and AC as shown in fig. What should be the magnitude of $\vec{F_3}$ so that total torque about O is zero :



1. $\left|\vec{F}_3\right| = \left|\vec{F_1}\right| + \left|\vec{F_2}\right|$
2. $\left|\vec{F_3}\right| = \left|\vec{F_1}\right| - \left|\vec{F_2}\right|$
3. $\left|\vec{F_3}\right| = \vec{F_1} + 2\vec{F_2}$
4. Not possible

71. A drum of radius R and mass M rolls down without slipping along an inclined plane of angle θ. The frictional force:
(1) Decreases the rotational and translational motion
(2) Dissipates energy as heat
(3) Decreases the rotational motion
(4) Converts translational energy to rotational energy

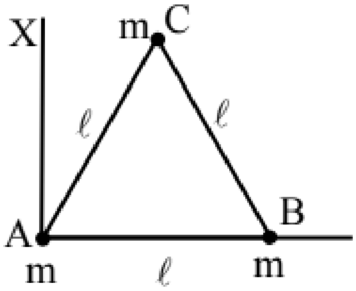
72. Two bodies have their moments of inertia I and 2I respectively about their axis of rotation. If their kinetic energies of rotation are equal, their angular momentum will be in the ratio -
(1) 1 : 2
(2) $\sqrt{2}$:1
(3) 1: $\sqrt{2}$
(4) 2 : 1

73. A particle is projected with velocity 'u' makes an angle θ w.r.t. horizontal. Now it breaks in two identical parts at highest point of trajectory. If one part is retrace its path, then velocity of other part is -
1. 3u cos θ
2. 2u cos θ
3. u cos θ
4. u

74. The ratio of the radii of gyration of a circular disc about a tangential axis in the plane of the disc and of a circular ring of the same radius about a tangential axis in the plane of the ring is:-
(1) 2 : 1
(2) $\sqrt{5}$: $\sqrt{6}$
(3) 2 : 3
(4) 1 : $\sqrt{2}$

75. A round disc of the moment of inertia I_2 about its axis perpendicular to its plane and passing through its centre is placed over another disc of the moment of inertia I_1 rotating with an angular velocity ω about the same axis. The final angular velocity of the combination of discs is:
(1) ω
(2) $\frac{I_1\omega}{I_1+I_2}$
(3) $\frac{(I_1+I_2)\omega}{I_1}$
(4) $\frac{I_2\omega}{I_1+I_2}$

76. Three particles, each of mass m gram, are situated at the vertices of an equilateral triangle ABC of side l cm (as shown in the figure). The moment of inertia of the system about a line AX perpendicular to AB and in the plane of ABC, in gram cm^2 units will be:



(1) $2\ m\ell^2$
(2) $\frac{5}{4}\ m\ell^2$
(3) $\frac{3}{2}\ m\ell^2$
(4) $\frac{3}{4}\ m\ell^2$

77. A wheel having a moment of inertia of 2 kg–m^2 about its vertical axis rotates at the rate of 60 rpm about the axis. The torque which can stop the wheel's rotation in one minute would be:
(1) $\frac{\pi}{12}\ N-m$
(2) $\frac{\pi}{15}\ N-m$
(3) $\frac{\pi}{18}\ N-m$
(4) $\frac{2\pi}{15}\ N-m$

78. Consider a system of two particles having masses m_1 and m_2. If the particle of mass m_1 is pushed towards the mass centre of particles through a distance 'd', by what distance would the particle of mass m_2 move so as to keep the mass centre of particles at the original position:
1. $\frac{m_1}{m_2}\ d$
2. d
3. $\frac{m_2}{m_1}$
4. $\frac{m_1}{m_1+m_2}\ d$

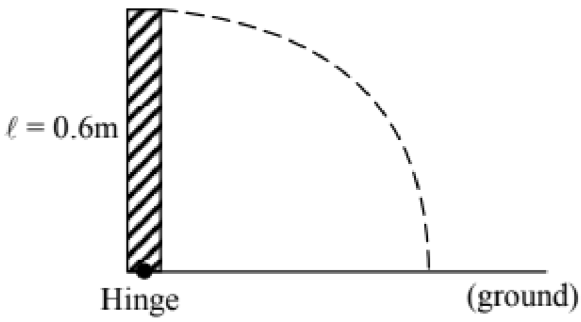
79. A circular disc is to be made by using iron and aluminium so that it acquires maximum moment of inertia about geometrical axis. It is possible with : -
(1) Aluminium at interior and iron surrounding it
(2) Iron at interior and aluminium surrounding it
(3) Using iron and aluminium layers in alternate order
(4) Sheet of iron is used at both external surface ands aluminium sheet as internal layer

80. A disc is rotating with angular speed ω. If a child sits on it, what is conserved : -
(1) Linear momentum
(2) Angular momentum
(3) Kinetic energy
(4) Potential energy

81. A solid sphere of radius R is placed on a smooth horizontal surface. A horizontal force 'F' is applied at height 'h' from the lowest point. For the maximum acceleration of the centre of mass, which is correct:
(1) h = R
(2) h = 2R
(3) h = 0
(4) No relation between h and R

82. For a body, angular velocity $\vec{\omega} = \hat{i} - 2\hat{j} + 3\hat{k}$ and radius vector is $\vec{r} = \hat{i} + \hat{j} + \hat{k}$, then its velocity is :
1. $-5\hat{i} + 2\hat{j} + 3\hat{k}$
2. $-5\hat{i} + 2\hat{j} - 3\hat{k}$
3. $-5\hat{i} - 2\hat{j} + 3\hat{k}$
4. $-5\hat{i} - 2\hat{j} - 3\hat{k}$

83. When a stick is released (as shown in fig.). Its free end velocity when it strikes the ground is :



(1) 4.2 m/s
(2) 1.4 m/s
(3) 2.8 m/s
(4) $\sqrt{6}$ m/s

84. A point P consThus for the disc the condition for rolling without slipping is ider at contact point of a wheel on ground which rolls on ground without sliping then value of displacement of point P when wheel completes half of rotation (If radius of wheel is 1m) : -
(1) 2m
(2) $\sqrt{\pi^2 + 4}$ m
(3) π m
(4) $\sqrt{\pi^2 + 2}$ m

85. A rod of length is 3m and its mass acting per unit length is driectly proportional to distance x from one of its end then its centre of gravity from that end will be at : -
(1) 1.5 m
(2) 2 m
(3) 2.5 m
(4) 3.0 m

86. A thin circular ring M and radius 'r' is rotating about its axis with a constant angular velocity ω. Four objects each of mass m, are kept gently to the opposite ends of two perpendicular diameters of the ring. The angular velocity of the ring will be -
1. $\frac{M\omega}{4m}$
2. $\frac{M\omega}{M+4m}$
3. $\frac{(M+4m)\omega}{M}$
4. $\frac{(M+4m)\omega}{M+4m}$

87. A stationary particle explodes into two particles of masses m_1 and m_2 which move in opposite directions with velocities v_1 and v_2. The ratio of their kinetic energies E_1/E2 is :
(1) m_2/m_1
(2) m_1/m_2
(3) 1
(4) m_1v_2/m_2v_1

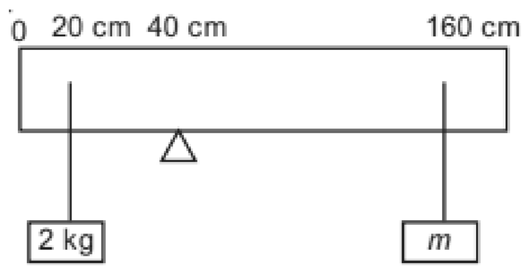
88. A solid cylinder of mass M and radius R rolls without slipping down an inclined plane of length L and height h. What is the speed of its centre of mass when the cylinder reaches its bottom -
1. $\sqrt{2gh}$
2. $\sqrt{\frac{3}{4}gh}$
3. $\sqrt{\frac{4}{3}gh}$
4. $\sqrt{4gh}$

89. A ball rolls without slipping. The radius of gyration of the ball about an axis passing through its centre of mass is K. If radius of the ball be R, then the fraction of total energy associated with its rotational energy will be :
1. $\frac{K^2+R^2}{R^2}$
2. $\frac{K^2}{R^2}$
3. $\frac{K^2}{K^2+R^2}$
4. $\frac{R^2}{K^2+R^2}$

90. A disc is rolling the velocity of its centre of mass is V_{cm} then which one will be correct : -
1. The velocity of highest point is $2V_{cm}$ and point of contact is zero
2. The velocity of highest point is V_{cm} and point of contact is V_{cm}
3. The velocity of highest point is 2 V_{cm} and point of contact is V_{cm}
4. The velocity of highest point is 2 V_{cm} and point of contact of contact is $2V_{cm}$

91. From a circular ring of mass 'M' and radius 'R' an arc corresponding to a 90° sector is removed. The moment of inertia of the remaining part of the ring about an axis passing through the centre of the ring and perpendicular to the plane of the ring is 'K' times 'MR^2'. Then the value of 'K' is:
1. $\frac{1}{4}$
2. $\frac{1}{8}$
3. $\frac{3}{4}$
4. $\frac{7}{8}$

92. A uniform rod of length 200 cm and mass 500 g is balanced on a wedge placed at 40 cm mark. A mass of 2 kg is suspended from the rod at 20 cm and another unknown mass 'm' is suspended from the rod at 160 cm mark as shown in the figure. Find the value of 'm' such that the rod is in equilibrium. ($g=10\ m/s^2$)



1. $\frac{1}{6}$ kg
2. $\frac{1}{12}$ kg
3. $\frac{1}{2}$ kg
4. $\frac{1}{3}$ kg

Fill OMR Sheet*

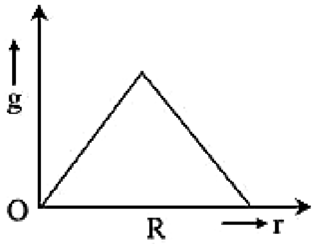
*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

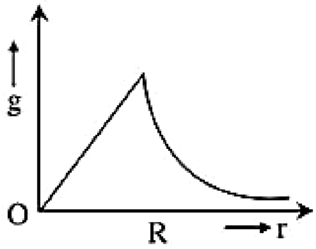
Gravitation

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Acceleration due to Gravity	14
Escape velocity	9
Satellite	7
Kepler's Laws	5
Gravitational Potential	4
Newton's Law of Gravitation	4
Gravitational Field	3
Orbital velocity	2

1. Starting from the centre of the earth having radius R, the variation of g (acceleration due to gravity) is shown by:

1.


2.


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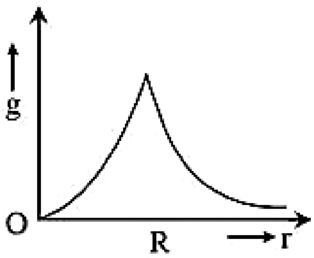

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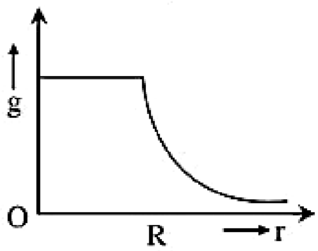


2. A satellite of mass m is orbiting the earth (of radius R) at a height h from its surface. The total energy of the satellite in terms of g_0, the value of acceleration due to gravity at the earth's surface, is:

1. $\frac{mg_0R^2}{2(R+h)}$
2. $-\frac{mg_0R^2}{2(R+h)}$
3. $\frac{2mg_0R^2}{(R+h)}$
4. $-\frac{2mg_0R^2}{(R+h)}$

3. The acceleration due to gravity at a height 1 km above the earth's surface is the same as at a depth d below the surface of the earth. Then:

1. $\mathrm{d} = 1\ \mathrm{Km}$
2. $\mathrm{d} = \frac{3}{2}\ \mathrm{Km}$
3. $\mathrm{d} = 2\ \mathrm{Km}$
4. $\mathrm{d} = \frac{1}{2}\ \mathrm{Km}$

4. Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will:

1. move towards each other.
2. move away from each other.
3. become stationary.
4. keep floating at the same distance between them.

5. At what temperature will the RMS speed of oxygen molecules become just sufficient for escaping from the earth's atmosphere?

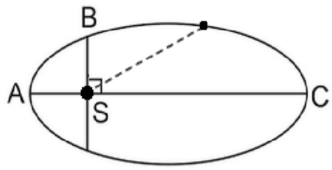
(Given : Mass of oxygen molecule (m) = 2.76×10^{-26} kg, Boltzmann's constant $k_B = 1.38 \times 10^{-23}\ \mathrm{J\,K^{-1}}$):

1. $2.508 \times 10^4\ K$
2. $8.360 \times 10^4\ K$
3. $5.016 \times 10^4\ K$
4. $1.254 \times 10^4\ K$

6. If mass of the Sun were ten times smaller and the universal gravitational constant were ten times larger in magnitude, which of the following is not correct?

1. Raindrops would drop faster.
2. walking on the ground would become more difficult.
3. Time period of a simple pendulum on the Earth would decrease.
4. 'g' on earth would not change.

7. The kinetic energies of a planet in an elliptical orbit around the Sun, at positions A, B and C are K_A, K_B and K_C respectively. AC is the major axis and SB is perpendicular to AC at the position of the Sun S as shown in the figure. Then:



1. $K_A < K_B < K_C$
2. $K_A > K_B > K_C$
3. $K_B < K_A < K_C$
4. $K_B > K_A > K_C$

8.
At what height from the surface of the earth, the gravitation potential and the value of g are: $5.4 \times 10^7\ \mathrm{Jkg^{-2}}$ and $6.0\ \mathrm{ms^{-2}}$ respectively? (Take, the radius of earth as 6400 km)

1. 1600 Km
2. 1400 km
3. 2000 km
4. 2600 km

9.
The ratio of escape velocity at earth (v_e) to the escape velocity at a planet (v_p) whose radius and mean density are twice that of the earth is:
1. $1:2\sqrt{2}$
2. 1:4
3. $1:\sqrt{2}$
4. 1:2

10. A remote sensing satellite of earth revolves in a circular orbit at a height of 0.25×10^6m above the surface of the earth. If Earth's radius is 6.38×10^6 m and g= 9.8 ms^{-2}, then the orbital speed of the satellite is:
1. 7.76 kms^{-1}
2. 8.56 kms^{-1}
3. 9.13 kms^{-1}
4. 6.67 kms^{-1}

11. A satellite S is moving in an elliptical orbit around the earth. The mass of the satellite is very small as compared to the mass of the earth. Then,
1. The angular momentum of S about the centre of the earth changes in direction, but its magnitude remains constant.
2. The total mechanical energy of S varies periodically with time.
3. The linear momentum of S remains constant in magnitude.
4. The acceleration of S is always directed towards the centre of the earth.

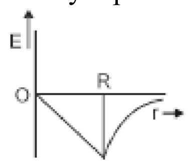
12.

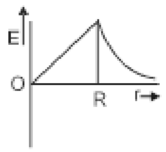
Kepler's third law states that square of the period of revolution (T) of a planet around the sun, is proportional to the third power of average distance r between the sun and planet i.e. $T^2= Kr^3$, here K is constant. If the masses of the sun and planet are M and m respectively, then as per Newton's law of gravitation, the force of attraction between them is $F = \frac{GMm}{r^2}$, here G is gravitational constant. The relation between G and K is described as:
1. $GK = 4\pi^2$
2. $GMK = 4\pi^2$
3. $K = G$
4. $K = \frac{I}{G}$

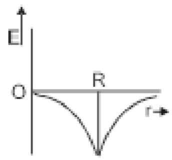
13. Two spherical bodies of masses M and 5M and radii R and 2R are released in free space with initial separation between their centres equal to 12 R. If they attract each other due to gravitational force only, then the distance covered by the smaller body before the collision is:
1. 2.5 R
2. 4.5 R
3. 7.5 R
4. 1.5 R

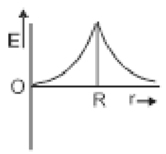
14. A black hole is an object whose gravitational field is so strong that even light cannot escape from it. To what approximate radius would earth (mass = 5.98×10^{24} kg) have to be compressed to be a black hole?
1. $10^{-9}m$
2. $10^{-6}m$
3. $10^{-2}m$
4. 100m

15. Dependence of intensity of gravitational field (E) of the earth with distance (r) from the centre of the earth is correctly represented by:

1. 

2. 

3. 

4. 

16. A body of mass 'm' is taken from the Earth's surface to the height equal to twice the radius (R) of the Earth. The change in potential energy of the body will be:
1. 2/3mgR
2. 3mgR
3. 1/3mgR
4. 2mgR

17.
An infinite number of bodies, each of mass 2 kg are situated on the x-axis at distances 1m, 2m, 4m, 8m, ... respectively, from the origin. The resulting gravitational potential due to this system at the origin will be :
1. $-\frac{8}{3}G$
2. $-\frac{4}{3}G$
3. –4G
4. –G

18. The height at which the weight of a body becomes $1/16^{th}$ of its weight on the surface of the earth (radius R) is:
1. 5 R
2. 15 R
3. 3 R
4. 4 R

19. A spherical planet has a mass M_p and diameter D_p. A particle of mass m falling freely near the surface of this planet will experience acceleration due to gravity equal to:
1. $\frac{4\,GM_p\,m}{{D_p}^2}$
2. $\frac{4\,GM_p}{{D_p}^2}$
3. $\frac{GM_p\,m}{{D_p}^2}$
4. $\frac{GM_p}{{D_p}^2}$

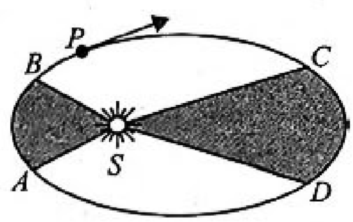
20. A geostationary satellite is orbiting the earth at a height of 5R above that surface of the earth, R being the radius of the earth. The time period of another satellite in hours at a height of 2R from the surface of the earth is
1. 5
2. 10
3. $6\sqrt{2}$
4. $6/\sqrt{2}$

21. A planet moving along an elliptical orbit is closest to the sun at a distance r_1 and farthest away at a distance of r_2. If v_1 and v_2 are the linear velocities at these points respectively, then the ratio $\frac{v_1}{v_2}$ is:
1. r_2/r_1
2. $(r_2/r_1)^2$
3. r_1/r_2
4. $(r_1/r_2)^2$

22. The radii of circular orbits of two satellites A and B of the earth are 4R and R respectively. If the speed of satellite A is 3v, then the speed of satellite B will be:
1. 3v/4
2. 6v
3. 12v
4. 3v/2

23. A particle of mass M is situated at the centre of a spherical shell of same mass and radius a. The gravitational potential at a point situated at a / 2 distance from the centre, will be:
1. $-\frac{3GM}{a}$
2. $-\frac{2GM}{a}$
3. $-\frac{GM}{a}$
4. $-\frac{4GM}{a}$

24. The figure shows the elliptical orbit of a planet m about the sun S. The shaded area SCD is twice the shaded area SAB. If t_1 is the time for the planet to move from C to D and t_2 is the time to move from A to B, then,



1. $t_1 > t_2$
2. $t_1 = 4t_2$
3. $t_1 = 2t_2$
4. $t_1 = t_2$

25. Two satellites of earth, S_1 and S_2, are moving in the same orbit. The mass of S_1 is four times the mass of S_2. Which one of the following statements is true?
1. The time period of S_1 is four times that of S_2.
2. The potential energies of the earth and satellite in the two cases are equal.
3. S_1 and S_2 are moving at the same speed.
4. The kinetic energies of the two satellites are equal.

26. The earth is assumed to be a sphere of radius R. A platform is arranged at a height R from the surface of the earth. The escape velocity of a body from this platform is fv_e, where v_e is its escape velocity from the surface of the earth. The value of f is :
1. $\sqrt{2}$
2. $\frac{1}{\sqrt{2}}$
3. $\frac{1}{3}$
4. $\frac{1}{2}$

27. The work done to raise a mass m from the surface of the earth to a height h, which is equal to the radius of the earth, is:
1. $\frac{3}{2}mgR$
2. mgR
3. 2mgR
4. $\frac{1}{2}mgR$

28. A body weighs 200 N on the surface of earth. How much will it weigh halfway down the centre of the earth?
1. 100 N
2. 150 N
3. 200 N
4. 250 N

29. A mass falls from a height 'h' and its time of fall 't' is recorded in terms of time period T of a simple pendulum. On the surface of the earth, it is found that t=2T. The entire set up is taken on the surface of another planet whose mass is half of that of the earth and radius is same. The same experiment is repeated and corresponding times noted as t' and T'. Then we can say:
1. t' = $\sqrt{2}T$
2. t' > 2T'
3. t' < 2T'
4. t' = 2T'

30. The time period of a geostationary satellite is 24 h at a height $6R_E$ (R_E is the radius of the earth) from the surface of the earth. The time period of another satellite whose height is $2.5R_E$ from the surface, will be:
1. $6\sqrt{2}h$
2. $12\sqrt{2}h$
3. $\frac{24}{2.5}h$
4. $\frac{12}{2.5}h$

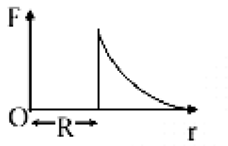
31. Assuming that the gravitational potential energy of an object at infinity is zero, the change in potential energy (final - initial) of an object of mass m when taken to a height h from the surface of the earth (of radius R and mass M), is given by:
1. $\frac{GMm}{R+h}$
2. $\frac{GMmh}{R(R+h)}$
3. mgh
4. $\frac{GMm}{R+h}$

32. A body weighs 72 N on the surface of the earth. What is the gravitational force on it at a height equal to half the radius of the earth?
1. 32 N
2. 30 N
3. 24 N
4. 48 N

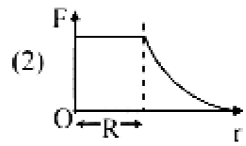
33. What is the depth at which the value of acceleration due to gravity becomes 1/nth time it's value at the surface of the earth? (radius of the earth = R)
1. $\frac{R}{n^2}$
2. $\frac{R(n-1)}{n}$
3. $\frac{Rn}{(n-1)}$
4. R/n

34. If v_e is the escape velocity and v_o is the orbital velocity of a satellite for orbit close to the earth's surface, then these are related by:
1. $v_o = v_e$
2. $v_e = \sqrt{2v_o}$
3. $v_e = \sqrt{2}\,v_o$
4. $v_o = \sqrt{2}\,v_e$

35. Which one of the following plots represents the variation of gravitational field on a particle with distance r due to a thin spherical shell of radius R ? (r is measured from the centre of the spherical shell).



1.



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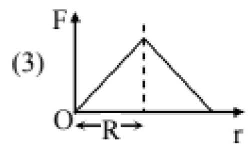

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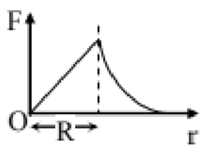
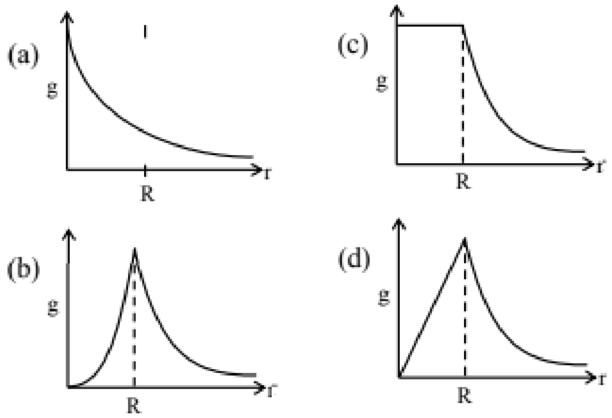


4.

36. A particle of mass m is thrown upwards from the surface of the earth, with a velocity u. The mass and the radius of the earth are, respectively, M and R. G is gravitational constant and g is acceleration due to gravity on the surface of the earth. The minimum value of u so that the particle does not return back to earth is :
1. $\sqrt{\frac{2GM}{R^2}}$
2. $\sqrt{\frac{2GM}{R}}$
3. $\sqrt{\frac{2gM}{R^2}}$
4. $\sqrt{2gR^2}$

37. A particle of mass M is situated at the center of a spherical shell of same mass and radius a. The magnitude of the gravitational potential at a point situated at a/2 distance from the center, will be :
1. $-\frac{GM}{a}$
2. $-\frac{2GM}{a}$
3. $-\frac{3GM}{a}$
4. $-\frac{4GM}{a}$

38. The dependence of acceleration due to gravity 'g' on the distance 'r' from the centre of the earth, assumed to be a sphere of radius R of uniform density is as shown in figure below-



The correct figure is
1. a
2. b
3. c
4. d

39. The additional kinetic energy to be provided to a satellite of mass m revolving around a planet of mass M, to transfer it from a circular orbit of radius R_1 to another of radius R_2 ($R_2 > R_1$) is -
1. GmM $\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$
2. 2 GmM $\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$
3. $\frac{1}{2}GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$
4. GmM $\left(\frac{1}{R_1^2} - \frac{1}{R_2^2}\right)$

40. A body of weight 72 N moves from the surface of earth at a height half of the radius of the earth, then gravitational force exerted on it will be :
1. 36 N
2. 32 N
3. 144 N
4. 50 N

41. For a satellite moving in an orbit around the earth, the ratio of kinetic energy to potential energy is:
(1) $\frac{1}{\sqrt{2}}$
(2) 2
(3) $\sqrt{2}$
(4) $\frac{1}{2}$

42. Imagine a new planet having the same density as that of the earth but it is 3 times bigger than the earth in size. If the acceleration due to gravity on the surface of the earth is g and that on the surface of the new planet is 'g', then -
(1) g' = 3g
(2) g' = 9g
(3) g' = g/9
(4) g' = 27g

43. For a planet having mass equal to mass of the earth but radius equal to one fourth of radius of the earth. Then escape velocity for this planet will be:
1. 11.2 km/s
2. 22.4 km/s
3. 5.6 km/s
4. 44.8 km/s

44. The density of the newly discovered planet is twice that of the earth. The acceleration due to gravity at the surface of the planet is equal to that at the surface of the earth. If the radius of the earth is R, the radius of the planet would be:
(1) 4R
(2) ¼ R
(3) ½ R
(4) 2R

45. If the radius of earth shrinks by 1% then for acceleration due to gravity:
1. No change at poles
2. No change at equator
3. Max. change at equator
4. Equal change at all locations

46. Rohini satellite is at a height of 500 km and Insat-B is at a height of 3600 km from the surface of the earth. The relation between their orbital velocity (v_R, v_i) is :
1. $v_R > v_i$
2. $v_R < v_i$
3. $v_R = v_i$
4. No relation

47. For moon, its mass is 1/81 of Earth's mass and its diameter is 1/3.7 of Earth's diameter. If acceleration due to gravity at Earth's surface is 9.8 m/s^2 then at the moon its value is :
1. 2.86 m/s^2
2. 1.65 m/s^2
3. 8.65 m/s^2
4. 5.16 m/s^2

48. A body of mass m is placed on earth surface which is taken from earth surface to a height of h = 3R then change in gravitational potential energy is : -
1. $\frac{mgR}{4}$
2. $\frac{2}{3}mgR$
3. $\frac{3}{4}mgR$
4. $\frac{mgR}{2}$

49. With what velocity should a particle be projected so that its height becomes equal to the radius of the earth:
1. $\left(\frac{GM}{R}\right)^{1/2}$
2. $\left(\frac{8GM}{R}\right)^{1/2}$
3. $\left(\frac{2GM}{R}\right)^{1/2}$
4. $\left(\frac{4GM}{R}\right)^{1/2}$

50. The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on planet B. A man jumps to a height of 2m on the surface of A. What is the height of jump by the same person on the planet B.
(1) 2/9 m
(2) 18 m
(3) 6 m
(4) 2/3 m

51. Two spheres of masses m and M are situated in air and the gravitational force between them is F. If the space around the masses is filled with a liquid of specific density 3, the gravitational force will become :
(1) 3F
(2) F
(3) F/3
(4) F/9

52. The escape velocity from the Earth's surface is v. The escape velocity from the surface of another planet having a radius, four times that of Earth and same mass density is:
1. 3v
2. 4v
3. v
4. 2v

53. A particle of mass 'm' is projected with a velocity $v = kV_e$ $(k < 1)$ from the surface of the earth.
$(V_e = \text{escape velocity})$
The maximum height above the surface reached by the particle is:
1. $\frac{R^2k}{1+k}$
2. $\frac{Rk^2}{1-k^2}$
3. $R\left(\frac{k}{1-k}\right)^2$
4. $R\left(\frac{k}{1+k}\right)^2$

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Mechanical Properties of Solids

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Elasticity	5
Stress - Strain Curve	2

1. Two wires are made of the same material and have the same volume. The first wire has cross-sectional area A and the second wire has cross-sectional area 3A. If the length of the first wire is increased by Δl on applying a force F, how much force is needed to stretch the second wire by the same amount?
1. 9F
2. 6F
3. 4F
4. F

2. The bulk modulus of a spherical object is 'B'. If it is subjected to uniform pressure 'P', the fractional decrease in radius is:
1. $\frac{B}{3P}$
2. $\frac{3P}{B}$
3. $\frac{P}{3B}$
4. $\frac{P}{B}$

3. The Young's modulus of steel is twice that of brass. Two wires of the same length and of the same area of cross-section, one of steel and another of brass, are suspended from the same roof. If we want the lower ends of the wires to be at the same level, then the weights added to the steel and brass wires must be in the ratio of:
1. 1:2
2. 2:1
3. 4:1
4. 1:1

4. Copper of fixed volume 'V' is drawn into a wire of length 'l'. When this wire is subjected to a constant force 'F', the extension produced in the wire is 'Δl'. Which of the following graph is a straight line?
1. Δl vs $\frac{1}{l}$
2. Δl vs l^2
3. Δl vs $\frac{1}{l^2}$
4. Δl vs l

5.
The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied?
1. length = 100 cm, diameter = 1 mm
2. length = 200 cm, diameter = 2 mm
3. length = 300 cm, diameter = 3 mm
4. length = 50 cm, diameter = 0.5 mm

6. When a block of mass M is suspended by a long wire of length L, the length of the wire becomes (L+l). The elastic potential energy stored in the extended wire is:
1. $\frac{1}{2}MgL$
2. Mgl
3. MgL

7. The stress-strain curves are drawn for two different materials X and Y. It is observed that the ultimate strength point and the fracture point are close to each other for material X but are far apart for material Y. We can say that materials X and Y are likely to be: (respectively)
1. ductile and brittle.
2. brittle and ductile.
3. brittle and plastic.
4. plastic and ductile.

8. A wire of length L, area of cross section A is hanging from a fixed support. The length of the wire changes to L_1 when mass M is suspended from its free end. The expression for Young's modulus is:
1. $\frac{Mg(L_1-L)}{AL}$
2. $\frac{MgL}{AL_1}$
3. $\frac{MgL}{A(L_1-L)}$
4. $\frac{MgL_1}{AL}$

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Mechanical Properties of Fluids

(Expected Questions in NEET 2022: 2)

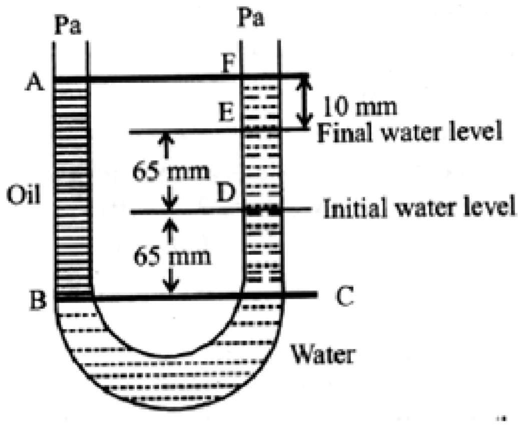
Subtopic Name	Number of Questions
Surface Tension	5
Pressure	4
Capillary Rise	3
Viscosity	3
Bernoulli's Theorem	2
Archimedes' Principle	1
Equation of Continuity	1

1. A small sphere of radius 'r' falls from rest in a viscous liquid. As a result, heat is produced due to the viscous force. The rate of production of heat when the sphere attains its terminal velocity is proportional to:
1. r^3
2. r^2
3. r^5
4. r^4

2. A rectangular film of liquid is extended from (4 cm x 2 cm) to (5 cm x 4 cm). If the work done is 3 x 10^{-4} J, the value of the surface tension of the liquid is:
1. 0.250 Nm^{-1}
2. 0.125 Nm^{-1}
3. 0.2 Nm^{-1}
4. 8.0 Nm^{-1}

3. Three liquids of densities ρ_1, ρ_2, and ρ_3 (with $\rho_1 > \rho_2 > \rho_3$) having the same value of surface tension T, rise to the same height in three identical capillaries. The angles of contact θ_1, θ_2, and θ_3 obey:
1. $\frac{\pi}{2} > \theta_1 > \theta_2 > \theta_3 \geq 0$
2. $0 \leq \theta_1 < \theta_2 < \theta_3 < \frac{\pi}{2}$
3. $\frac{\pi}{2} < \theta_1 < \theta_2 < \theta_3 < \pi$
4. $\pi > \theta_1 > \theta_2 > \theta_3 > \frac{\pi}{2}$

4.
A U-tube with both ends open to the atmosphere is partially filled with water. Oil, which is immiscible with water, is poured into one side until it stands at a distance of 10 mm above the water level on the other side. Meanwhile, the water rises by 65 mm from its original level (see diagram). The density of the oil is:



1. 425 kg m^{-3}
2. 800 Kg m^{-3}
3. 928 Kg m^{-3}
4. 650 Kg m^{-3}

5.
Two non-mixing liquids of densities ρ $and\, n\rho$ $(n > 1)$ are put in a container. The height of each liquid is h. A solid cylinder of length L and density d is put in this container. The cylinder floats with its axis vertical and length rL (r < 1) in the denser liquid. The density d is equal to:
1. $[2 + (n+1)r]\rho$
2. $[2 + (n-1)r]\rho$
3. $[1 + (n-1)r]\rho$
4. $[1 + (n+1)r]\rho$

6. The cylindrical tube of a spray pump has radius R, one end of which has n fine holes, each of radius r. If the speed of the liquid in the tube is v, the speed of the ejection of the liquid through the holes is:
1. $\frac{vR^2}{n^2r^2}$
2. $\frac{vR^2}{nr^2}$
3. $\frac{vR^2}{n^3r^2}$
4. $\frac{v^2R}{nr}$

7. Water rises to height 'h' in capillary tube. If the length of capillary tube above the surface of water is made less than 'h', then -
(1) water does not rise at all.
(2) water rises upto the tip of capillary tube and then starts overflowing like a fountain.
(3) water rises upto the top of capillary tube and stays there without overflowing.
(4) water rises upto a point a little below the top and stays there.

8. The heart of a man pumps 5 L of blood through the arteries per minute at a pressure of 150 mm of mercury. If the density of mercury be 13.6×10^3 kg $/m^3$ and g $= 10\ m/s^2$, then the power of the heart in watt is:
1. 1.70
2. 2.35
3. 3.0
4. 1.50

9. The approximate depth of an ocean is 2700 m. The compressibility of water is 45.4 x 10^{-11} Pa^{-1} and density of water is 10^3kg/m ^{3}. What fractional compression of water will be obtained at the bottom of the ocean?
1. 0.8 x 10^{-2}
2. 1.0 X 10^{-2}
3. 1.2 x 10^{-2}
4. 1.4 x 10^{-2}

10.

A wind with a speed of 40 m/s blows parallel to the roof of a house. The area of the roof is 250 m^2. Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be: ($\rho_{\text{air}} = 1.2 \text{ kg}/\text{m}^3$)
1. 4 x 10^5 N, downwards
2. 4 x 10^5 N, upwards
3. 2.4 X 10^5 N, upwards
4. 2.4 X 10^5 N, downwards

11. A certain number of spherical drops of a liquid of radius 'r' coalesce to form a single drop of radius 'R' and volume 'V'. If 'T' is the surface tension of the liquid, then:
1. Energy=4VT $\left(\frac{1}{r}-\frac{1}{R}\right)$ is released.
2. Energy=3VT $\left(\frac{1}{r}+\frac{1}{R}\right)$ is released.
3. Energy=3VT $\left(\frac{1}{r}-\frac{1}{R}\right)$ is released.
4. Energy is neither released nor absorbed.

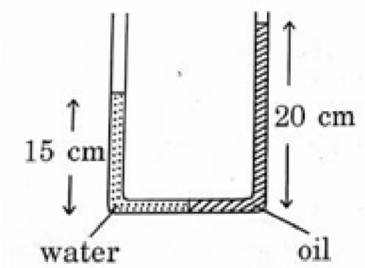
12.
The wettability of a surface by a liquid depends primarily on:
1. surface tension
2. density
3. angle of contact between the surface and the liquid
4. viscosity

13. A small hole of an area of cross-section 2 mm^2 is present near the bottom of a fully filled open tank of height 2 m. Taking g= 10 m/s^2, the rate of flow of water through the open hole would be nearly:
1. 6.4×10^{-6} m^3/s
2. 12.6×10^{-6} m^3/s
3. 8.9×10^{-6} m^3/s
4. 2.23×10^{-6} m^3/s

14. A soap bubble, having a radius of 1 mm, is blown from a detergent solution having a surface tension of $2.5 \times 10^{-2} N/m$. The pressure inside the bubble equals at a point Z_0 below the free surface of the water in a container. Taking g= 10 m/s^2, density of water = $10^3 kg/m^3$, the value of Z_0 is:
1. 0.5 cm
2. 100 cm
3. 10 cm
4. 1 cm

15. Two small spherical metal balls, having equal masses, are made from materials of densities ρ_1 *and* ρ_2 such that $\rho_1 = 8\rho_2$ and having radii of 1 mm and 2 mm, respectively. They are made to fall vertically (from rest) in a viscous medium whose coefficient of viscosity equals η and whose density is $0.1\rho_2$. The ratio of their terminal velocities would be:
1. $\frac{79}{72}$
2. $\frac{19}{36}$
3. $\frac{39}{72}$
4. $\frac{79}{36}$

16. In a U-tube, as shown in the figure, the water and oil are in the left side and right side of the tube respectively. The height for water and oil columns are 15 cm and 20 cm respectively. The density of the oil is: $[take\ \rho_{water} = 1000\ kg/m^3]$



1. 1200 kg/m^3
2. 750 kg/m^3
3. 1000 kg/m^3
4. 1333 kg/m^3

17. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of the water in the capillary is 5g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is :
1. 5.0 g
2. 10.0 g
3. 20.0 g
4. 2.5 g

18. A liquid does not wet the solid surface if the angle of contact is:
1. equal to 45°
2. equal to 60°
3. greater then 90°
4. zero

19. A barometer is constructed using a liquid (density = $760\ \mathrm{kg/m^3}$). What would be the height of the liquid column, when a mercury barometer reads 76 cm?
$\left(\text{density of mercury} = 13600\ \mathrm{kg/m^3}\right)$
1. 1.36 m
2. 13.6 m
3. 136 m
4. 0.76 m

20. The velocity of a small ball of mass M and density d, when dropped in a container filled with glycerine becomes constant after some time. If the density of glycerine is $\frac{d}{2}$, then the viscous force acting on the ball will be:
1. $\frac{3}{2}$Mg
2. 2Mg
3. $\frac{Mg}{2}$
4. Mg

Fill OMR Sheet*

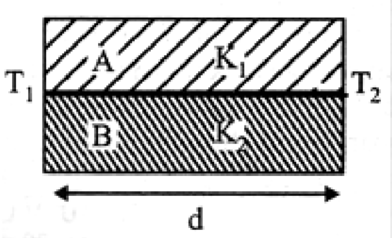
*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Thermal Properties of Matter

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Conduction	11
Wien's Displacement Law	8
Stefan-Boltzmann Law	7
Radiation	6
Calorimetry	4
Newton's Law of Cooling	4
Thermal Expansion	3
Convection	2
Temperature Scales	1

1. Two rods A and B of different materials are welded together as shown in the figure. Their thermal conductivities are K_1 and K_2. The thermal conductivity of the composite rod will be:



1. $\frac{3(K_1+K_2)}{2}$
2. K_1+K_2
3. $2(K_1+K_2)$
4. $\frac{K_1+K_2}{2}$

2. The power radiated by a black body is P and it radiates maximum energy at wavelength λ_0. If the temperature of the black body is now changed so that it radiates maximum energy at the wavelength $\frac{3}{4}\lambda_0$. The power radiated by it becomes nP. The value of n is:
1. $\frac{3}{4}$
2. $\frac{4}{3}$
3. $\frac{256}{81}$
4. $\frac{81}{256}$

3. Two identical bodies are made of a material for which the heat capacity increases with temperature. One of these is at 100 °C, while the other one is at 0 °C. If the two bodies are brought into contact, then assuming no heat loss, the final common temperature is:
1. 50°C
2. more than 50°C
3. less than 50°C but greater than 0°C
4. 0°C

4. A body cools from a temperature of 3T to 2T in 10 minutes. The room temperature is T. Assume that Newton's law of cooling is applicable. The temperature of the body at the end of the next 10 minutes will be
1. $\frac{7}{4}$T
2. $\frac{3}{2}$T
3. $\frac{4}{3}$T
4. T

5. A spherical black body with a radius of 12 cm radiates 450-watt power at 500 K. If the radius were halved and the temperature is doubled, the power radiated in watt would be:
1. 450
2. 1000
3. 1800
4. 225

6.
The coefficient of linear expansion of brass and steel rods are α_1 and α_2. Lengths of brass and steel rods are l_1 and l_2 respectively. If (l_2-l_1) remains the same at all temperatures, which one of the following relations holds good?
1. $\alpha_1 I_2{}^2 = \alpha_2 I_1{}^2$
2. $\alpha_1{}^2 I_2 = \alpha_2{}^2 l_1$
3. $\alpha_1 I_1 = \alpha_2 I_2$
4. $\alpha_1 I_2 = \alpha_2 I_1$

7.
A black body is at a temperature of 5760 K. The energy of radiation emitted by the body at wavelength 250 nm is U_1, at wavelength 500 nm is U_2 and that at 1000 nm is U_3. Wien's constant, b = 2.88 X 10^6 nm-K. Which of the following is correct?
1. $U_3 = 0$
2. $U_1 > U_2$
3. $U_2 > U_1$
4. $U_1 = 0$

8.
A piece of ice falls from a height h so that it melts completely. Only one-quarter of the heat produced is absorbed by the ice. The value of h is:
[Latent heat of ice is 3.4 X 10^5J/kg and g =10 N/kg]
1. 544 km
2. 136 km
3. 68 km
4. 34 km

9. The value of the coefficient of volume expansion of glycerine is $5\times10^{-4}\ K^{-1}$. The fractional change in the density of glycerine for a rise of 40 ^{0}C in its temperature is:
1. 0.015
2. 0.020
3. 0.025
4. 0.010

10. On observing light from three different stars P, Q, and R, it was found that the intensity of the violet colour is maximum in the spectrum of P, the intensity of the green colour is maximum in the spectrum of R and the intensity of the red colour is maximum in the spectrum of Q. If T_P, T_Q and T_R are the respective absolute temperatures of P, Q, and R, then it can be concluded from the above observations that:
1. $T_P > T_Q > T_R$
2. $T_P > T_R > T_Q$
3. $T_P < T_R < T_Q$
4. $T_P < T_Q < T_R$

11. The two ends of a metal rod are maintained at temperatures 100 °C and 110 °C. The rate of heat flow in the rod is found to be 4.0 J/s. If the ends are maintained at temperatures 200 °C and 210 °C, the rate of heat flow will be:
1. 44.0 J/s
2. 16.8 J/s
3. 8.0 J/s
4. 4.0 J/s

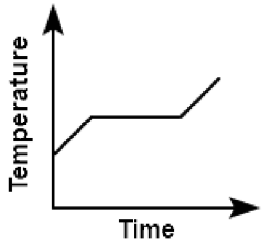
12. Steam at 100 ^{0}C is passed into 20g of water at 10 ^{0}C. When water acquires a temperature of 80 ^{0}C, the mass of water present will be:
[Take specific heat of water = 1 cal g^{-1} $^0C^{-1}$ and latent heat of steam = 540 cal g^{-1}]
1. 24 g
2. 31.5 g
3. 42.5 g
4. 22.5 g

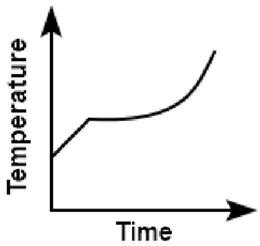
13. A certain quantity of water cools from 70 ^{0}C to 60 ^{0}C in the first 5 minutes and to 54 ^{0}C in the next 5 minutes. The temperature of the surroundings is:
1. 45°C
2. 20°C
3. 42°C
4. 10°C

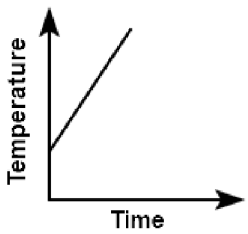
14.
A piece of iron is heated in a flame. It first becomes dull red, then becomes reddish yellow and finally turns to white-hot. The correct explanation for the above observation is possible by using:
1. Wien's displacement Law
2. Kirchoff's Law
3. Newton's Law of cooling
4. Stefan's Law

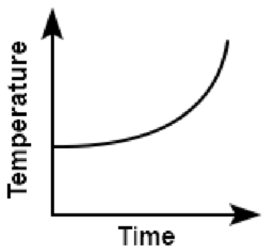
15. If the radius of a star is R and it acts as a black body, what would be the temperature of the star at which the rate of energy production is Q?
1. $Q/4\pi R^2\sigma$
2. $\left(Q/4\pi R^2\sigma\right)^{\frac{-1}{2}}$
3. $\left(4\pi R^2 Q/\sigma\right)^{\frac{1}{4}}$
4. $\left(Q/4\pi R^2\sigma\right)^{\frac{1}{4}}$

16. Liquid oxygen at 50 K is heated up to 300 K at a constant pressure of 1 atm. The rate of heating is constant. Which one of the following graphs represents the variation of temperature with time?

1. 

2. 

3. 

4. 

17. A cylindrical metallic rod in thermal contact with two reservoirs of heat at its two ends conducts an amount of heat Q in time t. The metallic rod is melted and the material is formed into a rod of half the radius of the original rod. What is the amount of heat conducted by the new rod when placed in thermal contact with the two reservoirs in the same time?
1. Q /4
2. Q/16
3. 2Q
4. Q/2

18. The total radiant energy per unit area, normal to the direction of incidence, received at a distance R from the centre of a star of radius r, whose outer surface radiates as a black body at a temperature T K is given by:
(where σ is Stefan's constant)
1. $\frac{\sigma r^2 T^4}{R^2}$
2. $\frac{\sigma r^2 T^4}{4\pi R^2}$
3. $\frac{\sigma r^2 T^4}{R^4}$
4. $\frac{4\pi\sigma r^2 T^4}{R^2}$

19.
A black body at 227 °C radiates heat at the rate of 7 cal-cm^{-2}s^{-1}. At a temperature of 727 °C, the rate of heat radiated in the same units will be:
1. 60
2. 50
3. 112
4. 80

20.
The two ends of a rod of length L and a uniform cross-sectional area A are kept at two temperatures T_1 and T_2 ($T_1 > T_2$). The rate of heat transfer $\frac{dQ}{dt}$ through the rod in steady state is given by:
1. $\frac{dQ}{dt} = \frac{KL(T_1 - T_2)}{A}$
2. $\frac{dQ}{dt} = \frac{K(T_1 - T_2)}{LA}$
3. $\frac{dQ}{dt} = KLA\left(T_1 - T_2\right)$
4. $\frac{dQ}{dt} = \frac{KA(T_1 - T_2)}{L}$

21. On a new scale of temperature, which is linear and called the W scale, the freezing and boiling points of water are 39 $^\circ$W and 239 $^\circ$W respectively. What will be the temperature on the new scale corresponding to a temperature of 39°C on the Celsius scale?
1. 78° W
2. 117° W
3. 200° W
4. 139° W

22. Assuming the sun to have a spherical outer surface of radius r, radiating like a black body at temperature t °C, the power received by a unit surface of the earth (normal to the incident rays) at a distance R from the centre of the sun is:
(where σ is Stefan's constant.)
1. $\frac{4\pi r^2\sigma t^4}{R^2}$
2. $\frac{r^2\sigma(t+273)^4}{4\pi R^2}$
3. $\frac{16\pi^2 r^2\sigma t^4}{R^2}$
4 $\frac{r^2\sigma(t+273)^4}{R^2}$

23. A black body is at 727 °C. It emits energy at a rate that is proportional to:
1. $(727)^2$
2. $(1000)^4$
3. $(1000)^2$
4. $(727)^4$

24. A black body at 1227 °C emits radiations with maximum intensity at a wavelength of 5000 Å. If the temperature of the body is increased by 1000 °C, the maximum intensity will be observed at:
1. 4000 Å
2. 5000 Å
3. 6000 Å
4. 3000 Å

25. A copper rod of 88 cm and an aluminium rod of an unknown length have an equal increase in their lengths independent of an increase in temperature. The length of the aluminium rod is : $(\alpha_{Cu} = 1.7 \times 10^{-5} K^{-1}$ and $\alpha_{Al} = 2.2 \times 10^{-5} K^{-1})$
1. 68 cm
2. 6.8 cm
3. 113.9 cm
4. 88 cm

26. An object kept in a large room having an air temperature of 25° C takes 12 minutes to cool from 80° C to 70° C. The time taken to cool for the same object from 70° C to 60° C would be nearly -
1. 10 min
2. 12 min
3. 20 min
4. 15 min

27. A deep rectangular pond of surface area A, containing water (density = ρ, specific heat capacity = s), is located in a region where the outside air temperature is at a steady value of $-26\ ^oC$. The thickness of the ice layer in this pond at a certain instant is x. Taking the thermal conductivity of ice as k, and its specific latent heat of fusion as L, the rate of increase of the thickness of the ice layer, at this instant, would be given by:
1. $\frac{26k}{x\rho(L-4s)}$
2. $\frac{26k}{x^2\rho L}$
3. $\frac{26k}{x\rho L}$
4. $\frac{26k}{x\rho(L+4s)}$

28. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 $(r_1 = 1.5\ r_2)$ through 1 K are in the ratio:
1. $\frac{9}{4}$
2. $\frac{3}{2}$
3. $\frac{5}{3}$
4. $\frac{27}{8}$

29. Three stars A, B, and C have surface temperatures T_A, T_B, and T_C respectively. Star A appears bluish, star B appears reddish and star C yellowish. Hence,
1. $T_A > T_B > T_C$
2. $T_B > T_C > T_A$
3. $T_C > T_B > T_A$
4. $T_A > T_C > T_B$

30. A slab of stone with an area $0.36\ m^2$ and thickness of 0.1 m is exposed on the lower surface to steam at $100^\circ C$. A block of ice at $0^\circ C$ rests on the upper surface of the slab. In one hour 4.8 kg of ice is melted. The thermal conductivity of the slab will be:
(Given latent heat of fusion of ice = $3.36 \times 10^5\ J\ Kg^{-1}$)
1. 1.29/m/s/^{0}C
2. 2.05J/m/s/^{0}C
3. 1.02/m/s/^{0}C
4. 1.24/m/s/^{0}C

31. Gravitational force is required for :
1. Stirring of liquid
2. Convection
3. Conduction
4. Radiation

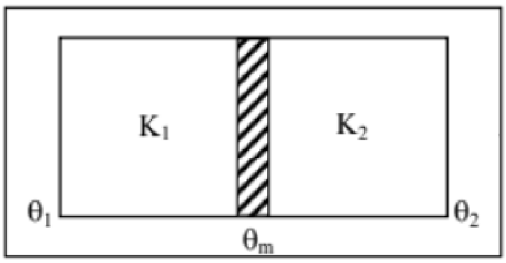
32. Which of the following circular rods, (given radius r and length l) each made of the same energy material and whose ends are maintained at the same temperature will conduct most heat:
(1) $r = 2r_0$; $l = 2l_0$
(2) $r = 2r_0$; $l = l_0$
(3) $r = r_0$; $l = 2l_0$
(4) $r = r_0$; $l = l_0$

33. Radiation energy corresponding to the temperature T of the sun is E. If its temperature is doubled, then its radiation energy will be :
1. 32 E
2. 16 E
3. 8 E
4. 4 E

34. A sphere maintained at temperature 600 K, has a cooling rate R in an external environment of 200 K temperature. If its temperature falls to 400 K then its colling rate will be
1. $\frac{3}{16}R$
2. $\frac{16}{3}R$
3. $\frac{9}{27}R$
4. None

35. If λ_m denotes the wavelength at which the radioactive emission from a black body at a temperature T K is maximum, then:-
(1) λ_m is independent of T
(2) $\lambda_m \propto T$
(3) $\lambda_m \propto T^{-1}$
(4) $\lambda_m \propto T^{-4}$

36. Two conducting slabs of heat conductivity K_1 and K_2 are joined as shown in fig. The temp. at ends of the slabs are θ_1 and θ_2 $(\theta_1 > \theta_2)$ the, final temp. (θ_m) of the junction will be:



1. $\frac{K_1\theta_1 + K_2\theta_2}{K_1 + K_2}$
2. $\frac{K_1\theta_2 + K_2\theta_1}{K_1 + K_2}$
3. $\frac{K_1\theta_2 + K_2\theta_1}{K_1 - K_2}$
4. None

37. The Wien's displacement law express relation between : -
(1) Wavelength corresponding to maximum energy and temperature
(2) Radiation energy and wavelength
(3) Temperature and wavelength
(4) Colour of light and temperature

38. Which of the following is closest to an ideal black body?
(1) Black lamp
(2) Cavity maintained at a constant temperature
(3) Platinum black
(4) A lump of charcoal heated to high temp.

39. For a black body at temperature 727ºC, its radiating power is 60 watt and temperature of surrounding is 227ºC. If temperature of black body is changed to 1227ºC then its radiating power will be : -
(1) 304 W
(2) 320 W
(3) 240 W
(4) 120 W

40. Consider two rods of same length and different specific heats (S_1, S_2), conductivities (K_1, K_2) and area of cross-sections (A_1, A_2) and both having temperature T_1 and T_2 at their ends. If rate of loss of heat due to conduction is equal, then :-
(1) $K_1A_1 = K_2A_2$
(2) $\frac{K_1A_1}{S_1} = \frac{K_2A_2}{S_2}$
(3) $K_2A_1 = K_1A_2$
(4) $\frac{K_2A_1}{S_2} = \frac{K_1A_2}{S_1}$

41. Unit of Stefan's constant is : -
(1) Watt-m^2-K^4
(2) Watt-m^2/K^4
(3) Watt/m^2–K
(4) Watt/m^2 K^4

42. A black body has wavelength λ_m corresponding to maximum energy at 2000 K. Its wavelength corresponding to maximum energy at 3000 K will be : -
1. $\frac{3}{2}\lambda_m$
2. $\frac{2}{3}\lambda_m$
3. $\frac{16}{81}\lambda_m$
4. $\frac{81}{16}\lambda_m$

43. A cylindrical rod has temperatures T_1 and T_2 at its ends. The rate of flow of heat is Q_1 cal/sec. If all the linear dimensions are doubled while keeping the temperature constant, then the rate of flow of heat Q_2 will be:
1. $4Q_1$
2. $2Q_1$
3. $\frac{Q_1}{4}$
4. $\frac{Q_1}{2}$

44. We consider the radiation emitted by the human body. Which of the following statements is true :
(1) The radiation emitted is in the infrared region
(2) The radiation is emitted only during the day
(3) The radiation is emitted during the summers and absorbed during the winters
(4) The radiation emitted lies in the ultraviolet region and hence is not visible

45. Consider a compound slab consisting of two different materials having equal thicknesses and thermal conductivities K and 2K, respectively. The equivalent thermal conductivity of the slab will be -
1. $2/6$ K
2. $\sqrt{2}$ K
3. 3K
4. $4/3$ K

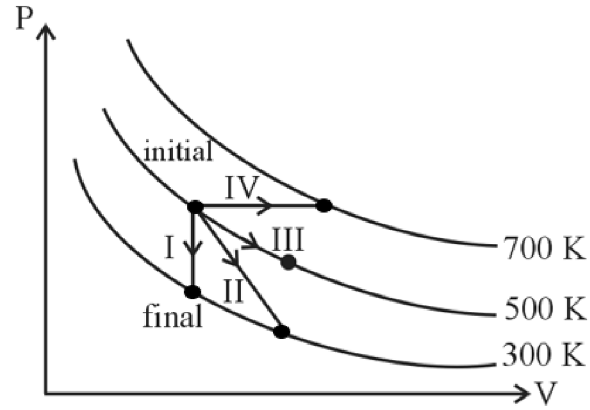
46. A cup of coffee cools from 90° to 80°C in t minutes, when the room temperature is 20°C. The time taken by a similar cup of coffee to cool from 80° to 60°C at room temperature same at 20°C is :
1. $\frac{10}{13}$t
2. $\frac{5}{13}$t
3. $\frac{13}{10}$t
4. $\frac{13}{5}$t

Thermodynamics

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Types of Processes	16
Heat Engine & Refrigerator	14
First Law of Thermodynamics	7
Cyclic Process	5
Molar Specific Heat	3
Work Done by Gas	2
Second Law of Thermodynamics	1

1.
Thermodynamic processes are indicated in the following diagram:



Match the following

Column-I	Column-II
P. Process I	a. Adiabatic
Q. Process II	b. Isobaric
R. Process III	c. Isochoric
S. Process IV	d. Isothermal

1. P→c, Q→a, R→d, S→b
2. P→c, Q→d, R→b, S→a
3. P→d, Q→b, R→a, S→c
4. P→a, Q→c, R→d, S→b

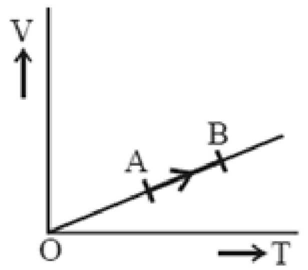
2. A sample of 0.1 g of water at $100^0\ C$ and normal pressure (1.013×10^5 Nm^{-2}) requires 54 cal of heat energy to convert it into steam at $100^0\ C$. If the volume of the steam produced is 167.1 cc, the change in internal energy of the sample is:
1. 104.3 J
2. 208.7 J
3. 42.2 J
4. 84.5 J

3. One mole of an ideal monatomic gas undergoes a process described by the equation. $PV^3 = cons\tan t$. The heat capacity of the gas during this process is:
1. $\frac{3}{2}$R
2. $\frac{5}{2}$R
3. 2R
4. R

4. The temperature inside a refrigerator (reversible process) is t_2°C and the room temperature is t_1°C. The amount of heat delivered to the room for each joule of electrical energy consumed ideally will be:
1. $\frac{t_1}{t_1-t_2}$
2. $\frac{t_1+273}{t_1-t_2}$
3. $\frac{t_2+273}{t_1+t_2}$
4. $\frac{t_1+t_2}{t_1+273}$

5. a Carnot engine having an efficiency of $\frac{1}{10}$a heat engine is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at a lower temperature is:
1. 90 J
2. 99 J
3. 100 J
4. 1 J

6. The volume (V) of a monatomic gas varies with its temperature (T) as shown in the graph. The ratio of work done by the gas to the heat absorbed by it when it undergoes a change from state A to state B is:



1. $\frac{2}{5}$
2. $\frac{2}{3}$
3. $\frac{1}{3}$
4. $\frac{2}{7}$

7. The efficiency of an ideal heat engine working between the freezing point and boiling point of water is:
1. 26.8%
2. 20%
3. 6.25%
4. 12.5%

8.
A gas is compressed isothermally to half its initial volume. The same gas is compressed separately through an adiabatic process until its volume is again reduced to half. Then,

1. compressing the gas through an adiabatic process will require more work to be done.

2. compressing the gas isothermally or adiabatically will require the same amount of work.

3. which of the case (whether compression through isothermal or through the adiabatic
process) requires more work will depend upon the atomicity of the gas.

4. compressing the gas isothermally will require more work to be done.

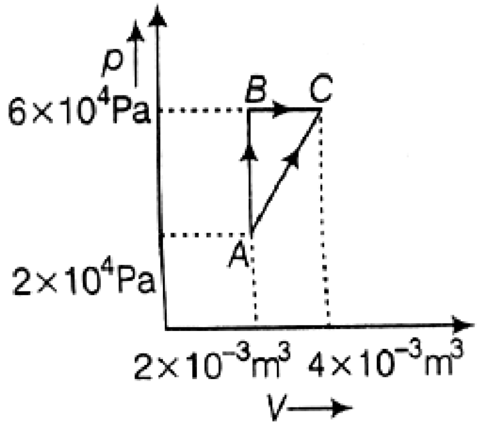
9.
A refrigerator works between 4^0C and 30^0C. It is required to remove 600 calories of heat every second to keep the temperature of the refrigerated space constant. The power required is:
(Take, 1 cal= 4.2 Joules)
1. 23.65 W
2. 236.5 W
3. 2365 W
4. 2.365 W

10. An ideal gas is compressed to half its initial volume using several processes. Which of the process results in the maximum work done on the gas?
1. Adiabatic
2. Isobaric
3. Isochoric
4. Isothermal

11. The coefficient of performance of a refrigerator is 5. If the temperature inside the freezer is -20^0C, the temperature of the surroundings to which it rejects heat is:
1. 31^oC
2. 41^oC
3. 11^oC
4. 21^oC

12.

The figure below shows two paths that may be taken by gas to go from state A to state C.



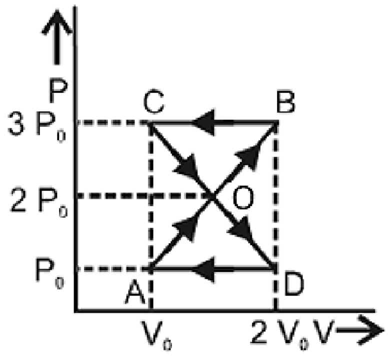
In process AB, 400 J of heat is added to the system, and in process BC, 100 J of heat is added to the system. The heat absorbed by the system in the process AC will be:

1. 380 J
2. 500 J
3. 460 J
4. 300 J

13. A Carnot engine, having an efficiency of $\eta = \frac{1}{10}$ as a heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at a lower temperature is:
1. 100 J
2. 99 J
3. 90 J
4. 1 J

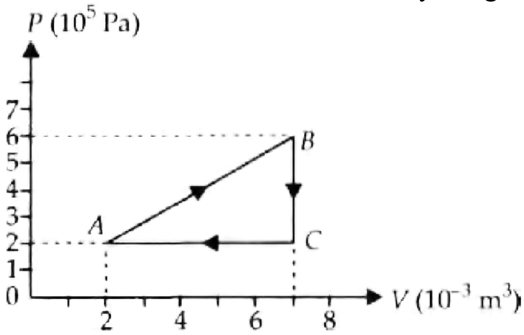
14. A monoatomic gas at a pressure P, having a volume V expands isothermally to a volume 2V and then adiabatically to a volume 16V. The final pressure of the gas is: (Take: γ= 5/3)
1. 64 P
2. 32 P
3. P/64
4. 16 P

15. A thermodynamics system undergoes cyclic process ABCDA as shown in Fig. The work done by the system in the cycle is:



1. P_0V_0
2. $2P_0V_0$
3. $\frac{P_0V_0}{2}$
4. Zero

16.
A gas is taken through the cycle A → B → C → A, as shown. What is the net work done by the gas?



1. 1000 J
2. zero
3. –2000 J
4. 2000 J

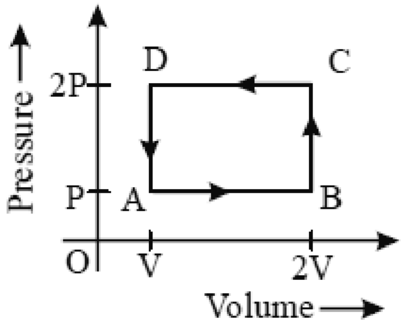
17.
The molar specific heats of an ideal gas at constant pressure and volume are denoted by C_P and C_V, respectively. If $\gamma = \frac{C_P}{C_V}$ and R is the universal gas constant, then C_V is equal to:

1. $\frac{R}{(\gamma-1)}$
2. $\frac{(\gamma-1)}{R}$
3. γR
4. $\frac{(\gamma-1)R}{(\gamma+1)}$

18.
During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its temperature. The ratio of $\frac{C_P}{C_V}$ for the gas is:

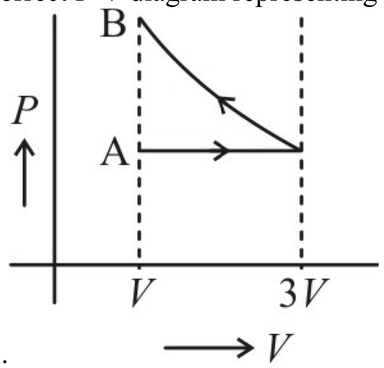
1. 2
2. 5/3
3. 3/2
4. 4/3

19. A thermodynamic system is taken through the cycle ABCD as shown in the figure. Heat rejected by the gas during the cycle is:

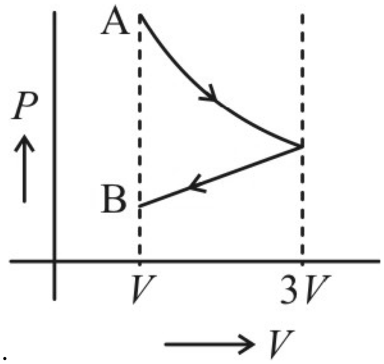


1. 2PV
2. 4PV
3. $\frac{1}{2}$PV
4. PV

20.
One mole of an ideal gas goes from an initial state A to the final state B with two processes. It first undergoes isothermal expansion from volume V to 3V and then its volume is reduced from 3V to V at constant pressure. The correct P-V diagram representing the two processes is:



1.



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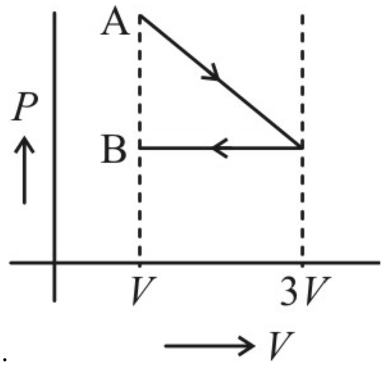

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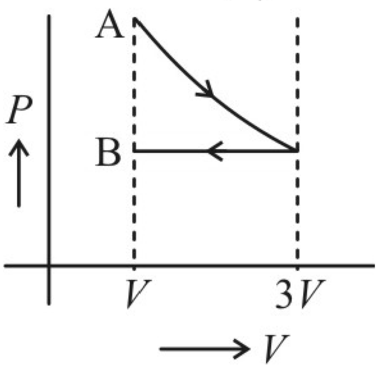


4.

21.
When 1 kg of ice at 0^0C melts into the water at 0^0C, the resulting change in its entropy, taking latent heat of ice to be 80 cal/gm, is:
1. 8×10^4 cal/K
2. 80 cal/K
3. 293 cal/K
4. 273 cal/K

22.
During an isothermal expansion, a confined ideal gas does -150 J of work against its surrounding. This implies that,
1. 300 J of heat has been added to the gas.
2. no heat is transferred because the process is isothermal.
3. 150 J of heat has been added to the gas.
4. 150 J of heat has been removed from the gas.

23. If ΔU and ΔW represent the increase in internal energy and work done by the system respectively in a thermodynamical process. Which of the following is true?
1. $\Delta U = -\Delta W$, in an adiabatic process
2. $\Delta U = \Delta W$, in an isothermal process
3. $\Delta U = \Delta W$, in an adiabatic process
4. $\Delta U = -\Delta W$, in an isothermal process

24.
The internal energy change in a system that has absorbed 2 kcal of heat and done 500 J of work is:
1. 8900 J

2. 6400 J

3. 5400 J
4. 7900 J

25.
In thermodynamic processes which of the following statements is not true?

1. In an adiabatic process the system is insulated from the surroundings

2. In an isochoric process pressure remains constant

3. in an isothermal process the temperature remains constant
4. In an adiabatic process PV^{γ}= constant

26.
If Q, E, and W denote respectively the heat added, the change in internal energy, and the work done in a closed cycle process, then:
1. W = 0
2. Q =W = 0
3. E = 0
4. Q = 0

27. An engine has an efficiency of $\frac{1}{6}$. When the temperature of the sink is reduced by $62^0 C$, its efficiency is doubled. the temperature of the source is:
1. 124^{o}C
2. 37^{o}C
3. 62^{o}C
4. 99^{o}C

28. A Carnot engine whose sink is at 300 K has an efficiency of 40%. By how much should the temperature of the source be increased so as to increase its efficiency by 50% of original efficiency?
1. 275 K
2. 325 K
3. 250 K
4. 380 K

29. The molar specific heat at a constant pressure of an ideal gas is $(7/2)R$. The ratio of specific heat at constant pressure to that at constant volume is:
1. 7/5
2. 8/7
3. 5/7
4. 9/7

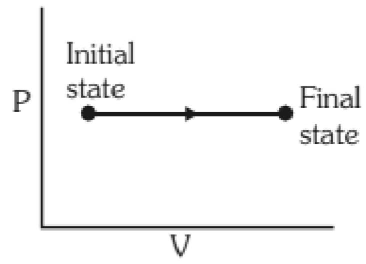
30. In which of the following processes, the heat is neither absorbed nor released by a system?
1. Isochoric
2. Isothermal
3. Adiabatic
4. Isobaric

31. 1 g of water of volume 1 cm^3 at 100 $^\circ$C is converted into steam at the same temperature under normal atmospheric pressure$\approx 1 \times 10^5$ Pa. The volume of steam formed equals 1671 cm^3. If the specific latent heat of vaporization of water is 2256 J/g, the change in internal energy is:
1. 2423 J
2. 2089 J
3. 167 J
4. 2256 J

32. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is :
(1) adiabatic
(2) isochoric
(3) isobaric
(4) isothermal

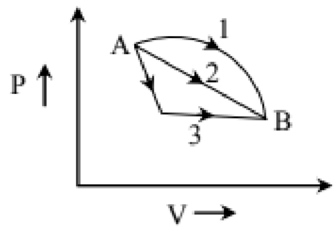
33. The efficiency of a Carnot engine depends upon:
1. the temperature of the sink only.
2. the temperatures of the source and sink.
3. the volume of the cylinder of the engine.
4. the temperature of the source only.

34. The P-V diagram for an ideal gas in a piston-cylinder assembly undergoing a thermodynamic process is shown in the figure. The process is:



1. adiabatic
2. isochoric
3. isobaric
4. isothermal

35. An ideal gas goes from state A to state B via three different processes as indicated in the P-V diagram -



If Q_1, Q_2 , Q_3 indicate thye heat absorbed by the gas along the three processes and ΔU_1 , ΔU_2 , ΔU_3 indicate the change in internal energy along the three processes repectively, then -
1. $Q_3 > Q_2 > Q_1$ *and* $\Delta U_1 = \Delta U_2 = \Delta U_3$
2. $Q_1 = Q_2 = Q_3$ *and* $\Delta U_1 > \Delta U_2 > \Delta U_3$
3. $Q_3 > Q_2 > Q_1$ *and* $\Delta U_1 > \Delta U_2 > \Delta U_3$
4. $Q_1 > Q_2 > Q_3$ *and* $\Delta U_1 = \Delta U_2 = \Delta U_3$

36. A mass of diatomic gas (γ = 1.4) at a pressure of 2 atmospheres is compressed adiabatically so that its temperature rises from 27ºC to 927ºC. The pressure of the gas in the final state is:
(1) 8 atm
(2) 28 atm
(3) 68.7 atm
(4) 256 atm

37. A monoatomic gas at pressure P_1 and volume V_1 is compressed adiabatically to 1/8th its original volume. What is the final pressure of gas -
1. P_1
2. 16 P_1
3. 32 P_1
4. 64 P_1

38. Which of the following processes is reversible?
(1) Transfer of heat by radiation
(2) Transfer of heat by conduction
(3) Isothermal compression
(4) Electrical heating of a nichrome wire

39. The ratio (W/Q) for a carnot – engine is $\frac{1}{6}$. Now the temp. of sink is reduced by 62ºC, then this ratio becomes twice, therefore the initial temp. of the sink and source are respectively :
1. 33ºC, 67ºC
2. 37ºC, 99ºC
3. 67ºC, 33ºC
4. 97 K, 37 K

40. An ideal gas heat engine operates in a Carnot cycle between 227ºC and 127ºC. It absorbs 6×10^4 cals of heat at higher temperatures. Amount of heat converted to work is:-
(1) 4.8×10^4 cals
(2) 2.4×10^4 cals
(3) 1.2×10^4 cals
(4) 6×10^4 cals

41. When volume changes from V to 2V at constant pressure(P), then the change in internal energy will be :
1. PV
2. 3PV
3. $\frac{PV}{\gamma-1}$
4. $\frac{RV}{Y-1}$

42. A gas of volume changes 2 litre to 10 litre at constant temperature 300K, then the change in internal energy will be :
1. 12 J
2. 24 J
3. 36 J
4. 0 J

43. We consider a thermodynamic system. If ΔU represents the increase in its internal energy and W the work done by the system, which of the following statements is true?
1. $\Delta U = -W$ in an isothermal process
2. $\Delta U = W$ in an isothermal process
3. $\Delta U = -W$ in an adiabatic process
4. $\Delta U = W$ in an adiabatic process

44. The initial pressure and volume of a gas are P and V respectively. First, its volume is expanded to 4V by isothermal process and then again its volume makes to be V by the adiabatic process then its final pressure is (γ = 1.5):
1. 8P
2. 4P
3. P
4. 2P

45. One mole of an ideal gas at an initial temperature of T K does 6R joules of work adiabatically. If the ratio of specific heats of this gas at constant pressure and at constant volume is 5/3, the final temperature of the gas will be:
(1) (T –2.4) K
(2) (T + 4)K
(3) (T – 4) K
(4) (T + 2.4)K

46. The efficiency of carnot engine is 50% and temperature of sink is 500K. If temperature of source is kept constant and its efficiency raised to 60%, then the required temperature of the sink will be : -
(1) 100 K
(2) 600 K
(3) 400 K
(4) 500 K

47. A scientist says that the efficiency of his heat engine which work at source temperature 127ºC and sink temperature 27º C to 26%, then
1. It is impossible
2. It is possible but less probable
3. It is quite probable
4. Data are incomplete

48. An ideal gas heat engine operates in a carnot cycle between 227ºC and 127ºC. It absorbs 6 kcal at the higher temperature. The amount of heat (in kcal) converted into work is equal to -
(1) 4.8
(2) 3.5
(3) 1.6
(4) 1.2

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Kinetic Theory of Gases

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Ideal Gas	7
Law of Equipartition of Energy	5
Mean Free Path	3
Specific Heat	3
Kinetic Energy of Gas	2

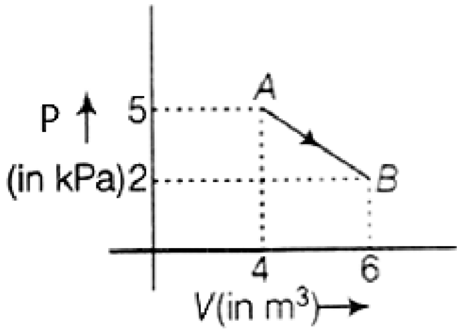
1. A given sample of an ideal gas occupies a volume V at a pressure P and absolute temperature T. The mass of each molecule of the gas is m. Which of the following gives the density of the gas?
1. P/(kT)
2. Pm/(kT)
3. P/(kTV)
4. mkT

2. A gas mixture consists of 2 moles of O_2 and 4 moles of Ar at temperature T. Neglecting all vibrational modes, the total internal energy of the system is:
1. 15 RT
2. 9 RT
3. 11 RT
4. 4 RT

3.
The molecules of a given mass of gas have RMS. velocity of 200 ms^{-1} at 27 °C and 1.0×10^5 Nm^{-2} pressure. When the temperature and the pressure of the gas are respectively, 127 °C and 0.05×10^5 Nm^{-2}, the RMS velocity of its molecules in ms^{-1} is:
1. $\frac{400}{\sqrt{3}}$
2. $\frac{100\sqrt{2}}{3}$
3. $\frac{100}{3}$
4. $100\sqrt{2}$

4. Two vessels separately contain two ideal gases A and B at the same temperature, the pressure of A being twice that of B. Under such conditions, the density of A is found to be 1.5 times the density of B. The ratio of molecular weight of A and B is:
1. $\frac{2}{3}$
2. $\frac{3}{4}$
3. 2
4. $\frac{1}{2}$

5. One mole of an ideal diatomic gas undergoes a transition from A to B along a path AB as shown in the figure.

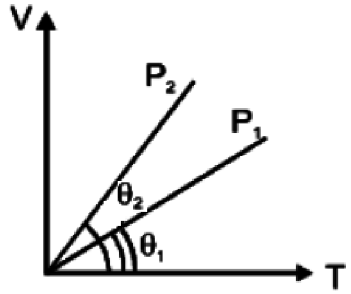


The change in internal energy of the gas during the transition is:
1. 20 kJ
2. - 20 kJ
3. 20 J
4. -12 kJ

6. The ratio of the specific heats $\frac{C_p}{C_v} = \gamma$ in terms of degrees of freedom(n) is given by:
1. $\left(1 + \frac{1}{n}\right)$
2. $\left(1 + \frac{n}{3}\right)$
3. $\left(1 + \frac{2}{n}\right)$
4. $\left(1 + \frac{n}{2}\right)$

7. The mean free path of molecules of a gas (radius 'r') is inversely proportional to:
1. r^3
2. r^2
3. r
4. $\sqrt{r}$

8.
In the given (V–T) diagram, what is the relation between pressure P_1 and P_2?



1. $P_2 > P_1$
2. $P_2 < P_1$
3. Cannot be predicted
4. $P_2 = P_1$

9.
The amount of heat energy required to raise the temperature of 1 g of Helium at NTP, from T_1 K to T_2 K is:
1. $\frac{3}{2}N_a k_B(T_2 - T_1)$
2. $\frac{3}{4}N_a k_B(T_2 - T_1)$
3. $\frac{3}{4}N_a k_B\frac{T_2}{T_1}$
4. $\frac{3}{8}N_a k_B(T_2 - T_1)$

10. At 10^o C the value of the density of a fixed mass of an ideal gas divided by its pressure is x. At 110^oC this ratio is:
1. x
2. $\frac{383}{283}$x
3. $\frac{10}{110}$x
4. $\frac{283}{383}$x

11. An increase in temperature of a gas-filled in a container would lead to:
1. decrease in intermolecular distance.
2. increase in its mass.
3. increase in its kinetic energy.
4. decrease in its pressure.

12. The value $\gamma = \left(\frac{C_p}{C_v}\right)$ for hydrogen, helium, and another ideal diatomic gas X (whose molecules are not rigid but have an additional vibrational mode), are respectively equal to:
1. $\frac{7}{5}, \frac{5}{3}, \frac{9}{7}$
2. $\frac{5}{3}, \frac{7}{5}, \frac{9}{7}$
3. $\frac{5}{3}, \frac{7}{5}, \frac{7}{5}$
4. $\frac{7}{5}, \frac{5}{3}, \frac{7}{5}$

13. The mean free path for gas, with molecular diameter d and number density n, can be expressed as:
(1) $\frac{1}{\sqrt{2}n\pi d^2}$
(2) $\frac{1}{\sqrt{2}n^2\pi d^2}$
(3) $\frac{1}{\sqrt{2}n^2\pi^2 d^2}$
(4) $\frac{1}{\sqrt{2}n\pi d}$

14. A cylinder contains hydrogen gas at a pressure of 249 kPa and temperature $27^\circ C$
Its density is: (R = 8.3 J mol^{-1} K^{-1})
1. 0.2 kg/m^3
2. 0.1 kg/m^3
3. 0.02 kg/m^3
4. 0.5 kg/m^3

15. The average thermal energy for a mono-atomic gas is: (k_B is Boltzmann constant and T absolute temperature)
1. $\frac{3}{2}k_B T$
2. $\frac{5}{2}k_B T$
3. $\frac{7}{2}k_B T$
4. $\frac{1}{2}k_B T$

16. The mean free path l for a gas molecule depends upon the diameter, d of the molecule as:
1. $l \propto \frac{1}{d^2}$
2. $l \propto d$
3. $l \propto d^2$
4. $l \propto \frac{1}{d}$

17. An ideal gas equation can be written as $P = \frac{\rho RT}{M_0}$ where ρ and M_0 are respectively,
1. Mass density, the mass of the gas
2. Number density, molar mass
3. Mass density, molar mass
4. Number density, the mass of the gas

18. If C_p and C_v denote the specific heats (per unit mass) of an ideal gas of molecular weight M.-
1. $C_p - C_v = R$
2. $C_p - C_v = R / M$
3. $C_p - C_v = MR$
4. $C_p - C_v = R / M^2$
Where R is the molar gas constant

19. To find out degree of freedom, the correct expression is :
1. $f = \frac{2}{\gamma-1}$
2. $f = \frac{\gamma+1}{2}$
3. $f = \frac{2}{\gamma+1}$
4. $f = \frac{1}{\gamma+1}$

20. The equation of state for 5g of oxygen at a pressure P and temperature T, when occupying a volume V, will be :-
(1) PV = 5 RT
(2) PV = (5/2) RT
(3) PV = (5/16) RT
(4) PV = (5/32) RT
Where R is the gas constant.

21. Match **column - I** and **column - II** and choose the correct match from the given choices.

	Column - I		**Column - II**
(A)	Root mean square speed of gas molecules	(P)	$\frac{1}{3}nm\bar{v}^2$
(B)	Pressure exerted by ideal gas	(Q)	$\sqrt{\frac{3RT}{M}}$
(C)	Average kinetic energy of a molecule	(R)	$\frac{5}{2}RT$
(D)	Total internal energy of 1 mole of a diatomic gas	(S)	$\frac{3}{2}k_BT$

1. (A) - (Q), (B) - (P), (C) - (S), (D) - (R)
2. (A) - (R), (B) - (Q), (C) - (P), (D) - (S)
3. (A) - (R), (B) - (P), (C) - (S), (D) - (Q)
4. (A) - (Q), (B) - (R), (C) - (S), (D) - (P)

Oscillations

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Simple Harmonic Motion	22
Linear SHM	10
Energy of SHM	6
Spring mass system	5
Damped Oscillations	4
Combination of Springs	3
Angular SHM	1
Forced Oscillations	1
Phasor Diagram	1

1. A spring of force constant k is cut into lengths of ratio 1:2:3. They are connected in series and the new force constant is k'. Then they are connected in parallel and force constant is k''. Then k': k'' is:
1. 1:9
2. 1:11
3. 1:14
4. 1:6

2. A body of mass m is attached to the lower end of a spring whose upper end is fixed. The spring has negligible mass. When the mass m is slightly pulled down and released, it oscillates with a time period of 3 s. When the mass m is increased by 1 kg, the time period of oscillations becomes 5 s. The value of m in kg is:
1. $\frac{3}{4}$
2. $\frac{4}{3}$
3. $\frac{16}{9}$
4. $\frac{9}{16}$

3. A particle executes linear simple harmonic motion with amplitude of 3 cm. When the particle is at 2 cm from the mean position, the magnitude of its velocity is equal to that of its acceleration. Then its time period in seconds is:-
1. $\frac{\sqrt{5}}{2\pi}$
2. $\frac{4\pi}{\sqrt{5}}$
3. $\frac{4\pi}{\sqrt{3}}$
4. $\frac{\sqrt{5}}{\pi}$

4. A pendulum is hung from the roof of a sufficiently high building and is moving freely to and fro like a simple harmonic oscillator. The acceleration of the bob of the pendulum is 20 m/s^2 at a distance of 5 m from the mean position. The time period of oscillation is:
1. 2π s
2. π s
3. 2 s
4. 1 s

5. A particle is executing a simple harmonic motion. Its maximum acceleration is α and maximum velocity is β. Then its time period of vibration will be:
1. $\frac{\beta^2}{\alpha^2}$
2. $\frac{\beta}{\alpha}$
3. $\frac{\beta^2}{\alpha}$
4. $\frac{2\pi\beta}{\alpha}$

6.

When two displacements represented by $y_1 = a\sin(\omega t)$ and $y_2 = b\cos(\omega t)$ are superimposed, the motion is:

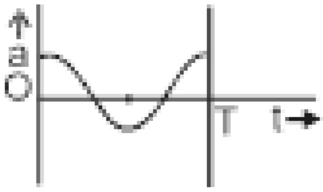
1. not a simple harmonic.
2. simple harmonic with amplitude $\frac{a}{b}$.
3. simple harmonic with amplitude $\sqrt{a^2+b^2}$.
4. simple harmonic with amplitude $\frac{(a+b)}{2}$.

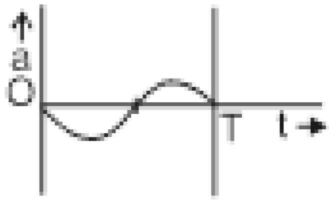
7.

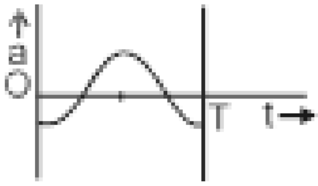
A particle is executing SHM along a straight line. Its velocities at distances x_1 and x_2 from the mean position are v_1 and v_2, respectively. Its time period is:

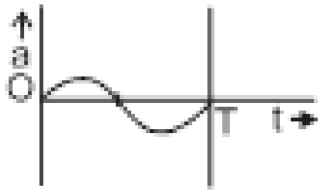
1. $2\pi\sqrt{\frac{x_1^2+x_2^2}{v_1^2+v_2^2}}$
2. $2\pi\sqrt{\frac{x_2^2-x_1^2}{v_1^2-v_2^2}}$
3. $2\pi\sqrt{\frac{v_1^2+v_2^2}{x_1^2+x_2^2}}$
4. $2\pi\sqrt{\frac{v_1^2-v_2^2}{x_1^2-x_2^2}}$

8. The oscillation of a body on a smooth horizontal surface is represented by the equation, X = A cos (ωt)
where X = displacement at time t
ω = frequency of oscillation
Which one of the following graphs shows correctly the variation 'a' with 't'?
Here a = acceleration at time t
T = time period

1. 

2. 

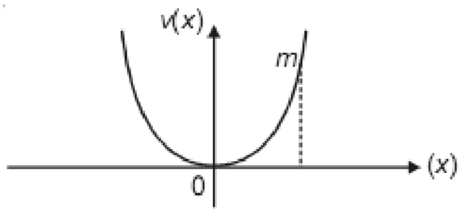
3. 

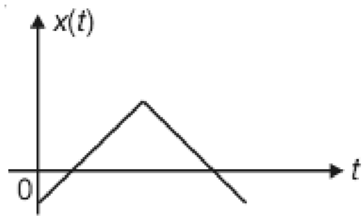
4. 

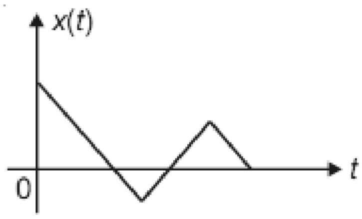
9. The damping force of an oscillator is directly proportional to the velocity. The units of the constant of proportionality are:
1. $kg\text{-}msec^{-1}$
2. $kg\text{-}msec^{-2}$
3. $kg\text{-}sec^{-1}$
4. kg-sec

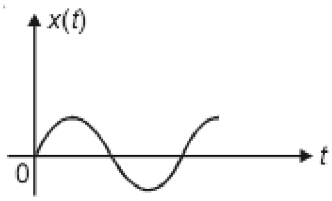
10.
Out of the following functions, which represent/s SHM?
I. $y = \sin \omega t - \cos \omega t$
II. $y = \sin^3 \omega t$
III. $y = 5 \cos\left(\frac{3\pi}{4} - 3\omega t\right)$
IV. $y = 1 + \omega t + \omega^2 t^2$
1. Only (IV) does not represent SHM
2. (I) and (III)
3. (I) and (II)
4. Only (I)

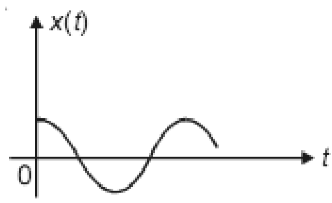
11. A particle of mass m is released from rest and follows a parabolic path as shown. Assuming that the displacement of the mass from the origin is small, which graph correctly depicts the position of the particle as a function of time?



1. 

2. 

3. 

4. 

12. The displacement of a particle along the x-axis is given by x = $a\sin^2\omega t$. The motion of the particle corresponds to:
1. Simple harmonic motion of frequency $\frac{\omega}{\pi}$
2. Simple harmonic motion of frequency $\frac{3\omega}{2\pi}$
3. non-simple harmonic motion
4. simple harmonic motion of frequency $\frac{\omega}{2\pi}$

13. The period of oscillation of a mass M suspended from a spring of negligible mass is T. If along with it, another mass M is also suspended, the period of oscillation will now be
1. T
2. $T/\sqrt{2}$
3. 2T
4. $\sqrt{2}T$

14.
A simple pendulum performs simple harmonic motion about x = 0 with an amplitude a and time period T. The speed of the pendulum at $x = \frac{a}{2}$ will be:
1. $\frac{\pi a\sqrt{3}}{2T}$
2. $\frac{\pi a}{T}$
3. $\frac{3\pi^2 a}{T}$
4. $\frac{\pi a\sqrt{3}}{T}$

15.
Which one of the following equations of motion represents simple harmonic motion where k, k_0, k_1, and a are all positive?

1. Acceleration = $-k_0x + k_1x^2$

2. Acceleration = -k(x + a)

3. Acceleration = k(x + a)

4. Acceleration = kx

16.
Two simple harmonic motions of angular frequencies 100 and 1000 rad s^{-1} have the same displacement amplitude. The ratio of their maximum acceleration is:
1. 1: 10
2. 1: 10^2
3. 1: 10^3
4. 1: 10^4

17. A point performs simple harmonic oscillation of period T and the equation of motion is given by $x = a\sin(\omega t + \pi/6)$. After the elapse of what fraction of the time period, the velocity of the point will be equal to half of its maximum velocity?
1. $\frac{T}{8}$
2. $\frac{T}{6}$
3. $\frac{T}{3}$
4. $\frac{T}{12}$

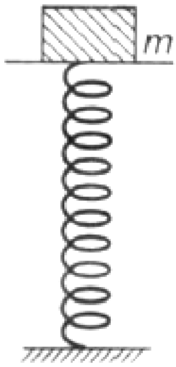
18. Two points are located at a distance of 10 m and 15 m from the source of oscillation. The period of oscillation is 0.05 s and the velocity of the wave is 300 m/s. What is the phase difference between the oscillations of two points?
1. $\frac{\pi}{3}$
2. $\frac{2\pi}{3}$
3. π
4. $\frac{\pi}{6}$

19. A particle executes simple harmonic oscillation with an amplitude a. The period of oscillation is T. The minimum time taken by the particle to travel half of the amplitude from the equilibrium position is:
1. $\frac{T}{4}$
2. $\frac{T}{8}$
3. $\frac{T}{12}$
4. $\frac{T}{2}$

20. A particle executing simple harmonic motion has a kinetic energy $K_0\cos^2\omega t$. The values of the maximum potential energy and the total energy are, respectively,
1. 0 *and* $2K_0$
2. $\frac{K_0}{2}$ *and* K_0
3. K_0 *and* $2K_0$
4. K_0 *and* K_0

21. A mass of 2.0 kg is put on a flat pan attached to a vertical spring fixed on the ground as shown in the figure. The mass of the spring and the pan is negligible. When pressed slightly and released, the mass executes a simple harmonic motion. The spring constant is 200 N/m. What should be the minimum amplitude of the motion, so that the mass gets detached from the pan?

(Take g = 10 m/s^2)



1. 8.0 cm
2. 10.0 cm
3. Any value less than 12.0 cm
4. 4.0 cm

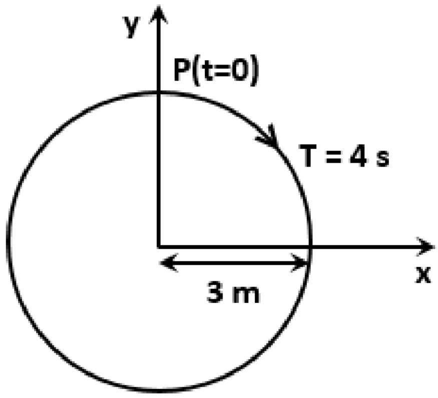
22. The phase difference between the instantaneous velocity and acceleration of a particle executing simple harmonic motion is:
1. 0.5π
2. π
3. 0.707π
4. zero

23. A rectangular block of mass m and area of cross-section A floats in a liquid of density ρ. If it is given a small vertical displacement from equilibrium, it undergoes oscillation with a time period T. Then:
1. $T \propto \sqrt{\rho}$
2. $T \propto \frac{1}{\sqrt{A}}$
3. $T \propto \frac{1}{\rho}$
4. $T \propto \frac{1}{\sqrt{m}}$

24. The displacement of a particle executing simple harmonic motion is given by,
$y = A_0 + A\ \sin\omega t\ +\ B\ \cos\omega t.$
Then the amplitude of its oscillation is given by:
1. $A + B$
2. $A_0\ +\ \sqrt{A^2 + B^2}$
3. $\sqrt{A^2 + B^2}$
4. $\sqrt{A_0^2\ +\ \left(A + B\right)^2}$

25. The average velocity of a particle executing SHM in one complete vibration is:
1. zero
2. $\frac{A\omega}{2}$
3. $A\omega$
4. $\frac{A\omega^2}{2}$

26. The radius of the circle, the period of revolution, initial position and direction of revolution are indicated in the figure.



The y-projection of the radius vector of rotating particle P will be
1. $y(t) =\ 3\ \cos\left(\frac{\pi t}{2}\right),\ where\ y\ in\ m$
2. $y(t) =\ -3\ \cos 2\pi t\ ,\ where\ y\ in\ m$
3. $y(t) =\ 4\ \sin\left(\frac{\pi t}{2}\right),\ where\ y\ in\ m$
4. $y(t) =\ 3\ \cos\left(\frac{3\pi t}{2}\right),\ where\ y\ in\ m$

27. The distance covered by a particle undergoing SHM in one time period is: (amplitude=A)
1. zero
2. A
3. 2A
4. 4A

28. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is:
1. $\frac{3\pi}{2}$rad
2. $\frac{\pi}{2}$rad
3. Zero
4. π rad

29. From the given functions, identify the function which represents a periodic motion:
1. $e^{\omega t}$
2. $\log_e(\omega t)$
3. $\sin\omega t + \cos\omega t$
4. $e^{-\omega t}$

30. The equation of a simple harmonic wave is given by $y = 3 \sin \frac{\pi}{2}\left(50t - x\right)$ where x and y are in meters and t is in seconds. The ratio of maximum particle velocity to the wave velocity is -
1. $\frac{3}{2}\pi$
2. 3π
3. $\frac{2}{3}\pi$
4. 2π

31. Two particles are oscillating along two close parallel straight lines side by side, with the same frequency and amplitudes. They pass each other, moving in opposite directions when their displacement is half of the amplitude. The mean positions of the two particles lie on a straight line perpendicular to the paths of the two particles. The phase difference is :
1. $\pi/6$
2. 0
3. $2\pi/3$
4. π

32. Two pendulums suspended from the same point having lengths 2m and 0.5m. If they are displaced slightly and released then they will be in the same phase when the small pendulum has completed:

1. 2 oscillation
2. 4 oscillation
3. 3 oscillation
4. 5 oscillation

33. If the time of mean position from amplitude (extreme) position is 6 seconds, then the frequency of SHM will be :
1. 0.01 Hz
2. 0.02 Hz
3. 0.03 Hz
4. 0.04 Hz

34. A particle executing simple harmonic motion of amplitude 5 cm has a maximum speed of 31.4 cm/s. The frequency of its oscillation will be
(1) 1 Hz
(2) 3 Hz
(3) 2 Hz
(4) 4 Hz

35. Two spherical bob of masses M_A and M_B are hung vertically from two strings of length l_A and l_B respectively. They are executing SHM with frequency as per the relation $f_A = 2f_B$, Then
1. $l_A = \frac{l_B}{4}$
2. $l_A = 4l_B$
3. $l_A = 2l_B$ & $M_A = 2M_B$
4. $l_A = \frac{l_B}{2}$ & $M_A = \frac{M_B}{2}$

36. The circular motion of a particle with constant speed is:
(1) Periodic and simple harmonic
(2) Simple harmonic but not periodic
(3) Neither periodic nor simple harmonic
(4) Periodic but not simple harmonic

37. Frequency of spring is n after suspending mass M. Now, mass 4M mass is suspended from spring, then the frequency will be:
1. 2n
2. n/2
3. n
4. None of the above

38. A particle, with restoring force proportional to the displacement and resisting force proportional to velocity is subjected to a force F sin ωt. If the amplitude of the particle is maximum for $\omega = \omega_1$ and the energy of the particle maximum for $\omega = \omega_2$, then:
1. $\omega_1 \neq \omega_0 \; and \; \omega_2 = \omega_0$
2. $\omega_1 = \omega_0 \; and \; \omega_2 = \omega_0$
3. $\omega_1 = \omega_0 \; and \; \omega_2 \neq \omega_0$
4. $\omega_1 \neq \omega_0 \; and \; \omega_2 \neq \omega_0$

39. Which one of the following statements is true for the speed 'v' and the acceleration 'a' of a particle executing simple harmonic motion?
(1) Value of a is zero whatever may be the value of 'v'.
(2) When 'v' is zero, a is zero.
(3) When 'v' is maximum, a is zero.
(4) When 'v' is maximum, a is maximum.

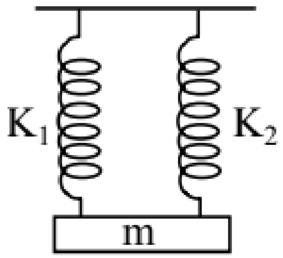
40. Two springs of spring constants k_1 and k_2 are joined in series. The effective spring constant of the combination is given by:
1. $\frac{(k_1+k_2)}{2}$
2. $k_1 + k_2$
3. $\frac{k_1 k_2}{(k_1+k_2)}$
4. $\sqrt{k_1 k_2}$

41. The amplitude of an S.H.O. reduces to 1/3 in first 20 secs. then in first 40 sec. its amplitude becomes -
1. $\frac{1}{3}$
2. $\frac{1}{9}$
3. $\frac{1}{27}$
4. $\frac{1}{\sqrt{3}}$

42. A spring elongates by a length 'L' when a mass 'M' is suspended to it. Now a tiny mass 'm' is attached to the mass 'M' and then released. The new time period of oscillation will be
1. $2\pi\sqrt{\frac{(M+m)l}{Mg}}$
2. $2\pi\sqrt{\frac{ml}{Mg}}$
3. $2\pi\sqrt{L/g}$
4. $2\pi\sqrt{\frac{Ml}{(m+M)g}}$

43. The frequency of a simple pendulum in a free-falling lift will be
1. Zero
2. Infinite
3. Can't be say
4. Finite

44. A mass is suspended separately by two different springs in successive order then the time period is t_1 and t_2 respectively. If it is connected by both springs as shown in the figure then the time period is t_0, the correct relation is:



1. $t_0^2 = t_1^2 + t_2^2$
2. $t_0^{-2} = t_1^{-2} + t_2^{-2}$
3. $t_0^{-1} = t_1^{-1} + t_2^{-1}$
4. $t_0 = t_1 + t_2$

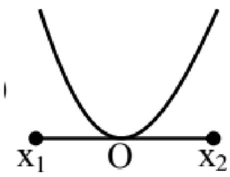
45. When an oscillator completes 100 oscillations, its amplitude is reduced to $\frac{1}{3}$of initial value. What will be its amplitude, when it completes 200 oscillations:
1. $\frac{1}{8}$
2. $\frac{2}{3}$
3. $\frac{1}{6}$
4. $\frac{1}{9}$

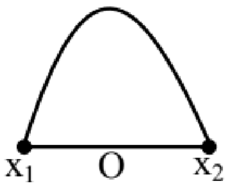
46. The displacement between maximum potential energy position and maximum kinetic energy position for a particle executing simple harmonic motion is
1. $\pm\frac{a}{2}$
2. $+a$
3. $\pm a$
4. -1

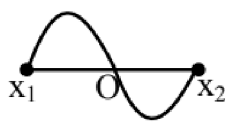
47. The total energy of particle performing SHM depend on : -
1. K, a, m
2. K, a
3. K, a, x
4. K, x

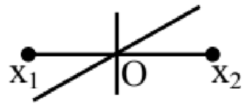
48. The time period of a mass suspended from a spring is T. If the spring is cut into four equal parts and the same mass is suspended from one of the parts, then the new time period will be -
(1) T/4
(2) T
(3) T/2
(4) 2T

49. A particle of mass m oscillates with simple harmonic motion between points x_1 and x_2, the equilibrium position being O. Its potential energy is plotted. It will be as given below in the graph :

1. 

2. 

3. 

4. 

50. In case of a forced vibration, the resonance wave becomes very sharp when the :
(1) Damping force is small
(2) Restoring force is small
(3) Applied periodic force is small
(4) Quality factor is small

51. The potential energy of a simple harmonic oscillator when the particle is halfway to its endpoint will be
1. 2/3 E
2. 1/8 E
3. 1/4 E
4. 1/2 E

52. A body is executing simple harmonic motion with frequency 'n', the frequency of its potential energy is:
1. 3n
2. 4n
3. n
4. 2n

53. A spring is stretched by 5 cm by a force 10 N. The time period of the oscillations when a mass of 2 kg is suspended by it is:
1. 3.14 s
2. 0.628 s
3. 0.0628 s
4. 6.28 s

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Waves

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Standing Waves	18
Beats	10
Doppler's Effect	10
Travelling Wave on String	10
Speed of Sound	2
Wave Motion	2
Energy of Waves	1
Types of Waves	1

1. The two nearest harmonics of a tube closed at one end and open at the other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?
1. 20 Hz
2. 30 Hz
3. 40 Hz
4. 10 Hz

2. Two cars moving in opposite directions approach each other with speeds of 22 m/s and 16.5 m/s respectively. The driver of the first car blows a horn having a frequency of 400 Hz. The frequency heard by the driver of the second car is [velocity of sound 340 m/s]:
1. 361 Hz
2. 411 Hz
3. 448 Hz
4. 350 Hz

3. The second overtone of an open organ pipe has the same frequency as the first overtone of a closed pipe L meter long. The length of the open pipe will be:
1. L
2. 2L
3. L/2
4. 4L

4. Three sound waves of equal amplitudes have frequencies (n- 1), n, (n + 1). They superimpose to give beats. The number of beats produced per second will be
1. 1
2. 4
3. 3
4. 2

5. A tuning fork is used to produce resonance in a glass tube. The length of the air column in this tube can be adjusted by a variable piston. At room temperature of 27°C two successive resonances are produced at 20 cm and 73 cm column length. If the frequency of the tuning fork is 320 Hz, the velocity of sound in air at 27°C is:
1. 330 m/s
2. 339 m/s
3. 350 m/s
4. 300 m/s

6. The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is:
1. 13.2 cm
2. 8 cm
3. 12.5 cm
4. 16 cm

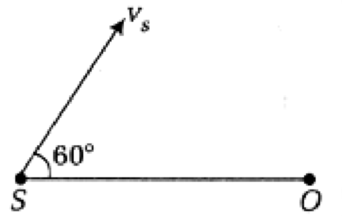
7. A siren emitting a sound of frequency 800 Hz moves away from an observer towards a cliff at a speed of 15 ms^{-1}. Then, the frequency of sound that the observer hears in the echo reflected from the cliff is:(Take, the velocity of sound in air = 330 ms^{-1})
1. 800 Hz
2. 838 Hz
3. 885 Hz
4. 765Hz

8.
An air column, closed at one end and open at the other, resonates with a tuning fork when the smallest length of the column is 50 cm. The next larger length of the column resonating with the same tuning fork is:

1. 100 cm
2. 150 cm
3. 200 cm
4. 66.7cm

9. A uniform rope of length L and mass m_1 hangs vertically from a rigid support. A block of mass m_2 is attached to the free end of the rope. A transverse pulse of wavelength λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2.The ratio $\frac{\lambda_2}{\lambda_1}$ is:
1. $\sqrt{\frac{m_1+m_2}{m_2}}$
2. $\sqrt{\frac{m_2}{m_1}}$
3. $\sqrt{\frac{m_1+m_2}{m_1}}$
4. $\sqrt{\frac{m_1}{m_2}}$

10.
A source of sound S emitting waves of frequency 100 Hz and an observer O is located at some distance from each other. The source is moving with a speed of 19.4 ms^{-1} at an angle of 60^0 with the source-observer line as shown in the figure. The observer is at rest. The apparent frequency observed by the observer (velocity of sound in air 330 ms^{-1}), is:



1. 100 Hz
2. 103 Hz
3. 106 Hz
4. 97 Hz

11. 4.0 gm of a gas occupies 22.4 litres at NTP. The specific heat capacity of the gas at constant volume is 5.0 JK^{-1} mol^{-1}. If the speed of sound in the gas at NTP is 952 ms^{-1}, then the molar heat capacity at constant pressure is: $\left[Take\ R = 8.31\ JK^{-1}\ mol^{-1}\right]$
1. 8.0 JK^{-1} mol^{-1}
2. 7.5 JK^{-1} mol^{-1}
3. 7.0 JK^{-1} mol^{-1}
4. 8.5 JK^{-1} mol^{-1}

12. A string is stretched between fixed points separated by 75.0 cm. It is observed to have resonant frequencies of 420 Hz and 315 Hz. There are no other resonant frequencies between these two. The lowest resonant frequency for this string is:
1. 155 Hz
2. 205 Hz
3. 10.5 Hz
4. 105 Hz

13. The fundamental frequency of a closed organ pipe of length 20 cm is equal to the second overtone of an organ pipe open at both ends. The length of the organ pipe open at both ends is:
1. 80 cm
2. 100 cm
3. 120 cm
4. 140 cm

14. If n_1, n_2, and n_3 are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency n of the string is given by:
1. $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$
2. $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}} + \frac{1}{\sqrt{n_3}}$
3. $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$
4. $n = n_1 + n_2 + n_3$

15. The number of possible natural oscillations of the air column in a pipe closed at one end of length 85 cm whose frequencies lies below 1250 Hz are:(Velocity of sound= 340 m/s)
1. 4
2. 5
3. 7
4. 6

16. A speeding motorcyclist sees a traffic jam ahead of him. He slows down to 36 km/hour. He finds that traffic has eased and a car moving ahead of him at 18 km/hour is honking at a frequency of 1392 Hz. If the speed of sound is 343 m/s, the frequency of the honk as heard by him will be:
1. 1332 Hz
2. 1372 Hz
3. 1412 Hz
4. 1454 Hz

17. If we study the vibration of a pipe open at both ends, then the following statement is not true:
1. Odd harmonics of the fundamental frequency will be generated
2. All harmonics of the fundamental frequency will be generated
3. Pressure change will be maximum at both ends
4. Open end will be an antinode

18. A source of unknown frequency gives 4 beats/s when sounded with a source of known frequency 250 Hz. The second harmonic of the source of unknown frequency gives five beats per second when sounded with a source of frequency 513 Hz. The unknown frequency is:
1. 246 Hz
2. 240 Hz
3. 260 Hz
4. 254 Hz

19.
A wave travelling in the +ve x-direction having maximum displacement along y-direction as 1 m, wavelength $2\pi\ m$ and frequency of $\frac{1}{\pi}$ Hz, is represented by:
1. $y=\sin(2\pi x-2\pi t)$
2. $y=\sin(10\pi x-20\pi t)$
3. $y=\sin(2\pi x+2\pi t)$
4. $y=\sin(x-2t)$

20. When a string is divided into three segments of lengths l_1, l_2 and l_3, the fundamental frequencies of these three segments are v_1, v_2 and v_3 respectively. The original fundamental frequency (v) of the string is
1. $\sqrt{v}=\sqrt{v_1}+\sqrt{v_2}+\sqrt{v_3}$
2. $v=v_1+v_2+v_3$
3. $\frac{1}{v}=\frac{1}{v_1}+\frac{1}{v_2}+\frac{1}{v_3}$
4. $\frac{1}{\sqrt{v}}=\frac{1}{\sqrt{v_1}}+\frac{1}{\sqrt{v_2}}+\frac{1}{\sqrt{v_3}}$

21. Two sources of sound placed close to each other, are emitting progressive waves given by,
y_1=4sin600πt and y_2=5sin608πt
An observer located near these two sources of sound will hear:
1. 4 beats per second with intensity ratio 25:16 between waxing and waning
2. 8 beats per second with intensity ratio 25:16 between waxing and waning
3. 8 beats per second with intensity ratio 81:1 between waxing and waning
4. 4 beats per second with intensity ratio 81:1 between waxing and waning

22. Two waves are represented by the equations $y_1=a\ \sin(\omega t+kx+0.57)\ m$ and $y_2=a\cos(\omega t+kx)\ m$, where x is in meter and t in second. The phase difference between them is:
(1) 1.25 rad
(2) 1.57 rad
(3) 0.57 rad
(4) 1.0 rad

23.
Sound waves travel at 350 m/s through the warm air and at 3500 m/s through brass. The wavelength of a 700 Hz acoustic wave as it enters brass from warm air:
1. increase by a factor 20
2. increase by a factor 10
3. decrease by a factor 20
4. decrease by a factor 10

24. A transverse wave is represented by y = Asin(ωt -kx). For what value of the wavelength is the wave velocity equal to the maximum particle velocity?
1. πA/2
2. πA
3. 2πA
4. A

25. A tuning fork of frequency 512 Hz makes 4 beats/s with the vibrating string of a piano. The beat frequency decreases to 2 beats/s when the tension in the piano string is slightly increased. The frequency of the piano string before increasing the tension was:
1. 510 Hz
2. 514 Hz
3. 516 Hz
4. 508 Hz

26. A wave in a string has an amplitude of 2 cm. The wave travels in the +ve direction of the x-axis with a speed of 128 m/s and it is noted that 5 complete waves fit in 4 m length of the string. The equation describing the wave is:
1. y = (0.02)m sin(7.85x+1005t)
2. y = (0.02)m sin(15.7x -2010t)
3. y = (0.02)m sin(15.7x+2010t)
4. y = (0.02)m sin(7.85x -1005t)

27. The driver of a car travelling with speed 30 m/s towards a hill sounds a horn of frequency 600 Hz. If the velocity of sound in air is 330 m/s the frequency of reflected sound as heard by the driver is:
1. 550 Hz
2. 555.5 Hz
3. 720 Hz
4. 500 Hz

28.
Each of the two strings of length 51.6 cm and 49.1 cm are tensioned separately by 20 N force. Mass per unit length of both the strings is the same and equal to 1 g/m. When both the strings vibrate simultaneously the number of beats is:
1. 5
2. 7
3. 8
4. 3

29.
The wave described by y = 0.25 sin ($10\pi x$ - $2\pi t$), where x and y are in metre and t in second, is a wave travelling along the:
1. –ve x-direction with frequency 1 Hz
2. +ve x-direction with frequency π Hz and wavelength λ = 0.2 m
3. +ve x-direction with frequency 1 Hz and wavelength λ = 0.2m
4. –ve x-direction with amplitude 0.25 m and wavelength λ = 0.2m

30. Two sound waves with wavelength 5.0 m and 5.5 m respectively, each propagates in gas with a velocity of 330 m/s. We expect the following number of beats per seconds:
1. 12
2. 0
3. 1
4. 6

31. A transverse wave propagating along the x-axis is represented by:
$y(x,t) = 8.0 \sin\left(0.5\pi x - 4\pi t - \frac{\pi}{4}\right)$ where x is in meters and t is in seconds. The speed of the wave is:
1. 4π m/s
2. $0.5\ m/s$
3. $\frac{\pi}{4}\ m/s$
4. $8\ m/s$

32. Which one of the following statements is true?
1. Both light and sound waves in the air are transverse.
2. The sound waves in the air are longitudinal while the light waves are transverse.
3. Both light and sound waves in the air are longitudinal.
4. Both light and sound waves can travel in a vacuum.

33. A tuning fork with a frequency 800 Hz produces resonance in a resonance column tube with the upper end open and the lower end closed by the water surface. Successive resonances are observed at lengths 9.75 cm, 31.25 cm, and 52.75 cm. The speed of sound in air is:
1. 500 m/s
2. 156 m/s
3. 344 m/s
4. 172 m/s

34. In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly decreased, the beat frequency increases to 7 Hz. If the frequency of A is 530 Hz, the original frequency of B will be
1. 524 Hz
2. 536 Hz
3. 537 Hz
4.523 Hz

35. The length of the string of a musical instrument is 90 cm and has a fundamental frequency of 120 Hz. Where should it be pressed to produce a fundamental frequency of 180 Hz?
1. 75 cm
2. 60 cm
3. 45 cm
4. 80 cm

36. A train is moving at a speed of 220 ms^{-1} towards a stationary object, emits a sound of frequency 1000 Hz. Some of the sound reaching the object gets reflected back to the train as echo. The frequency of the echo as detected by the driver of the train is -(speed of sound in air is 330 ms^{-1})
1. 4000 Hz
2. 5000 Hz
3. 3000 Hz
4. 3500 Hz

37. Two identical piano wires, kept under the same tension T, have a fundamental frequency of 600 Hz. The fractional increase in the tension of one of the wires which will lead to the occurrence of 6 beats/s when both the wires oscillate together would be :
1. 0.01
2. 0.02
3. 0.03
4. 0.04

38. For a wave $y = y_0 \sin\ (\omega t - kx)$, for what value of λ is the maximum particle velocity equal to two times the wave velocity :
1. πy_0
2. $2\pi y_0$
3. $\pi y_0/2$
4. $4\pi y_0$

39. Two stationary sources each emitting waves of wave length λ. An observer moves from one source to other with velocity u. Then number of beats heared by him :
1. $\frac{2u}{\lambda}$
2. $\frac{u}{\lambda}$
3. $\sqrt{\mu\lambda}$
4. $\frac{\mu}{2\lambda}$

40. A string is cut into three parts, having fundamental frequencies n_1, n_2 and n_3 respectively. Then original fundamental frequency 'n' related by the expression as :
1. $\frac{1}{n}=\frac{1}{n_1}+\frac{1}{n_2}+\frac{1}{n_3}$
2. $n=n_1\times n_2\times n_3$
3. $n=n_1+n_2+n_3$
4. $n=\frac{n_1+n_2+n_3}{3}$

41. The equations of two waves given as x = acos(ωt + δ) and y = a cos (ωt + α), Where δ = α + π/2, then resultant wave represent :
1. a circle (c.w)
2. a circle (a.c.w)
3. an Ellipse (c.w)
4. an ellipse (a.c.w)

42. Two vibrating tuning forks produce progressive waves given by Y_1 = 4sin500πt and Y_2 = 2sin506πt. The number of beats produced per minute is:
(1) 3
(2) 360
(3) 180
(4) 60

43. A standing wave having 3 nodes and 2 antinodes is formed between 1.21 Å distance, then the wavelength is :
1. 1.21 Å
2. 2.42 Å
3. 0.605 Å
4. 4.84 Å

44. A point source emits sound equally in all directions in a non-absorbing medium. Two points P and Q are at distances of 2m and 3m respectively from the source. The ratio of the intensities of the waves at P and Q is:
(1) 3 : 2
(2) 2 : 3
(3) 9 : 4
(4) 4 : 9

45. If a source moves perpendicularly from the listener, then the change in frequency will be :
1. 2 n
2. n
3. n/2
4. Zero

46. A car is moving towards a high cliff. The car driver sounds a horn of frequency 'f'. The reflected sound heard by the driver has a frequency of 2f. If 'v' be the velocity of sound, then the velocity of the car, in the same velocity units, will be:
(1) v/3
(2) v/4
(3) v/2
(4) v/$\sqrt{2}$

47. A cylindrical tube (L = 125 cm) is resonant with a tuning fork of frequency 330 Hz. If it is filling by water then to get resonance again, minimum length of water column is (V_{air} = 330 m/s)-
1. 50 cm
2. 60 cm
3. 25 cm
4. 20 cm

48. The phase difference between two waves, represented by
$y_1=10^{-6}\sin\{100t+(x/50)+0.5\}m$
$y_2=10^{-6}\cos\left\{100t+\left(\frac{x}{50}\right)\right\}m$
where X is expressed in metres and t is expressed in seconds, is approximately:
(1) 2.07 radians
(2) 0.5 radians
(3) 1.5 radians
(4) 1.07 radians

49. A wave travelling in positive X-direction with A = 0.2 m velocity = 360 m/s and λ = 60 m, then correct expression for the wave is:
1. $y=0.2\ \sin\left[2\pi\left(6t+\frac{x}{60}\right)\right]$
2. $y=0.2\ \sin\left[\pi\left(6t+\frac{x}{60}\right)\right]$
3. $y=0.2\ \sin\left[2\pi\left(6t-\frac{x}{60}\right)\right]$
4. $y=0.2\ \sin\left[\pi\left(6t-\frac{x}{60}\right)\right]$

50. A whistle revolves in a circle with angular speed ω = 20 rad/sec using a string of length 50 cm. If the frequency of sound from the whistle is 385 Hz, then what is the minimum frequency heard by an observer which is far away from the centre : - (V_{sound} = 340 m/s)
(1) 385 Hz
(2) 374 Hz
(3) 394 Hz
(4) 333 Hz

51. If the tension and diameter of a sonometer wire of fundamental frequency n is doubled and density is halved then its fundamental frequency will become
1. $\frac{n}{4}$
2. $\sqrt{2}\,n$
3. n
4. $\frac{n}{\sqrt{2}}$

52. Two waves having equation
$x_1 = a \sin(\omega t + \phi_1)$
$x_2 = a \sin(\omega t + \phi_2)$
If in the resultant wave the frequency and amplitude remains equals to amplitude of superimposing waves. Then phase difference between them : -
1. $\frac{\pi}{6}$
2. $\frac{2\pi}{3}$
3. $\frac{\pi}{4}$
4. $\frac{\pi}{3}$

53. An observer moves towards a stationary source of sound with a speed 1/5th of the speed of sound. The wavelength and frequency of the source emitted are λ and f respectively. The apparent frequency and wavelength recorded by the observer are respectively :
(1) 1.2f, 1.2λ
(2) 1.2f, λ
(3) f, 1.2λ
(4) 0.8f, 0.8λ

54. The equation of a wave is represented by : -
$y = 10^{-4} \sin\left(100t - \frac{x}{10}\right) m$, then the velocity of wave will be : -
1. 100 m/s
2. 4 m/s
3. 1000 m/s
4. 0.00 m/s

Electric Charges & Fields

(Expected Questions in NEET 2022: 1-2)

Subtopic Name	Number of Questions
Electric Field	12
Gauss's Law	10
Electric Dipole	8
Coulomb's Law	7
Ways of Charging	1

1. Suppose the charge of a proton and an electron differ slightly. One of them is –e, the other is (e+ Δe). If the net of electrostatic force and gravitational force between two hydrogen atoms placed at a distance d (much greater than atomic size) apart is zero, then Δe is of the order of? [Given mass of hydrogen $m_h = 1.67 \times 10^{-27}$ kg]

1. 10^{-23} C

2. 10^{-37} C

3. 10^{-47}C

4. 10^{-20} C

2. An electric dipole is placed at an angle of 30 ° with an electric field intensity 2 x 10^5 N/C. It experiences a torque equal to 4 Nm. The charge on the dipole, if the dipole length is 2 cm, is

1. 8 mC

2. 2 mC

3. 5 mC

4. 7 μC

3. An electron falls from rest through a vertical distance h in a uniform and vertically upward-directed electric field E. The direction of the electric field is now reversed, keeping its magnitude the same. A proton is allowed to fall from rest through the same vertical distance h. The fall time of the electron in comparison to the fall time of the proton is:

1. smaller.

2. 5 times greater.

3. 10 times greater.

4. equal.

4. A toy car with charge q moves on a frictionless horizontal plane surface under the influence of a uniform electric field $\vec{E}$. Due to the force $q\vec{E}$, its velocity increases from 0 to 6 m/s in one-second duration. At that instant, the direction of the field is reversed. The car continues to move for two more seconds under the influence of this field. The average velocity and the average speed of the toy car between 0 to 3 seconds are respectively:-

1. 2 m/s, 4 m/s

2. 1 m/s, 3 m/s

3. 1 m/s, 3.5 m/s

4. 1.5 m/s, 3 m/s

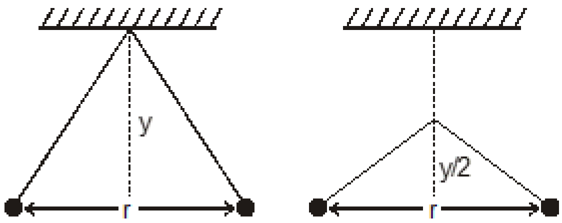
5.
Two identical charged spheres suspended from a common point by two massless strings of lengths l, are initially at a distance d (d << l) apart because of their mutual repulsion. The charges begin to leak from both the spheres at a constant rate. As a result, the spheres approach each other with a velocity v. Then, v varies as a function of the distance x between the sphere, as
1. v $\propto$ x
2. v $\propto x^{-1/2}$
3. v $\propto x^{-1}$
4. v $\propto x^{1/2}$

6.

The electric field in a certain region is acting radially outward and is given by E = Ar. A charge contained in a sphere of radius 'a' centered at the origin of the field will be given by
1. $4\pi\varepsilon_o Aa^2$
2. $\varepsilon_o Aa^2$
3. $4\pi\varepsilon_o Aa^3$
4. $\varepsilon_o Aa^3$

7.

Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation between them is r. Now the strings are rigidly clamped at half the height. The equilibrium separation between the balls now become:



1. $\dfrac{r}{\sqrt[3]{2}}$

2. $\dfrac{r}{\sqrt[2]{2}}$

3. $\dfrac{2r}{3}$

4. None of the above

8. What is the flux through a cube of side a, if a point charge of q is placed at one of its corners?

1. $\frac{2q}{\varepsilon_o}$

2. $\frac{q}{8\varepsilon_o}$

3. $\frac{q}{\varepsilon_o}$

4. $\frac{q}{2\varepsilon_o}$

9.
A charge Q is enclosed by a Gaussian spherical surface of radius R. If the radius is doubled, then the outward electric flux will

1. be reduced to half

2. remain the same

3. be doubled

4. increased four times

10. Two positive ions, each carrying a charge q, are separated by a distance d. If F is the force of repulsion between the ions, the number of electrons missing from each ion will be (e being the charge on an electron)

1. $\frac{4\pi\varepsilon_0 F d^2}{e^2}$

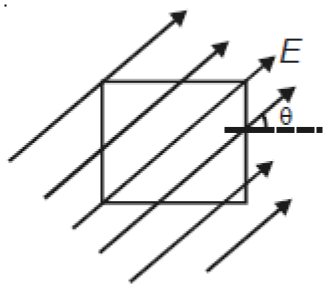
2. $\sqrt{\frac{4\pi\varepsilon_0 F d^2}{d^2}}$

3. $\sqrt{\frac{4\pi\varepsilon_0 F d^2}{e^2}}$

4. $\frac{4\pi\varepsilon_0 F d^2}{q^2}$

11.

A square surface of side L metre in the plane of the paper is placed in a uniform electric field E (volt/m) acting along the same place at an angle θ with the horizontal side of the square as shown in figure. The electric flux linked to the surface in unit of V-m, is



1. EL^2

2. $EL^2 \ \cos\ \theta$

3. $EL^2 \ \sin\ \theta$

4. 0

12.
The mean free path of electrons in a metal is 4 x 10^{-8} m. The electric field which can give on an average 2 eV energy to an electron in the metal will be in the unit of Vm^{-1}

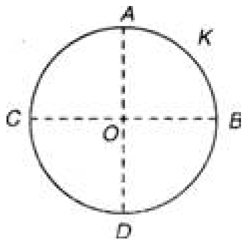
1. 8 x 10^{7}

2. 5 x 10^{-11}

3. 8 X 10^{-11}

4. 5 X 10^{7}

13.
A thin conducting ring of radius R is given a charge +Q. The electric field at the centre O of the ring due to the charge on the part AKB of the ring is E. The electric field at the centre due to the charge on the part ACDB of the ring is



1. 3E along KO

2. E along OK

3. f along KO

4. 3 E along OK

14. Three-point charges + q and -2q and +q are placed at points (x=0, y=a, z=0), (x=0, y=0, z=0) and (x=a, y=0, z=0), respectively. The magnitude and direction of the electric dipole moment vector of this charge assembly are:

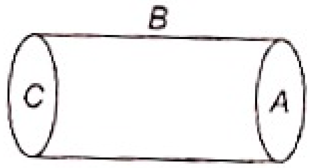
1. $\sqrt{2}$qa along +y direction

2. $\sqrt{2}$qa along the line joining points (x=0, y= 0, z=0) And (x=a, y=a, z=0)

3. qa along the line joining points (x=0, y=0, z=0) And (x=a, y=a, z=0)

4. $\sqrt{2}$qa along +x direction

15. A hollow cylinder has a charge q coulomb within it(at the geometrical centre). If ϕ is the electric flux in unit of Volt-meter associated with the curved surface B, the flux linked with the plane surface A in unit of Volt-meter will be:



1. $\frac{1}{2}\left(\frac{q}{\varepsilon_0}-\Phi\right)$

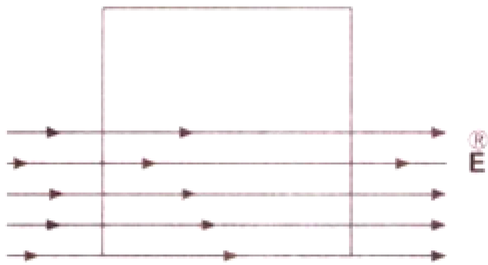
2. $\frac{q}{2\varepsilon_0}$

3. $\frac{\Phi}{3}$

4. $\frac{q}{\varepsilon_0}-\Phi$

16.

A square surface of side L m is in the plane of the paper. A uniform electric field $\bar{E}$ (V/m), also in the plane of the paper, is limited only to the lower half of the square surface, (see figure). The electric flux in SI units associated with the surface is :



1. $EL^2/(2\varepsilon_0)$

2. $EL^2/2$

3. zero

4. EL^2

17. A hollow metal sphere of radius R is uniformly charged. The electric field due to the sphere at a distance r from the centre:

1. decreases as r increases for r < R and for r > R.

2. increases as r increases for r < R and for r > R.

3. zero as r increases for r < R, decreases as r increases for r > R.

4. zero as r increases for r < R, increases as r increases for r > R.

18. Two point charges A and B, having charges +Q and -Q respectively, are placed at certain distance apart and force acting between them is F. If 25% charge of A is transferred to B, then force between the charges becomes:

1. $\frac{4F}{3}$

2. F

3. $\frac{9F}{16}$

4. $\frac{16F}{9}$

19. Two parallel infinite line charges with linear charge densities $+\lambda\, C/m\, and\, +\lambda\, C/m$ are placed at a distance R. Electric field mid-way between the two line charges is-

1. $\frac{\lambda}{2\pi\varepsilon_0 \mathrm{R}} N/C$

2. zero

3. $\frac{2\lambda}{\pi\varepsilon_0 \mathrm{R}} N/C$

4. $\frac{\lambda}{\pi\varepsilon_0 \mathrm{R}} N/C$

20. A sphere encloses an electric dipole with charges $\pm 3 \times 10^{-6} C$. What is the total electric flux through the sphere?

1. -3$\times 10^{-6}$

2. zero

3. 3$\times 10^{-6}$ Nm^2/C

4. 6$\times 10^{-6}$ Nm^2/C

21. A spherical conductor of radius 10 cm has a charge of 3.2 x 10^{-7} C distributed uniformly. What is the magnitude of the electric field at a point 15 cm from the center of the sphere?

$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \mathrm{~N~m^2/C^2}\right)$

1. 1.28 x 10^5 N/C

2. 1.28 x 10^6 N/C

3. 1.28 x 10^7 N/C

4. 1.28 x 10^4 N/C

22. The electric field at a point on the equatorial plane at a distance r from the centre of a dipole having dipole moment $\overrightarrow{P}$ is given by:

(r>> separation of two charges forming the dipole, ε_0 = permittivity of free space)

1. $\overrightarrow{\mathrm{E}} = \frac{\overrightarrow{\mathrm{P}}}{4\pi\, \varepsilon_0\, \mathrm{r}^3}$

2. $\overrightarrow{\mathrm{E}} = \frac{2\overrightarrow{\mathrm{P}}}{4\pi\, \varepsilon_0\, \mathrm{r}^3}$

3. $\overrightarrow{\mathrm{E}} = -\frac{\overrightarrow{\mathrm{P}}}{4\pi\, \varepsilon_0\, \mathrm{r}^2}$

4. $\overrightarrow{\mathrm{E}} = -\frac{\overrightarrow{\mathrm{P}}}{4\pi\, \varepsilon_0\, \mathrm{r}^3}$

23. The acceleration of an electron due to the mutual attraction between the electron and a proton when they are $1.6\ \overset{o}{A}$ apart is,

$\left(m_e \simeq\ 9\times10^{-31}\ kg,\ e=1.6\times10^{-19}\ C\right)$

$\left(Take\ \frac{1}{4\pi\varepsilon_0}\ =\ 9\times10^{9}\ Nm^2C^{-2}\right)$

1. $10^{24}\ m/s^2$

2. $10^{23}\ m/s^2$

3. $10^{22}\ m/s^2$

4. $10^{25}\ m/s^2$

24. The electric field at a distance $\frac{3R}{2}$ from the centre of a charged conducting spherical shell of radius R is E. The electric field at a distance $\frac{R}{2}$ from the centre of the sphere is -

1. E

2. $\frac{E}{2}$

3. $\frac{E}{2}$

4. Zero

25. A hollow sphere of radius 1m is given a positive charge of 10μC. The electric field at the centre of hollow sphere will be :

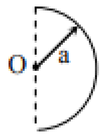
1. $60\ \times10^{3}\ Vm^{-1}$

2. $90\times10^{3}\ Vm^{-1}$

3. Zero

4. Infinite

26. Electric field at centre O of semicircle of radius 'a' having linear charge density λ given is given by



1. $\frac{2\lambda}{\in_0 a}$

2. $\frac{\lambda\pi}{\in_0 a}$

3. $\frac{\lambda}{2\pi\in_0 a}$

4. $\frac{\lambda}{\pi\in_0 a}$

27. A charge Q is situated at the corner of a cube, the electric flux passed through all the six faces of the cube is :

1. $\frac{Q}{6\in_0}$

2. $\frac{Q}{8\in_0}$

3. $\frac{Q}{\in_0}$

4. $\frac{Q}{2\in_0}$

28. Who evaluated the mass of electron indirectly with help of charge :

1. Thomson

2. Millikan

3. Rutherford

4. Newton

29. A charge q is placed in an uniform electric field E. If it is released, then the K.E of the charge after travelling distance y will be :
1. qEy
2. 2qEy
3. $\frac{qEy}{2}$
4. $\sqrt{qEy}$

30. Electric field at the equator of a dipole is E. If strength and distance is now doubled then the electric field will be :
1. E/2
2. E/8
3. E/4
4. E

31. A point Q lies on the perpendicular bisector of an electric dipole of dipole moment p. If the distance of Q from the dipole is r (much larger than the size of the dipole), then the electric field at Q is proportional to :
1. $P^2 \; and \; r^{-3}$
2. $P \; and \; r^{-2}$
3. $P^{-1} \; and \; r^{-2}$
4. $P \; and \; r^{-3}$

32. The unit of permittivity of free space ε_0 is :-

(1) Newton metre^2 / Coulomb^2

(2) Coulomb^2 /Newton metre^2

(3) Coulomb^2/ (Newton metre)^2

(4) Coulomb/Newton metre

33. In millikan oil drop experiment a charged drop falls with a terminal velocity v. If an electric field E is applied vertically upwards it moves with terminal velocity 2v in upward direction. If electric field reduces to E/2 then its terminal velocity will be -

1. v/2
2. v
3. $\frac{3v}{2}$
4. 2v

34. A charge Q μc is placed at the centre of cube, the flux coming out from any surfaces will be : -

1. $\frac{Q}{6\varepsilon_0} \times 10^{-6}$
2. $\frac{Q}{6\varepsilon_0} \times 10^{-3}$
3. $\frac{Q}{2\varepsilon_0}$
4. $\frac{Q}{8\varepsilon_0}$

35. A dipole of moment $\vec{p}$ is placed in uniform electric field $\vec{E}$ then torque acting on it is given by :-

1. $\vec{T} = \vec{p} \cdot \vec{E}$
2. $\vec{T} = \vec{p} \times \vec{E}$
3. $\vec{T} = \vec{p} + \vec{E}$
4. $\vec{T} = \vec{p} - \vec{E}$

36. A charge q is located at the centre of a cube. The electric flux through any face is -

1. $\frac{2\pi q}{6(4\pi\varepsilon_0)}$

2. $\frac{4\pi q}{6(4\pi\varepsilon_0)}$

3. $\frac{\pi q}{6(4\pi\varepsilon_0)}$

4. $\frac{q}{6(4\pi\varepsilon_0)}$

37. Polar molecules are the molecules:

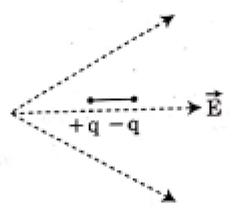
1. acquire a dipole moment only when magnetic field is absent.

2. having a permanent electric dipole moment.

3. having zero dipole moment.

4. acquire a dipole moment only in the presence of electric field due to displacement of charges.

38. A dipole is placed in an electric field as shown. In which direction will it move?



1. towards the left as its potential energy will decrease.

2. towards the right as its potential energy will increase.

3. towards the left as its potential energy will increase.

4. towards the right as its potential energy will decrease.

Selected Questions (Only NCERT based)
from AIPMT & AIPMT 1998 to NEET 2021

Electrostatic Potential & Capacitance

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Electric Potential	12
Energy stored in Capacitor	11
Combination of Capacitors	8
Dielectrics	5
Electric Potential Energy	5
Relation between Field & Potential	4
Torque & Energy of Dipole in External Field	4
Capacitance	2
Electrostatic Shielding	1
Equipotential Surfaces	1

1. A capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. The total electrostatic energy of resulting system:-

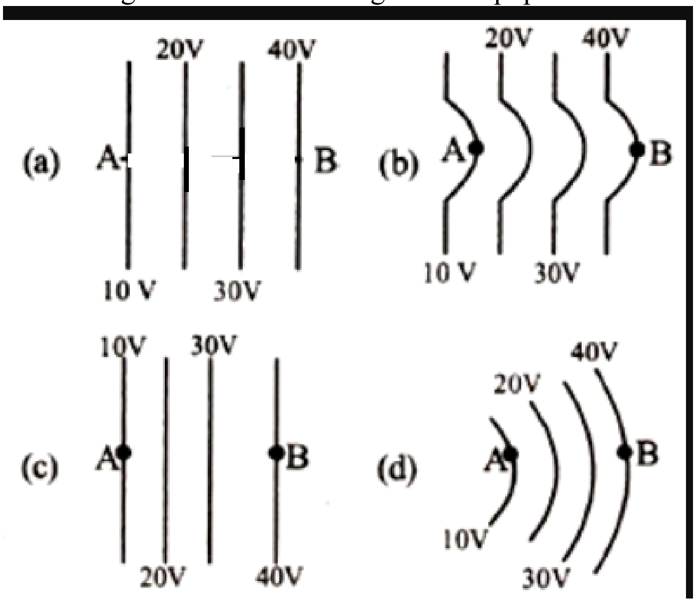
1. Decreases by a factor of 2

2. Remains the same

3. Increases by a factor of 2

4. Increases by a factor of 4

2. The diagrams below show regions of equipotential.



A positive charge is moved from A to B in each diagram.

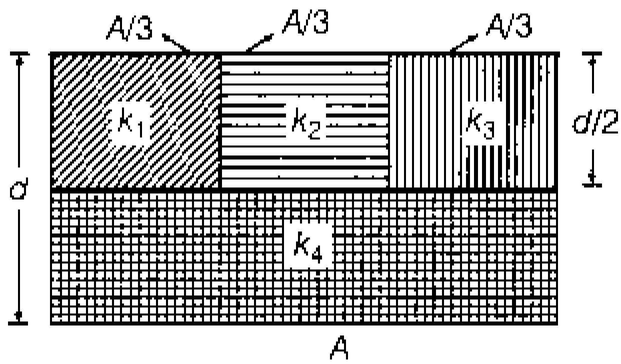
1. In all the four cases , the work done is the same

2. Minimum work is required to move q in figure (a)

3. Maximum work is required to move q in figure (b)

4. Maximum work is required to move q in figure (c)

3. A parallel-plate capacitor of area A, plate separation d and capacitance C is filled with four dielectric materials having dielectric constants k_1, k_2, k_3 and k_4 as shown in the figure below. If a single dielectric material is to be used to have the same capacitance C in this capacitor, then its dielectric constant k is given by:



1. $k = k_1 + k_2 + k_3 + 3k_4$

2. $k = \frac{2}{3}(k_1 + k_2 + k_3) + 2k_4$

3. $k = \frac{2}{3}k_4\left(\frac{k_1}{k_1+K_4} + \frac{k_2}{k_2+k_4} + \frac{k_3}{k_3+k_4}\right)$

4. $\frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3} + \frac{3}{2k_4}$

4. The electrostatic force between the metal plates of an isolated parallel plate capacitor C having a charge Q and area A, is

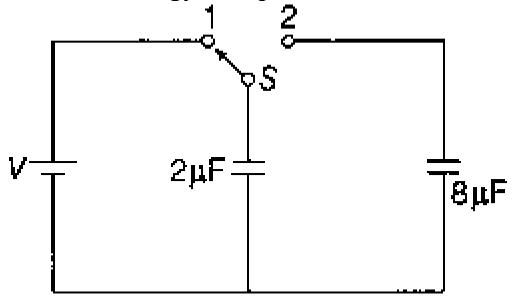
1. Independent of the distance between the plates

2. linearly proportional to the distance between the plates

3. proportional to the sqaure root of the distance between the plates

4. inversely proportional to the distance between the plates

5. A capacitor of 2 μF is charged as shown in the figure. When the switch S is turned to position 2, the percentage of its stored energy dissipated is:



1. 20%
2. 75%
3. 80%
4. 0%

6. A parallel plate air capacitor has capacity C, distance of separation between plates is d and potential difference V is applied between the plates. Force of attraction between the plates of the parallel plate air capacitor is?

1. $\frac{C^2V^2}{2d}$

2. $\frac{CV^2}{2d}$

3. $\frac{CV^2}{d}$

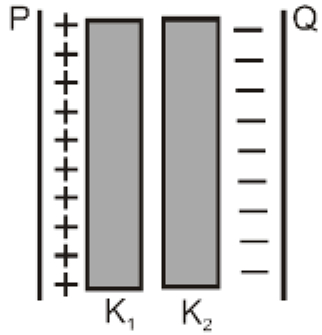
4. $\frac{C^2V^2}{2d^2}$

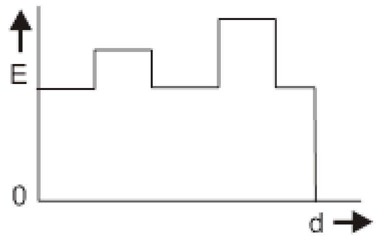
7.

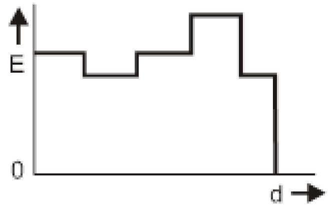
A parallel plate air capacitor of capacitance C is connected to a cell of emf V and then disconnected from it. A dielectric slab of dielectric constant K, which can just fill the air gap of the capacitor, is now inserted in it. Which of the following is incorrect?
1. The potential difference between the plates decreases K times

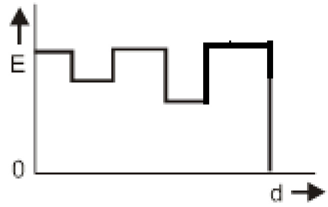
2. The energy stored in the capacitor decreases K times
3. The change in energy stored is $\frac{1}{2}CV^2\left(\frac{1}{K}-1\right)$
4. The charge on the capacitor is not conserved

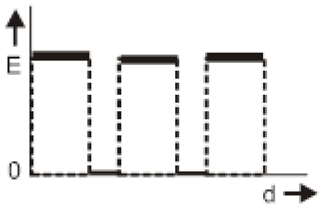
8. Two thin dielectric slabs of dielectric constants K_1 and K_2 ($K_1 < K_2$) are inserted between plates of a parallel plate capacitor, as shown in the figure. The variation of electric field 'E' between the plates with distance 'd' as measured from plate P is correctly shown by:



1. 

2. 

3. 

4. 

9. A conducting sphere of radius R is given a charge Q. The electric potential and the electric field at the centre of the sphere respectively are:

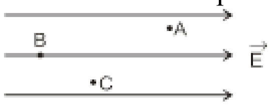
1. Zero and $\frac{Q}{4\pi\varepsilon_0 R^2}$

2. $\frac{Q}{4\pi\varepsilon_0 R}$ and zero

3. $\frac{Q}{4\pi\varepsilon_0 R}$ and $\frac{Q}{4\pi\varepsilon_0 R^2}$

4. Both are zero.

10. A, B and C are three points in a uniform electric field. The electric potential is:



1. maximum at B
2. maximum at C
3. same at all the three points A, B and C
4. maximum at A

11. An electric dipole of moment p is placed in an electric field of intensity E. The dipole acquires a position such that the axis of the dipole makes an angle θ with the direction of the field. Assuming that the potential energy of the dipole to be zero when $\theta = 90^\circ$, the torque and the potential energy of the dipole will respectively be

1. $pE\ \sin\theta, -pE\ \cos\theta$

2. $pE\ \sin\theta, -2pE\ \cos\theta$

3. $pE\ \sin\theta,\ 2pE\ \cos\theta$

4. $pE\ \cos\theta, -pE\ \sin\theta$

12. Four-point charges –Q, -q, 2q and 2Q are placed, one at each corner of the square. The relation between Q and q for which the potential at the center of the square is zero is:

1. Q = -q

2. Q = -2q

3. Q = q

4. Q = 2q

13. A parallel plate condenser has a uniform electric field E (V/m) in the space between the plates. If the distance between the plates is d(m) and the area of each plate is A(m^2), the energy (joule) stored in the condenser is:

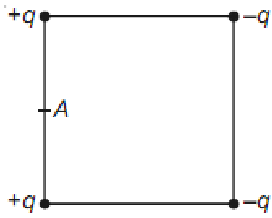
1. $\frac{1}{2}(\varepsilon_o)(E)^2$

2. $\frac{E^2 Ad}{\varepsilon_o}$

3. $\frac{1}{2}(\varepsilon_o)E^2\ Ad$

4. $(\varepsilon_o)EAd$

14. Four electric charges +q, +q, -q and –q are placed at the corners of a square of side 2L (see figure). The electric potential at point A, mid-way between the two charges +q and +q is:



1. $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1+\frac{1}{\sqrt{5}}\right)$

2. $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1-\frac{1}{\sqrt{5}}\right)$

3. zero

4. $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1+\sqrt{5}\right)$

15. A series combination of n_1 capacitors, each of value C_1, is charged by a source of potential difference 4V. When another parallel combination of n_2 capacitors, each of value C_2, is charged by a source of potential difference V, it has the same (total) energy stored in it, as the first combination has. The value of C_2 , in terms of C_1, is then

1. $\frac{2C_1}{n_1n_2}$

2. $16\frac{n_2}{n_1}C_1$

3. $2\frac{n_2}{n_1}C_1$

4. $\frac{16C_1}{n_1n_2}$

16. Three concentric spherical shells have radii a, b and c (a<b<c) and have surface charge densities $\sigma, \ -\sigma$ and σ respectively. If $\mathrm{V_A}, \ \mathrm{V_B}$ and $\mathrm{V_C}$ denote the potential of the three shells, if c=a+b, we have

(1) $\mathrm{V_C} = \mathrm{V_A} \neq \mathrm{V_B}$

(2) $\mathrm{V_C} = \mathrm{V}_B \neq \mathrm{V_A}$

(3) $\mathrm{V_C} \neq \mathrm{V}_B \neq \mathrm{V}_A$

(4) $\mathrm{V_C} = \mathrm{V}_B = \mathrm{V}_A$

17.
Three capacitors each of capacitance C and of breakdown voltage V are joined in series. The capacitance and breakdown voltage of the combination will be:
1. $\frac{C}{3}, \ \frac{V}{3}$
2. $3C, \ \frac{V}{3}$
3. $\frac{C}{3}, \ 3V$
4. 3C, 3V

18. The electric potential at a point in free space due to a charge Q coulomb is Q x 10^{11} V. The electric field at that point is

1. $4\pi\varepsilon_0\mathrm{Q} \times 10^{22} \ \mathrm{V/m}$

2. $12\pi\varepsilon_0\mathrm{Q} \times 10^{20} \ \mathrm{V/m}$

3. $4\pi\varepsilon_0\mathrm{Q} \times 10^{20} \ \mathrm{V/m}$

4. $12\pi\varepsilon_0\mathrm{Q} \times 10^{22} \ \mathrm{V/m}$

19. The energy required to charge a parallel plate condenser of plate separation d and plate area of cross-section A such that the uniform electric field between the plates is E, is?

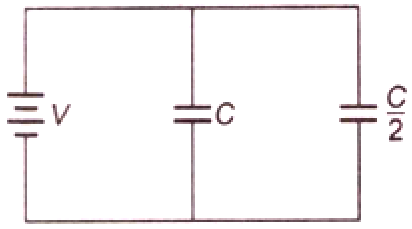
1. $\frac{1}{2} \ \varepsilon_0\mathrm{E}^2/ \ \mathrm{Ad}$

2. $\varepsilon_0\mathrm{E}^2/ \ \mathrm{Ad}$

3. $\varepsilon_0\mathrm{E}^2 \ \mathrm{Ad}$

4. $\frac{1}{2} \ \varepsilon_0\mathrm{E}^2 \ \mathrm{Ad}$

20. Two condensers, one of capacity C and the other of capacity C/2 are connected to a V volt battery, as shown.



The work done in charging fully both the condensers is?

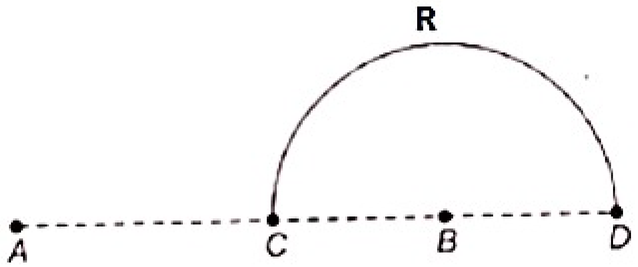
1. $2 \ CV^2$

2. $\frac{1}{4} \ CV^2$

3. $\frac{3}{4} \ CV^2$

4. $\frac{1}{2} \ CV^2$

21. Charges $+q$ and $-q$ are placed at points A and B, respectively; which are at a distance $2L$ apart, C is the midpoint between A and B. The work done in moving a charge +Q along the semicircle CRD is :



1. $\frac{qQ}{4\pi\varepsilon_0 \mathrm{L}}$

2. $\frac{qQ}{2\pi\varepsilon_0 \mathrm{L}}$

3. $\frac{qQ}{6\pi\varepsilon_0 \mathrm{L}}$

4. $-\frac{qQ}{6\pi\varepsilon_0 \mathrm{L}}$

22. An electric dipole of moment $\vec{p}$ is lying along a uniform electric field $\vec{E}$. The work done in rotating the dipole by $90°$ is :

1. $\sqrt{2}pE$

2. $\frac{2E}{2}$

3. 2pE

4. pE

23. A parallel plate air capacitor is charged to a potential difference of V volts. After disconnecting the charging battery, the distance between the plates of the capacitor is increased using an insulating handle. As a result the potential difference between the plates:

1. decreases

2. does not change

3. becomes zero

4. increases

24. Two metal spheres, one of radius R and the other of radius 2R respectively have the same surface charge density σ. They are brought in contact and separated. What will be the new surface charge densities on them?

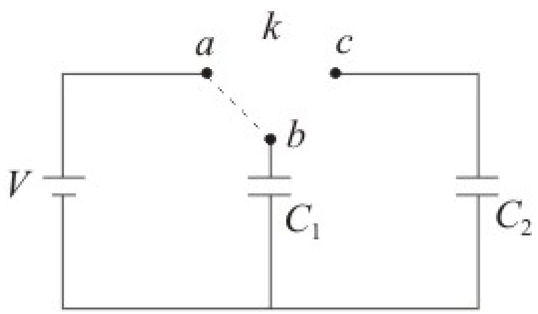
1. $\sigma_1 = \frac{5}{6}\sigma$, $\sigma_2 = \frac{5}{6}\sigma$

2. $\sigma_1 = \frac{5}{2}\sigma$, $\sigma_2 = \frac{5}{6}\sigma$

3. $\sigma_1 = \frac{5}{2}\sigma$, $\sigma_2 = \frac{5}{3}\sigma$

4. $\sigma_1 = \frac{5}{3}\sigma$, $\sigma_2 = \frac{5}{6}\sigma$

25. Two identical capacitors C_1 and C_2 of equal capacitance are connected as shown in the circuit. Terminals a and b of the key k are connected to charge capacitor C_1 using a battery of emf V volt. Now disconnecting a and b terminals, terminals b and c are connected. Due to this what will be the percentage loss of energy?



1. 75%

2. 0%

3. 50%

4. 25%

26. In a certain region of space with volume 0.2 m^3, the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is:

(1) 0.5 N/C

(2) 1 N/C

(3) 5 N/C

(4) zero

27. A short electric dipole has a dipole moment of 16×10^{-9} C m. The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole situated on a line making an angle of 60° with the dipole axis is :

$\left(\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2\right)$

1. 200 V

2. 400 V

3. zero

4. 50 V

28. The capacitance of a parallel plate capacitor with air as medium is $6 \mu\text{F}$. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is: $\varepsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$

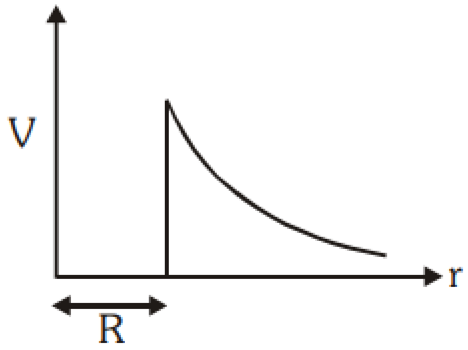
1. $1.77 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$

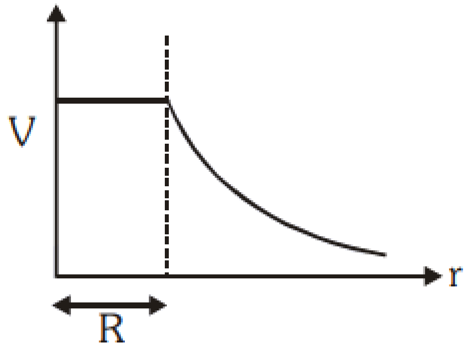
2. $0.44 \times 10^{-10} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$

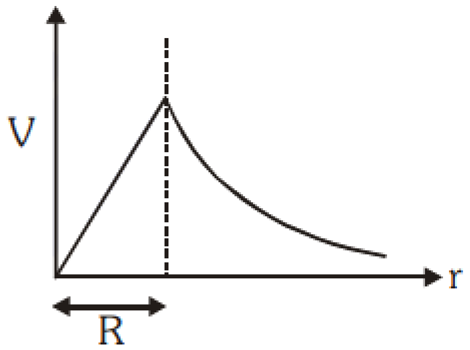
3. $5.00 \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$

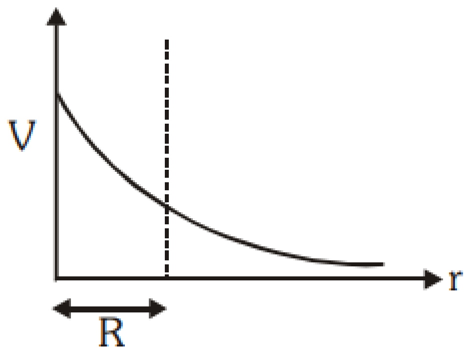
4. $0.44 \times 10^{-13} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$

29. The variation of electrostatic potential with radial distance r from the centre of a positively charged metallic thin shell of radius R is given by the graph:

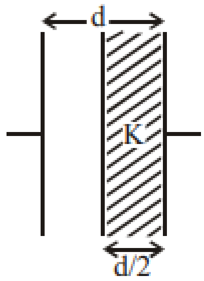
1. 

2. 

3. 

4. 

30. A parallel plate capacitor having cross-sectional area A and separation d has air in between the plates. Now an insulating slab of the same area but thickness d/2 is inserted between the plates as shown in the figure having dielectric constant K(=4). The ratio of new capacitance to its original capacitance will be?



1. 2: 1
2. 8: 5
3. 6: 5
4. 4: 1

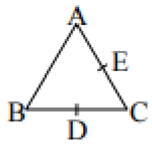
31. Two metallic spheres of radii 1 cm and 3cm are given charges of $-1 \times 10^{-2}\ C$ and $5 \times 10^{-2}\ C$, respectively. If these are connected by a conducting wire , then the final charge on the bigger sphere is-

1. $3 \times 10^{-2}\ C$
2. $4 \times 10^{-2}\ C$
3. $1 \times 10^{-2}\ C$
4. $2 \times 10^{-2}\ C$

32. A parallel plate capacitor has a uniform electric field E in the space between the plates. If the distance between the plates is d and area of each plate is A, the energy stored in the capacitor is-

1. $E^2 Ad/\varepsilon_0$
2. $\frac{1}{2}\varepsilon_0 E^2 Ad$
3. $\varepsilon_0 EAd$
4. $\frac{1}{2}\varepsilon_0 E^2$

33. Three charges, each +q, are placed at the corners of an isosceles triangle ABC of sides BC and AC, 2a. D and E are the mid points of BC and CA. The work done in taking a charge Q from D to E is :



1. $\frac{3qQ}{4\pi\epsilon_0 a}$

2. $\frac{3qQ}{8\pi\epsilon_0 a}$

3. $\frac{qQ}{4\pi\epsilon_0 a}$

4. zero

34. The electric potential V at any point (x, y, z), all in meters in space is given by $V = 4x^2$ volt. The electric field at the point (1, 0, 2) in volt/meter, is :
1. 8 along negative X-axis
2. 8 along positive X-axis
3. 16 along negative X-axis
4. 16 along positive X-axis

35. Two parallel metal plates having charges +Q and –Q face each each other at a certain distance between them. If the plates are now dipped in kerosene oil tank, the electric field between the plates will -

1. increase

2. decrease

3. remain same

4. become zero

36. A capacitor is charged with a battery and energy stored is U. After disconnecting the battery another capacitor of the same capacity is connected in parallel with it. Then energy stored in each capacitor is :

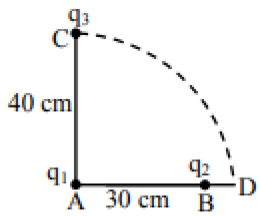
1. U/2

2. U/4

3. 4 U

4. 2 U

37. Two charges q_1 and q_2 are placed 30 cm apart, as shown in the figure. A third charge q_3 is moved along the arc of a circle of radius 40 cm from C to D. The change in the potential energy of the system is $\frac{q_3}{4\pi\epsilon_0}k$, where k is –



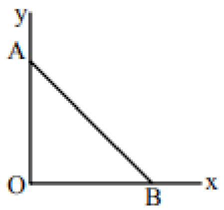
(1) $8q_2$

(2) $6q_2$

(3) $8q_1$

(4) $6q_1$

38. As per this diagram, a point charge +q is placed at the origin O. Work done in taking another point charge –Q from the point A, coordinates (0, a), to another point B, coordinates (a, 0), along the straight path AB is



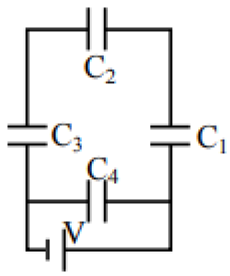
1. $\left(\frac{-qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right)\sqrt{2}a$

2. zero

3. $\left(\frac{qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right)\frac{1}{\sqrt{2}}$

4. $\left(\frac{qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right)\sqrt{2}a$

39. A network of four capacitors of capacity equal to $C_1 = C, C_2 = 2C, C_3 = 3C$ and $C_4 = 4C$ are conducted to a battery as shown in the figure. The ratio of the charges on C_2 and C_4 is –



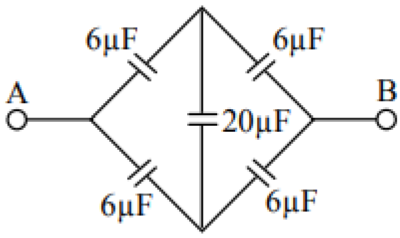
1. $\frac{7}{4}$

2. $\frac{22}{3}$

3. $\frac{3}{22}$

4. $\frac{4}{7}$

40. The effective capacity of the network between terminals A and B is:



1. 6 μF
2. 20 μF
3. 3 μF
4. 10 μF

41. Eight equals charged tiny drops are combined to form a big drop. If the potential on each drop is 10V then potential of big drop will be -
1. 40V
2. 10V
3. 30V
4. 20V

42. A bullet of mass 2 g is having a charge of 2 μC. Through what potential difference must it be accelerated, starting from rest, to acquire a speed of 10 m/s ?

(1) 50 kV

(2) 5V

(3) 50 V

(4) 5kV

43. An electric dipole has the magnitude of its charges as q and its dipole moment is p. It is placed in a uniform electric field E. If its dipole moment is along the direction of the field, the force on it and its potential energy are respectively :-

(1) q.E and p.E

(2) zero and minimum

(3) q.E and maximum

(4) 2q.E and minimum

44. The energy and capacity of a charged parallel plate capacitor are E and C respectively. Now a dielective slab of $E_r = 6$ is inserted in it then energy and capacity becomes (Assuming charge on plates remains constant)
(1) 6E, 6C
(2) E, C
(3) $\frac{E}{6}$, $6C$
(4) E, 6C

45. Some charge is being given to a conductor. Then its potential : -

(1) Is maximum at surface

(2) Is maximum at centre

(3) Is remain same throughout the conductor

(4) Is maximum somewhere between surface and centre

46. A capacitor of capacity C_1 charged upto V volt and then connected to an uncharged capacitor C_2. Then final P.D. across each will be

1. $\frac{C_2V}{C_1+C_2}$

2. $\frac{C_1V}{C_1+C_2}$

3. $\left(1+\frac{C_2}{C_1}\right)$

4. $\left(1-\frac{C_2}{C_1}\right)V$

47. Identical charges (–q) are placed at each corner of a cube of side 'b' then electrical potential energy of charge (+q) which is placed at centre of cube will be

1. $\frac{-4\sqrt{2}q^2}{\pi\varepsilon_0 b}$

2. $\frac{-8\sqrt{2}q^2}{\pi\varepsilon_0 b}$

3. $\frac{-4q^2}{\sqrt{3}\pi\varepsilon_0 b}$

4. $\frac{8\sqrt{2}q^2}{4\pi\varepsilon_0 b}$

48. Energy per unit volume for a capacitor having area A and separation d kept at potential diffeence V is given by : -

1. $\frac{1}{2}\varepsilon_0\frac{V^2}{d^2}$

2. $\frac{1}{2\varepsilon_0}\frac{V^2}{d^2}$

3. $\frac{1}{2}CV^2$

4. $\frac{Q^2}{2C}$

49. Three capacitors each of capacity 4 μF are to be connected in such a way that the effective capacitance is 6μF. This can be done by:

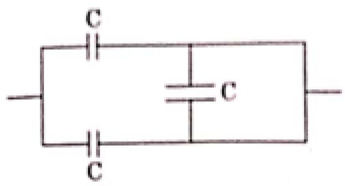
(1) connecting all of them in series

(2) connecting them in parallel

(3) connecting two in series and one in parallel

(4) connecting two in parallel and one in series

50. The equivalent capacitance of the combination shown in the figure is:



1. C/2

2. 3C/2

3. 3C

4. 2C

51. A parallel plate capacitor has a uniform electric field '$\overrightarrow{E}$' in the space between the plates. If the distance between the plates is 'd' and the area of each plate is 'A', the energy stored in the capacitor is: $(\varepsilon_0 = \text{permittivity of free space})$

1. $\frac{1}{2}\varepsilon_0 E^2 Ad$

2. $\frac{E^2 Ad}{\varepsilon_0}$

3. $\frac{1}{2}\varepsilon_0 E^2$

4. $\varepsilon_0 EAd$

52. Two charged spherical conductors of radius R_1 and R_2 are connected by a wire. Then the ratio of surface charge densities of the spheres (σ_1/σ_2) is:

1. $\sqrt{\left(\frac{R_1}{R_2}\right)}$

2. $\frac{R_1^2}{R_2^2}$

3. $\frac{R_1}{R_2}$

4. $\frac{R_2}{R_1}$

53. Twenty seven drops of same size are charged at 220 V each. They combine to form a bigger drop. Calculate the potential of the bigger drop.

1. 1520 V

2. 1980 V

3. 660 V

4. 1320 V

Current Electricity

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Heating Effects of Current	22
Combination of Resistors	19
Kirchoff's Voltage Law	13
Meter Bridge & Potentiometer	13
emf & Terminal Voltage	9
Wheatstone Bridge	6
Current & Current Density	5
Grouping of Cells	5
Colour Coding of Resistors	1
Derivation of Ohm's Law	1

1. A set of 'n' equal resistors, of value 'R' each, are connected in series to a battery of emf 'E' and internal resistance 'R'. The current drawn is I. Now, the 'n' resistors are connected in parallel to the same battery. Then the current drawn becomes 10I. The value of 'n' is:-

1. 10

2. 11

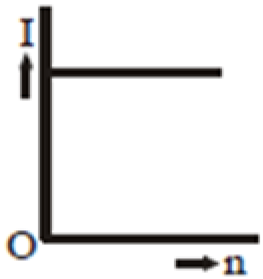
3. 20

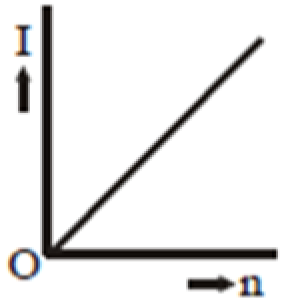
4. 9

2.
The resistance of a wire is ‘R’ ohm. If it is melted and stretched ‘n’ times its original length, its new resistance will be:-
1. $\frac{R}{n}$
2. n^2R
3. $\frac{R}{n^2}$
4. nR

3.

A battery consists of a variable number 'n' of identical cells (having internal resistance 'r' each) which are connected in series. The terminals of the battery are short-circuited and the current I is measured. Which of the graphs shows the correct relationship between I and n?



1.


2.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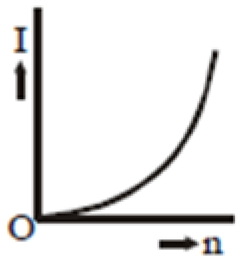


4.

4. A carbon resistor (47 ± 4.7) kΩ is to be marked with rings of different colours for its identification. The colour code sequence will be :-

1. Violet - Yellow - Orange - Silver

2. Yellow - Violet - Orange - Silver

3. Yellow - Green - Violet - Gold

4. Green - Orange - Violet - Gold

5. A potentiometer is an accurate and versatile device to make electrical measurements of E.M.F. because the method involves:-

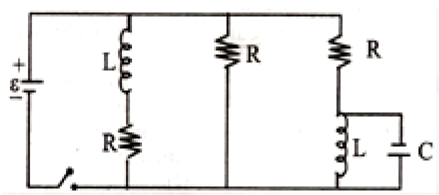
1. Potential gradients

2. A condition of no current flow through the galvanometer

3. A condition of cells, galvanometer, and resistances

4. Cells

6. The figure shows a circuit that contains three identical resistors with resistance R = 9.0 Ω each, two identical inductors with inductance L = 2.0 mH each, and an ideal battery with emf $\varepsilon = 18$ V. The current 'i' through the battery just after the switch closed is:



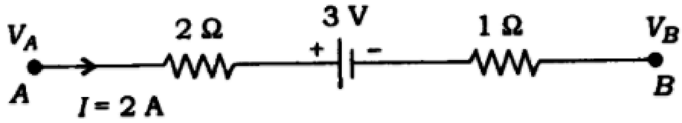
1. 0.2A

2. 2A

3. 4 A

4. 2mA

7. The potential difference $V_A - V_B$ between the points A and B in the given figure is :



1. -3V

2. +3V

3. +6V

4. +9V

8. A filament bulb (500 W, 100 V) is to be used in a 230 V main supply. When a resistance R is connected in series, the bulb works perfectly and consumes 500 W. The value of R is :

1. 230 Ω

2. 46 Ω

3. 26 Ω

4. 13 Ω

9.
A potentiometer wire is 100 cm long and a constant potential difference is maintained across it. Two cells are connected in series first to support one another and then in opposite direction. The balance points are obtained at 50 cm and 10 cm from the positive end of the wire in the two cases. The ratio of emf of two cells is-
1. 5 : 4
2. 3 : 4
3. 3 : 2
4. 5 : 1

10.
The charge following through a resistance R varies with time t as Q = at - bt^2, where a and b are positive constants. The total heat produced in R is:
1. $\frac{a^3R}{3b}$
2. $\frac{a^3R}{2b}$
3. $\frac{a^3R}{b}$
4. $\frac{a^3R}{6b}$

11. Two metal wires of identical dimensions are connected in series. If σ_1 and σ_2 are the conductivities of the metal wires respectively, the effective conductivity of the combination is:

1. $\frac{2\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

2. $\frac{\sigma_1+\sigma_2}{2\sigma_1\sigma_2}$

3. $\frac{\sigma_1+\sigma_2}{\sigma_1\sigma_2}$

4. $\frac{\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

12. A circuit contains an ammeter, a battery of 30 V, and a resistance 40.8 Ω all connected in series. If the ammeter has the coil of resistance 480 Ω and a shunt of 20 Ω, then reading in the ammeter will be:

1. 0.5 A

2. 0.02 A

3. 2 A

4. 1 A

13. A potentiometer wire of length L and a resistance r are connected in series with a battery of e.m.f. $E_0$and resistance r_1. An unknown e.m.f. is balanced at a length l of the potentiometer wire. The e.m.f. E will be given by :

1. $\frac{LE_0r}{lr_1}$

2. $\frac{E_0r}{(r+r_1)} \cdot \frac{l}{L}$

3. $\frac{E_0l}{L}$

4. $\frac{LE_0r}{(r+r_1)1}$

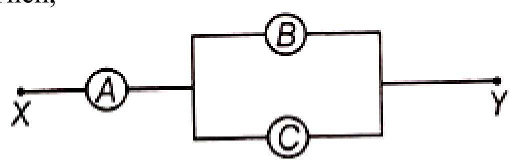
14.

A potentiometer wire has length 4 m and resistance 8Ω. The resistance that must be connected in series with the wire and an accumulator of emf 2V, so as to get a potential gradient 1 mV per cm on the wire is
1. 32 Ω
2. 40 Ω
3. 44 Ω
4. 48 Ω

15.

A, B and C are voltmeters of resistance R, 1.5 R and 3R respectively as shown in the figure. When some potential difference is applied between X and Y, the voltmeter readings are V_A, V_B and V_C respectively.

Then,



1. $V_A = V_B = V_C$
2. $V_A \neq V_B = V_C$
3. $V_A = V_B \neq V_C$
4. $V_A \neq V_B \neq V_C$

16.

Across a metallic conductor of non-uniform cross-section, a constant potential difference is applied. The quantity which remains constant along the conductor is :
1. current density
2. current
3. drift velocity
4. electric field

17. Two cities are 150 km apart. Electric power is sent from one city to another city through copper wires. The fall of potential per km is 8 volt and the average resistance per km is 0.5 The power loss in the wire is:

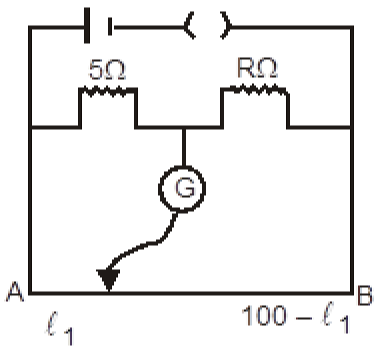
1. 19.2 W

2. 19.2 kW

3. 19.2 J

4. 12.2 kW

18. The figure shows a circuit when resistance in the two arms of the meter bridge are 5 and R, respectively. When the resistance R is shunted with an equal resistance, the new balance point is at 1.6 l_1. The resistance 'R' is :



1. 10

2. 15

3. 20

4. 25

19. A potentiometer circuit has been set up for finding the internal resistance of a given cell. The main battery, used across the potentiometer wire, has an emf of 2.0 V and a negligible internal resistance. The potentiometer wire itself is 4 m long. When the resistance, R, connected across the given cell, has values of (i) infinity (ii) 9.5, the 'balancing lengths, on the potentiometer wire, are found to be 3m and 2.85 m, respectively.
The value of internal resistance of the cell is (in ohm) :

1. 0.25

2. 0.95

3. 0.5

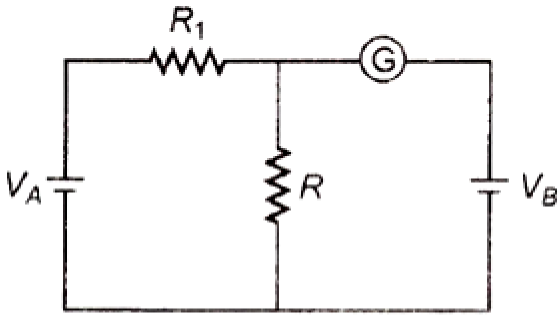
4. 0.75

20.
A wire of resistance 4Ω is stretched to twice its original length. The resistance of stretched wire would be :
1. 4Ω
2. 8Ω
3. 16Ω
4. 2Ω

21.
The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is :
1. 0.5Ω
2. 0.8Ω
3. 1.0Ω
4. 0.2Ω

22.
The resistances of the four arms P, Q, R and S in a Wheatstone's bridge are 10 ohm, 30 ohm, 30 ohm and 90 ohm, respectively. The e.m.f. and internal resistance of the cell are 7 Volt and 5 ohm respectively. If the galvanometer resistance is 50 ohm, the current drawn from the cell will be :
1. 0.2 A
2. 0.1 A
3. 2.0 A
4. 1.0 A

23. In the circuit shown cells, A and B have negligible resistance. For V_A=12 V, R_1=500 Ω, and R=100 Ω, the galvanometer (G) shows no deflection. The value of V_B is:



1. 4 V

2. 2 V

3. 12 V

4. 6 V

24. If voltage across a bulb rated 220 V-100 W drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is :

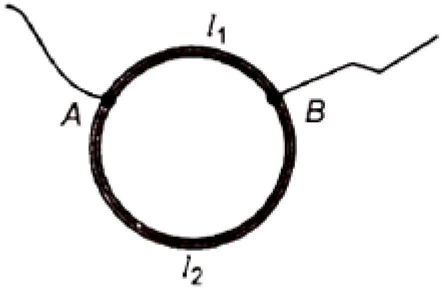
1. 20%

2. 2.5%

3. 5%

4. 10%

25. A ring is made of a wire having a resistance R_0= 12Ω. Find the points A and B, as shown in the figure, at which a current-carrying conductor should be connected so that the resistance R of the subcircuit between these points is equal to 8/3 Ω.



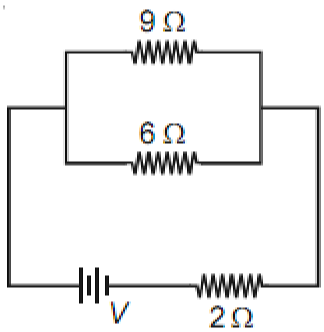
1. $\frac{l_1}{l_2}=\frac{5}{8}$

2. $\frac{l_1}{l_2}=\frac{1}{3}$

3. $\frac{l_1}{l_2}=\frac{3}{8}$

4. $\frac{l_1}{l_2}=\frac{1}{2}$

26. If power dissipated in the 9 Ω resistor in the circuit shown is 36 W, the potential difference across the 2 Ω resistor is:



1. 8 V

2. 10 V

3. 2 V

4. 4 V

27. A current of 2 A flows through a 2 Ω resistor when connected across a battery. The same battery supplies a current of 0.5 A when connected across a 9 Ω resistor. The internal resistance of the battery is:

1. 1/3 Ω

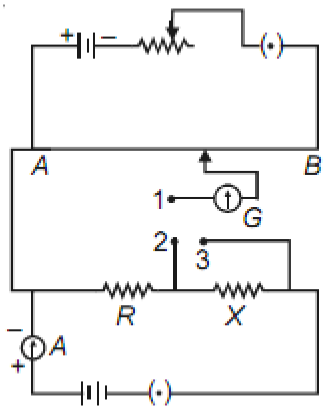
2. 1/4 Ω

3. 1 Ω

4. 0.5 Ω

28.

A potentiometer circuit is set up as shown. The potential gradient across the potentiometer wire is k volt/cm and the ammeter, present in the circuit, reads 1.0 A when the two-way key is switched off. The balance points, when the key between the terminals (i) 1 and 2 (ii) 1 and 3, is plugged in, are found to be at lengths $l_1\,cm$ and $l_2\,cm$ respectively. The magnitudes, of the resistors R and X, in ohm, are then, equal, respectively, to



1. $k(l_2-l_1)$ *and* kl_2

2. kl_1 *and* $k(l_2-l_1)$

3. $k(l_2-l_1)$ *and* kl_1

4. kl_1 *and* kl_2

29. Consider the following two statements :
(A) Kirchhoff's junction law follows the conservation of charge.
(B) Kirchhoff's loop law follows the conservation of energy.

Which of the following is correct?

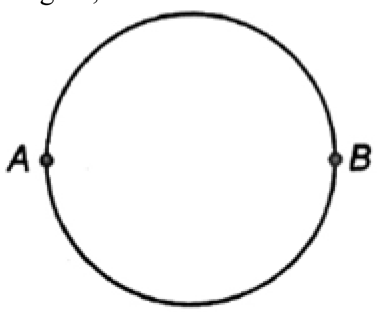
1. Both (A) and (B) are wrong.

2. (A) is correct but (B) is wrong.

3. (A) is wrong and (B) is correct.

4. Both (A) and (B) are correct.

30. A wire of resistance 12 Ωm^{-1} is bent to form a complete circle of radius 10 cm. The resistance between its two diametrically opposite points, A and B as shown in the figure, is:



1. 0.6 $\pi\Omega$
2. 3 $\pi\Omega$

3. 61 $\pi\Omega$

4. 6 $\pi\Omega$

31.
A student measures the terminal potential difference (V) of a cell (of emf E and internal resistance r) as a function of the current (I) flowing through it. The slope and intercept of the graph between V and I, respectively, equal to:

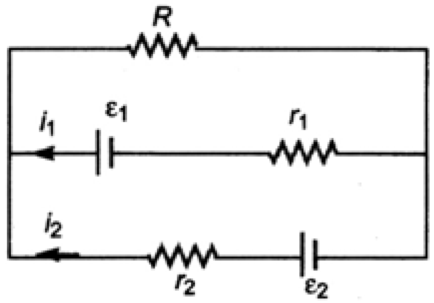
1. E and -r

2. -r and E

3. r and -E

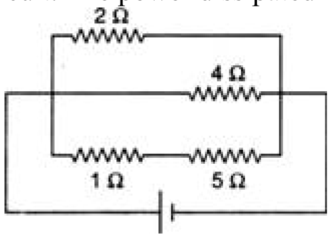
4. -E and r

32. See the electrical circuit shown in this figure. Which of the following equations is a correct equation for it?



1. $\varepsilon_1 - (i_1 + i_2)R - i_1 r_1 = 0$
2. $\varepsilon_2 - i_2 r_2 - \varepsilon_1 - i_1 r_1 = 0$
3. $-\varepsilon_2 - (i_1 + i_2)R + i_2 r_2 = 0$
4. $\varepsilon_1 - (i_1 + i_2)R + i_1 r_1 = 0$

33. A current of 3 A flows through the 2 Ω resistor shown in the circuit. The power dissipated in the 5 Ω resistor is :



1. 4 W
2. 2W
3. 1 W
4. 5W

34.
A wire of a certain material is stretched slowly by ten percent, its new resistance and specific resistance become respectively :

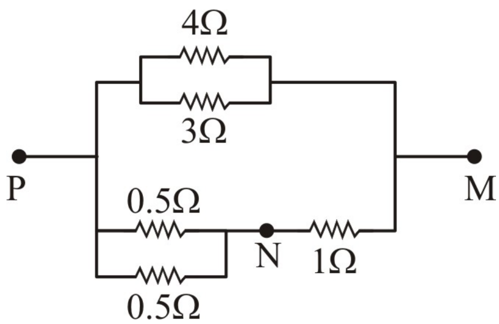
1. 1.2 times, 1.1 times
2. 1.21 times, same
3. both remain the same
4. 1.1 times, 1.1 times

35.
An electric kettle takes 4 A current at 220 V. How much time will it take to boil 1 kg of water from temperature 20°C? The temperature of boiling water is 100 °C.
1. 6.3 min
2. 8.4 min
3. 12.6 min
4. 4.2 min

36.
A cell can be balanced against 100 cm and 110 cm of potentiometer wire, respectively with and without being short-circuited through a resistance of 10 Ω. its internal resistance is :

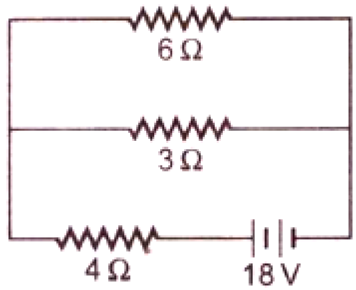
1. 1.0 Ω
2. 0.5 Ω
3. 2.0 Ω
4. zero

37.
In the circuit shown, the current through the 4Ω resistors is 1 A when the points P and M are connected to a DC voltage source. The potential difference between the points M and N is:



1. 1.5 V
2. 1.0 V
3. 0.5 V
4. 3.2 V

38. The total power dissipated in watts in the circuit shown here is:

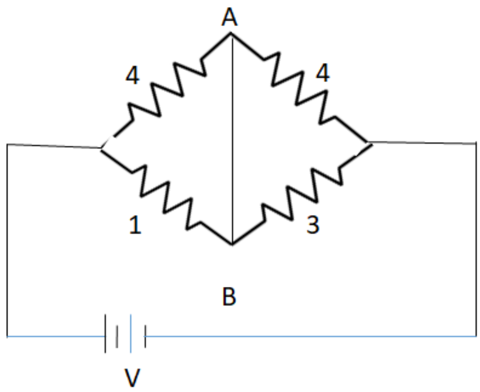


1. 16 W
2. 40 W
3. 54 W
4. 4 W

39. Three resistances P, Q, R, each of 2 Ω and an unknown resistance S form the four arms of a Wheatstone bridge circuit. When the resistance of 6 Ω is connected in parallel to S, the bridge gets balanced. What is the value of S?

1. 2 *Ω*
2. 3 *Ω*
3. 6 *Ω*
4. 1 *Ω*

40.
In the circuit shown, if a conducting wire is connected between points *A* and *B*, the current in this wire will: (All resistance given in ohms)

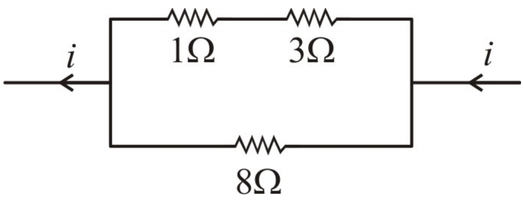


1. flow from A to B
2. flow in the direction which will be decided by the value of V
3. be zero
4. flow from B to A

41. Two cells having the same emf, are connected in series through an external resistance R. Cells have internal resistance r_1 and r_2 respectively. When the circuit is closed, the potential difference across the first cell is zero. The value of *R* is:

1. $r_1 - r_2$
2. $\frac{r_1+r_2}{2}$
3. $\frac{r_1-r_2}{2}$
4. $r_1 + r_2$

42. The power dissipated across the 8 Ω resistor in the circuit shown here is 2 W. The power dissipated in watts across the 3 Ω resistor is:



1. 2.0

2. 1.0

3. 0.5

4. 3.0

43. Kirchhoff's first and second laws for electrical circuits are consequences of:

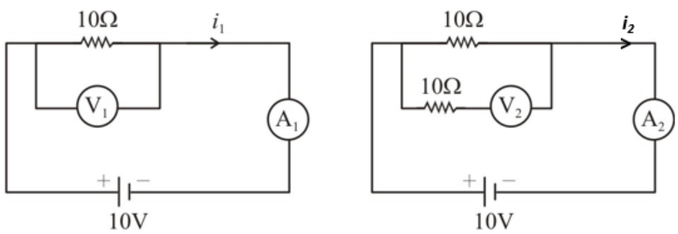
1. conservation of energy.

2. conservation of electric charge and energy respectively.

3. conservation of electric charge.

4. conservation of energy and electric charge respectively.

44. In the circuits shown below, the readings of the voltmeters and the ammeters will be:



1. $V_2 > V_1$ and $i_1 = i_2$

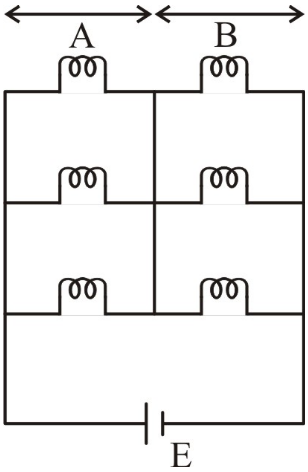
2. $V_2 = V_1$ and $i_1 > i_2$

3. $V_2 = V_1$ and $i_1 = i_2$

4. $V_2 > V_1$ and $i_1 > i_2$

45. Six similar bulbs are connected as shown in the figure with a DC source of emf E and zero internal resistance.

The ratio of power consumption by the bulbs when (i) all are glowing and (ii) in the situation when two from section A and one from section B are glowing, will be:



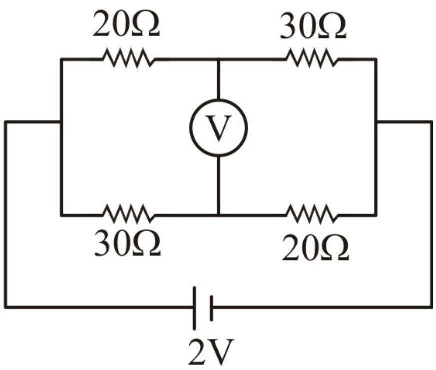
1. 2: 1

2. 4: 9

3. 9: 4

4. 1: 2

46. The reading of an ideal voltmeter in the circuit shown is:



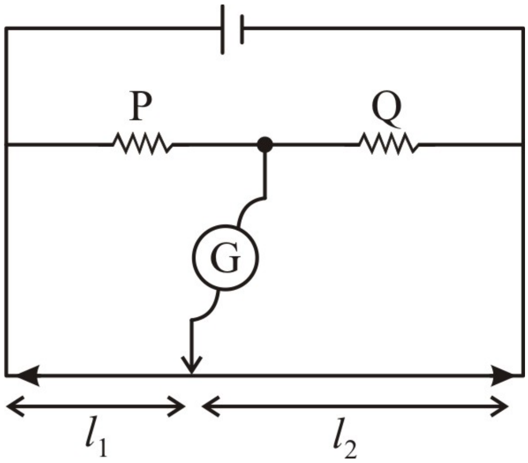
1. 0.6 V

2. 0 V

3. 0.5 V

4. 0.4 V

47. The metre bridge shown is in a balanced position with $\frac{P}{Q}=\frac{l_1}{l_2}$. If we now interchange the position of the galvanometer and cell, will the bridge work? If yes, what will be the balanced condition?



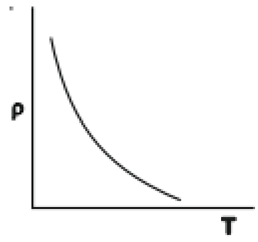
1. Yes, $\frac{P}{Q}=\frac{l_1-l_2}{l_1+l_2}$

2. No, no null point

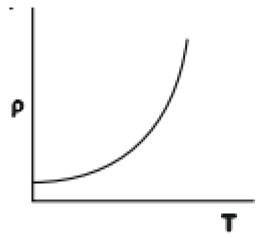
3. Yes, $\frac{P}{Q}=\frac{l_2}{l_1}$

4. Yes, $\frac{P}{Q}=\frac{l_1}{l_2}$

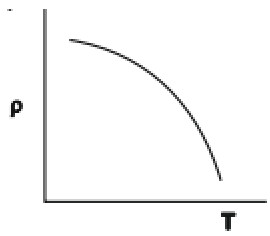
48. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper?



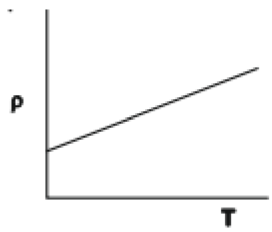
(1)



(2)



(3)



(4)

49. A charged particle having drift velocity of $7.5\times10^{-4}\ ms^{-1}$ in an electric field of $3\times10^{-10}\ Vm^{-1}$, has mobility in $\mathrm{m^2V^{-1}s^{-1}}$ of:

1. 2.5×10^{6}

2. 2.5×10^{-6}

3. 2.25×10^{-15}

4. 2.25×10^{15}

50. A resistance wire connected in the left gap of a metre bridge balances a 10 Ω resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of 1 Ω of the resistance wire :

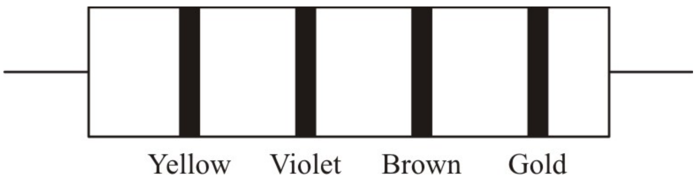
(1) $1.0 \times 10^{-1}\ m$

(2) $1.5 \times 10^{-1}\ m$

(3) $1.5 \times 10^{-2}\ m$

(4) $1.0 \times 10^{-2}\ m$

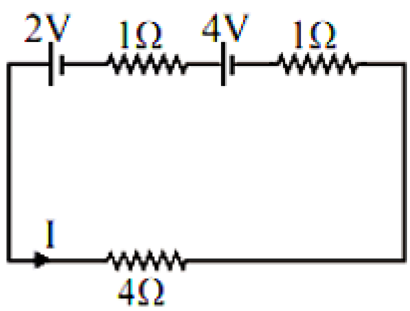
51. The colour code of resistance is given below:



The values of resistance and tolerance, respectively are:

1. 47 kΩ, 10%
2. 4.7 kΩ, 5%
3. 470 Ω, 5%
4. 470 kΩ, 5%

52. For the circuit shown in the figure, the current I will be:



1. 0.75 A

2. 1 A

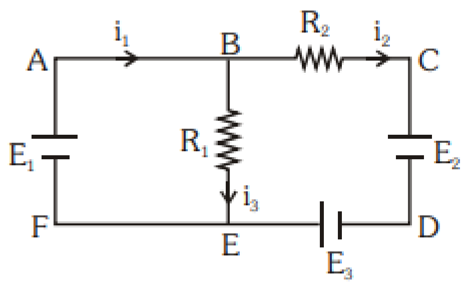
3. 1.5 A

4. 0.5 A

53. Two solid conductors are made up of the same material, have the same length and same resistance. One of them has a circular cross-section of area A_1 and the other one has a square cross-section of area A_2. The ratio A_1/A_2 is:

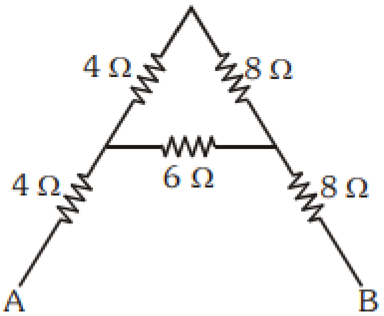
1. 1.5
2. 1
3. 0.8
4. 2

54. For the circuit given below, the Kirchoff's loop rule for the loop BCDEB is given by the equation:



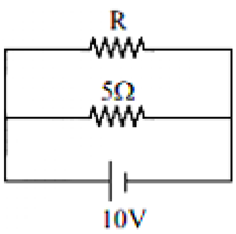
1. $-i_2R_2 + E_2 - E_3 + i_3R_1 = 0$
2. $i_2R_2 + E_2 - E_3 - i_3R_1 = 0$
3. $i_2R_2 + E_2 + E_3 + i_3R_1 = 0$
4. $-i_2R_2 + E_2 + E_3 + i_3R_1 = 0$

55. The equivalent resistance between A and B for the mesh shown in the figure is:



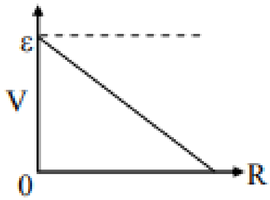
1. $7.2\ \Omega$
2. $16\ \Omega$
3. $30\ \Omega$
4. $4.8\ \Omega$

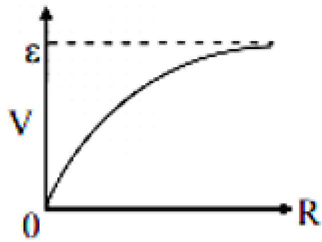
56. The power dissipated in the circuit shown in the figure is 30 Watts. The value of R is:

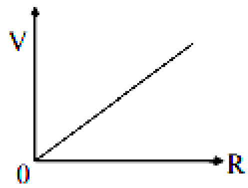


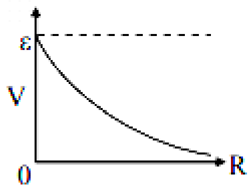
1. $15\ \Omega$
2. $10\ \Omega$
3. $30\ \Omega$
4. $20\ \Omega$

57. A cell having an emf ε and internal resistance r is connected across a variable external resistance R. As the resistance R is increased, the plot of potential difference V across R is given by -

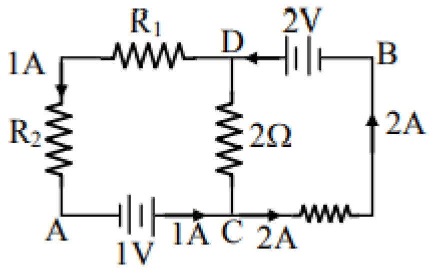
1. 

2. 

3. 

4. 

58. In the circuit shown in the figure, if the potential at point A is taken to be zero, the potential at point B is



1. +1 V

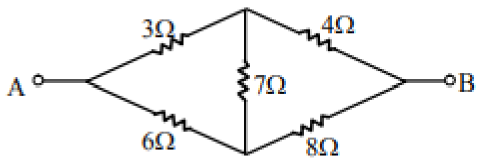
2. -1 V

3. +2 V

4. -2 V

59. A thermocouple of negligible resistance produces an e.m.f. of 40 μV/ºC in the linear range of temperature. A galvanometer of resistance 10 ohm whose sensitivity is 1 μA/division, is employed with the thermocouple. The smallest value of temperature difference that can be detected by the system will be
1. 0.25ºC
2. 0.5 ºC
3. 1ºC
4. 0.1ºC

60. Calculate the net resistance of the circuit between A and B:



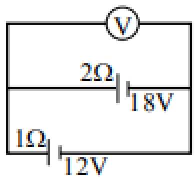
1. 8/3 Ω

2. 14/3 Ω

3. 16/3 Ω

4. 22/3 Ω

61. Two batteries, one of emf 18 volts and internal resistance 2Ω and the other of emf 12 volt and internal resistance 1Ω, are connected as shown. The voltmeter V will record a reading of:



(1) 18 volt

(2) 30 volt

(3) 14 volt

(4) 15 volt

62. A 5-ampere fuse wire can withstand a maximum power of 1 watt in the circuit. The resistance of the fuse wire is:

(1) 5 ohm

(2) 0.04 ohm

(3) 0.2 ohm

(4) 0.4 ohm

63. 10^5 coloumb charge liberated 1 gm silver (Ag). If now charge is doubled then the amount of liberated Ag will be :
1. 1 gm
2. 2 gm
3. 3 gm
4. 4 gm

64. When a wire of uniform cross-section a, length l, and resistance R is bent into a complete circle, the resistance between any two of diametrically opposite points will be -

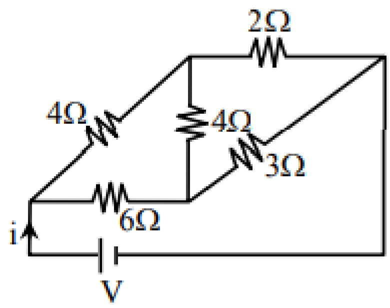
(1) R/2

(2) R/4

(3) R/8

(4) 4R

65. For the network shown in the figure the value of the current i is –



1. $\frac{18\ V}{5}$

2. $\frac{5\ V}{9}$

3. $\frac{9\ V}{35}$

4. $\frac{5\ V}{18}$

66. A car battery of emf 12 V and internal resistance 5×10^{-2} Ω, receives a current of 60 A from external source, then terminal voltage of battery is :

1. 12 V

2. 9 V

3. 15 V

4. 20 V

67. Two bulbs of (40 W, 200 V), and (100 W, 200 V). Then correct relation for their resistance :

1. $R_{40} < R_{100}$

2. $R_{40} > R_{100}$

3. $R_{40} = R_{100}$

4. No relation can be predicted

68. When three identical bulbs are connected in series, the consumed power is 10W. If they are now connected in parallel then the consumed power will be :
1. 30W
2. 90W
3. $\frac{10}{3}W$
4. 270W

69. According to the Faraday Law of electrolysis, the mass deposited at electrode proportional to :

1. $m \propto I^2$

2. $m \propto Q$

3. $m \propto Q^2$

4. 'm' does not depend on Q

70. In a hot wire ammeter due to the flowing of the current, the temperature of the wire is increased by 5°C. If the value of current is doubled, then increases in temperature will be :
1. 15°C
2. 20°C
3. 25°C
4. 30°C

71. The potentiometer is best for measuring voltage, as :

1. It has a sensitive galvanometer
2. It has wire of high resistance
3. It measures p.d. like in closed circuit
4. It measures p.d. like in open circuit

72. When three identical bulbs of 60 watts and 200-volt rating are connected in series to a 200 volt supply, the power drawn by them will be:

(1) 180 watt

(2) 10 watt

(3) 20 watt

(4) 60 watt

73. The electric resistance of a certain wire of iron is R. If its length and radius are doubled, then:

(1) The resistance will be halved and the specific resistance will remain unchanged

(2) The resistance will be halved and the specific resistance will be doubled

(3) The resistance and the specific resistance, will both remain unchanged

(4) The resistance will be doubled and the specific resistance will be halved

74. Resistances n, each of r ohm, when connected in parallel give an equivalent resistance of R ohm. If these resistances were connected in series, the combination would have a resistance in ohms, equal to

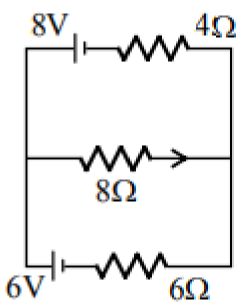
(1) $\frac{R}{n^2}$

(2) R/n

(3) nR

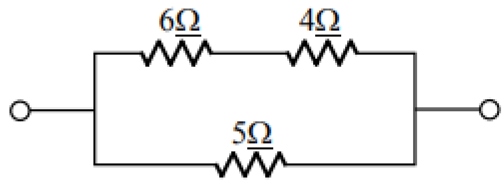
(4) n^2 R

75. The current in 8Ω resistance is (See fig.)



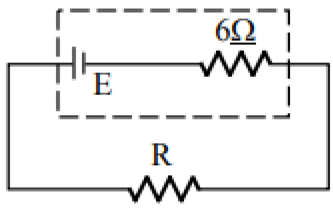
1. 0.69 A
2. 0.92 A
3. 1.30 A
4. 1.6 A

76. If the power dissipated in 5Ω is 20 W then power dissipated in 4Ω is -



1. 4 W
2. 6 W
3. 10 W
4. 20 W

77. The value of R for which power in it is maximum



1. 3Ω
2. 6Ω
3. 12Ω
4. 9Ω

78. The terminal potential difference of a cell is greater than its emf when -
1. A battery of less emf is connected in its series
2. A battery of higher emf is connected in its series
3. A battery of higher emf is connected in its parallel
4. A battery of less emf is connected in its parallel

79. In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60W bulb for use in India is R, The resistance of a 60W bulb for use in USA will be :-

(1) 2R

(2) R/4

(3) R/2

(4) R

80. A battery is charged at a potential of 15V for 8 hours when the current flowing is 10A. The battery on discharge supplies a current of 5A for 15 hours. The mean terminal voltage during discharges is 14 V. The "Watt hour" efficiency of the battery is :-

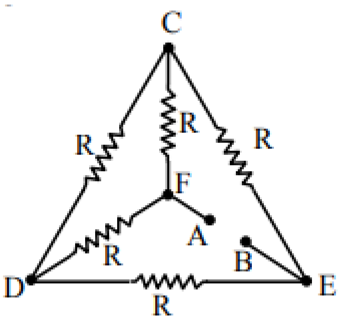
(1) 80%

(2) 90%

(3) 87.5%

(4) 82.5%

81. Five equal resistances each of resistance R are connected as shown in the figure. A battery of V volts is connected between A and B. The current flowing in AFCEB will be:



(1) V/R

(2) V/2R

(3) 2V/R

(4) 3V/R

82. A 6-volt battery is connected to the terminals of a three-metre long wire of uniform thickness and resistance of 100 ohms. The difference of potential between two points on the wire separated by a distance of 50 cm will be:

(1) 3 V

(2) 1 V

(3) 1.5 V

(4) 2 V

83. Specific resistance of a conductor increases with :

(1) Increase in temperature

(2) Increase in cross section area

(3) Increase in cross section and decrease in length

(4) Decrease in cross section area

84. For a cell, the terminal P.D. is 2.2V when the circuit is open and reduces to 1.8V when the cell is connected to the resistance of R = 5Ω. Determine internal resistance of cell (r) is then:

1. $\frac{10}{9}\Omega$

2. $\frac{9}{10}\Omega$

3. $\frac{11}{9}\Omega$

4. $\frac{5}{9}\Omega$

85. If specific resistance of a potentiometer wire is 10^{-7} Ωm and current flow through it is 0.1 A, cross-sectional area of wire is 10^{-6} m^2 then potential gradient will be : -

1. 10^{-2} V/m

2. 10^{-4} V/m

3. 10^{-6} V/m

4. 10^{-8} V/m

86. The resistance of each arm of the wheat stone bridge is 10 ohm. A resistance of 10 ohm is connected in series with galvanometer then the
equivalent resistance across the battery will be :
1. 10 ohm
2. 15 ohm
3. 20 ohm
4. 40 ohm

87. Copper and silicon is cooled from 300 K to 60 K, the specific resistance: -
1. Decrease in copper but increase in silicon
2. Increase in copper but decrease in silicon
3. Increase in both
4. Decrease in both

88. Two 220 volt, 100 watt bulbs are connected first in series and then in parallel. Each time the combination is connected to a 220 volt a.c. supply line. The power drawn by the combination in each case respectively will be :

(1) 50 watt, 100 watt

(2) 100 watt, 50 watt

(3) 200 watt, 150 watt

(4) 50 watt, 200 watt

89. An electric kettle has two heating coils. When one of the coils is connected to an a.c. source, the water in the kettle boils in 10 minutes. When the other coil is used the water boils in 40 minutes. If both the coils are connected in parallel, the time taken by the same quantity of water to boil will be :

(1) 8 min

(2) 4 min

(3) 25 min

(4) 15 min

90. In a Wheatstone bridge all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen by the battery is:

(1) R/4

(2) R/2

(3) R

(4) 2R

91. **Column- I** gives certain physical terms associated with flow of current through a metallic conductor.

Column-II gives some mathematical relations involving electrical quantities.

Match **Column-I** and **Column-II** with appropriate relations.

Column-I	Column -II
(A) Drift Velocity	(P) $\frac{m}{ne^2\rho}$
(B) Electrical Resistivity	(Q) nev_d
(C) Relaxation Period	(R) $\frac{eE}{m}\tau$
(D) Current Density	(S) $\frac{E}{J}$

1. (A)-(R), (B)-(P), (C)-(S), (D)-(Q)

2. (A)-(R), (B)-(Q), (C)-(S), (D)-(P)

3. (A)-(R), (B)-(S), (C)-(P), (D)-(Q)

4. (A)-(R), (B)-(S), (C)-(Q), (D)-(P)

92. In a potentiometer circuit, a cell of EMF 1.5 V gives a balance point at 36 cm length of wire. If another cell of EMF 2.5 V replaces the first cell, then at what length of the wire, the balance point occurs?

1. 64 cm

2. 62 cm

3. 60 cm

4. 21.6 cm

93. The effective resistance of a parallel connection that consists of four wires of equal length, equal area of cross-section and same material is 0.25Ω . What will be the effective resistance if they are connected in series?

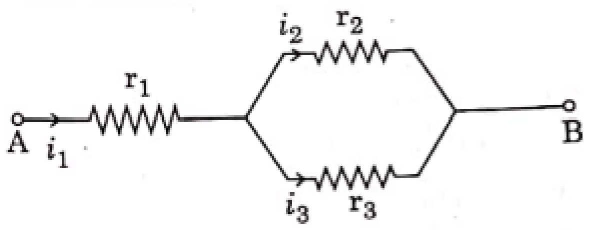
1. 1Ω

2. 4 Ω

3. 0.25 Ω

4. 0.5 Ω

94. Three resistors having resistances r_1, r_2 and r_3 are connected as shown in the given circuit. The ratio $\frac{i_3}{i_1}$ of currents in terms of resistances used in the circuit is:



1. $\frac{r_1}{r_1+r_2}$
2. $\frac{r_2}{r_1+r_3}$
3. $\frac{r_1}{r_2+r_3}$
4. $\frac{r_2}{r_2+r_3}$

Moving Charges & Magnetism

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Lorentz Force	25
Magnetic Field due to various cases	18
Current Carrying Loop: Force & Torque	10
Moving Coil Galvanometer	10
Ampere Circuital Law	4
Magnetic Moment	4
Conversion to Ammeter & Voltmeter	3
Force between Current Carrying Wires	2
Cyclotron	1

1. A long wire carrying a steady current is bent into a circular loop of one turn. The magnetic field at the centre of the loop is B. It is then bent into a circular coil of n turns. The magnetic field at the centre of this coil of n turns will be:

1. nB

2. n^2B

3. 2nB

4. $2n^2B$

2. A bar magnet is hung by a thin cotton thread in a uniform horizontal magnetic field and is in the equilibrium state. The energy required to rotate it by 60^o is W. Now the torque required to keep the magnet in this new position is:

1. $\frac{W}{\sqrt{3}}$

2. $\sqrt{3}W$

3. $\frac{\sqrt{3}W}{2}$

4. $\frac{2W}{\sqrt{3}}$

3. An electron is moving in a circular path under the influence of a transverse magnetic field of 3.57×10^{-2} T. If the value of e/m is 1.76×10^{11} C/kg, the frequency of revolution of the electron is:

1. 1 GHz

2. 100 MHz

3. 62.8 MHz

4. 6.28 MHz

4. A 250 turn rectangular coil of length 2.1 cm and width 1.25 cm carries a current of 85 μA and subjected to the magnetic field of strength 0.85 T. Work done for rotating the coil by 180° against the torque is:

1. $4.55\ \mu J$

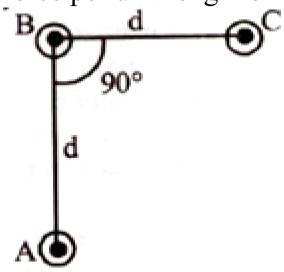
2. $2.3\ \mu J$

3. $1.15\ \mu J$

4. $9.8\ \mu J$

5.

An arrangement of three parallel straight wires placed perpendicular to plane of paper carrying same current 'I along the same direction is shown in fig. Magnitude of force per unit length on the middle wire 'B' is given by:-



(a) $\frac{\mu_o i^2}{2\pi d}$

(b) $\frac{2\mu_0 i^2}{\pi d}$

(c) $\frac{\sqrt{2}\mu_o i^2}{\pi d}$

(d) $\frac{\mu_o i^2}{\sqrt{2}\pi d}$

6. A metallic rod of mass per unit length 0.5 kg m^{-1} is lying horizontally on a smooth inclined plane which makes an angle of 30° with the horizontal. The rod is not allowed to slide down by flowing a current through it when a magnetic field of induction 0.25 T is acting on it in the vertical direction. The current flowing in the rod to keep it stationery is:

1. 7.14 A

2. 5.98 A

3. 14.76 A

4. 11.32 A

7. The current sensitivity of a moving coil galvanometer is 5 div/mA and its voltage sensitivity (angular deflection per unit voltage applied) is 20 div/V. The resistance of the galvanometer is:

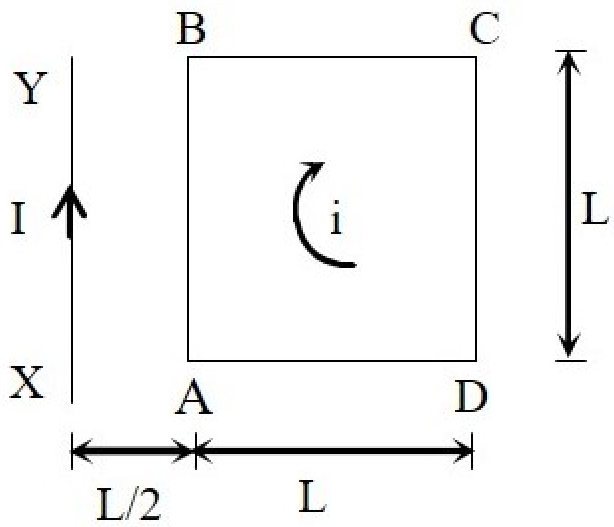
1. 40 Ω

2. 25 Ω

3. 250 Ω

4. 500 Ω

8. A square loop ABCD carrying a current i is placed near and coplanar with a long straight conductor XY carrying a current I, the net force on the loop will be:



1. $\frac{\mu_o \mathrm{Ii}}{2\pi}$

2. $\frac{2\mu_o \mathrm{IiL}}{3\pi}$

3. $\frac{\mu_o \mathrm{IiL}}{2\pi}$

4. $\frac{2\mu_o \mathrm{Ii}}{3\pi}$

9.
A long straight wire of radius a ' carries a steady current I. The current is uniformly distributed over its cross-section. The ratio of the magnetic fields B and B' at radial distances $\frac{a}{2}$ and 2a respectively, from the axis of the wire, is:
1. $\frac{1}{2}$
2. 1
3. 4
4. $\frac{1}{4}$

10. A proton and an alpha particle both enter a region of uniform magnetic field B, moving at right angles to field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by the proton is 1 MeV, the energy acquired by the alpha particle will be:

1. 4 MeV

2. 0.5 MeV

3. 1.5 MeV

4. 1 MeV

11. A rectangular coil of length 0.12 m and width 0.1 m having 50 turns of wire is suspended vertically in a uniform magnetic field of strength 0.2 Wb/m^2. The coil carries a current of 2 A. If the plane of the coil is inclined at an angle of 30^o with the direction of the field, the torque required to keep the coil in stable equilibrium will be:

1. 0.15 Nm

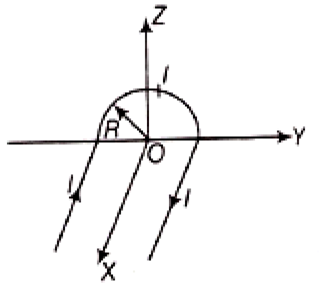
2. 0.20 Nm

3. 0.24 Nm

4. 0.12 Nm

12.

A wire carrying current I has the shape as shown in the adjoining figure. Linear parts of the wire are very long and parallel to X-axis while the semicircular portion of radius R is lying in the Y –Z plane. The magnetic field at point O is:



1. $B = \frac{\mu_o i}{4\pi R}\left(\pi\hat{i} + 2\hat{k}\right)$

2. $B = -\frac{\mu_o i}{4\pi R}\left(\pi\hat{i} - 2\hat{k}\right)$

3. $B = -\frac{\mu_o i}{4\pi R}\left(\pi\hat{i} + 2\hat{k}\right)$

4. $B = \frac{\mu_o i}{4\pi R}\left(\pi\hat{i} - 2\hat{k}\right)$

13. An electron moving in a circular orbit of radius r makes n rotations per second. The magnetic field produced at the centre has a magnitude:

(1) $\mu_0 ne/2\pi r$

(2) zero

(3) n^2e/r

(4) $\mu_0 ne/2r$

14. In an ammeter 0.2% of main current passes through the galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be:

1. $\frac{1}{499}G$

2. $\frac{499}{500}G$

3. $\frac{1}{500}G$

4. $\frac{500}{499}G$

15. Two identical long conducting wires AOB and COD are placed at the right angle to each other, with one above the other such that 'O' is the common point for the two. The wires carry I_1 and I_2 currents, respectively. Point 'P' is lying at distance 'd' from 'O' along a direction perpendicular to the plane containing the wires. The magnetic field at the point 'P' will be :

1. $\frac{\mu_0}{2\pi d}\left(\frac{I_1}{I_2}\right)$

2. $\frac{\mu_0}{2\pi d}(I_1+I_2)$

3. $\frac{\mu_0}{2\pi d}(I_1^2+I_2^2)$

4. $\frac{\mu_0}{2\pi d}(I_1^2+I_2^2)^{1/2}$

16.
A current loop in a magnetic field:
1. can be in equilibrium in one orientation.
2. can be in equilibrium in two orientations, both the equilibrium states are unstable.
3. can be in equilibrium in two orientations, one stable while the other is unstable.
4. experiences a torque whether the field is uniform or non-uniform in all orientations.

17.
When a proton is released from rest in a room, it starts with an initial acceleration a_0 towards the east. When it is projected towards the north with a speed v_0, it moves with initial acceleration $3a_0$ towards east. The electric and magnetic fields in the room are -

1. $\frac{Ma_0}{e}$west, $\frac{Ma_0}{ev_0}$up

2. $\frac{Ma_0}{e}$west, $\frac{2Ma_0}{ev_0}$down

3. $\frac{Ma_0}{e}$east, $\frac{2Ma_0}{ev_0}$up

4. $\frac{Ma_0}{e}$east, $\frac{3Ma_0}{ev_0}$down

18. Two similar coils of radius R are lying concentrically with their planes at right angles to each other. The currents flowing in them are I and 2I, respectively. The resultant magnetic field induction at the center will be

1. $\frac{\sqrt{5}\mu_0 I}{2R}$

2. $\frac{3\mu_0 I}{2R}$

3. $\frac{\mu_0 I}{2R}$

4. $\frac{\mu_0 I}{R}$

19. A millivoltmeter of 25 mV range is to be converted into an ammeter of 25 A range. The value (in ohm) of necessary shunt will be:

1. 0.001

2. 0.01

3. 1

4. 0.05

20. An alternating electric field of frequency ν, is applied across the dees (radius=R) of a cyclotron that is being used to accelerate protons (mass=m). The operating magnetic field B, used in the cyclotron and the kinetic energy (K) of the proton beam, produced by it, are given by:

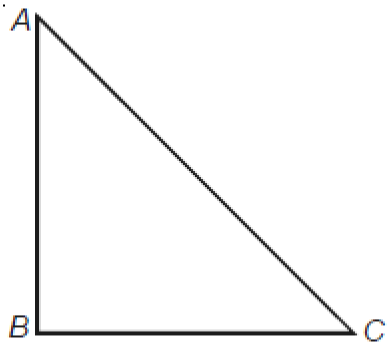
1. $\mathrm{B}=\frac{\mathrm{m}\nu}{\mathrm{e}}$ and $\mathrm{K}=2\mathrm{m}\pi^2\nu^2\mathrm{R}^2$

2. $\mathrm{B}=\frac{2\pi\mathrm{m}\nu}{\mathrm{e}}$ and $\mathrm{K}=\mathrm{m}^2\pi\nu\mathrm{R}^2$

3. $\mathrm{B}=\frac{2\pi\mathrm{m}\nu}{\mathrm{e}}$ and $\mathrm{K}=2\mathrm{m}\pi^2\nu^2\mathrm{R}^2$

4. $\mathrm{B}=\frac{\mathrm{m}\nu}{\mathrm{e}}$ and $\mathrm{K}=\mathrm{m}^2\pi\nu\mathrm{R}^2$

21. A current-carrying closed loop in the form of a right isosceles triangle ABC is placed in a uniform magnetic field acting along with AB. If the magnetic force on the arm BC is F, the force on the arm AC is :



1. $-\mathrm{F}$

2. F

3. 2F

4. $-2\mathrm{F}$

22. A uniform electric field and a uniform magnetic field are acting in the same direction in a certain region. If an electron is projected in the region such that its velocity is pointed along the direction of fields, then the electron:

1. speed will decrease

2. speed will increase

3. will turn towards the left of the direction of motion

4. will turn towards tight of direction a motion

23. A beam of cathode rays is subjected to cross Electric (E) and magnetic fields(B). The fields are adjusted such that the beam is not deflected. The specific charge of the cathode rays is given by

(1) $\frac{B^2}{2VE^2}$

(2) $\frac{2VB^2}{E^2}$

(3) $\frac{2VE^2}{B^2}$

(4) $\frac{E^2}{2VB^2}$

(where V is the potential difference between cathode and anode)

24. A thin ring of radius R metre has a charge q coulomb uniformly spread on it. The ring rotates about its axis with a constant frequency of f revolution/s.The value of magnetic induction in Wbm^{-2} at the centre of the ring is

(a) $\frac{\mu_0\,\mathrm{qf}}{2\pi\mathrm{R}}$ (b) $\frac{\mu_0\mathrm{q}}{2\pi\mathrm{fR}}$

(c) $\frac{\mu_0\mathrm{q}}{2\,\mathrm{fR}}$ (d) $\frac{\mu_0\,\mathrm{qf}}{2\mathrm{R}}$

25. A galvanometer has a coil of resistance 100 Ω and gives a full-scale deflection for 30 mA current. If it is to work as a voltmeter of 30 V range, the resistance required to be added will be:

1. 900 Ω

2. 1800 Ω

3. 500 Ω

4. 1000 Ω

26. A square current-carrying loop is suspended in a uniform magnetic field acting in the plane of the loop. If the force on one arm of the loop is $\vec{F}$, the net force on the remaining three arms of the loop is:

1. $3\vec{F}$

2. $-\vec{F}$

3. $-3\vec{F}$

4. $\vec{F}$

27. Under the influence of a uniform magnetic field, a charged particle moves with constant speed v in a circle of radius R. The time period of rotation of the particle:

1. depends on v and not on R.

2. depends on R and not on v.

3. is independent of both v and R.

4. depends on both v and R.

28.
The magnetic force acting on a charged particle of charge -2μC in a magnetic field of 2T acting in the y-direction, when the particle velocity is $(2\hat{i}+3\hat{j}) \times 10^6$ ms^{-1} is:

1. 8 N in - z-direction

2. 4 N in the z-direction

3. 8 N in the y-direction

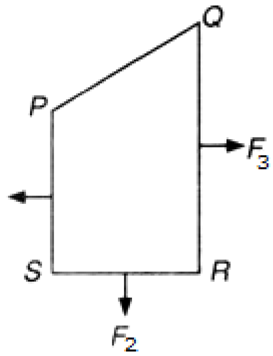
4. 8 N in the z-direction

29.
A galvanometer having a coil resistance of 60 Ω shows full-scale deflection when a current of. 1.0 A passes through it. It can be converted into an ammeter to read currents up to 5.0 A by:
1. Putting in parallel resistance of 24 Ω

2. Putting in series resistance of 15 Ω
3. Putting in series resistance of 240 Ω

4. Putting in parallel resistance of 15 Ω

30. A closed-loop PQRS carrying a current is placed in a uniform magnetic field. If the magnetic forces on segments PS, SR, and RQ are F_1, F_2, and F_3 respectively and are in the plane of the paper and along the directions shown. The force on the segment QP is:



1. $F_3 - F_1 - F_2$

2. $\sqrt{(F_3 - F_1)^2 + F_2^2}$

3. $\sqrt{(F_3 - F_1)^2 - F_2^2}$

4. $F_3 - F_1 + F_2$

31.
A particle of mass m, charge Q, and kinetic energy T enters a transverse uniform magnetic field of induction $\vec{B}$. After 3 sec, the kinetic energy of the particle will be :

(a) 3T

(b) 2T

(c) T

(d) 4T

32.
A galvanometer of resistance 50 Ω is connected to a battery of 3 V along with a resistance of 2950 Ω in series. A full-scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce its deflection to 20 divisions, the resistance added in series should be:

1. 1050 Ω

2. 1550 Ω

3. 2050 Ω

4. 1500 Ω

33. The resistance of an ammeter is 13 Ω and its scale is graduated for a current up to 100 A. After an additional shunt has been connected to this ammeter, it becomes possible to measure currents up to 750 A by this ammeter. The value of shunt resistance is:

1. 20 Ω

2. 2 Ω

3. 0.2 Ω

4. 2 kΩ

34. Under the influence of a uniform magnetic field a charged particle is moving in a circle of radius *R* with constant speed *v*. The time period of the motion:

1. depends on v and not on R.

2. depends on both R and v.

3. is independent of both R and v.

4. Depends on R and not on v.

35. A charged particle (charge q) is moving in a circle of radius R with uniform speed v. The associated magnetic moment μ is given by:

1. $\frac{qvR}{2}$

2. qvR^2

3. $\frac{qvR^2}{2}$

4. qvR

36. In a mass spectrometer used for measuring the masses of ions, the ions are initially accelerated by an electric potential V and then made to describe semi-circular paths of radius R using a magnetic field B. If V and B are kept constant, the ratio $\frac{\text{Charge on the ion}}{\text{mass of the ion}}$, will be proportional to:

1. $\frac{1}{R}$

2. $\frac{1}{R^2}$

3. R^2

4. R

37. A beam of electrons passes un-deflected through mutually perpendicular electric and magnetic fields. If the electric field is switched off, and the same magnetic field is maintained, the electrons move:

1. in an elliptical orbit.

2. in a circular orbit.

3. along a parabolic path.

4. along a straight line.

38. When a charged particle moving with velocity $\vec{v}$ is subjected to a magnetic field of induction $\vec{B}$, the force on it is non-zero. This implies that:

1. angle between $\vec{v}$ and $\vec{B}$ is necessarily 90^o.

2. angle $\vec{v}$ and $\vec{B}$ between can have any value other than 90^o.

3. angle between $\vec{v}$ and $\vec{B}$ have any value other than zero and 180^o.

4. angle between $\vec{v}$ and $\vec{B}$ is either zero or 180^o.

39. Two circular coils 1 and 2 are made from the same wire but the radius of the 1^{st} coil is twice that of the 2^{nd} coil. What is the ratio of the potential difference applied across them so that the magnetic field at their centres is the same?

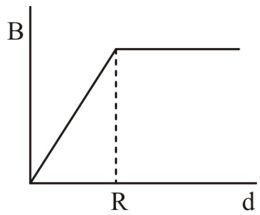
1. 3

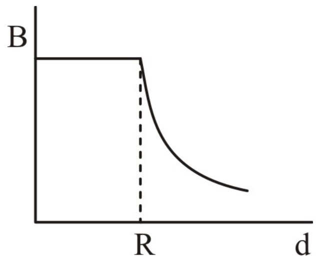
2. 4

3. 6

4. 2

40. A cylindrical conductor of radius R is carrying a constant current. The plot of the magnitude of the magnetic field B with the distance d from the centre of the conductor is correctly represented by the figure:

1.


2.


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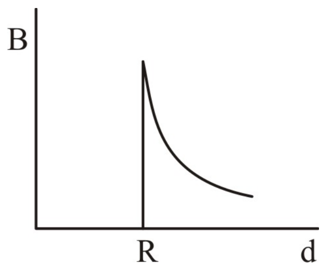

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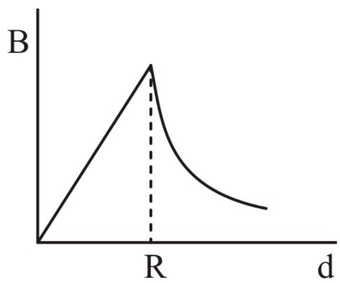


41. Ionized hydrogen atoms and α-particles with same momenta enters perpendicular to a constant magnetic field, B. The ratio of their radii of their paths $r_H : r_\alpha$ will be:

1. 1 : 4

2. 2 : 1

3. 1 : 2

4. 4 : 1

42. Two toroids 1 and 2 have total no. of turns 200 and 100 respectively with average radii 40 cm and 20 cm respectively. If they carry the same current i, the ratio of the magnetic fields along the two loops is:

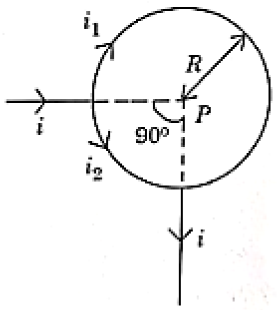
1. 1:1

2. 4:1

3. 2:1

4. 1:2

43. A straight conductor carrying current I splits into two parts as shown in the figure. The radius of the circular loop is R. The total magnetic field at the centre P of the loop is,



1. zero

2. $\frac{3\mu_0 i}{32R}$, *inward*

3. $\frac{3\mu_0 i}{32R}$, *outward*

4. $\frac{\mu_0 i}{2R}$, *inward*

44. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is:

$\left(\mu_0 = 4\pi \times 10^{-7}\ \mathrm{T\ m\ A^{-1}}\right)$

1. $3.4 \times 10^{-4} T$

2. $6.28 \times 10^{-5} T$

3. $3.14 \times 10^{-5} T$

4. $6.28 \times 10^{-4} T$

45. A wire of length L meter carrying a current of I ampere is bent in the form of a circle. Its magnetic moment is,

1. $\frac{\mathrm{IL}^2}{4}\ \mathrm{A-m^2}$

2. $\frac{\mathrm{I}\times\pi\mathrm{L}^2}{4}\ \mathrm{A-m^2}$

3. $\frac{2\,\mathrm{IL}^2}{\pi}\ \mathrm{A-m^2}$

4. $\frac{\mathrm{IL}^2}{4\pi}\ \mathrm{A-m^2}$

46. A proton carrying 1 MeV kinetic energy is moving in a circular path of radius R in uniform magnetic field. What should be the energy of an $\alpha-$particle to describe a circle of the same radius in the same field?

1. 1 MeV

2. 0.5 MeV

3. 4 MeV

4. 2MeV

47. A galvanometer of resistance, G, is shunted by a resistance S ohm. To keep the main current in the circuit unchanged the resistance to be put in series with the galvanometer is

1. $\frac{\mathrm{G}}{(\mathrm{S+G})}$

2. $\frac{\mathrm{S}^2}{(\mathrm{S+G})}$

3. $\frac{\mathrm{SG}}{(\mathrm{S+G})}$

4. $\frac{\mathrm{G}^2}{(\mathrm{S+G})}$

48. Charge q is uniformly spread on a thin ring of radius R. The ring rotates about its axis with a uniform frequency f Hz. The magnitude of magnetic induction at the center of the ring is

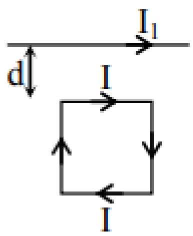
1. $\frac{\mu_0 \text{qf}}{2\pi \text{R}}$

2. $\frac{\mu_0 \text{qf}}{2\text{R}}$

3. $\frac{\mu_0 \text{q}}{2\text{fR}}$

4. $\frac{\mu_0 \text{q}}{2\pi \text{fR}}$

49. A square loop, carrying a steady current I, is placed in a horizontal plane near a long straight conductor carrying a steady current I1 at a distance d from the conductor as shown in figure. The loop will experience :



1. a net attractive force towards the conductor
2. a net repulsive force away from the conductor
3. a net torque acting upward perpendicular to the horizontal plane
4. a net torque acting downward normal to the horizontal plane

50. A current loop consists of two identical semicircular parts each of radius R, one lying in the x-y plane and the other in x-z plane. If the current in the loop is i. The resultant magnetic field due to the two semicircular parts at their common centre is -

1. $\frac{\mu_0 i}{2R}$

2. $\frac{\mu_0 i}{4R}$

3. $\frac{\mu_0 i}{\sqrt{2}R}$

4. $\frac{\mu_0 i}{2\sqrt{2}R}$

51. A closely wound solenoid of 2000 turns and area of cross-section 1.5×10^{-4} m^2 carries a current of 2.0 A. It is suspended through its centre and perpendicular to its length allowing it to turn in a horizontal plane in a uniform magnetic field 5×10^{-2} Tesla making an angle of 30º with the axis of the solenoid. The torque on the solenoid will be -

1. 1.5×10^{-3} N.m

2. 1.5×10^{-2} N.m

3. 3×10^{-2} N.m

4. 3×10^{-3} N.m

52. A particle having a mass of 10^{-2} kg carries a charge of 5×10^{-8}C. The particle is given an initial horizoantal velocity of 10^5 ms^{-1} in the presence of electric field $\vec{E}$ and magnetic field $\vec{B}$. To keep the particle moving in a horizontal direction, it is necessary that -

(a) $\vec{B}$ should be perpendicular to the direction of velocity and $\vec{E}$ should be along the direction of velocity.

(b) Both $\vec{B}$ and $\vec{E}$ should be along the direction of velocity.

(c) Both $\vec{B}$ and $\vec{E}$ are mutually perpendicularand perpendicular to the direction of velocity

(d) $\vec{B}$ should be along the direction of velocityand $\vec{E}$ should be perpendicualr to the direction of velocity.

Which one of the following pairs of statements is possible ?

1. (c) and (d)

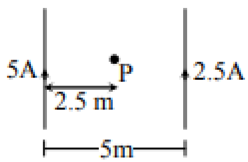
2. (b) and (c)

3. (b) and (d)

4. (a) and (c)

53. A coil of one loop is made from a wire of length L and thereafter a coil of two loops is made from same wire, then the ratio of magnetic field at the centre of coils will be :
1. 1 : 4
2. 1 : 1
3. 1 : 8
4. 4 : 1

54. For adjoining fig., the magnetic field at point, 'P' will be :



1. $\frac{\mu_0}{4\pi}\odot$

2. $\frac{\mu_0}{\pi}\otimes$

3. $\frac{\mu_0}{2\pi}\otimes$

4. $\frac{\mu_0}{2\pi}\odot$

55. A charge having q/m equal to 10^8 c/kg and with velocity 3×10^5 m/s enters into a uniform magnetic field B = 0.3 tesla at an angle 30º with direction of field. Then radius of curvature will be :

1. 0.01 cm

2. 0.5 cm

3. 1 cm

4. 2 cm

56. An electron moves in a circular orbit with a uniform speed v. It produces a magnetic field B at the centre of the circle. The radius of the circle is proportional to :

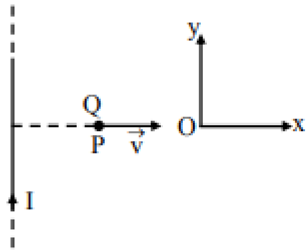
1. $\sqrt{\frac{v}{B}}$

2. $\frac{v}{B}$

3. $\frac{B}{v}$

4. $\sqrt{\frac{B}{v}}$

57. A very long straight wire carries a current I. At the instant when a charge +Q at point P has velocity $\vec{v}$, as shown, the force on the charge is



(1) Along ox

(2) Opposite to oy

(3) Along oy

(4) Opposite to ox

58. Resistance of a Galvanometer coil is 8Ω and 2Ω shunt resistance is connected with it. If main current is 1 A then the current flow through 2Ω resistance will be:
1. 0.2 A
2. 0.8 A
3. 0.1 A
4. 0.4 A

59. A coil in the shape of an equilateral triangle of side l is suspended between the pole pieces of a permanent magnet such that $\overrightarrow{B}$ is in the plane of the coil. If due to a current i in the triangle a torque τ acts on it, the side l of the triangle is:

1. $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)$

2. $\frac{1}{\sqrt{3}}\frac{\tau}{Bi}$

3. $2\left(\frac{\tau}{\sqrt{3}Bi}\right)^{\frac{1}{2}}$

4. $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)^{\frac{1}{2}}$

60. Two long parallel wires are at a distance of 1m. If both of them carry one ampere of current in same direction, then the force of attraction on unit length of the wires will be :

1. $2\times\ 10^{-7}\ N/m$

2. $4\times\ 10^{-7}\ N/m$

3. $8\times\ 10^{-7}\ N/m$

4. $10^{-7}\ N/m$

61. A galvanometer acting as a voltmeter will have:

(1) high resistance in series with its coil

(2) low resistance in parallel with its coil

(3) low resistance in series with its coil

(4) high resistance in parallel with its coil

62. A current carrying coil (I = 5A, R = 10 cm.) having 50 number of turns find field at its centre-
1. 1.57 mT
2. 3.14 mT
3. 1 mT
4. 2 mT

63. A galvanometer of 50-ohm resistance has 25 divisions. A current of 4×10^{-4} ampere gives a deflection of one division. To convert this galvanometer into a voltmeter having a range of 25 volts, it should be connected with a resistance of:

(1) 245 Ω as a shunt

(2) 2550 Ω in series

(3) 2450 Ω in series

(4) 2500 Ω as a shunt

64. Two identically charged particles A and B initially at rest, are accelerated by a common potential difference V. They enters into a transverse uniform magnetic field B. They describe a circular path of radii $r_1\ and\ r_2$ respectively then their mass ratio is :

1. $\left(\frac{r_1}{r_2}\right)^2$

2. $\left(\frac{r_2}{r_1}\right)^2$

3. $\left(\frac{r_1}{r_2}\right)$

4. $\left(\frac{r_2}{r_1}\right)$

65. To convert a galvanometer into a voltmeter one should connect a : -

(1) High resistance in series with galvanometer

(2) Low resistance in series with galvanometer

(3) High resistance in parallel with galvanometer

(4) Low resistance in parallel with galvanometer

66. The magnetic field of given length of wire for single turn coil at its centre is 'B' then its value for two turns coil for the same wire is : -

1. $\frac{B}{4}$

2. $\frac{B}{2}$

3. 4B

4. 2B

67. A charge 'q' moves in a region where electric field and magnetic field both exist, then force on it is : -

1. $q\left(\vec{V} \times \vec{B}\right)$

2. $q\vec{E} + q\left(\vec{V} \times \vec{B}\right)$

3. $q\vec{E} + q\left(\vec{B} \times \vec{V}\right)$

4. $q\vec{B} + q\left(\vec{E} \times \vec{V}\right)$

68. An electron having mass 'm' and kinetic energy E enter in uniform magnetic field B perpendicularly, then its frequency will be:

1. $\frac{eE}{qVB}$

2. $\frac{2\pi m}{eB}$

3. $\frac{eB}{2\pi m}$

4. $\frac{2m}{eBE}$

69. In Thomson mass spectrograph $\vec{E} \perp \vec{B}$ then the velocity of the undeflected electron beam will be :

1. $\frac{|\vec{E}|}{|\vec{B}|}$

2. $\vec{E} \times \vec{B}$

3. $\frac{|\vec{B}|}{|\vec{E}|}$

4. $\frac{E^2}{B^2}$

70. Tangent galvanometer is used to measure : -
1. Potential difference
2. Current
3. Resistance
4. In measuring charge

71. If number of turn, area and current through it is given by n, A and i respectively then its magnetic moment will be : -

1. niA

2. n^2iA

3. niA^2

4. $\frac{ni}{\sqrt{A}}$

72. A long solenoid carrying a current produces a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new value of the magnetic field is -

(1) B/2

(2) B

(3) 2B

(4) 4B

73. A charged particle moves through a magnetic field in a direction perpendicular to it. Then the

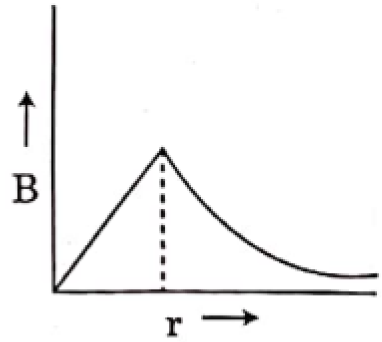
(1) Speed of the particle remains unchanged

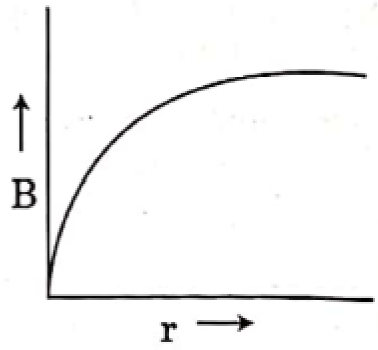
(2) Direction of the particle remains unchanged

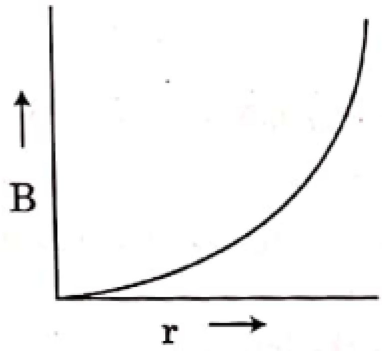
(3) Acceleration remains unchanged

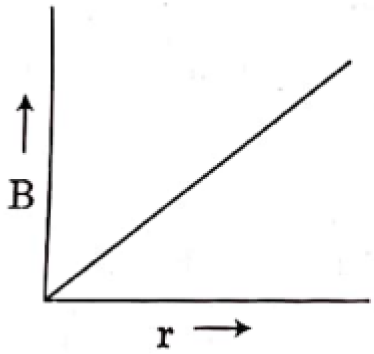
(4) Velocity remains unchanged

74. A thick current-carrying cable of radius 'R' carries current 'I' uniformly distributed across its cross-section. The variation of magnetic field B(r) due to the cable with the distance 'r' from the axis of the cable is represented by:

1. 

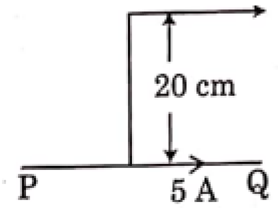
2. 

3. 

4. 

75. An infinitely long straight conductor carries a current of 5 A as shown. An electron is moving with a speed of 10^5 m/s parallel to the conductor. The perpendicular distance between the electron and the conductor is 20 cm at an instant. Calculate the magnitude of the force experienced by the electron at that instant.

Electron $v = 10^5\ m/s$



1. $4\pi \times 10^{-20}$ N
2. 8×10^{-20} N
3. 4×10^{-20} N
4. $8\pi \times 10^{-20}$ N

76. A uniform conducting wire of length 12a and resistance 'R' is wound up as a current carrying coil in the shape of,

(i) an equilateral triangle of side 'a'

(ii) a square of side 'a'

The magnetic dipole moments of the coil in each case respectively are:

1. $3\,Ia^2$ and $4\,Ia^2$
2. $4\,Ia^2$ and $3\,Ia^2$
3. $\sqrt{3}\,Ia^2$ and $3\,Ia^2$
4. $3\,Ia^2$ and Ia^2

77. In the product

$$\vec{F} = q\left(\vec{v} \times \vec{B}\right)$$
$$= q\vec{v} \times \left(B\hat{i} + B\hat{j} + B\hat{k}\right)$$

For $q = 1$ and $\vec{v} = 2\hat{i} + 4\hat{j} + 6\hat{k}$ and
$$\vec{F} = 4\hat{i} - 20\hat{j} + 12\hat{k}$$

What will be the complete expression for $\vec{B}$?

1. $8\hat{i} + 8\hat{j} - 6\hat{k}$
2. $6\hat{i} + 6\hat{j} - 8\hat{k}$
3. $-8\hat{i} - 8\hat{j} - 6\hat{k}$
4. $-6\hat{i} - 6\hat{j} - 8\hat{k}$

Magnetism & Matter

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Magnetic materials	10
Bar Magnet	7
Earth's Magnetism	5
Curie's Law and Hysteresis	4
Analogy between Electrostatics & Magnetostatics	2
Magnetization & Magnetic Intensity	1

1. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip θ is given by:-

1. $\tan^2\theta = \tan^2\theta_1 + tan^2\theta_2$

2. $cot^2\theta = cot^2\theta_1 - cot^2\theta_2$

3. $\tan^2\theta = \tan^2\theta_1 + tan^2\theta_2$

4. $cot^2\theta = cot^2\theta_1 + cot^2\theta_2$

2. A thin diamagnetic rod is placed vertically between the poles of an electromagnet. When the current in the electromagnet is switched on, then the diamagnetic rod is pushed up, out of the horizontal magnetic field. Hence the rod gains gravitational potential energy. The work required to do this comes from

1. the current source

2. the magnetic field

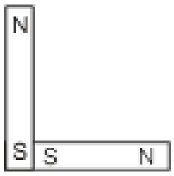
3. the lattice structure of the material of the rod

4. the induced electric field due to the changing magnetic field.

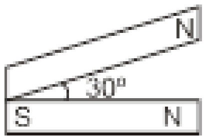
3.
The magnetic susceptibility is negative for:

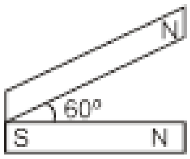
1. Paramagnetic material only
2. Ferromagnetic material only
3. Paramagnetic and ferromagnetic materials
4. Diamagnetic material only

4. Following figures show the arrangement of bar magnets in different configurations. Each magnet has magnetic dipole. Which configuration has highest net magnetic dipole moment ?

(a) 

(b) 

(c) 

(d) 

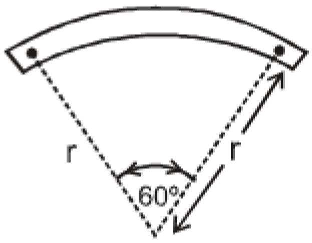
1. a

2. b

3. c

4. d

5.
A bar magnet of length 'l' and magnetic dipole moment 'M' is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be:



1. 3M/π
2. 2M/lπ
3. M/2
4. M

6. A compass needle which is allowed to move in a horizontal plane is taken to a geomagnetic pole. It

1. will become rigid showing no movement

2. will stay in any position

3. will stay in north-south direction only

4. will stay in east-west direction only

7.
There are four light-weight-rod samples A, B, C, D separately suspended by threads. A bar magnet is slowly brought near each sample and the following observations are noted:
(i) A is feebly repelled.
(ii) B is feebly attracted.
(iii) C is strongly attracted.
(iv) D remains unaffected .

Which one of the following is true?

1. C is of a diamagnetic material.

2. D is of a ferromagnetic material.

3. A is of a non-magnetic material.

4. B is of a paramagnetic material.

8. A vibration magnetometer placed in a magnetic meridian has a small bar magnet. The magnet executes oscillations with a time period of 2s in earth's horizontal magnetic field of 24 μT. When a horizontal field of 18 μT is produced opposite to the earth's field by placing a current-carrying wire, the new time period of the magnet will be

1. 1s

2. 2s

3. 3s

4. 4s

9. Electromagnets are made of soft iron because soft iron has:

1. low retentivity and high coercive force

2. high retentivity and high coercive force

3. low retentivity and low coercive force

4. high retentivity and low coercive force

10. If a diamagnetic substance is brought near the north or the south pole of a bar magnet, it is:

1. Repelled by both the poles

2. Repelled by the north pole and attracted by the south pole

3. Attracted by the north pole and repelled by the south pole

4. Attracted by both the poles

11.
A bar magnet having a magnetic moment of 2×10^4 JT^{-1} is free to rotate in a horizontal plane. A horizontal magnetic field $B = 6 \times 10^{-4} T$ exists in the space. The work done in taking the magnet slowly from a direction parallel to the field to a direction 60 ° from the field is

1. 0.6 J

2. 12 J

3. 6 J

4. 2 J

12.
Curie temperature is the temperature above which:

1. Ferromagnetic material becomes paramagnetic material.

2. Paramagnetic material becomes diamagnetic material.

3. Paramagnetic material becomes ferromagnetic material.

4. Ferromagnetic material becomes diamagnetic material.

13. Nickel shows the ferromagnetic property at room temperature. If the temperature is increased beyond Curie temperature, then it will show:

1. paramagnetism

2. anti-ferromagnetism

3. no magnetic property

4. diamagnetism

14. Above Curie temperature:

1. a ferromagnetic substance becomes paramagnetic.

2. a paramagnetic substance becomes diamagnetic.

3. a diamagnetic substance becomes paramagnetic.

4. a paramagnetic substance becomes ferromagnetic.

15. At point A on the earth's surface, the angle of dip is, $\delta = +25^\circ$. At a point B on the earth's surface, the angle of dip is, $\delta = -25^\circ$. We can interpret that:

1. A and B are both located in the southern hemisphere.

2. A and B are both located in the northern hemisphere.

3. A is located in the southern hemisphere and B is located in the northern hemisphere.

4. A is located in the northern hemisphere and B is located in the southern hemisphere.

16. The relations amongst the three elements of Earth's magnetic field, namely horizontal component H, vertical component V and dip angle δ is: (B_E=total magnetic field)

1. V=$B_E$tanδ, H=B_E

2. V=$B_E$sinδ, H=$B_E$cosδ

3. V=$B_E$cosδ, H=$B_E$sin δ

4. V=B_E, H=$B_E$tanδ

17. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeability of the material of the rod is:

$\left(\mu_0 = 4\pi \times 10^{-7}\ \mathrm{T\ m\ A^{-1}}\right)$

1. $8.0 \times 10^{-5}\ \mathrm{T\ m\ A^{-1}}$

2. $2.4\pi \times 10^{-5}\ \mathrm{T\ m\ A^{-1}}$

3. $2.4\pi \times 10^{-7}\ \mathrm{T\ m\ A^{-1}}$

4. $2.4\pi \times 10^{-4}\ \mathrm{T\ m\ A^{-1}}$

18. A magnetic needle suspended parallel to a magnetic field requires $\sqrt{3}$ J of work to turn it through 60°. The torque needed to maintain the needle in this position will be:

1. 3 J

2. $\sqrt{3}\ J$

3. $\frac{3}{2} J$

4. $2\sqrt{3}\ J$

19. A short bar magnet of magnet moment
$0.4\ \mathrm{JT}^{-1}$ is placed in a uniform magnetic field of

0.16 T. The magnet is in stable equilibrium when the potential energy is :
1. 0.064 J
2. – 0.064 J
3. Zero
4. – 0.082 J

20. The magnetic moment of a diamagnetic atom is

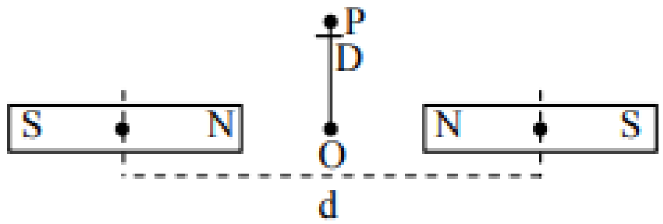
1. 1

2. between zero and one

3. equal to zero

4. much greater than one

21. Two identical bar magnets are fixed with their centres at a distance d apart. A stationary charge Q is placed at P in between the gap of the two magnets at distance D from the centre O as shown in the figure -



The force on the charge Q is in-
1. direction along OP
2. direction along PQ
3. direction perpendicular to the plane of paper
4. zero

22. For protecting a magnetic needle it should be placed

1. In iron box

2. In wooden box

3. In metallic box

4. None of these

23. If the magnetic dipole moment of an atom of diamagnetic material, paramagnetic material and ferromagnetic material are denoted by μ_d, μ_p, and μ_f respectively, then-

(1) $\mu_p = 0$ and $\mu_f \neq 0$

(2) $\mu_d \neq 0$ and $\mu_p = 0$

(3) $\mu_d \neq 0$ and $\mu_f \neq 0$

(4) $\mu_d = 0$ and $\mu_p \neq 0$

24. For a vibration magnetometer, the time period of the suspended bar magnet can be reduced by:

1. Moving it towards the south pole
2. Moving it towards the north pole
3. Moving it towards the equator
4. Anyone of them

25. Two bar magnets having same geometry with magnetic moments M and 2M, are firstly placed in such a way that their similer poles are same side then its time period of osccilation is T_1. Now the polarity of one of the magnet is reversed then time period of oscilation is T_2, then : -

1. $T_1 < T_2$

2. $T_1 = T_2$

3. $T_1 > T_2$

4. $T_2 = \infty$

26. Among which the magnetic susceptibility does not depend on the temperature:
1. Dia-magnetism
2. Paramagnetism
3. Ferro-magnetism
4. Ferrite

27. A bar magnet is oscillating in the Earth's magnetic field with a period T. What happens to this period and motion if this mass is quadrupled -

(1) Motion remains S.H. with time period = T/2

(2) Motion remains S.H. with time period = 2T

(3) Motion remains S.H. with time period = 4T

(4) Motion remains S.H. with time and period remains nearly constant

28. According to Curie's law, the magnetic susceptibility of a substance at an absolute temperature T is proportional to:

(1) 1/T

(2) T

(3) $1/T^2$

(4) T^2

29. Diamagnetic material in a magnetic field moves:

(1) from stronger to the weaker parts of the field

(2) from weaker to the stronger parts of the field

(3) perpendicular to the field

(4) in none of the above directions

Electromagnetic Induction

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Faraday's Law & Lenz Law	11
Self - Inductance	7
Motional emf	6
Magnetic Flux	4
Mutual Inductance	3
Eddy Current	1

1. The magnetic potential energy stored in a certain inductor is 25 mJ, when the current in the inductor is 60 mA. This inductor is of inductance :

1. 0.138 H

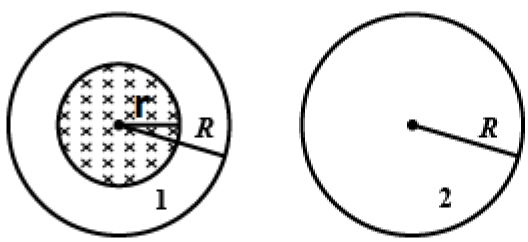
2. 138.88 H

3. 1.389 H

4. 13.89 H

2. A long solenoid of diameter 0.1 m has 2×10^4 turns per meter. At the center of the solenoid, a coil of 100 turns and radius 0.01 m is placed with its axis coinciding with solenoid axis. The current in the solenoid reduces at a constant rate to 0A from 4A in 0.05 s. If the resistance of the coil is $10\pi^2\ \Omega$. The total charge flowing through the coil during this time is:-
1. $16\mu\text{C}$
2. $32\mu\text{C}$
3. $16\pi\mu C$
4. $32\pi\mu C$

3. A uniform magnetic field is restricted within a region of radius r. The magnetic field changes with time at a rate $\frac{\text{dB}}{\text{dt}}$. Loop 1 of radius R > r encloses the region r and loop 2 of radius R is outside the region of the magnetic field as shown in the figure. Then, the emf generated is:



1. Zero in loop 1 and zero loop 2

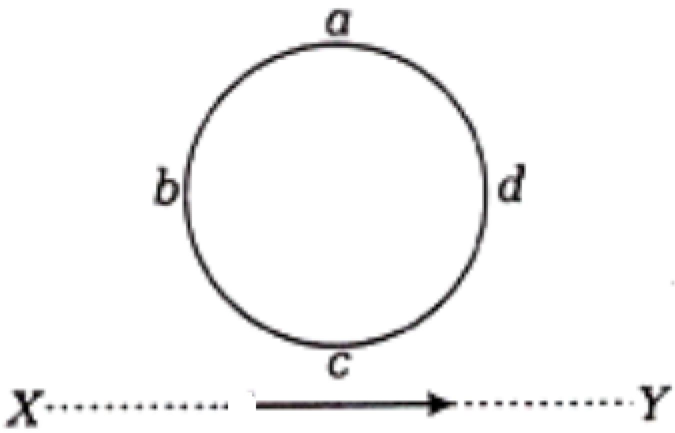
2. $-\frac{\text{dB}}{\text{dt}}\pi \text{r}^2$ in loop 1 and zero in loop 2

3. $-\frac{\text{dB}}{\text{dt}}\pi \text{R}^2$ in loop 1 and zero in loop 2

4. Zero in loop 1 and not defined in loop 2

4.
A long solenoid has 1000 turns. When a current of 4 A flows through it, the magnetic flux linked with each turn of the solenoid is 4 x 10^{-3} Wb. The self-inductance of the solenoid is:
1. 3 H
2. 2 H
3. 1 H
4. 4 H

5. An electron moves on a straight-line path XY as shown. The abcd is a coil adjacent to the path of electrons. What will be the direction of current if any, induced in the coil?



1. abcd

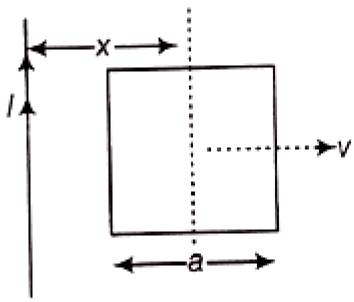
2. adcb

3. The current will reverse its direction as the electron goes past the coil

4. No current included

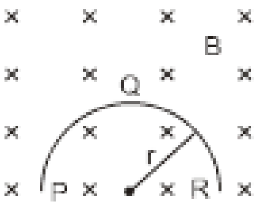
6.

A conducting square frame of side 'a' and a long straight wire carrying current I are located in the same plane as shown in the figure. The frame moves to the right with a constant velocity 'v'. The emf induced in the frame will be proportional to:



1. $\frac{1}{x^2}$
2. $\frac{1}{(2x-a)^2}$
3. $\frac{1}{(2x+a)^2}$
4. $\frac{1}{(2x-a)(2x+a)}$

7. A thin semicircular conducting the ring (PQR) of radius 'r' is falling with its plane vertical in a horizontal magnetic field B, as shown in figure. The potential difference developed across the ring when its speed is v is:



1. Zero

2. $Bv\pi r^2/2$ and P is at the higher potential

3. $\pi r Bv$ and R is at the higher potential

4. 2BvR and R is at the higher potential

8.
A coil of self-inductance L is connected in series with a bulb B and an AC source. The brightness of the bulb decreases when :

1. number of turns in the coil is reduced.
2. a capacitance of reactance $X_C = X_L$ is included in the same circuit
3. an iron rod is inserted in the coil
4. frequency of the AC source is decreased

9.
A wire loop is rotated in a magnetic field. The frequency of change of direction of the induced e.m.f. is:
1. twice per revolution.
2. four times per revolution.
3. six times per revolution.
4. once per revolution.

10. A coil of resistance 400 Ω is placed in a magnetic field. If the magnetic flux ϕ(Wb) linked with the coil varies with time t (sec) as $\phi = 50t^2+4$.
The current in the coil at t= 2s is:

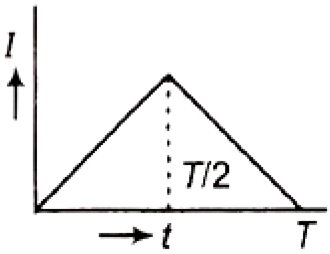
1. 0.5 A

2. 0.1 A

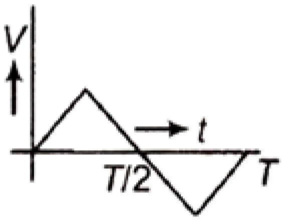
3. 2 A

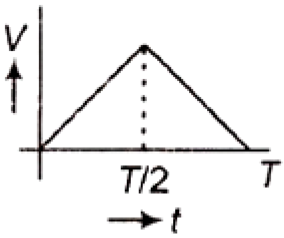
4. 1 A

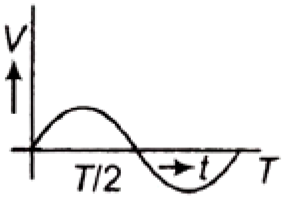
11. The current (I) in the inductance is varying with time according to the plot shown in the figure.

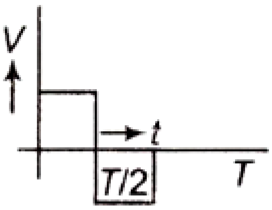


Which one of the following is the correct variation of voltage with time in the coil?

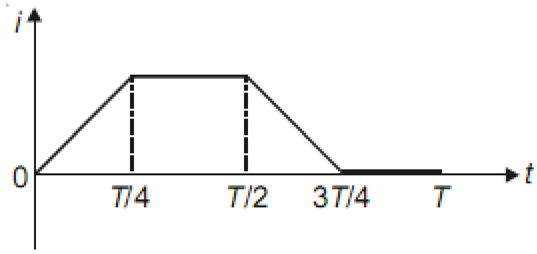
1. 

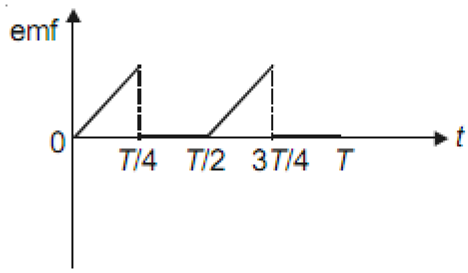
2. 

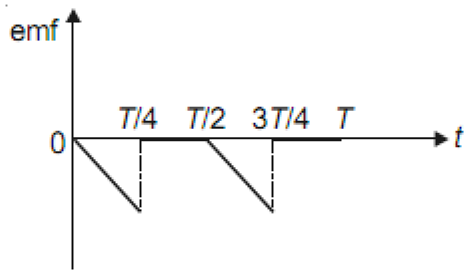
3. 

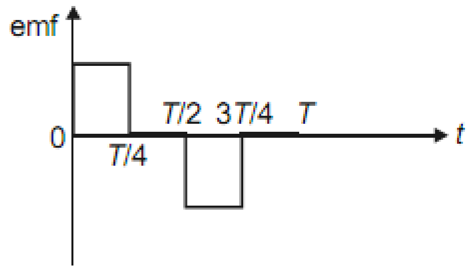
4. 

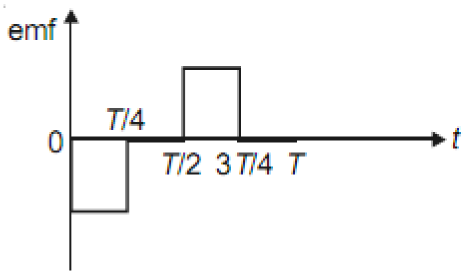
12. The current 'i' in a coil varies with time as shown in the figure. The variation of induced emf with time would be:



1. 

2. 

3. 

4. 

13. A conducting circular loop is placed in a uniform magnetic field, B = 0.025 T with its plane perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of 1 mms^{-1}. The induced emf when the radius is 2cm is:

1. $2\pi\mu$V

2. $\pi\mu$V

3. $\frac{\pi}{2}\mu V$

4. 2μV

14. A conducting circular loop is placed in a uniform magnetic field 0.04 T with its plane perpendicular to the magnetic field. The radius of the loop starts shrinking at rate of 2 mm/s .The induced emf in the loop when the radius is 2 cm is:

1. 3.2 $\pi\mu$V

2. 4.8 $\pi\mu$V

3. 0.8 $\pi\mu$V

4. 1.6 $\pi\mu$V

15. A rectangular, a square, a circular and an elliptical loop, all in the (x-y) plane, are moving out of a uniform magnetic field with a constant velocity, $\vec{v} = v\hat{i}$. The magnetic field is directed along the negative z-axis direction. The induced emf, during the passage of these loops out of the field region, will not remain constant for:

1. the rectangular, circular and elliptical loops.

2. the circular and the elliptical loops.

3. only the elliptical loop.

4. any of the four loops.

16.
A long solenoid has 500 turns. When a current of 2 A is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 4 x 10^{-3} Wb. The self-inductance of the solenoid is:

1. 2.5 V

2. 2.0 H

3. 1.0 H

4. 4.0 H

17.
A circular disc of radius 0.2 m is placed in a uniform magnetic field of induction $\frac{1}{\pi}\left(\frac{Wb}{m^2}\right)$ in such a way that its axis makes an angle of 60^0 with $\vec{B}$. The magnetic flux linked with the disc is:

1. 0.02 Wb

2. 0.06 Wb

3. 0.08 Wb

4. 0.01 Wb

18. The primary and secondary coils of a transformer have 50 and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coil is given by $\phi=\phi_0+4t$, where ϕ is in weber, t is time in second and ϕ_0 is a constant, the output voltage across the secondary coil is:

1. 90 V

2. 120 V

3. 220 V

4. 30 V

19. Two coils of self-inductance 2 mH and 8 mH are placed so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coils is:

1. 10 mH

2. 6 mH

3. 4 mH

4. 16 mH

20. In which of the following devices, the eddy current effect is not used?

1. Electric heater

2. Induction furnace

3. Magnetic braking in train

4. Electromagnet

21. A 800 turn coil of effective area 0.05 m^2 is kept perpendicular to a magnetic field $5 \times 10^{-5}\ T$. When the plane of the coil is rotated by 90° around any of its coplanar axis in 0.1 s, the emf induced in the coil will be:

1. 0.02 V

2. 2 V

3. 0.2 V

4. $2 \times 10^{-3}\ V$

22. A cycle wheel of radius 0.5 m is rotated with a constant angular velocity of 10 rad/s in a region of a magnetic field of 0.1 T which is perpendicular to the plane of the wheel. The EMF generated between its centre and the rim is:

1. 0.25 V

2. 0.125 V

3. 0.5 V

4. zero

23. The magnetic flux linked with a coil (in Wb) is given by the equation $\phi = 5t^2 + 3t + 60$.
The magnitude of induced emf in the coil at t=4 s will be:

1. 33 V

2. 43 V

3. 108 V

4. 10 V

24. A wheel with 20 metallic spokes, each 1 m long, is rotated with a speed of 120 rpm in a plane perpendicular to a magnetic field of 0.4 G. The induced emf between the axle and rim of the wheel will be, $\left(1\ \text{G} = 10^{-4}\ \text{T}\right)$

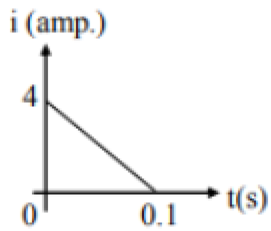
1. $2.51 \times 10^{-4}\ V$

2. $2.51 \times 10^{-5}\ V$

3. $4.0 \times 10^{-5}\ V$

4. 2.51 V

25. In a coil of resistance 10 Ω, the induced current develpoed by changing magnetic flux through it, is shown in figure as a function of time. The magnitude of change in flux through the coil in Weber is -



1. 2

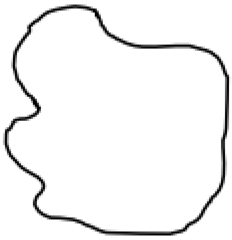
2. 6

3. 4

4. 8

26. Two coils have a mutual inductance 0.005 H. The current changes in first coil according to equation $I = I_0 \sin \omega t$ where $I_0 = 2$A and $\omega = 100\pi$ rad/sec. The maximum value of emf in second coil is :
1. 4π
2. 3π
3. 2π
4. π

27. As a result of a change in the magnetic flux linked to the closed-loop shown in the figure, an e.m.f., V volt is induced in the loop. The work done (joules) in taking a charge Q coulomb once along the loop is:



(1) QV

(2) QV/2

(3) 2QV

(4) Zero

28. Initially plane of coil is parallel to the uniform magnetic field B. In time Δt it makes to perpendicular to the magnetic field, then charge flows in Δt depends on this time as -

1. $\propto \Delta t$

2. $\propto \frac{1}{\Delta t}$

3. $\propto (\Delta t)^0$

4. $\propto (\Delta t)^2$

29. For an inductor coil, L = 0.04 H, then work done by a source to establish a current of 5A in it is:

1. 0.5 J
2. 1.00 J
3. 100 J
4. 20 J

30. The magnetic flux through a circuit of resistance R changes by an amount $\Delta\phi$ in a time Δt. Then the total quantity of electric charges Q that passes any point in the circuit during the time Δt is represented by :-

(1) $Q = \frac{\Delta\phi}{R}$

(2) $Q = \frac{\Delta\phi}{\Delta t}$

(3) $Q = R \cdot \frac{\Delta\phi}{\Delta t}$

(4) $Q = \frac{1}{R} \cdot \frac{\Delta\phi}{\Delta t}$

31. For a coil having L = 2 mH, current flow through it is $I = t^2 e^{-t}$, then the time at which emf becomes zero : -
1. 2 s
2. 1 s
3. 4 s
4. 3 s

32. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 >> R_2$, the mutual inductance M between them will be directly proportional to:

1. $\frac{R_1^2}{R_2}$

2. $\frac{R_2^2}{R_1}$

3. $\frac{R_1}{R_2}$

4. $\frac{R_2}{R_1}$

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there

Alternating Current

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Different Types of AC Circuits	19
Power factor	6
Transformer	6
RMS & Average Values	5
LC Oscillations	2
AC Generator	1

1. Which of the following combinations should be selected for better tuning of an L-C-R circuit used for communication?

(1) $R = 20\ \Omega,\ L = 1.5\ H,\ C = 35\ \mu F$
(2) $R = 25\ \Omega,\ L = 2.5\ H,\ C = 45\ \mu F$
(3) $R = 15\ \Omega,\ L = 3.5 H,\ C = 30\ \mu F$
(4) $R = 25\ \Omega,\ L = 1.5\ H,\ C = 45\ \mu F$

2. The potential differences across the resistance, capacitance and inductance are 80 V, 40 V and 100 V respectively in an L-C-R circuit. The power factor of this circuit is:

1. 0.4
2. 0.5
3. 0.8
4. 1.0

3. A 100 Ω resistance and a capacitor of 100 Ω reactance are connected in series across a 220 V source. When the capacitor is 50% charged, the peak value of the displacement current is:

1. 2.2 A
2. 11 A
3. 4.4 A
4. $11\sqrt{2}$ A

4. An inductor 20 mH, a capacitor 100 μF, and a resistor 50 Ω are connected in series across a source of emf, V= 10sin314t. The power loss in the circuit is:

1. 0.79 W
2. 0.43 W
3. 2.74 W
4. 1.13 W

5.
A small-signal voltage V(t) = V_0sinωt is applied across an ideal capacitor C:

1. over a full cycle, the capacitor C does not consume any energy from the voltage source.
2. current l(t) is in phase with voltage V(t).
3. current l(t) leads voltage V(t) by 180°.
4. current l(t), lags voltage V(t) by 90°

6.
An inductor 20mH, a capacitor 50μF, and a resistor 40Ω are connected in series across a source of emf V = 10sin340t. The power loss in the AC circuit is:
1. 0.67 W
2. 0.76 W
3. 0.89 W
4. 0.51 W

7. A series R-C circuit is connected to an alternating voltage source. Consider two situations:

1) When the capacitor is air-filled.
2) When the capacitor is mica filled.
Current through the resistor is I and voltage across the capacitor is V then:

1. $V_a < V_b$
2. $V_a > V_b$
3. $i_a > i_b$
4. $V_a = V_b$

8.

A resistance ' R' draws power 'P' when connected to an AC source. If an inductance is now placed in series with the resistance, such that the impedance of the circuit becomes 'Z' the power drawn will be

1. $P\left(\frac{R}{Z}\right)^2$
2. $P\sqrt{\frac{R}{Z}}$
3. $P\left(\frac{R}{Z}\right)$
4. P

9. A transformer has an efficiency of 90% is working on 200 V and 3 kW power supply. If the current in the secondary coil is 6 A the voltage across the secondary coil and the current in the primary coil respectively are:

1. 300 V, 15 A

2. 450 V, 15 A

3. 450 V, 13.5 A

4. 600 V, 15 A

10. In an electrical circuit R, L, C, and an AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and the current in the circuit is $\tan^{-1}\sqrt{3}$. If instead, C is removed from the circuit, the phase difference is again $\tan^{-1}\sqrt{3}$. The power factor of the circuit is:

1. 1/2

2. $1/\sqrt{2}$

3. 1

4. $\sqrt{3}/2$

11.
In an AC circuit an alternating voltage $e = 200\sqrt{2}\sin 100t$ volt is connected to a capacitor of capacity $1\mu F$. The RMS value of the current in the circuit is:

1. 100 mA

2. 200 mA

3. 20 mA

4. 10 mA

12. An AC voltage is applied to a resistance R and an inductor L in series. If R and the inductive reactance are both equal to 3Ω, the phase difference between the applied voltage and the current in the circuit is:

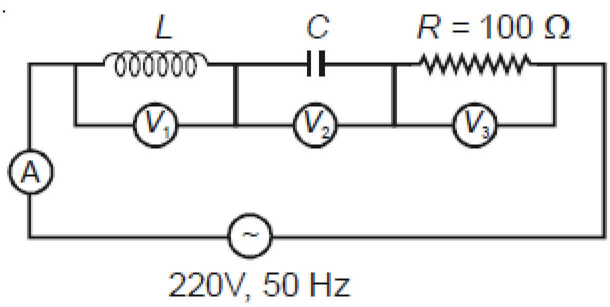
1. $\frac{\pi}{4}$

2. $\frac{\pi}{2}$

3. zero

4. $\frac{\pi}{6}$

13. In the given circuit, the reading of voltmeter V_1 and V_2 are 300 V each. The reading of the voltmeter V_3 and ammeter A are respectively:



1. 150 V, 2.2 A

2. 220 V, 2.2 A

3. 220 V, 2.0 A

4. 100 V, 2.0 A

14. A 220 V input is supplied to a transformer. The output circuit draws a current of 2.0 A at 440 V. If the efficiency of the transformer is 80%, the current drawn by the primary windings of the transformer is:

1. 3.6 A

2. 2.8 A

3. 2.5 A

4. 5.0 A

15.
Power dissipated in an L-C-R series circuit connected to an AC source of emf E is:

1. $\dfrac{\varepsilon^2 R}{\left[R^2+\left(L\omega-\dfrac{1}{C\omega}\right)^2\right]}$

2. $\dfrac{\varepsilon^2\sqrt{R^2+\left(L\omega-\dfrac{1}{C\omega}\right)^2}}{R}$

3. $\dfrac{\varepsilon^2\left[R^2+\left(L\omega-\dfrac{1}{C\omega}\right)^2\right]}{R}$

4. $\dfrac{\varepsilon^2 R}{\sqrt{R^2+\left(L\omega-\dfrac{1}{C\omega}\right)^2}}$

16. In an AC circuit, the emf (e) and the current (I) at any instant are given respectively by
$e = E_0 \sin\omega t$
$I = I_0 \sin(\omega t - \phi)$
The average power in the circuit over one cycle of AC is:

1. $\frac{E_o I_o}{2}$

2. $\frac{E_o I_o}{2}\sin\phi$

3. $\frac{E_o I_o}{2}\cos\phi$

4. $E_o I_o$

17. What is the value of inductance L for which the current is a maximum in a series LCR circuit with C = 10 μF and $\omega = 1000\ s^{-1}$?

1. 100 mH

2. 1 mH

3. cannot be calculated unless R is known

4. 10 mH

18. A transformer is used to light a 100 W and 110 V lamp from a 220 V mains. If the main current is 0.5 A, the efficiency of the transformer is approximately :

1. 30%

2. 50%

3. 90%

4. 10%

19. A transistor-oscillator using a resonant circuit with an inductance *L* (of negligible resistance) and a capacitance C has a frequency f. If *L* is doubled and C is changed to 4*C*, the frequency will be:

1. f/4

2. 8f

3. $f/2\sqrt{2}$

4. f/2

20. The core of a transformer is laminated because :

1. energy losses due to eddy currents may be minimized

2. the weight of the transformer may be reduced

3. rusting of the core may be prevented

4. ratio of voltage in primary and secondary may be increased

21. A coil of inductive reactance 31 Ω has a resistance of 8 Ω. It is placed in series with a condenser of capacitive reactance 25 Ω. The combination is connected to an a.c. source of 110 V. The power factor of the circuit is:

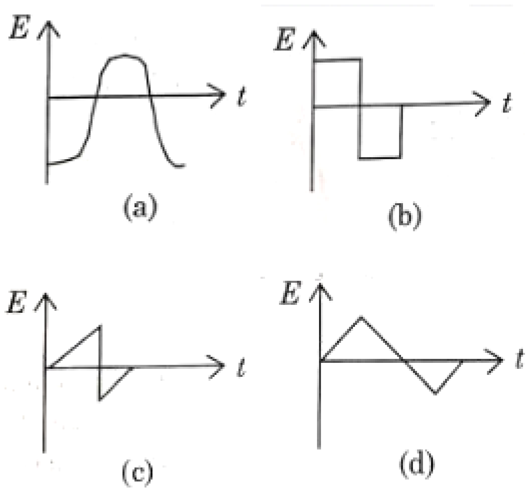
1. 0.56

2. 0.64

3. 0.80

4. 0.33

22. The variation of EMF with time for four types of generators is shown in the figures. Which amongst them can be called AC?



1. (a) and (d)

2. (a), (b), (c), (d)

3. (a) and (b)

4. only (a)

23. A circuit when connected to an AC source of 12 V gives a current of 0.2 A. The same circuit when connected to a DC source of 12 V, gives a current of 0.4 A. The circuit is:

1. series LR

2. series RC

3. series LC

4. series LCR

24. A 40 μF capacitor is connected to a 200 V, 50 Hz ac supply. The RMS value of the current in the circuit is, nearly:

1. 2.05 A

2. 2.5 A

3. 25.1 A

4. 1.7 A

25. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\frac{\pi}{3}$. If instead C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$ between current and voltage. The power factor of the circuit is:

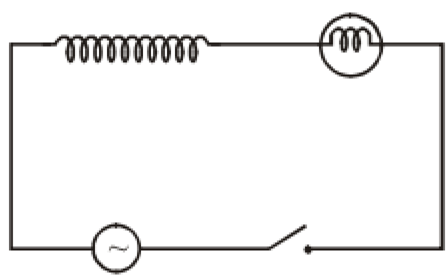
1. 0.5

2. 1.0

3. -1.0

4. Zero

26. A light bulb and an inductor coil are connected to an ac source through a key as shown in the figure below. The key is closed and after some time an iron rod is inserted into the interior of the inductor. The glow of the light bulb:



1. decreases

2. remains unchanged

3. will fluctuate

4. increases

27. The instantaneous values of alternating current and voltages in a circuit are given as

$$i = \frac{1}{\sqrt{2}}\sin\left(100\ \pi t\right)\ ampere$$

$$e = \frac{1}{\sqrt{2}}\sin\left(100\pi t\ +\ \pi/3\right)\ volt$$

The average power in Watts consumed in the circuit is :

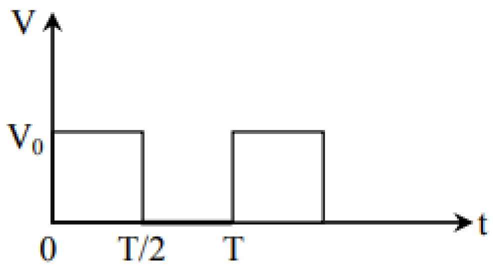
1. $\frac{\sqrt{3}}{4}$

2. $\frac{1}{2}$

3. $\frac{1}{8}$

4. $\frac{1}{4}$

28. The r.m.s. value of potential difference V shown in the figure is :



1. $V_0/\sqrt{3}$

2. V_0

3. $V_0/\sqrt{2}$

4. $V_0/2$

29. A coil has resistance 30 ohm and inductive reactance 20 Ohm at 50 Hz frequency. If an ac source, of 200 volts, 100 Hz, is connected across the coil, the current in the coil will be
1. 2.0 A
2. 4.0 A
3. 8.0 A
4. $\frac{20}{\sqrt{13}}$A

30. A condenser of capicity C is charged to a potential difference of V_1. The plates of the condenser are then connected to an ideal inductor of inductance L. The current through the inductor when the potential difference across the condenser reduces to V_2 is -

1. $\frac{C\left(V_1^2-V_2^2\right)}{L}$

2. $\frac{C\left(V_1^2+V_2^2\right)}{L}$

3. $\left(\frac{C\left(V_1^2-V_2^2\right)}{L}\right)^{1/2}$

4. $\left(\frac{C\left(V_1-V_2\right)^2}{L}\right)^{1/2}$

31. The value of quality factor is :

1. $\frac{\omega L}{R}$

2. $\frac{\omega}{RC}$

3. $\sqrt{LC}$

4. L/R

32. In a circuit L, C and R are connected in series with an alternating voltage source of frequency f. The current leads the voltage by 45°. The value of C is:

1. $\frac{1}{2\pi f(2\pi f\ L-R)}$

2. $\frac{1}{2\pi f(2\pi f\ L+R)}$

3. $\frac{1}{\pi f(2\pi f\ L-R)}$

4. $\frac{1}{\pi f(2\pi f\ L+R)}$

33. Turn ratio of a step-up transformer is 1 : 25. If current in load coil is 2A, then the current in primary coil will be :
1. 25A
2. 50A
3. 0.25A
4. 0.5A

34. A coil of 40-henry inductance is connected in series with a resistance of 8 ohms and the combination is joined to the terminals of a 2-volt battery. The time constant of the circuit is:

(1) 1/5 seconds

(2) 40 seconds

(3) 20 seconds

(4) 5 seconds

35. For a series LCR circuit the power loss at resonance is : -

1. $\frac{V^2}{\left[\omega L-\frac{1}{\omega C}\right]}$

2. $I^2L\omega$

3. I^2R

4. $\frac{V^2}{C\omega}$

36. A capacitor of capacity C has reactance X. If capacitance and frequency become double, then reactance will be:

1. 4X

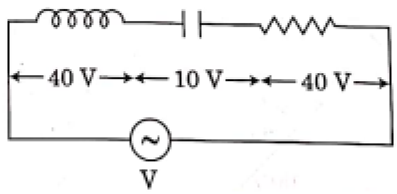
2. $\frac{X}{2}$

3. $\frac{X}{4}$

4. 2X

37. An inductor of inductance L, a capacitor of capacitance C and a resistor of resistance 'R' are connected in series to an ac source of potential difference 'V' volts as shown in fig.

Potential difference across L, C and R is 40 V, 10 V and 40V, respectively. The amplitude of the current flowing through LCR series circuit is $10\sqrt{2}A$. The impedance of the circuit:



1. 4 Ω

2. 5 Ω

3. $4\sqrt{2}$ Ω

4. $5/\sqrt{2}$ Ω

38. A step down transformer connected to an ac mains supply of 220 V is made to operate at 11 V, 44 W lamp. Ignoring power losses in the transformer, what is the current in the primary circuit?

1. 2 A

2. 4 A

3. 0.2 A

4. 0.4 A

39. A series LCR circuit containing 5.0 H inductor, 80 μF capacitor and 40 Ω resistor is connected to 230 V variable frequency ac source. The angular frequencies of the source at which power transferred to the circuit is half the power at the resonant angular frequency are likely to be:

1. 46 rad/s and 54 rad/s

2. 42 rad/s and 58 rad/s

3. 25 rad/s and 75 rad/s

4. 50 rad/s and 25 rad/s

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Electromagnetic Waves

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Properties of EM Waves	20
Electromagnetic Spectrum	9
Problem with Ampere's Law	2

1. An EM wave is propagating in a medium with a velocity $\overrightarrow{\mathrm{V}} = \mathrm{V}\,\hat{\mathrm{i}}$. The instantaneous oscillating electric field of this EM wave is along the +y axis. Then the direction of the oscillating magnetic field of the EM wave will be along:

1. -z-direction

2. +z direction

3. -y-direction

4. +y direction

2. In an electromagnetic wave in free space, the root mean square value of the electric field is E_{rms} = 6V/m. The peak value of the magnetic field is:-

1. $2.83 \times 10^{-8}\,T$

2. $0.70 \times 10^{-8}\,T$

3. $4.23 \times 10^{-8}\,T$

4. $1.41 \times 10^{-8}\,T$

3. Out of the following options which one can be used to produce a propagating electromagnetic wave?

1. A stationary charge

2. A charge-less particle

3. An accelerating charge

4. A charge moving at constant velocity

4. The energy of the EM waves is of the order of 15 KeV. To which part of the spectrum does it belong?

1. X-rays

2. Infrared rays

3. Ultraviolet rays

4. γ-rays

5. Light with an energy flux of 25×10^4 Wm^{-2} falls on a perfectly reflecting surface at normal incidence. If the surface area is 15 cm^2, the average force exerted on the surface is :

1. $1.25 \times 10^{-6} N$

2. $2.50 \times 10^{-6} N$

3. $1.20 \times 10^{-6} N$

4. $3.0 \times 10^{-6} N$

6.
The condition under which a microwave oven heats up a food item containing water molecules most efficiently is :

1. The frequency of the microwaves has no relation with the natural frequency of water molecules.
2. Microwaves are heatwaves, so always produce heating.
3. Infra-red waves produce heating in a microwave oven.
4. The frequency of the microwaves must match the resonant frequency of the water molecules.

7. The electric field associates with an electromagnetic wave in vacuum is given by $E=\hat{i}\ 40\ \cos\left(kz - 6 \times 10^8 t\right)$, where E, z and t are in volt/m, meter and second respectively. The value of wave vector k is

1. $2m^{-1}$

2. $0.5m^{-1}$

3. $6m^{-1}$

4. $3m^{-1}$

8. The electric and the magnetic fields, associated with an electromagnetic wave, propagating along the +z-axis, can be represented by:

1. $\left[\mathrm{E}=\mathrm{E}_0\ \widehat{\mathrm{k}},\ \mathrm{B}=\mathrm{B}_0\ \hat{\mathrm{i}}\right]$

2. $\left[\mathrm{E}=\mathrm{E}_0\ \hat{\mathrm{j}},\ \mathrm{B}=\mathrm{B}_0\ \hat{\mathrm{j}}\right]$

3. $\left[\mathrm{E}=\mathrm{E}_0\ \hat{\mathrm{j}},\ \mathrm{B}=\mathrm{B}_0\ \widehat{\mathrm{k}}\right]$

4. $\left[\mathrm{E}=\mathrm{E}_0\ \hat{\mathrm{i}},\ \mathrm{B}=\mathrm{B}_0\ \hat{\mathrm{j}}\right]$

9.
The decreasing order of wavelength of infrared microwave, ultraviolet and gamma rays is

1. gamma rays, ultraviolet, infrared, microwaves

2. microwaves, gamma rays, infrared, ultraviolet

3. infrared, microwave, ultraviolet, gamma rays

4. microwave, infrared, ultraviolet, gamma rays

10. Which of the following statement is false for the properties of electromagnetic waves?

1. Both electric and magnetic field vectors attain the maxima and minima at the same place and same time.

2. The energy in the electromagnetic wave is divided equally between electric and magnetic vectors.

3. Both electric and magnetic field vectors are parallel to each other and perpendicular to the direction of propagation of the wave.

4. These waves do not require any material medium for propagation.

11.
The electric field part of an electromagnetic wave in a medium is represented by
E_x =0;
E_y=$2.5\frac{\mathrm{N}}{\mathrm{C}}\cos\left[\left(2\pi\times10^{6}\frac{\mathrm{rad}}{\mathrm{m}}\right)t-\left(\pi\times10^{-2}\frac{\mathrm{rad}}{\mathrm{s}}\right)x\right]$

E_s = 0. The wave is

1. Moving along y-direction with frequency 21π x 10^6 Hz and wavelength 200 m.

2. Moving along x-direction with frequency 10^6 Hz and wavelength 100m

3. Moving along x-direction with frequency 10^6 Hz and wavelength 200m

4. Moving along x-direction with frequency 10^6 Hz and wavelength 800m

12. The velocity of electromagnetic radiation in a medium of permittivity ε_0 and permeability μ_0 is given by:

1. $\sqrt{\frac{\varepsilon_o}{\mu_o}}$

2. $\sqrt{\mu_o\varepsilon_o}$

3. $\frac{1}{\sqrt{\mu_o\varepsilon_o}}$

4. $\sqrt{\frac{\mu_o}{\varepsilon_o}}$

13. The electric and magnetic field of an electromagnetic wave are :

1. in phase and parallel to each other

2. in opposite phase and perpendicular to each other

3. in opposite phase and parallel to each other

4. in phase and perpendicular to each other

14. Which colour of the light has the longest wavelength?

1. violet

2. red

3. blue

4. green

15. A parallel plate capacitor of capacitance 20 μF is being charged by a voltage source whose potential is changing at the rate of 3 V/s. The conduction current through the connecting wires, and the displacement current through the plates of the capacitor, would be, respectively:

1. zero, zero

2. zero, 60μA

3. 60μA, 60μA

4. 60μA, zero

16. For a transparent medium relative permeability and permittivity, $\mu_r \; and \; \varepsilon_r$ are 1.0 and 1.44 respectively. The velocity of light in this medium would be:

1. 2.5$\times 10^8$ m/s

2. 3 $\times 10^8$ m/s

3. 2.08 $\times 10^8$ m/s

4. 4.32 $\times 10^8$ m/s

17. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (c = speed of electromagnetic waves)

1. 1 : 1

2. 1 : c

3. 1 : c^2

4. c : 1

18. Light with an average flux of 20 W/cm^2 falls on a non-reflecting surface at normal incidence having surface area 20 cm^2 . The energy received by the surface during time span of 1 minute is :

(1) 12 $\times 10^3 \; J$

(2) 24 $\times 10^3 \; J$

(3) 48 $\times 10^3 \; J$

(4) 10 $\times 10^3 \; J$

19. The E.M wave with the shortest wavelength among the following is:

1. Ultraviolet rays

2. X-rays

3. Gamma-rays

4. Microwaves

20. The magnetic field in a plane electromagnetic wave is given by:

$$B_Y = 2 \times 10^{-7} \sin \left(\pi \times 10^3 x + 3\pi \times 10^{11} t\right) T$$

Calculate the wavelength.

1. $\pi \times 10^3 \; m$

2. $2 \times 10^{-3} \; m$

3. $2 \times 10^3 \; m$

4. $\pi \times 10^{-3} \; m$

21. The ratio of amplitude of magnetic field to the amplitude of electric field for an electromagnetic wave propagating in vacuum is equal to -

1. reciprocal of speed of light in vacuum

2. the ratio of magnetic permeability to the electric susceptiblity of vaccum

3. unity

4. the speed of light in vacuum

22. The electric field of an electromagnetic wave in free space is given by –
$\vec{E} = 10\ \cos\left(10^7 t + kx\right)\hat{j}\ V/m$, where t and x are in seconds and metres respectively. It can be inferred that -

(a) The wavelength λ is 188.4 m
(b) The wave number k is 0.33 rad / m
(c) The wave amplitude is 10 V / m
(d) The wave is propagating along + x direction

Which one of the following pairs of statements is correct ?

1. (a) and (b)

2. (b) and (c)

3. (a) and (c)

4. (c) and (d)

23. The frequency order for γ - rays (b), X – rays (a), UV – rays (c) :

1. b > a > c

2. a > b > c

3. c > b > a

4. a > c > b

24. If $\lambda_{\text{v}},\ \lambda_{\text{x}}$ and λ_{m} represent the wavelengths of visible light, x-rays and microwaves respectively, then:

1. $\lambda_{\text{m}} > \lambda_{\text{x}} > \lambda_{\text{v}}$

2. $\lambda_v > \lambda_m > \lambda_x$

3. $\lambda_v > \lambda_x > \lambda_m$

4. $\lambda_{\text{m}} > \lambda_{\text{v}} > \lambda_{\text{x}}$

25. Which is having minimum wavelength : -

(1) X-rays

(2) Ultra violet rays

(3) γ-rays

(4) Cosmic rays

26. What is the cause of "Green house effect" : -

(1) Infra-red rays

(2) Ultra violet rays

(3) X-rays

(4) Radio waves

27. The frequency of an E.M. waves is 10 MHz then its wavelength is:
1. 30 m
2. 300 m
3. 3 m
4. None of the above

28. The velocity of electromagnetic wave is parallel to : -

1. $\vec{\text{B}} \times \vec{\text{E}}$

2. $\vec{\text{E}} \times \vec{\text{B}}$

3. $\vec{\text{E}}$

4. $\vec{\text{B}}$

29. Biological importance of Ozone layer is : -
(1) It stops ultraviolet rays
(2) Ozone layer reduces green house effect
(3) Ozone layer reflects radio waves
(4) Ozone layer controls O_2/H_2 ratio in atmosphere

30. For a plane electromagnetic wave propagating in the x-direction, which one of the following combinations gives the correct possible directions for the electric field (E) and magnetic field (B) respectively?

1. $\hat{j}+\widehat{k}, \ -\hat{j}-\widehat{k}$

2. $-\hat{j}+\widehat{k}, \ -\hat{j}+\widehat{k}$

3. $\hat{j}+\widehat{k}, \ \hat{j}+\widehat{k}$

4. $-\hat{j}+\widehat{k}, \ -\hat{j}-\widehat{k}$

31. A capacitor of capacitance 'C' is connected across an ac source of voltage V, given by

$V = V_0 \sin\omega t$

The displacement current between the plates of the capacitor would then be given by:

1. $I_d = \frac{V_0}{\omega C}\sin\omega t$

2. $I_d = V_0\omega C\sin\omega t$

3. $I_d = V_0\omega C\cos\omega t$

4. $I_d = \frac{V_0}{\omega C}\cos\omega t$

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Selected Questions (Only NCERT based) from AIPMT 1998 to NEET 2021

Ray Optics & Optical Instruments

(Expected Questions in NEET 2022: 4)

Subtopic Name	Number of Questions
Lenses	17
Prisms	13
Total Internal Reflection	11
Refraction at Plane Surface	6
Lensmakers' Formula	5
Reflection at Spherical Surface	5
Telescope	4
Reflection at Plane Surface	3
Simple & Compound Microscope	3
Human Eye	2

1. The ratio of resolving powers of an optical microscope for two wavelengths λ_1=4000 $\overset{0}{A}$ and $\lambda_2 = 6000\ \overset{0}{A}$ is:

1. 9:4

2. 3:2

3. 16:81

4. 8:27

2. The refractive index of the material of a prism is $\sqrt{2}$ and the angle of the prism is 30°. One of the two refracting surfaces of the prism is made a mirror inwards, by a silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the silvered surface) if the angle of incidence on the prism is:

1. 60°
2. 45°
3. 30°
4. Zero

3. An object is placed at a distance of 40 cm from a concave mirror of a focal length of 15 cm. If the object is displaced through a distance of 20 cm towards the mirror, the displacement of the image will be:

1. 30 cm away from the mirror

2. 36 cm away from the mirror

3. 30 cm towards the mirror

4. 36 cm towards the mirror

4. A beam of light from a source L is incident normally on a plane mirror fixed at a certain distance x from the source. The beam is reflected back as a spot on a scale placed just above the source L. When the mirror is rotated through a small angle θ, the spot of the light is found to move through a distance y on the scale. The angle θ is given by:-

1. $\frac{y}{x}$

2. $\frac{x}{2y}$

3. $\frac{x}{y}$

4. $\frac{y}{2x}$

5. A thin prism having refracting angle 10^0 is made of glass of refractive index 1.42. This prism is combined with another thin prism of a glass of refractive index 1.7. This combination produces dispersion without deviation. The refracting angle of the second prism should be:-

1. 6^o

2. 8^o

3. 10^o

4. 4^o

6. Two identical glass (μ_g= 3/2) equiconvex lenses of focal length f each are kept in contact. The space between the two lenses is filled with water (μ_w = 4/3). The focal length of the combination is :

1. f/3

2. f

3. $\frac{4f}{3}$

4. $\frac{3f}{4}$

7. An air bubble in a glass slab with refractive index 1.5 (near-normal incidence) is 5 cm deep when viewed from one surface and 3 cm deep when viewed from the opposite face. The thickness (in cm) of the slab is :

1. 8
2. 10
3. 12
4. 16

8. A person can see clearly objects only when they lie between 50 cm and 400 cm from his eyes. In order to increase the maximum distance of distinct vision to infinity, the type and power of the correcting lens, the person has to use, will be

1. convex, +2.25 diopter
2. concave, -0.25 diopter
3. concave -0.2 diopter
4. convex, +0.5 diopter

9. An astronomical refracting telescope will have large angular magnification and high angular resolution when it has an objective lens of:-

1. small focal length and large diameter
2. large focal length and small diameter
3. large focal length and large diameter
4. small focal length and small diameter

10. An astronomical telescope has an objective and eyepiece of focal lengths 40 cm and 4 cm respectively. To view an object 200 cm away from the objective, the lenses must be separated by a distance :

1. 46.0 cm
2. 50.0 cm
3. 54.0 cm
4. 37.3 cm

11. Match the corresponding entries of Column 1 with Column 2. [Where m is the magnification produced by the mirror]

Column 1	**Column 2**
A. m = -2	**I.** Convex mirror
B. m = -1/2	**II.** Concave mirror
C. m = +2	**III.** Real Image
D. m = +1/2	**IV.** Virtual Image

	A	B	C	D
(1)	I & III	I & IV	I & II	III & IV
(2)	I & IV	II & III	II & IV	II & III
(3)	III & IV	II & IV	II & III	I & IV
(4)	II & III	II & III	II & IV	I & IV

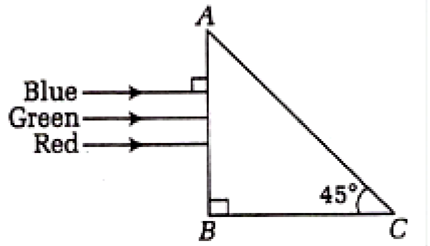
12.
The angle of incidence for a ray of light at a refracting surface of a prism is 45^0. The angle of prism is 60^0. If the ray suffers minimum deviation through the prism, the angle of minimum deviation and refractive index of the material of the prism respectively, are

1. $45^{\circ}, \sqrt{2}$
2. $30^{\circ}, \sqrt{2}$
3. $30^{\circ}, \frac{1}{\sqrt{2}}$
4. $45^{\circ}, \frac{1}{\sqrt{2}}$

13. In an astronomical telescope in normal adjustment, a straight line of length L is drawn on inside part of the objective lens. The eye-piece forms a real image of this line. The length of this image is I. The magnification of the telescope is :

1. $\frac{L}{I}+1$
2. $\frac{L}{I}-1$
3. $\frac{L+1}{I-1}$
4. $\frac{L}{I}$

14. A beam of light consisting of red, green, and blue colors is incident on a right-angled prism. The refractive index of the material of the prism for the red, green, and blue wavelengths is 1.39, 1.44, and 1.47 respectively.



The prism will :

1. separate the blue color part from the red and green color

2. separate all the three colors from one another

3. Not separate the three colors at all

4. Separate the red color part from the green and blue colors

15.

Two identical thin plano-convex glass lenses (refractive index = 1.5) each having radius of curvature of 20 cm are placed with their convex surfaces in contact at the centre. The intervening space is filled with the oil of refractive index 1.7. The focal length of the combination is:
1. -20 cm
2. -25 cm
3. -50 cm
4. 50 cm

16.

The refracting angle of a prism is A, and refractive index of the material of the prism is cot(A /2). The angle of minimum deviation is :
1. 180° - 3A
2. 180° - 2A
3. 90° - A
4. 180° + 2A

17. If the focal length of the objective lens is increased then magnifying power of:

1. microscope will increase but that of the telescope decrease.

2. microscope and telescope both will increase.

3. microscope and telescope both will decrease.

4. microscope will decrease but that of the telescope will increase.

18. The angle of a prism is 'A'. One of its refracting surfaces is silvered. Light rays falling at an angle of incidence 2A on the first surface returns back through the same path after suffering reflection at the silvered surface. The refractive index μ, of the prism, is :

1. 2sin A

2. 2cosA

3. $\frac{1}{2}\cos A$

4. tan A

19.
A plano-convex lens fits exactly into a plano concave lens. Their plane surfaces are parallel to each other. If lenses are made of different materials of refractive indices μ_1 and μ_2 and R is the radius of curvature of the curved surface of the lenses, then the focal length of the combination is:
1. $\frac{R}{2(\mu_1-\mu_2)}$
2. $\frac{R}{(\mu_1-\mu_2)}$
3. $\frac{2R}{(\mu_2-\mu_1)}$
4. $\frac{R}{2(\mu_1+\mu_2)}$

20.
For a normal eye, the cornea of the eye provides a converging power of 40 D and the least converging power of the eye lens behind the cornea is 20 D. Using this information, the distance between the retina and the cornea-eye lens can be estimated to be:

1. 2.5 cm
2. 1.67 cm
3. 1.5 cm
4. 5 cm

21. When a biconvex lens of glass having a refractive index of 1.47 is dipped in a liquid, it acts as a plane sheet of glass. The liquid must have a refractive index:

1. equal to that of glass.

2. less than one.

3. greater than that of glass.

4. less than that of glass.

22. A ray of light is incident at an angle of incidence, i, on one face of a prism of angle A (assumed to be small) and emerges normally from the opposite face. If the refractive index of the prism is μ, the angle of incidence i, is nearly equal to

1. μA

2. $\frac{\mu A}{2}$

3. A/μ

4. $A/2\mu$

23. A concave mirror of the focal length f_1 is placed at a distance of d from a convex lens of focal length f_2. A beam of light coming from infinity and falling on this convex lens-concave mirror combination returns to infinity. The distance d must be equal :

1. $f_1 + f_2$

2. $-f_1 + f_2$

3. $2f_1 + f_2$

4. $-2f_1 + f_2$

24. The magnifying power of a telescope is 9. When it is adjusted for parallel rays the distance between the objective and eyepiece is 20 cm. The focal length of lenses is :

1. 10 cm, 10 cm

2. 15 cm, 5 cm

3. 18 cm, 2 cm

4. 11 cm, 9 cm

25.
A biconvex lens $(\mu = 1.5)$ has a radius of curvature of magnitude 20 cm. Which one of the following options describes best the image formed of an object of height 2 cm placed 30 cm from the lens?

1. Virtual, upright, height = 0.5 cm

2. Real, inverted, height = 4 cm

3. Real, inverted, height = 1 cm

4. Virtual, upright, height = 1 cm

26.
Which of the following is not due to total internal reflection?
1. Difference between apparent and real depth of the pond

2. Mirage on hot summer days

3. Brilliance of the diamond

4. Working of optical fibre

27. A ray of light travelling in a transparent medium of refractive index μ falls on a surface separating the medium from the air at an angle of incidence of 45 °. For which of the following value of μ, the ray can undergo total internal reflection?

1. $\mu = 1.33$

2. $\mu = 1.40$

3. $\mu = 1.50$

4. $\mu = 1.25$

28. A lens having focal length f and aperture of diameter d forms an image of intensity I . Aperture of diameter $\frac{d}{2}$ in central region of lens is covered by a black paper. The focal length of lens and intensity of image now will be respectively :

1. f and $\frac{1}{4}$

2. $\frac{3f}{4}$ and $\frac{I}{2}$

3. f and $\frac{3I}{4}$

4. $\frac{f}{2}$ and $\frac{I}{2}$

29. Two thin lenses of focal lengths f_1 and f_2 are in contact and coaxial. The power of the combination is :

1. $\sqrt{\frac{f_1}{f_2}}$

2. $\sqrt{\frac{f_2}{f_1}}$

3. $\frac{f_1+f_2}{f_1 f_2}$

4. None of the above

30. A boy is trying to start a fire by focusing sunlight on a piece of paper using an equiconvex lens of focal length 10 cm. The diameter of the sun is 1.39 x10^9 m and its mean distance from the earth is 1.5 x 10^{11} m. What is the diameter of the sun's image on the paper?

1. 9.2×10^{-4} m

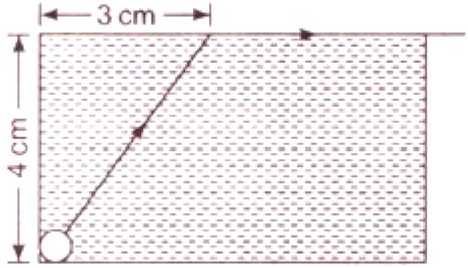
2. 6.5×10^{4} m

3. 6.5×10^{-5} m

4. 12.4×10^{-4} m

31.

A small coin is resting on the bottom of a beaker filled with a liquid. A ray of light from the coin travels upto the surface of the liquid and moves along its surface (see figure).



Coin

How fast is the light traveling in the liquid?

1. $1.8 \times 10^8\ m/s$

2. $2.4 \times 10^8\ m/s$

3. $3.0 \times 10^8\ m/s$

4. $1.2 \times 10^8\ m/s$

32. The frequency of a light wave in a material is 2×10^{14} Hz and wavelength is 5000 Å. The refractive index of material will be:

1. 1.40

2. 1.50

3. 3.00

4. 1.33

33. A microscope is focussed on a mark on a piece of paper and then a slab of a glass of thickness 3 cm and refractive index 1.5 is placed over the mark. How should the microscope be moved to get the mark in focus again?

1. 1 cm upward

2. 4.5 cm downward

3. 1 cm downward

4. 2 cm upward

34. A convex lens and a concave lens, each having the same focal length of 25 cm, are put in contact to form a combination of lenses. The power in dioptres of the combination is:

1. 25

2. 50

3. infinite

4. zero

35. Pick the wrong statement in the context with a rainbow.

1. Rainbow is a combined effect of dispersion, refraction, and reflection of sunlight.

2. When the light rays undergo two internal reflections in a water drop, a secondary rainbow is formed.

3. The order of colours is reversed in the secondary rainbow.

4. An observer can see a rainbow when his front is towards the sun.

36. In total internal reflection when the angle of incidence is equal to the critical angle for the pair of media in contact, what will be angle of refraction?

1. 90°

2. 180°

3. 0°

4. equal to angle of incidence

37. Two similar thin equi-convex lenses, of focal length f each, are kept coaxially in contact with each other such that the focal length of the combination is F_1. When the space between the two lenses is filled with glycerin which has the same refractive index as that of glass ($\mu = 1.5$), then the equivalent focal length is F_2. The ratio $F_1 : F_2$ will be:

1. 3: 4

2. 2: 1

3. 1: 2

4. 2: 3

38. A biconvex lens has power P. It is cut into two symmetrical halves by a plane containing the principal axis. The power of one part will be :

1. 0

2. $\frac{P}{2}$

3. $\frac{P}{4}$

4. P

39. A double convex lens has a focal length of 25 cm. The radius of curvature of one of the surfaces is double of the other. Find the radii if the refractive index of the material of the lens is 1.5.

1. 100 cm, 50 cm

2. 25 cm, 50 cm

3. 18.75 cm, 37.5 cm

4. 50 cm, 100 cm

40. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, then the angle of incidence is nearly equal to :

1. $\frac{2A}{\mu}$

2. μA

3. $\frac{\mu A}{2}$

4. $\frac{A}{2\mu}$

41. A plane-convex lens of unknown material and unknown focal length is given. With the help of a spherometer, we can measure the:

1. focal length of the lens.

2. radius of curvature of the curved surface.

3. aperture of the lens.

4. refractive index of the material.

42. An object is placed on the principal axis of a concave mirror at a distance of 1.5f (f is the focal length). The image will be at:

1. -3f

2. 1.5f

3. -1.5f

4. 3f

43. If the critical angle for total internal reflection from a medium to vacuum is 45°, the velocity of light in the medium is,

1. $1.5 \times 10^{8}\ m/s$

2. $\frac{3}{\sqrt{2}} \times 10^{8}\ m/s$

3. $\sqrt{2} \times 10^{8}\ m/s$

4. $3 \times 10^{8}\ m/s$

44. The power of a biconvex lens is 10 dioptre and the radius of curvature of each surface is 10 cm. Then the refractive index of the material of the lens is,

1. $\frac{4}{3}$

2. $\frac{9}{8}$

3. $\frac{5}{3}$

4. $\frac{3}{2}$

45. For the angle of minimum deviation of a prism to be equal to its refracting angle, the prism must be made of a material whose refractive index -

1. lies between 2 and $\sqrt{2}$

2. is less than 1

3. is greater than 2

4. lies between $\sqrt{2}$ and 1

46. A rod of length 10 cm lies along the principal axis of concave mirror of focal length 10 cm in such a way that its end closer to the pole is 20 cm away from the mirror. The length of the image is -

1. 15 cm

2. 2.5 cm

3. 5 cm

4. 10 cm

47. A thin prism of angle 15º made of glass of refractive index μ_1 = 1.5 is combined with another prism of glass of refractive index μ_2 = 1.75. The combination of the prism produced dispersion without deviation.
The angle of the second prism should be :
1. 5º
2. 7º
3. 10º
4. 12º

48. A converging beam of rays is incident on a diverging lens. Having passed through the lens the rays intersect at a point 15 cm from the lens on the opposite side. If the lens is removed the point where the rays meet will move 5 cm closer to the lens. The focal length of the lens is :

1. 5 cm
2. -10 cm
3. 20 cm
4. -30 cm

49. The speed of light in media M_1 and M_2 is 1.5×10^8 m/s and 2.0×10^8 m/s respectively. A ray of light enters from medium M_1 to M_2 at an incidence angle i. If the ray suffers total internal reflection the value of i is -

1. Equal to or less than $\sin^{-1}\left(\frac{3}{5}\right)$

2. Equal to or greater than $\sin^{-1}\left(\frac{3}{4}\right)$

3. less than $\sin^{-1}\left(\frac{2}{3}\right)$

4. Equal to $\sin^{-1}\left(\frac{2}{3}\right)$

50. A ray of light is incident on a 60º prism at the minimum deviation position. The angle of refraction at the first face (i.e. incident face) of the prism is-

1. 30º

2. 45º

3. 60º

4. Zero

51. Rainbow is formed due to :

1. Scattering & refraction

2. Total internal reflection & dispersion

3. Reflection only

4. Diffraction and dispersion

52. For a plane convex lenx (μ = 1.5) has radius of curvature 10 cm. It is silvered on its plane surface. Find focal length after silvering :

1. 10 cm

2. 20 cm

3. 15 cm

4. 25 cm

53. Light enters at an angle of incidence in a transparent rod of refractive index n. For what value of the refractive index of the material of the rod, the light once entered into it will not leave it through its lateral face whatsoever be the value of angle of incidence :

1. $n > \sqrt{2}$
2. 1.0
3. 1.3
4. 1.4

54. A tall man of height 6 feet, wants to see his full image. Then required minimum length of the mirror will be :

1. 12 feet

2. 3 feet

3. 6 feet

4. Any length

55. A bubble in glass slab (μ = 1.5) when viewed from one side appears at 5 cm and 2 cm from other side, then thickness of slab is :

1. 3.75 cm

2. 3 cm

3. 10.5 cm

4. 2.5 cm

56. A beam of light composed of red and green rays is incident obliquely at a point on the face of a rectangular glass slab. When coming out on the opposite parallel face, the red and green rays emerge from :-

(1) Two points propagating in two different parallel directions

(2) One point propagating in two different directions through slab

(3) One point propagating in the same direction through slab

(4) Two points propagating in two different non parallel directions

57. The refractive index of the material of a prism is $\sqrt{2}$ and its refracting angle is 30º. One of the refracting surfaces of the prism is made a mirror inwards. A beam of monochromatic light entering the prism from the other face will retrace its path after reflection from the mirrored surface if its angle of incidence on the prism is:

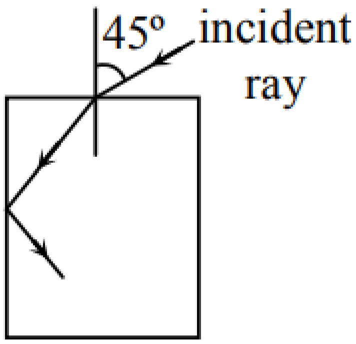
(1) 60º

(2) 0º

(3) 30º

(4) 45º

58. For the given incident ray as shown in the figure, the condition of total internal reflection of this ray, the minimum refractive index of the prism will be:



1. $\frac{\sqrt{3}+1}{2}$
2. $\frac{\sqrt{2}+1}{2}$
3. $\sqrt{\frac{3}{2}}$
4. $\sqrt{\frac{7}{6}}$

59. For a prism its refractive index is cot A/2, then the minimum angle of deviation is:
1. 180 – A
2. 180 – 2A
3. 90 – A
4. A/2

60. A bulb is located on a wall. Its image is to be obtained on a parallel wall with the help of a convex lens. If the distance between parallel walls is 'd' then the required focal length of the lens placed in between the walls is:

(1) Only $\frac{d}{4}$

(2) Only $\frac{d}{2}$

(3) More than $\frac{d}{4}$ but less than $\frac{d}{2}$

(4) Less than or equal to $\frac{d}{4}$

61. In compound microscope the magnification is 95, and the distance of object from objective lens 1/3.8 cm and focal length of objective is 1/4 cm. What is the magnification of eye pieces when final image is formed at least distance of
distinct vision :
1. 5
2. 10
3. 100
4. None

62. A disc is placed on a surface of pond which has refractive index $\frac{5}{3}$. A source of light is placed 4 m below the surface of liquid. The minimum
radius of disc will be so light is not coming out
1. ∞
2. 3m
3. 6m
4. 4m

63. A ray of light travelling in the air has wavelength λ, frequency n, velocity v and intensity I. If this ray enters into water then these parameters are λ', n', v' and I' respectively. Which relation is correct?
1. $\lambda = \lambda'$
2. $n = n'$
3. $v = v'$
4. $I = I'$

64. Optical fibre are based on : -
1. Total internal relfection
2. Less scattering
3. Refraction
4. Less absorbtion coefficient

65. A convex lens is dipped in a liquid whose refractive index is equal to the refractive index of the lens. Then its focal length will:

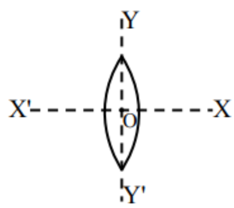
(1) Become zero

(2) Become infinite

(3) Become small, but non-zero

(4) Remain unchanged

66. A equiconvex lens is cut into two halves along (i) XOX' and (ii) YOY' as shown in the figure. Let f, f' f'' be the focal lengths of the complete lens, of each half in case (i), and of each half in case (ii), respectively



Choose the correct statement from the following-

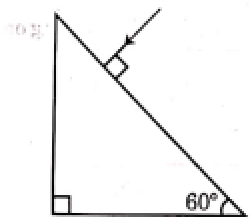
(1) f' = f, f'' = 2f

(2) f' = 2f, f'' = f

(3) f' = f, f'' = f

(4) f' = 2f, f'' = 2f

67. Find the value of the angle of emergence from the prism. The refractive index of the glass is $\sqrt{3}$.



1. 45°

2. 90°

3. 60°

4. 30°

68. A convex lens 'A' of focal length 20 cm and a concave lens 'B' of focal length 5 cm are kept along the same axis with a distance 'd' between them. If a parallel beam of light falling on 'A' leaves 'B' as a parallel beam, then the distance 'd ' in cm will be:

1. 50

2. 30

3. 25

4. 15

69. A lens of large focal length and large aperture is best suited as an objective of an astronomical telescope since:

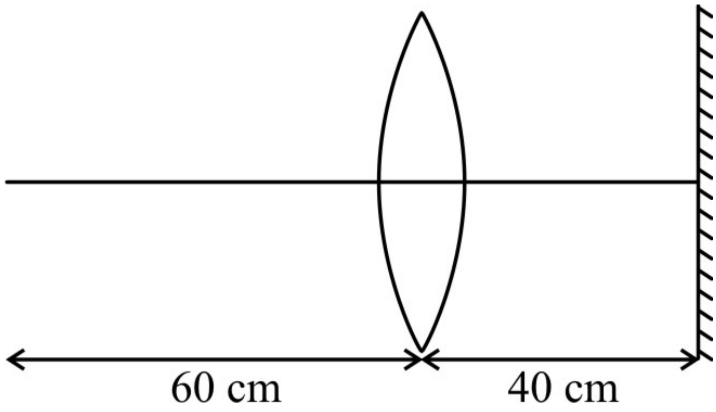
1. a large aperture contributes to the quality and visibility of the images.

2. a large area of the objective ensures better light-gathering power.

3. a large aperture provides a better resolution.

4. all of the above.

70. A point object is placed at a distance of 60 cm from a convex lens of focal length 30 cm. If a plane mirror were put perpendicular to the principal axis of the lens and at a distance of 40 cm from it, the final image would be formed at a distance of:



1. 30 cm from the plane mirror, it would be a virtual image.

2. 20 cm from the plane mirror, it would be a virtual image.

3. 20 cm from the lens, it would be a real image.

4. 30 cm from the lens, it would be a real image.

Wave Optics

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Young's Double Slit Experiment	**10**
Diffraction	**9**
Resolving Power of Optical Devices	**5**
Polarization of Light	**3**
Superposition Principle	**3**

1.
Young's double-slit experiment is first performed in air and then in a medium other than air. It is found that the 8^{th} bright fringe in the medium lies where the 5^{th} dark fringe lies in the air. The refractive index of the medium is nearly:
1. 1.59
2. 1.69
3. 1.78
4. 1.25

2. Two polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarised light of intensity I_o is incident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its axis makes an angle 45 ° with that of P_1. The intensity of transmitted light through P_2 is:-

1. $\frac{I_0}{4}$

2. $\frac{I_0}{8}$

3. $\frac{I_0}{16}$

4. $\frac{I_0}{2}$

3. The interference pattern is obtained with two coherent light sources of intensity ratio n. In the interference pattern, the ratio $\frac{I_{max}-I_{min}}{I_{max}+I_{min}}$will be

1. $\frac{\sqrt{n}}{n+1}$

2. $\frac{2\sqrt{n}}{n+1}$

3. $\frac{\sqrt{n}}{(n+1)^2}$

4. $\frac{2\sqrt{n}}{(n+1)^2}$

4. A linear aperture whose width is 0.02 cm is placed immediately in front of a lens of focal length 60 cm. The aperture is illuminated normally by a parallel beam of wavelength 5 x 10^{-5} cm. The distance of the first dark band of the diffraction pattern from the center of the screen is :

1. 0.10 cm

2. 0.25 cm

3. 0.20 cm

4. 0.15 cm

5. Unpolarised light is incident from the air on a plane surface of a material of refractive index 'μ'. At a particular angle of incidence 'i', it is found that the reflected and refracted rays are perpendicular to each other. Which of the following options is correct for this situation?

1. The reflected light is polarised with its electric vector parallel to the plane of incidence.

2. The reflected light is polarised with its electric vector perpendicular to the plane of incidence.

3. $\mathrm{i} = \sin^{-1}\left(\frac{1}{\mu}\right)$

4. $\mathrm{i} = \tan^{-1}\left(\frac{1}{\mu}\right)$

6. In Young's double-slit experiment, the separation d between the slits is 2 mm, the wavelength λ of the light used is 5896 Å and distance D between the screen and slits is 100 cm. It is found that the angular width of the fringes is 0.20°. To increase the fringe angular width to 0.21° (with same λ and D) the separation between the slits needs to be changed to:-

1. 1.8 mm

2. 1.9 mm

3. 2.1 mm

3. 1.7 mm

7.
The intensity at the maximum in a Young's double-slit experiment is I_0. Distance between two slits is d = 5λ, where λ is the wavelength of light used in the experiment. What will be the intensity in front of one of the slits on the screen placed at a distance D = 10 d?
1. $\frac{I_0}{4}$
2. $\frac{3}{4}I_0$
3. $\frac{I_0}{2}$
4. I_0

8. In a diffraction pattern due to a single slit of width a, the first minimum is observed at an angle 30^0 when light of wavelength 5000 $\overset{0}{A}$ is incident on the slit. The first secondary maximum is observed at an angle of
1. $\sin^{-1}\left(\frac{2}{3}\right)$
2. $\sin^{-1}\left(\frac{1}{2}\right)$
3. $\sin^{-1}\left(\frac{3}{4}\right)$
4. $\sin^{-1}\left(\frac{1}{4}\right)$

9. Two slits in young's experiment have widths in the ratio 1:25. The ratio of intensity at the maxima and minima in the interference pattern $\frac{I_{max}}{I_{min}}$ is
1. $\frac{9}{4}$
2. $\frac{121}{49}$
3. $\frac{49}{121}$
4. $\frac{4}{9}$

10. At the first minimum adjacent to the central maximum of a single slit diffraction pattern, the phase difference between the Huygen's wavelet from the edge of the slit and the wavelet from the midpoint of the slit is:
1. $\frac{\pi}{4}$ $radian$
2. $\frac{\pi}{2}$ $radian$
3. π $radian$
4. $\frac{\pi}{8}$ $radian$

11.
For a parallel beam of monochromatic light of wavelength 'λ', diffraction is produced by a single slit whose width 'a' is much greater than the wavelength of the light. If 'D' is the distance of the screen from the slit, the width of the central maxima will be
1. $\frac{2D\lambda}{a}$
2. $\frac{D\lambda}{a}$
3. $\frac{Da}{\lambda}$
4. $\frac{2Da}{\lambda}$

12.
In a double-slit experiment, the two slits are 1 mm apart and the screen is placed 1 m away. Monochromatic light of wavelength 500nm is used. What will be the width of each slit for obtaining ten maxima of double-slit within the central maxima of a single-slit pattern?
1. 0.2 mm
2. 0.1 mm
3. 0.5 mm
4. 0.02 mm

13. A beam of light of λ = 600 nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between the first dark fringes on either side of the central bright fringe is :

1. 1.2 cm

2. 1.2 mm

3. 2.4 cm

4. 2.4 mm

14. In Young's double-slit experiment, the intensity of light at a point on the screen where the path difference is λ is K, (λ being the wavelength of light used). The intensity at a point where the path difference is $\lambda/4$ will be :

1. K

2. K/4

3. K/2

4. zero

15. In Young's double slit experiment, the slits are 2 mm apart and are illuminated by photons of two wavelength λ_1 = 12000 Å and λ_2 = 10000 Å. At what minimum distance from the common central bright fringe on the screen 2 m from the slit will a bright fringe from one interference pattern coincide with a bright fringe from the other?

1. 6 mm

2. 4 mm

3. 3 mm

4. 8 mm

16.
A parallel beam of fast-moving electrons is incident normally on a narrow slit. A fluorescent screen is placed at a large distance from the slit. If the speed of the electrons is increased, which of the following statements is correct?

1. The angular width of the central maximum of the diffraction pattern will increase.
2. The angular width of the central maximum will decrease.
3. The angular width of the central maximum will be unaffected.
4. A diffraction pattern is not observed on the screen in the case of electrons.

17. Two periodic waves of intensities I_1 and I_2 pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities is

1. $2(I_1 + I_2)$

2. $\left(\sqrt{I_1} + \sqrt{I_2}\right)^2$

3. $\left(\sqrt{I_1} - \sqrt{I_2}\right)^2$

4. $2\left(\sqrt{I_1} - \sqrt{I_2}\right)$

18. A major breakthrough in the studies of cells came with the development of an electron microscope. This is because:

1. the resolution power of the electron microscope is much higher than that of the light microscope.

2. the resolving power of the electron microscope is 200-350 nm compared to 0.1-0.2 nm for the light microscope.

3. electron beam can pass through thick materials, whereas light microscopy requires thin sections.

4. the electron microscope is more powerful than the light microscope as it uses a beam of electrons that has a wavelength much longer than that of photons.

19. In a double-slit experiment, when the light of wavelength 400 nm was used, the angular width of the first minima formed on a screen placed 1 m away, was found to be 0.2°. What will be the angular width of the first minima, if the entire experimental apparatus is immersed in water? $(\mu_{water} = 4/3)$

1. 0.1°

2. 0.266°

3. 0.15°

4. 0.05°

20. In Young's double-slit experiment, if there is no initial phase difference between the light from the two slits, a point on the screen corresponding to the fifth minimum has path difference :

1. $5\frac{\lambda}{2}$

2. $10\frac{\lambda}{2}$

3. $9\frac{\lambda}{2}$

4. $11\frac{\lambda}{2}$

21. The angular width of the central maximum in the Fraunhofer diffraction for $\lambda = 6000\ \overset{o}{A}\ is\ \theta_0$. When the same slit is illuminated by another monochromatic light, the angular width decreases by 30%. The wavelength of this light is:

1. $1800\ \overset{o}{A}$

2. $4200\ \overset{o}{A}$

3. $420\ \overset{o}{A}$

4. $6000\ \overset{o}{A}$

22. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2m is :

1. $1.83 \times 10^{-7}\ rad$

2. $7.32 \times 10^{-7}\ rad$

3. $6.00 \times 10^{-7}\ rad$

4. $3.66 \times 10^{-7}\ rad$

23. In Young's double-slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes:

1. half

2. four times

3. one-fourth

4. double

24. The Brewster's angle for an interface should be:

(1) $30° < i_b < 45°$

(2) $45° < i_b < 90°$

(3) $i_b = 90°$

(4) $0° < i_b < 30°$

25. Two coherent sources of light interfere and produce fringe pattern on a screen. For the central maximum, the phase difference between the two waves will be:

1. zero

2. π

3. $3\pi/2$

4. $\pi/2$

26. The angular resolution of a 10cm diameter telescope at a wavelength of 5000 Å is of the order of:

(1) 10^{-4} rad

(2) 10^{-6} rad

(3) 10^{6} rad

(4) 10^{-2} rad

27. For the diffraction from a crystal with λ = 1Å and Bragg's angle θ = 60°, then for the second-order diffraction, 'd' will be :

1. 1.15 Å
2. 0.75 Å
3. 0.55 Å
4. 2.1 Å

28. A telescope has an objective lens of 10 cm diameter and is situated at a distance of one kilometre from two objects. The minimum distance between these two objects, which can be resolved by the telescope, when the mean wavelength of light is 5000 Å, is of the order of:

(1) 5 m

(2) 5 mm

(3) 5 cm

(4) 0.5 m

29. Diameter of human eye lens is 2 mm. What will be the minimum distance between two points to resolve them, which are situated at a distance of 50 meter from eye. The wavelength of light is 5000 Å : -

(1) 2.32 m

(2) 4.28 mm

(3) 1.52 cm

(4) 12.48 cm

30. The interplaner distance in a crystal is $2.8 \times 10^{-8}\ m$. The value of maximum wavelength which can be diffracted : -

1. $2.8 \times 10^{-8}\ m$

2. $5.6 \times 10^{-8}\ m$

3. $1.4 \times 10^{-8}\ m$

4. $7.6 \times 10^{-8}\ m$

Dual Nature of Radiations & Matter

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Einstein's Photoelectric Equation	22
De-broglie Wavelength	20
Photoelectric Effect: Experiment	16
Electron Emission	7
Particle Nature of Light	2
Davisson & Germer Experiment	1

1. Photons with energy 5 eV are incident on a cathode C in a photoelectric cell. The maximum energy of emitted photoelectrons is 2 eV. When photons of energy 6 eV are incident on C, no photoelectrons will reach the anode A, if the stopping potential of A relative to C is :

1. +3V

2. +4V

3. -1V

4. -3V

2. The photoelectric threshold wavelength of silver is 3250 x 10^{-10} m. The velocity of the electron ejected from a silver surface by the ultraviolet light of wavelength 2536 x 10^{-10} m is:

(Given h= 4.14×10^{-15} eVs and c $= 3 \times 10^{8}$ ms^{-1})

(1) $\approx 0.6 \times 10^{6} ms^{-1}$

(2) $\approx 61 \times 10^{3} ms^{-1}$

(3) $\approx 0.3 \times 10^{6} ms^{-1}$

(4) $\approx 0.3 \times 10^{5} ms^{-1}$

3. An electron of mass m with an initial velocity $\vec{v} = \mathrm{v}_0 \hat{i} \left(\mathrm{v}_0 > 0\right)$ enters in an electric field $\vec{\mathrm{E}} = -E_0 \hat{i}$ (E_o = constant >0) at t = 0. If λ_0, is its de-Broglie wavelength initially, then its de-Broglie wavelength at time t is:-

1. $\frac{\lambda_0}{\left(1+\frac{\mathrm{eE_0}}{\mathrm{mv_0}}\mathrm{t}\right)}$

2. $\lambda_0\left(1 + \frac{\mathrm{eE_0}}{\mathrm{mv_0}}\mathrm{t}\right)$

3. $\lambda_0 \mathrm{t}$

4. λ_0

4. When light of frequency $2\nu_o$ (where ν_o is threshold frequency), is incident on a metal plate, the maximum velocity of electrons emitted is v_1. When the frequency of the incident radiation is increased to $5\nu_o$, the maximum velocity of electrons emitted from the same plate is v_2. The ratio of v_1 to v_2 is

1. 1: 2

2. 1: 4

3. 4: 1

4. 2: 1

5.
When a metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is $\frac{V}{4}$. The threshold wavelength for the metallic surface is
1. 5λ
2. $\frac{5}{2}\lambda$
3. 3λ
4. 4λ

6. An electron of mass m and a photon have same energy E. The ratio of de-Broglie wavelengths associated with them is (c is the velocity of light) :

1. $\left(\frac{\mathrm{E}}{2\mathrm{m}}\right)^{\frac{1}{2}}$

2. $\mathrm{c}(2\,\mathrm{mE})^{\frac{1}{2}}$

3. $\frac{1}{\mathrm{c}}\left(\frac{2m}{E}\right)^{\frac{1}{2}}$

4. $\frac{1}{\mathrm{c}}\left(\frac{\mathrm{E}}{2\mathrm{m}}\right)^{\frac{1}{2}}$

7. A photoelectric surface is illuminated successively by the monochromatic light of wavelength λ and $\frac{\lambda}{2}$. If the maximum kinetic energy of the emitted photoelectrons in the second case is 3 times that in the first case, the work function of the surface of the mineral is :
[h=Plank's constant, c=speed of light]

1. $\frac{hc}{2\lambda}$

2. $\frac{hc}{\lambda}$

3. $\frac{2hc}{\lambda}$

4. $\frac{hc}{3\lambda}$

8. Light of wavelength 500 nm is incident on metal with work function 2.28 eV. The de-Broglie wavelength of the emitted electron is :

1. $< 2.8 \times 10^{-10} m$

2. $< 2.8 \times 10^{-9} m$

3. $\geq 2.8 \times 10^{-9} m$

4. $\leq 2.8 \times 10^{-12} m$

9.

Radiation of energy 'E' falls normally on a perfectly reflecting surface. The momentum transferred to the surface is (c = velocity of light) :

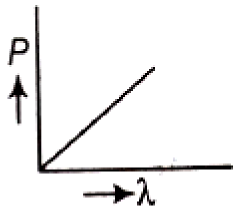
1. $\frac{\mathrm{E}}{\mathrm{c}}$
2. $\frac{2\mathrm{E}}{\mathrm{c}}$
3. $\frac{2\mathrm{E}}{\mathrm{c}^2}$
4. $\frac{\mathrm{E}}{\mathrm{c}^2}$

10.

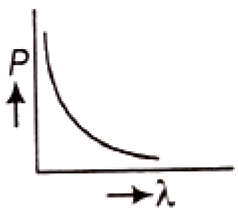
A certain metallic surface is illuminated with monochromatic light of wavelength λ.The stopping potential for photoelectric current for this light is $3V_0$. If the same surface is illuminated with light of wavelength 2λ, the stopping potential is V_0. The threshold wavelength for this surface for the photoelectric effect is
1. 6λ
2. 4λ
3. $\frac{\lambda}{4}$
4. $\frac{\lambda}{6}$

11.

Which of the following figures represent the variation of the particle momentum and the associated de-Broglie wavelength?



1.



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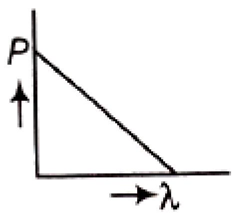

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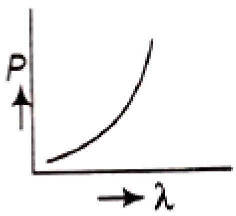


4.

12. When the energy of the incident radiation is increased by 20%, the kinetic energy of the photoelectrons emitted from a metal surface increased from emitted 0.5 eV to 0.8eV. The work function of the metal is :

1. 0.65 eV

2. 1.0 eV

3. 1.3 eV

4. 1.5 eV

13. If the kinetic energy of the particle is increased to 16 times its previous value, the percentage change in the de-Broglie wavelength of the particle is :

1. 25

2. 75

3. 60

4. 50

14. For photoelectric emission from certain metal, the cut off frequency is ν. If radiation of frequency 2ν impinges on the metal plate the maximum possible velocity of the emitted electron will be (m is the electron mass) :

1. $\sqrt{\mathrm{h}\nu/\mathrm{m}}$

2. $\sqrt{2\mathrm{h}\nu/\mathrm{m}}$

3. $2\sqrt{\mathrm{h}\nu/\mathrm{m}}$

4. $\sqrt{\mathrm{h}\nu/(2\mathrm{m})}$

15.
The wavelength λ_e of an electron and λ_p of a photon of same energy E are related by :
1. $\lambda_p \propto \lambda_e$
2. $\lambda_p \propto \sqrt{\lambda_e}$
3. $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$
4. $\lambda_p \propto \lambda_e^2$

16. A 200 W sodium street lamp emits yellow light of wavelength 0.6 μm. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is

1. 1.5×10^{20}

2. 6×10^{18}

3. 62×10^{20}

4. 3×10^{19}

17. An α-particle moves in a circular path of radius 0.83 cm in the presence of a magnetic field of 0.25 Wb/m^2. The de-Broglie wavelength associated with the particle will be :

1. $1\ \mathrm{\mathring{A}}$
2. $0.1\ \mathrm{\mathring{A}}$
3. $10\ \mathrm{\mathring{A}}$
4. $0.01\ \mathrm{\mathring{A}}$

18. In the Davisson and Germer experiment, the velocity of electrons emitted from the electron gun can be increased by

1. increasing the filament current

2. decreasing the filament current

3. decreasing the potential difference between the anode and filament

4. increasing the potential difference between the anode and filament

19. A radioactive nucleus of mass M emits a photon of frequency ν and the nucleus will recoil. The recoil energy will be

1. $\frac{h^2\nu^2}{2Mc^2}$

2. zero

3. $\frac{h\nu}{c\sqrt{2M}}$

4. $\frac{c\sqrt{2M}}{h\nu}$

20.
In the photoelectric emission process from a metal of work function 1.8 eV, the kinetic energy of most energetic elections is 0.5 eV. The corresponding stopping potential is:

1. 1.3 V

2. 0.5 V

3. 2.3 V

4. 1.8 V

21.
Light of two different frequencies whose photons have energies 1 eV and 2.5 eV respectively illuminate a metallic surface whose work function is 0.5 eV successively. Ratio of maximum speeds of emitted electrons will be

1. 1:2

2. 1:1

3. 1:5

4. 1:4

22.
Electrons used in an electron microscope are accelerated by a voltage of 25 kV. If the voltage is increased to 100 kV, then the de-Broglie wavelength associated with the electrons would

1. decrease by 2 times

2. decrease by 4 times

3. increase by 4 times

4. increase by 2 times

23.

A source S_1 is producing, 10^{15} photons per sec of wavelength $5000\overset{0}{A}$. Another source S_2 is producing 1.02×10^{15} photons per second of wavelength $5100\overset{0}{A}$. Then, (power of S_2)/(power of S_1) is equal to

1. 1.00

2. 1.02

3. 1.04

4. 0.98

24. The potential difference that must be applied to stop the fastest photoelectrons emitted by a nickel surface, having work function 5.01 eV, when ultraviolet light of 200 nm falls on it, must be

1. 2.4 V

2. -1.2 V

3. -2.4 V

4. 1.2 V

25.
Monochromatic light of wavelength 667 nm is produced by a helium-neon laser. The power emitted is 9mW. The number of photons arriving per second on the average at a target irradiated by this beam is

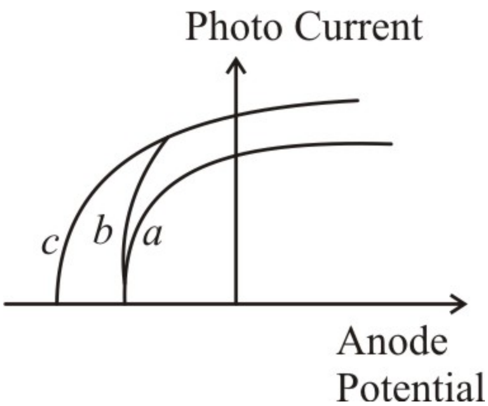
1. 9×10^{17}

2. 3×10^{16}

3. 9×10^{15}

4. 3×10^{19}

26.
The figure shows a plot of photocurrent versus anode potential for a photosensitive surface for three different radiations. Which one of the following is a correct statement?



1. Curves a and b represent incident radiations of different frequencies and different intensities

2. Curves a and b represent incident radiations of the same frequency but of different intensities

3. Curves b and c represent incident radiations of different frequencies and different intensities

4. Curves b and c represent incident radiations of same frequency having the same intensity

27.
The number of photoelectrons emitted for the light of a frequency ν (higher than the threshold frequency ν_0) is proportional to
1. $\nu - \nu_0$
2. threshold frequency (ν_0)
3. intensity of light
4. frequency of light (ν)

28.
The work function of a surface of a photosensitive material is 6.2 eV. The wavelength of the incident radiation for which the stopping potential is 5 V lies in the

1. ultraviolet region

2. visible region

3. infrared region

4. X-ray region

29.
In the phenomenon of electric discharge through gases at low pressure, the colored glow in the tube appears as a result of

1. excitation of electrons in the atoms

2. collision between the atoms of the gas

3. collisions between the charged particles emitted from the cathode and the atoms of the gas

4. collision between different electrons of the atoms of the gas

30. A particle of mass 1 mg has the same wavelength as an electron moving with a velocity of 3×10^6 ms^{-1}. The velocity of the particle is :
(Mass of electron = 9.1×10^{-31} kg)

1. $2.7 \times 10^{-18}\ \mathrm{ms}^{-1}$

2. $9 \times 10^{-2}\ \mathrm{ms}^{-1}$

3. $3 \times 10^{-31}\ \mathrm{ms}^{-1}$

4. $2.7 \times 10^{-21}\ \mathrm{ms}^{-1}$

31. A 5 W source emits monochromatic light of wavelength 5000 Å. When placed 0.5 m away, it liberates photoelectrons from a photosensitive metallic surface. When the source is moved to a distance of 1.0 m, the number of photoelectrons liberated, will be reduced by a factor of:

1. 4

2. 8

3. 16

4. 2

32. Monochromatic light of frequency 6.0×10^{14} Hz is produced by a laser. The power emitted is 2×10^{-3} W. The number of photons emitted, on the average, by the source per second is :

1. 5×10^{15}

2. 5×10^{16}

3. 5×10^{17}

4. 5×10^{14}

33. A photo-cell employs photoelectric effect to convert:

1. change in the frequency of light into a change in electric voltage.

2. change in the intensity of illumination into a change in photoelectric current.

3. change in the intensity of illumination into a change in the work function of the photocathode.

4. change in the frequency of light into a change in the electric current.

34. When photons of energy $h\nu$ fall on an aluminium plate (of work function E_0), photoelectrons of maximum kinetic energy K are ejected. If the frequency of the radiation is doubled, the maximum kinetic energy of the ejected photoelectrons will be :

1. $K+E_0$

2. 2K

3. K

4. K+hν

35. The momentum of a photon of energy 1 MeV in kg m/s, will be :

1. 0.33×10^{6}

2. 7×10^{-24}

3. 10^{-22}

4. 5×10^{-22}

36. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T (kelvin) and mass m, is:

1. $\frac{\mathrm{h}}{\sqrt{\mathrm{mkT}}}$

2. $\frac{\mathrm{h}}{\sqrt{3\,\mathrm{mkT}}}$

3. $\frac{2\mathrm{h}}{\sqrt{3\,\mathrm{mkT}}}$

4. $\frac{2\mathrm{h}}{\sqrt{\mathrm{mkT}}}$

37. An electron is accelerated through a potential difference of 10,000 V. Its de-Broglie wavelength is, (nearly) : $(m_e = 9\times10^{-31}kg)$

1. 12.2 nm

2. $12.2\times10^{-13}m$

3. $12.2\times10^{-12}m$

4. $12.2\times10^{-14}m$

38. The work function of the photosensitive material is 4.0 eV. The longest wavelength of light that can cause photoelectric emission from the substance is (approximately) :

1. 3100 nm

2. 966 nm

3. 31 nm

4. 310 nm

39. A proton and an $\alpha-$particle are accelerated from rest to the same energy. The de-Broglie wavelength λ_p and λ_α are in the ratio:

1. 2:1

2. 1:1

3. $\sqrt{2}:1$

4. 4:1

40. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled?

(1) four times

(2) one-fourth

(3) zero

(4) doubled

41. An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of electron is 1.227×10^{-2} nm, the potential difference is:

1. 10^2 V

2. 10^3 V

3. 10^4 V

4. 10^5 V

42. The de-Broglie wavelength of an electron moving with the kinetic energy of 144 eV is nearly equal to:

1. $102 \times 10^{-3}\ nm$

2. $102 \times 10^{-4}\ nm$

3. $102 \times 10^{-5}\ nm$

4. $102 \times 10^{-2}\ nm$

43. The wave nature of electrons was experimentally verified by,

1. de-Broglie

2. Hertz

3. Einstein

4. Davisson and Germer

44. Two radiations of photons energies 1 eV and 2.5 eV , successively illuminate a photosensitive metallic surface of work function 0.5 eV. The ratio of the maximum speeds of the emitted electrons is -

1. 1 : 2

2. 1 : 1

3. 1 : 5

4. 1 : 4

45. If the momentum of an electron is changed by P, then the de-Broglie wavelength associated with it changes by 0.5 %. The initial momentum of electron will be-

1. 400 P

2. $\frac{P}{200}$

3. 100 P

4. 200 P

46. The threshold frequency for a photosensitive metal is 3.3 x 10^{14} Hz. If light of frequency 8.2 x 10^{14} Hz is incident on this metal, the cutoff voltage for the photoelectric emission is nearly:

(1) 1 V

(2) 2 V

(3) 3 V

(4) 5 V

47. When monochromatic radiation of intenisty I falls on a metal surface, the number of
photoelectron and their maximum kinetic energy are N and T respectively. If the intensity of radiation is 2I, the number of emitted electrons and their maximum kinetic energy are respectively-

1. 2N and T

2. 2N and 2T

3. N and T

4. N and 2T

48. By photo-electric effect, Einstein proved :

1. E = hv

2. $KE = \frac{1}{2}mv^2$

3. $E = mc^2$

4. $E = \frac{-Rhc^2}{n^2}$

49. If the light of wavelength λ is incident on the metal surface, the ejected fastest electron has speed v. If the wavelength is changed to $\frac{3\lambda}{4}$, the speed of the fastest emitted electron will be :

1. smaller than $\sqrt{\frac{4}{3}}v$

2. greater than $\sqrt{\frac{4}{3}}v$

3. 2v

4. Zero

50. The work functions for metals A, B and C are respectively 1.92 eV, 2.0 eV and 5eV. According to Einstein's equation, the metals which will emit photo electrons for a radiation of wavelength 4100Å is/are-

(1) None

(2) A only

(3) A and B only

(4) All the three metals

51. Work function of a metal surface is φ = 1.5 eV. If a light of wavelength 5000Å falls on it then the maximum K.E. of ejected electron will be -

(1) 1.2 eV

(2) 0.98 eV

(3) 0.45 eV

(4) 0 eV

52. A photosensitive metallic surface has a work function of $h\nu_0$. If photons of energy $2h\nu_0$ fall on this surface, the electrons come out with a maximum velocity of 4×10^6 m/s. When the photon energy is increased to $5h\nu_0$, then the maximum velocity of photoelectrons will be

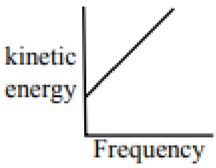
(1) 2×10^7 m/s

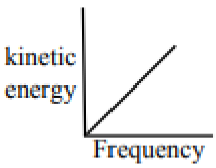
(2) 2×10^6 m/s

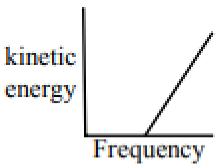
(3) 8×10^5 m/s

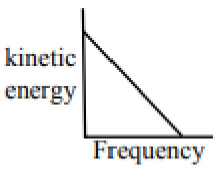
(4) 8×10^6 m/s

53. According to Einstein's photoelectric equation, the graph between the kinetic energy of photoelectrons ejected and the frequency of incident radiation is :-

(1) 

(2) 

(3) 

(4) 

54. The current conduction in a discharge tube is due to -
1. Electrons only
2. +ve ions and –ve ions
3. –ve ions and electrons
4. +ve ions, and electrons

55. A light of amplitude A and wavelength λ is incident on a metallic surface, then saturation current flows is proportional to (assume cut off wave length = λ_0) -

1. $A^2\ ,\ if\ \lambda\ >\ \lambda_0$

2. $A^2\ ,\ if\ \lambda\ <\ \lambda_0$

3. $A\ ,\ if\ \lambda\ >\ \lambda_0$

4. $A\ ,\ if\ \lambda\ <\ \lambda_0$

56. Light of wavelength 3000 Å in Photoelectric effect gives electron of max. K.E. 0.5 eV. If wavelength change to 2000 Å then max. K.E. of emitted electrons will be :

(1) Less than 0.5 eV

(2) 0.5 eV

(3) Greater than 0.5 eV

(4) PEE does not occurs

57. The K.E. of electron and photon is same, then the relation between their de-Broglie wavelength is :

1. $\lambda_{ph}\ <\ \lambda_e$

2. $\lambda_{ph}\ =\ \lambda_e$

3. $\lambda_{ph}\ >\ \lambda_e$

4. $\lambda_{ph}\ = 2\ \lambda_e$

58. The total energy of an electron is 3.555 MeV, then its Kinetic energy is :
1. 3.545 MeV
2. 3.045 MeV
3. 3.5 MeV
4. None

59. The value of Planck's constant is : -

1. $6.63 \times 10^{-34}\ \mathrm{J/s}$

2. $6.63 \times 10^{-34}\ \mathrm{kg - m^2/s}$

3. $6.63 \times 10^{-34}\ \mathrm{kg - m^2}$

4. $6.63 \times 10^{-34}\ \mathrm{J - s^{-1}}$

60. If particles are moving with the same velocity, then De-Broglie wavelength is maximum for

(1) Proton

(2) α-particle

(3) Neutron

(4) β-particle

61. When ultraviolet rays incident on a metal plate then the photoelectric effect does not occur, it occurs by the incidence of:

(1) Infrared rays

(2) X-rays

(3) Radio wave

(4) Lightwave

62. Which of the following is not the property of cathode rays:

(1) It produces a heating effect

(2) It does not deflect in the electric field

(3) It casts a shadow

(4) It produces fluorescence

63. Which one among shows the particle nature of light?
1. P.E.E.
2. Interference
3. Refraction
4. Polirazation

64. A photo-cell is illuminated by a source of light, which is placed at a distance d from the cell. If the distance become d/2, then number of electrons emited per second will be : -
1. Remain same
2. Four times
3. Two times
4. One-fourth

65. A photoelectric cell is illuminated by a point source of light 1 m away. When the source is shifted to 2m then -

(1) each emitted electron carries one quarter of the initial energy

(2) number of electrons emitted is half the initial number

(3) each emitted electron carries half the initial energy

(4) number of electrons emitted is a quarter of the initial number

66. J.J. Thomson's cathode-ray tube experiment demonstrated that-

(1) cathode rays are streams of negatively charged ions

(2) all the mass of an atom is essentially in the nucleus

(3) the e/m of electrons is much greater than the e/m of protons

(4) the e/m ratio of the cathode ray particles changes when a different gas is placed in the discharge tube

67. The number of photons per second on an average emitted by the source of monochromatic light of wavelength 600 nm, when it delivers the power of 3.3×10^{-3} watt will be: $\left(\mathrm{h} = 6.6 \times 10^{-34}\ \mathrm{Js}\right)$

1. 10^{16}

2. 10^{15}

3. 10^{18}

4. 10^{17}

68. An electromagnetic wave of wavelength 'λ' is incident on a photosensitive surface of negligible work function. If 'm' is mass of photoelectron emitted from the surface has de-Broglie wavelength λ_d, then:

1. $\lambda = \left(\frac{2mc}{h}\right)\lambda_d^2$

2. $\lambda = \left(\frac{2h}{mc}\right)\lambda_d^2$

3. $\lambda = \left(\frac{2m}{hc}\right)\lambda_d^2$

4. $\lambda_d = \left(\frac{2mc}{h}\right)\lambda^2$

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Atoms

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Bohr's Model of Atom	25
Various Atomic Models	9
Spectral Series	8
X-Ray	2

1. Electrons of mass m with de- Broglie wavelength λ fall on the target in an X-ray tube. The cut-off wavelength (λ_o) of the emitted X-ray is :

1. $\lambda_0 = \frac{2mc\lambda^2}{h}$

2. $\lambda_0 = \frac{2h}{mc}$

3. $\lambda_0 = \frac{2m^2c^2\lambda^2}{h^2}$

4. $\lambda_0 = \lambda$

2. If an electron in a hydrogen atom jumps from the 3rd orbit to the 2nd orbit, it emits a photon of wavelength λ. When it jumps from the 4th orbit to the 3rd orbit, the corresponding wavelength of the photon will be

1. $\frac{16}{25}\lambda$

2. $\frac{9}{16}\lambda$

3. $\frac{20}{7}\lambda$

4. $\frac{20}{13}\lambda$

3. The ratio of wavelengths of the last line of Balmer series and the last line of Lyman series is:-

1. 1

2. 4

3. 0.5

4. 2

4. The ratio of kinetic energy to the total energy of an electron in a Bohr orbit of the hydrogen atom is:

1. 1 : 1

2. 1 : -1

3. 2 : -1

4. 1 : -2

5.
Given, the value of Rydberg constant is 10^7 m^{-1}, the wave number of the last line of the Balmer series in hydrogen spectrum will be:

1. $0.5 \times 10^7\ m^{-1}$
2. $0.25 \times 10^7\ m^{-1}$
3. $2.5 \times 10^7\ m^{-1}$
4. $0.025 \times 10^4\ m^{-1}$

6.
When an $\alpha-$ particle of mass m moving with velocity v bombards on a heavy nucleus of charge Ze, its distance of closest approach from the nucleus depends on m as:
1. $\frac{1}{\sqrt{m}}$
2. $\frac{1}{m^2}$
3. m
4. $\frac{1}{m}$

7. In the spectrum of hydrogen, the ratio of the longest wavelength in the Lyman series to the longest wavelength in the Balmer series is:

1. $\frac{4}{9}$

2. $\frac{9}{4}$

3. $\frac{27}{5}$

4. $\frac{5}{27}$

8. Consider 3^{rd} orbit of He^+ (Helium), using non-relativistic approach, the speed of electron in this orbit will be (given Z = 2 and h (Planck's constant)= 6.6 x 10^{-34} J-s)
1. 2.92 x10^6 m/s
2. 1.46 x10^6 m/s
3. 0.73 x10^6 m/s
4. 3.0 x10^8 m/s

9. The hydrogen gas with its atoms in the ground state is excited by monochromatic radiation of λ = 975 Å. The number of spectral lines in the resulting spectrum emitted will be :

1. 3

2. 2

3. 6

4. 10

10. Ratio of longest wave lengths corresponding to Lyman and Blamer series in hydrogen spectrum is :

1. 3/23

2. 7/29

3. 9/31

4. 5/27

11. Electron in hydrogen atom first jumps from third excited state to second excited state and then from second excited to the first excited state. The ratio of the wavelengths $\lambda_1 : \lambda_2$ emitted in the two cases is

1. 7/5

2. 20/7

3. 27/5

4. 27/20

12. An electron of a stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom acquired as a result of photon emission will be (m is the mass of hydrogen atom, R is Rydberg constant and h is Plank's constant)

1. $\frac{24m}{25hR}$

2. $\frac{25hR}{24m}$

3. $\frac{25m}{24hR}$

4. $\frac{24hR}{25m}$

13. Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the ground state irradiates a photosensitive material. The stopping potential is measured to be 3.57 V. The threshold frequency of the material is

1. $4X10^{15}$ Hz

2. $5X10^{15}$ Hz

3. $1.6X10^{15}$ Hz

4. $2.5X10^{15}$ Hz

14.
The wavelength of the first line of Lyman series for hydrogen atom is equal to that of the second line of Balmer series for a hydrogen like ion. The atomic number Z of hydrogen like ion is

1. 4

2. 1

3. 2

4. 3

15. The energy of a hydrogen atom in the ground state is -13.6eV. The energy of a He^+ ion in the first excited state will be-

1. -13.6 eV

2. -27.2 eV

3. -54.4 eV

4. -6.8 eV

16. An alpha nucleus of energy $\frac{1}{2}mv^2$ bombards a heavy nuclear target of charge Ze. Then the distance of closest approach for the alpha nucleus will be proportional to:

1. $\frac{1}{Ze}$

2. v^2

3. $\frac{1}{m}$

4. $\frac{1}{v^4}$

17.
In a Rutherford scattering experiment, when a projectile of charge Z_1 and mass M_1 approaches a target nucleus of charge Z_2 and mass M_2, the distance of the closest approach is r_0. The energy of the projectile is

1. Directly proportional to M_1 x M_2

2. Directly proportional to Z_1Z_2

3. Inversely proportional to Z_1

4. Directly proportional to mass M_1

18.
The ionization energy of the electron in the hydrogen atom in its ground state is 13.6 eV. The atoms are excited to higher energy levels to emit radiations of 6 wavelengths. Maximum wavelength of emitted radiation corresponds to the transition between :
1. n = 3 to n = 2 states
2. n = 3 to n = 1 states
3. n = 2 to n = 1 states
4. n = 4 to n= 3 states

19.
The ground state energy of hydrogen atom is -13.6 eV. When its electron is in the first excited state, its excitation energy is-

1. 3.4 eV

2. 6.8 eV

3. 10.2 eV

4. zero

20. If the nucleus $^{27}_{13}\mathrm{Al}$ has a nuclear radius of about 3.6 fermi, then $^{125}_{52}\mathrm{Te}$ would have its radius approximately as:

1. 6.0 fermi

2. 9.6 fermi

3. 12.0 fermi

4. 4.8 fermi

21. The total energy of electron in the ground state of hydrogen atom is -13.6 eV. The kinetic energy of an electron in the first excited state is:

1. 3.4 eV

2. 6.8 eV

3. 13.6 eV

4. 1.7 eV

22. The ionization potential of the hydrogen atom is 13.6 V. Hydrogen atoms in the ground state are excited by monochromatic radiation of photon energy 12.1 eV. According to Bohr's theory, the spectral lines emitted by hydrogen will be:

1. two

2. three

3. four

4. one

23. In a discharge tube ionization of enclosed gas is produced due to collisions between:

1. positive ions and neutral atoms/molecules

2. negative electrons and neutral atoms/molecules

3. photons and neutral atoms/molecules

4. neutral gas atoms/molecules

24. The radius of Germanium (Ge) nuclide is measured to be twice the radius of ${}^{9}_{4}\text{Be}$. The number of nucleons in Ge are:

1. 73

2. 74

3. 75

4. 72

25. The total energy of an electron in an atom in an orbit is -3.4eV. Its kinetic and potential energies are, respectively:

1. 3.4 eV, 3.4 eV

2. -3.4 eV, -3.4 eV

3. -3.4 eV, -6.8 eV

4. 3.4 eV, -6.8 eV

26. α-particle consists of:

1. 2 protons only

2. 2 protons and 2 neutrons only

3, 2 electrons, 2 protons, and 2 neutrons

4. 2 electrons and 4 protons only

27. The radius of the first permitted Bohr orbit for the electron in a hydrogen atom equals $0.5\ \overset{o}{A}$ and its ground state energy equals -13.6 eV. If the electron in the hydrogen atom is replaced by muon (μ^-) [charge same as electron and mass $207m_e$], the first Bohr radius and ground state energy will be- $(m_e$ represents mass of electron)

1. 0.53 $\times 10^{-13}\ m,\ \ -3.6\ eV$

2. 25.6 $\times 10^{-13}\ m,\ \ -2.8\ eV$

3. 2.56 $\times 10^{-13}\ m,\ \ -2.8\ keV$

4. 2.56$\times 10^{-13}\ m,\ \ -13.6\ eV$

28. For which one of the following Bohr model is not valid?

1. Singly ionised helium atom (He^+)

2. Deuteron atom

3. Singly ionised neon atom (Ne^+)

4. Hydrogen atom

29. The total energy of an electron in the n^{th} stationary orbit of the hydrogen atom can be obtained by:

1. $E_n = \frac{13.6}{n^2}\ eV$

2. $E_n = -\frac{13.6}{n^2}\ eV$

3. $E_n = -\frac{1.36}{n^2}\ eV$

4. $E_n = -13.6 \times n^2\ eV$

30. The transition from the state n = 3 to n = 1 in a hydrogen like atom results in ultraviolet radiation. Infrared radiation will be obtained in the transition from -

1. $3 \rightarrow 2$

2. $4 \rightarrow 2$

3. $4 \rightarrow 3$

4. $2 \rightarrow 1$

31. An electron in the hydrogen atom jumps from excited state n to the ground state. The wavelength so emitted illuminates a photosensitive material having work function 2.75 eV. If the stopping potential of the photoelectron is 10V, then the value of n is :
1. 2
2. 3
3. 4
4. 5

32. Out of the following which one is not a possible energy for a photon to be emitted by hydrogen atom according to Bohr's atomic model?

1. 0.65 eV

2. 1.9 eV

3. 11.1 eV

4. 13.6 eV

33. The electrons in the hydrogen atom jumps from excited state (n = 3) to its ground state (n = 1) and the photons thus emitted irradiate a photosensitive matieral. If the work function of the material is 5.1 eV, the stopping potential is estimated to be (the energy of the electron in nth state $E_n = -\frac{13.6}{n^2} eV)$ -
1. 12.1 V

2. 17.2 V

3. 7 V

4. 5.1 V

34. Maximum frequency of emission is obtained for the transition :

1. n = 2 to n = 1

2. n = 6 to n = 2

3. n = 1 to n = 2

4. n = 2 to n = 6

35. The total energy of an electron in the first excited state of a hydrogen atom is about –3.4 eV. Its kinetic energy in this state is-

(1) –6.8 eV

(2) 3.4 eV

(3) 6.8 eV

(4) –3.4 eV

36. Energy levels A, B and C of a certain atom correspond to increasing values of energy i.e. $E_A < E_B < E_C$. If λ_1, λ_2 and λ_3 are wavelengths of radiations corresponding to transitions C to B, B to A and C to A respectively, which of the following relations is correct?

1. $\lambda_3 = \lambda_1 + \lambda_2$

2. $\lambda_1 + \lambda_2 + \lambda_3 = 0$

3. $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

4. $\lambda_3 = \frac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$

37. In the Bohr model of H-atom, an electron (e) is revolving around a proton (p) with velocity v, if r is the radius of orbit and m is mass and ε_0 is vacuum permittivity, the value of v is :

1. $\frac{e}{\sqrt{4\pi m \varepsilon_0 r}}$

2. $\frac{2e}{\sqrt{\pi m \varepsilon_0 r}}$

3. $\frac{e}{\sqrt{\pi m \varepsilon_0 r}}$

4. $\frac{e}{4\pi m \varepsilon_0 r}$

38. When an electron transitions from n = 4 to n = 2, then emitted line in spectrum will be :

1. First line of Lyman series

2. Second line of Balmer series

3. First line of Paschen series

4. Second line of Paschen series

39. Energy E of a hydrogen atom with principal quantum number n is given by $E = \frac{-13.6}{n^2} eV$. The energy of a photon ejected when the electron jumps from n = 3 state to n = 2 state of hydrogen is approximately:

(1) 0. 85 eV

(2) 3.4 eV

(3) 1.9 eV

(4) 1.5 eV

40. The Bohr model of atoms:

(1) Uses Einstein's photoelectric equation

(2) Predicts continuous emission spectra for atoms

(3) Predicts the same emission spectra for all types of atoms

(4) Assumes that the angular momentum of electrons is quantized

41. An electron is moving around the nucleus of a hydrogen atom in a circular orbit of radius r. The coulomb force $\vec{F}$ between the two is -

1. $K\frac{e^2}{r^2}\hat{r}$

2. $-K\frac{e^2}{r^3}\hat{r}$

3. $K\frac{e^2}{r^3}\vec{r}$

4. $-K\frac{e^2}{r^3}\vec{r}$

Where ($K = \frac{1}{4\pi\varepsilon_o}$)

42. The energy of hydrogen atom in n^{th} orbit is E_n, then the energy in n^{th} orbit of singly ionised helium atom will be:
1. $4E_n$
2. $E_n/4$
3. $2E_n$
4. $E_n/2$

43. The volume occupied by an atom is greater than the volume of the nucleus by a factor of about

(1) 10

(2) 10^5

(3) 10^{10}

(4) 10^{15}

44. In which of the following systems will be radius of the first orbit (n = 1) be minimum -

(1) Doubly ionized lithium

(2) Singly ionized helium

(3) Deuterium atom

(4) Hydrogen atom

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Nuclei

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Radioactivity	25
Types of Decay	18
Nuclear Binding Energy	17
Nuclear Reactor	7
Mass-Energy Equivalent	3

1. Radioactive material 'A' has decay constant '8λ' and material 'B' has a decay constant 'λ'. Initially, they have the same number of nuclei. After what time the ratio of the number of nuclei of material 'A' to that of 'B' will be $\frac{1}{e}$?

1. $\frac{1}{7\lambda}$
2. $\frac{1}{8\lambda}$
3. $\frac{1}{9\lambda}$
4. $\frac{1}{\lambda}$

2. The half-life of a radioactive substance is 30 minutes. The time (in minutes) taken between 40% decay and 85% decay of the same radioactive substance is:

1. 15
2. 30
3. 45
4. 60

3. For radioactive material, the half-life is 10 minutes. If initially, there are 600 number of nuclei, the time taken (in minutes) for the disintegration of 450 nuclei is :

1. 20
2. 10
3. 30
4. 15

4. A nucleus of uranium decays at rest into nuclei of thorium and helium. Then,

1. The nucleus helium has more kinetic energy than the thorium nucleus
2. The helium nucleus has less momentum than the thorium nucleus
3. The helium nucleus has more momentum than the thorium nucleus
4. The helium nucleus has less kinetic energy than the thorium nucleus

5. If the radius of Al nucleus is taken to be R_{Al}, then the radius of Te^{125}_{53} nucleus is near.

1. $\left(\frac{53}{13}\right)^{\frac{1}{3}} R_{Al}$
2. $\frac{5}{3} R_{Al}$
3. $\frac{3}{5} R_{Al}$
4. $\left(\frac{13}{53}\right) R_{Al}$

6. The Binding energy per nucleon of ${}_3Li^7$ and ${}_2He^4$ nucleon are 5.60 MeV and 7.06 MeV, respectively. In the nuclear reaction ${}_3Li^7 + {}_1H^1 \rightarrow {}_2He^4 + {}_2He^4 + Q$, the value of energy Q released is:

1. 19.6 MeV
2. -2.4 MeV
3. 8.4 MeV
4. 17.3 MeV

7. A radioisotope 'X' with a half-life 1.4×10^9 years decays to 'Y' which is stable. A sample of the rock from a cave was found to contain 'X' and 'Y' in the ratio 1:7. The age of the rock is :

1. 1.96×10^9 years
2. 3.92×10^9 years
3. 4.20×10^9 years
4. 8.40×10^9 years

8.
A certain mass of Hydrogen is changed to Helium by the process of fusion. The Mass defect in the fusion reaction is 0.02866 u. The energy liberated per u (unified mass) is : (given 1 u = 931 MeV)
1. 26.7 MeV
2. 6.675 MeV
3. 13.35 MeV
4. 2.67 MeV

9.
The half-life of a radioactive isotope 'X' is 20 years. It decays to another element 'Y' which is stable. The two elements 'X' and 'Y' were found to be in the ratio 1:7 in a sample of a given rock. The age of the rock is estimated to be:
1. 60 years
2. 80 years
3. 100 years
4. 40 years

10. If the nuclear radius of ^{27}Al is 3.6 Fermi, the approximate nuclear radius of ^{64}Cu in Fermi is:

1. 2.4

2. 1.2

3. 4.8

4. 3.6

11. A mixture consists of two radioactive materials A_1 and A_2 with half-lives of 20 s and 10 s respectively. Initially, the mixture has 40 g of A_1 and 160 g of A_2. The amount of the two in the mixture will become equal after:

1. 60 s

2. 80 s

3. 20 s

4. 40 s

12. The power obtained in a reactor using U^{235} disintegration is 1000 kW. The mass decay of U^{235}per hour is approximately equal to:

1. 20 μg

2. 40 μg

3. 1 μg

4. 10 μg

13. The half-life of a radioactive element X is 50 yrs. It decays to another element Y which is stable. The two elements X and Y were found to be in the ratio of 1:15 in a sample of a given rock. The age of the rock was estimated to be:

1. 200 yr

2. 250 yr

3. 100 yr

4. 150 yr

14.
Fusion reaction takes place at high temperature because:

1. atoms get ionized at high temperature

2. kinetic energy is high enough to overcome the Coulomb repulsion between nuclei

3. molecules break up at high temperature

4. nuclei break up at high temperature

15. A nucleus $^{m}_{n}X$ emits one α-particle and two β^- particles. The resulting nucleus is:

1. $^{m-6}_{n}Z$

2. $^{m-4}_{n}X$

3. $^{m-4}_{n-2}Y$

4. $^{m-6}_{n-4}Z$

16. The mass of a $^{7}_{3}$Li nucleus is 0.042u less than the sum of the masses of all its nucleons. The binding energy per nucleon of the $^{7}_{3}$Li nucleus is near:

1. 4.6 MeV

2. 5.6 MeV

3. 3.9 MeV

4. 23 MeV

17. The activity of a radioactive sample is measured as N_0 counts per minute at t = 0 and N_0/e counts per minute at t = 5 min. The time (in minute) at which the activity reduces to half its value is:

1. $\log_e\left(\frac{2}{5}\right)$

2. $\frac{5}{\log_e(2)}$

3. $5\log_{10} 2$

4. $5\ \log_e 2$

18.
In the nuclear decay given below:
${}^{A}_{Z}X \rightarrow {}_{Z+1}{}^{A}Y \rightarrow {}^{A-4}_{Z-1}B \rightarrow {}^{A-4}_{Z-1}B$
the particles emitted in the sequence are:
1. $\beta,\ \alpha,\ \gamma$
2. $\gamma,\ \beta,\ \alpha$
3. $\beta,\ \gamma,\ \alpha$
4. $\alpha,\ \beta,\ \gamma$

19.
The number of beta particles emitted by a radioactive substance is twice the number of alpha particles emitted by it. The resulting daughter is an:

1. isobar of parent
2. Isomer of parent
3. Isotone of parent
4. Isotope of parent

20.

Two radioactive materials X_1 and X_2 have decay constants 5λ and λ respectively. If initially they have the same number of nuclei, then the ratio of the number of nuclei of X_1 to that of X_2 will be $\frac{1}{e}$ after a time

1. λ

2. $\frac{1}{2}\lambda$

3. $\frac{1}{4}\lambda$

4. $\frac{e}{\lambda}$

21. If M (A, Z), M_p, and M_n denote the masses of the nucleus ${}^{A}_{Z}X$, proton, and neutron respectively in units of u (1 u = 931.5 MeV/c^2) and BE represents its binding energy in MeV, then:

1. $M(A,\ Z) = ZM_p + (A\text{-}Z)\ M_n\text{-}\ BE/c^2$

2. $M(A,\ Z) = ZM_p + (A\text{-}Z)\ M_n + BE$

3. $M(A,\ Z) = ZM_p + (A\text{-}Z)\ M_n\text{-}\ BE$

4. $M(A,\ Z) = ZM_p + (A\text{-}Z)\ M_n + BE/c^2$

22.
Two nuclei have their mass numbers in the ratio of 1 : 3. The ratio of their nuclear densities would be

1. 1 : 3

2. 3 : 1

3. $(3)^{1/3}$: 1

4. 1 : 1

23. In radioactive decay process, the negatively charged emitted β-particles are:

1. the electrons present inside the nucleus

2. the electrons produced as a result of the decay of neutrons inside the nucleus

3. the electrons produced as a result of collisions between atoms

4. the electrons orbiting around the nucleus

24. A nucleus $_ZX^A$ has mass represented by *M(A, Z)*. If M_p and M_n denote the mass of proton and neutron respectively and BE the binding energy, then :

1. $BE = [M(A,Z) - ZM_p - (A-Z)M_n]c^2$

2. $BE = [ZM_p + (A-Z)M_n - M(A,\ Z)]c^2$

3. $BE = [ZM_p + AM_n - M - (A,\ Z)]c^2$

4. $BE = M(A,\ Z) - ZM_p - (A-Z)M_n$

25. Two radioactive substances *A* and *B* have decay constants 5λ and λ respectively. At *t* = 0 they have the same number of nuclei. The ratio of the number of nuclei of *A* to those of *B will be* $\frac{1}{e^2}$ after a time interval:

1. $\frac{1}{4\lambda}$

2. 4λ

3. 2λ

4. $\frac{1}{2\lambda}$

26. The binding energy of deuteron is 2.2 MeV and that of $_2He^4$ is 28 MeV. If two deuterons are fused to form one $_2He^4$ then the energy released is:

1. 25.8 MeV

2. 23.6 MeV

3. 19.2 MeV

4. 30.2 MeV

27. In a radioactive material, the activity at time t_1 is R_1 and at a later time t_2, it is R_2. If the decay constant of the material is λ, then:

1. $R_1 = R_2 e^{\lambda(t_1+t_2)}$

2. $R_1 = R_2 e^{-\lambda(t_1-t_2)}$

3. $R_1 = R_2\,(t_1 - t_2)$

4. $R_1 = R_2$

28. The rate of radioactive disintegration at an instant for a radioactive sample of half-life 2.2 $\times 10^9 s\ is\ 10^{10}\ s^{-1}$. The number of radioactive atoms in that sample at that instant is:

1. 3.7×10^{20}

2. 3.17×10^{17}

3. 3.17×10^{18}

4. 3.17×10^{19}

29. The energy equivalent of 0.5 g of a substance is :

1. $4.5 \times 10^{13}\ J$

2. $1.5 \times 10^{13}\ J$

3. $0.5 \times 10^{13}\ J$

4. $4.5 \times 10^{16}\ J$

30. When a uranium isotope $^{235}_{92}U$ is bombarded with a neutron , it generates $^{89}_{36}Kr$, three neutrons and :

(1) $^{91}_{40}Zr$

(2) $^{101}_{36}Kr$

(3) $^{103}_{36}Kr$

(4) $^{144}_{56}Ba$

31. What happens to the mass number and the atomic number of an element when it emits $\gamma-$radiation?

1. Mass number decreases by four and atomic number decreases by two.

2. Mass number and atomic number remain unchanged.

3. Mass number remains unchanged while atomic number decreases by one.

4. Mass number increases by four and the atomic number increases by two.

32. The half-life of a radioactive sample undergoing $\alpha-$decay is 1.4×10^{17} sec. If the number of nuclei in the sample is 2.0×10^{21}, the activity of the sample is nearly equal to:

1. $10^4\ Bq$

2. $10^5\ Bq$

3. $10^6\ Bq$

4. $10^3\ Bq$

33. The half of a radioactive nucleus is 50 days. The time interval $(t_2 - t_1)$ between the time t_2 when $\frac{2}{3}$ of it has decayed and the time t_1 when $\frac{1}{3}$ of it had decayed is -

1. 50 days

2. 60 days

3. 15 days

4. 30 days

34. Two radioactive nuclei P and Q, in a given sample decay into a stable nucleus R. At time t = 0, number of P species are 4 N_0 and that of Q are N_0. Half-life of P (for conversion to R) is 1 minute where as that of Q is 2 minutes. Initially there are no nuclei of R present in the sample. When number of nuclei of P and Q are equal, the number of nuclei of R present in the sample would be :

1. $2N_0$
2. $3N_0$
3. $\frac{9N_0}{2}$
4. $\frac{5N_0}{2}$

35. The binding energy per nucleon in deutorium and helium nuclei are 1.1 MeV and 7.0 MeV, respectively. When two deuterium neclei fuse to form a helium nucleus the energy released in the fusion is -

1. 2.2 MeV

2. 28.0 MeV

3. 30.2 MeV

4. 23.6 MeV

36. The decay constant of a radio isotope is λ. If A_1 and A2 are its activities at times t_1 and t_2 respectively, the number of nuclei which have decayed during the time $(t_1 - t_2)$ -

1. $A_1 - A_2$

2. $(A_1 - A_2) / \lambda$

3. $\lambda (A_1 - A_2)$

4. $A_1t_1 - A_2t_2$

37. For the given reaction, the particle X is :
$6^{C^{11}} \rightarrow 5^{B^{11}} + \beta^+ + X$

1. Neutron

2. Anti neutrino

3. Neutrino

4. Proton

38. Half life period of two elements are 40 minute and 20 minute respectively, then after 80 minute ratio of the remaining nuclei will be (Initially both have equal active nuclei):

1. 4 : 1
2. 1 : 2
3. 8 : 1
4. 16 : 1

39. The relation between λ and $T_{1/2}$ is : ($T_{1/2}$ = half life, λ → decay constant)

1. $T_{1/2} = \frac{\ln 2}{\lambda}$

2. $T_{1/2}\ \ln 2 = \lambda$

3. $T_{1/2} = \frac{1}{\lambda}$

4. $\left(\lambda + T_{1/2}\right) = \frac{\ln}{2}$

40. In the reaction ${}_1^2\mathrm{H} + {}_1^3\mathrm{H} \rightarrow {}_2^4\mathrm{He} + {}_0^1\mathrm{n}$. If the binding energies of ${}_1^2\mathrm{H}$, ${}_1^3\mathrm{H}$ and ${}_2^4\mathrm{He}$ are respectively a, b and c (in MeV), then the energy (in MeV) released in this reaction is:

(1) a + b + c

(2) c + a – b

(3) c – a – b

(4) a + b – c

41. Fission of nuclei is possible because of the binding energy per nucleon in them:

(1) decreases with the mass number at low mass numbers

(2) increases with the mass number at low mass numbers

(3) decreases with the mass number at high mass numbers

(4) increases with the mass number at high mass numbers

42. Nuclear – fission is best explained by :

1. Liquid droplet theory

2. Yukawa π - meson theory

3. Independent particle model of the nucleus

4. Proton-proton cycle

43. For the nuclear reaction :

$${}_{92}U_{235} + {}_0n_1 \rightarrow {}_{56}Ba^{144} + \ldots\ldots\ldots + 3_0n^1$$

1. ${}_{26}Kr^{89}$

2. ${}_{36}Kr^{89}$

3. ${}_{26}Sr^{90}$

4. ${}_{38}Sr^{89}$

44. ${}_nX_m$ emitted one $\alpha\ and\ 2\beta$ particles, then it will become :

1. ${}_nX_{m-4}$

2. ${}_{n-1}X_{m-1}$

3. ${}_nZ_{m-4}$

4. None

45. When X → N_7^{14} + $2\beta^-$ then number of neutron will be in X :
1. 3
2. 5
3. 7
4 9

46. If in a nuclear fusion process the masses of the fusing nuclei be m_1 and m_2 and the mass of the resultant nucleus be m_3, then

(1) $m_3 = |m_1 - m_2|$

(2) $m_3 < (m_1 + m_2)$

(3) $m_3 > (m_1 + m_2)$

(4) $m_3 = m_1 + m_2$

47. A nucleus represented by the symbol ${}_Z^AX$ has :-

(1) Z protons and A –Z neutrons

(2) Z protons and A neutrons

(3) A protons and Z –A neutrons

(4) Z neutrons and A –Z protons

48. The half-life of radium is about 1600 years. Of 100g of radium existing now, 25g will remain undecayed after:

(1) 6400 years

(2) 2400 years

(3) 3200 years

(4) 4800 years

49. M_P denotes the mass of a proton and M_n that of a neutron. A given nucleus, of binding energy B, contains Z protons and N neutrons. The mass M(N, Z) of the nucleus is given by (c is the velocity of light)

(1) $M(N, Z) = NM_n + ZM_P + Bc^2$

(2) $M(N, Z) = NM_n + ZM_P - B/c^2$

(3) $M(N, Z) = NM_n + ZM_P + B/c^2$

(4) $M(N, Z) = NM_n + ZM_P - Bc^2$

50. A radioactive element emitted one α and one β particle, then the mass number of the daughter element

(1) Decreased by 4

(2) Increased by 4

(3) Decreased by 2

(4) Increased by 2

51. The half-life of a radionuclide is 77 days then its decay constant is:

1. 0.003/day
2. 0.006/day
3. 0.009/day
4. 0.012/day

52. Which of the following are suitable for the fusion process : -

(1) Light nuclei

(2) heavy nuclei

(3) Element must be lying in the middle of the periodic table

(4) Middle elements, which are lying on binding energy curve

53. A sample of radioactive element containing 4×10^{16} active nuclei. Half life of element is 10 days, then number of decayed nuclei after 30 days : -

1. 0.5×10^{16}

2. 2×10^{16}

3. 3.5×10^{16}

4. 1×10^{16}

54. A deuteron is bombarded on $_8O^{16}$ nucleus then α-particle is emitted then product nucleus is -

(1) $_7N^{13}$

(2) $_5B^{10}$

(3) $_4Be^9$

(4) $_7N^{14}$

55. Which rays contain (+ve) charged particle : -
1. α-rays
2. β-rays
3. γ-rays
4. X-rays

56. $X\left(n,\ \alpha\right)\ {}^{7}_{3}Li$, then X will be:

1. ${}^{10}_{5}B$

2. ${}^{9}_{5}B$

3. ${}^{11}_{4}Be$

4. ${}^{4}_{2}He$

57. The half-life of a radioactive element is 12.5 Hour and its quantity is 256 gm. After how much time its quantity will remain 1 gm:
1. 50 Hrs
2. 100 Hrs
3. 150 Hrs
4. 200 Hrs

58. $M_n\ and\ M_P$ represet the mass of neutron and proton respectively. An element having mass M has N neutron and Z-protons, then the correct relation will be : -

1. $M\ <\ \{N.M_n\ +\ Z.M_P\}$

2. $M\ >\ \{N.M_n\ +\ Z.M_P\}$

3. $M\ =\ \{N.M_n\ +\ Z.M_P\}$

4. $M\ =N\{M_n\ +\ M_P\}$

59. Energy is released in nuclear fission is due to
1. Some mass is converted into energy
2. Total binding energy of fragments is more than the B.E. of parental element
3. Total B.E. of fragments is less than the B.E. of parental element
4. Total B.E. of fragments is equals to the B.E. of parental element

60. A human body required the 0.01 Curie activity of radioactive substance after 24 hours. Half-life of radioactive is 6 hours. Then maximum activity of radioactive substance that can be injected will be: -
1. 0.08
2. 0.04
3. 0.16
4. 0.32

61. Solar energy is mainly caused due to :

(1) burning of hydrogen in the oxygen

(2) fission of uranium present in the sun

(3) fusion of protons during synthesis of heavier elements

(4) gravitational contraction

62. A sample of radioactive element has a mass of 10 gm at an instant t = 0. The approximate mass of this element in the sample after two mean lives is :

(1) 1.35 gm

(2) 2.50 gm

(3) 3.70 gm

(4) 6.30 gm

63. Which of the following ray are not electromagnetic waves?

(1) X-rays

(2) γ-rays

(3) β-rays

(4) Heat rays

64. The mass of proton is 1.0073 u and that of neutron is 1.0087 u (u = atomic mass unit). The binding energy of ${}^{4}_{2}He$ is (Given : helium nucleus mass ≈ 4.0015 u)

(1) 0.0305 J

(2) 0.0305 erg

(3) 28.4 MeV

(4) 0.061 u

65. The mass number of a nucleus is

(1) always less than its atomic number

(2) always more than its atomic number

(3) sometimes equal to its atomic number

(4) sometimes less than and sometimes more than its atomic number

66. A nuclear reaction given by

$_{Z}X^{A} \rightarrow _{Z+1}Y^{A} + _{-1}e^{0} + \overline{v}$

represents

(1) β-decay

(2) γ-decay

(3) fusion

(4) fission

67. If a ${}^{b}_{a}X$ species emits firstly a positron, then two α and two β and at last one α is also after initially it finally converts into stable ${}^{c}_{d}Y$ species so correct relation will be : -

1. c = b – 12, d = a – 5
2. a = c – 8, d = b – 1
3. a = c – 6, d = b – 0
4. a = c – 4, a = b – 2

68. A nucleus with mass number 240 breaks into fragments each of mass number 120, the binding energy per nucleon of unfragmented nuclei is 7.6 MeV while that of fragments is 8.5 MeV. The total gain in the Binding Energy in the process is:

1. 804 MeV

2. 216 MeV

3. 0.9 MeV

4. 9.4 MeV

69. A radioactive nucleus ${}^{A}_{Z}X$ undergoes spontaneous decay in the sequence ${}^{A}_{Z}X \rightarrow {}_{Z-1}B \rightarrow {}_{Z-3}C \rightarrow {}_{Z-2}D$, where Z is the atomic number of element X. The possible decay particles in the sequence are :

1. $\beta^{+}, \alpha, \beta^{-}$

2. $\beta^{-}, \alpha, \beta^{+}$

3. $\alpha, \beta^{-}, \beta^{+}$

4. $\alpha, \beta^{+}, \beta^{-}$

70. The half-life of a radioactive nuclide is 100 hours. The fraction of original activity that will remain after 150 hours would be:

1. $\frac{2}{3}$

2. $\frac{2}{3\sqrt{2}}$

3. $1/2$

4. $\frac{1}{2\sqrt{2}}$

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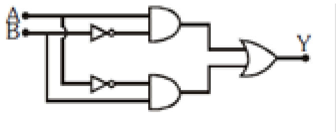
Semiconductor Electronics

(Expected Questions in NEET 2022: 4)

Subtopic Name	Number of Questions
Logic gates	28
PN junction	24
Applications of Transistor	13
Transistor	9
Types of Semiconductors	8
Applications of PN junction	7
Energy Band theory	7
Rectifier	2

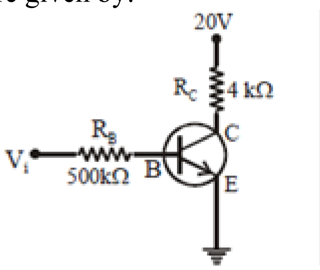
1. In the combination of the following gates, the output Y can be written in terms of inputs A and B as:



1. $\overline{A.B}$
2. $A.\overline{B}+B.\overline{A}$
3. $\overline{A.B}+A.B$
4. $\overline{A+B}$

2.

In the circuit shown in the figure, the input voltage V_i is 20 V, V_{BE} = 0, and V_{CE} = 0. The values of I_B, I_C and β are given by:



1. $I_B = 40\ \mu A,\ I_c = 10\ mA,\ \beta = 250$
2. $I_B = 25\ \mu A,\ I_c = 5\ mA,\ \beta = 200$
3. $I_B = 20\ \mu A,\ I_c = 5\ mA,\ \beta = 250$
4. $I_B = 40\ \mu A,\ I_c = 5\ mA,\ \beta = 125$

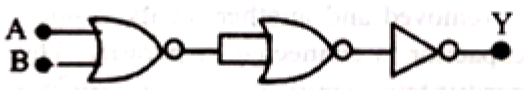
3. In a common-emitter transistor amplifier, the audio signal voltage across the collector is 3V. The resistance of the collector is 3kΩ. If current gain is 100 and the base resistance is 2kΩ, the voltage and power gain of the amplifier is:

1. 15 and 200
2. 150 and 15000
3. 20 and 2000
4. 200 and 1000

4. In a p-n junction diode, the change in temperature due to heating:

1. affects only reverse resistance.
2. affects only forward bias.
3. does not affect the resistance of the p-n junction.
4. affects the overall V-I characteristics of a p-n junction.

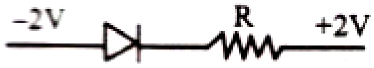
5. The given electrical network is equivalent to:



1. OR gate
2. NOR gate
3. NOT gate
4. AND gate

6. Which one of the following represents the forward bias diode?

1. 

2. 

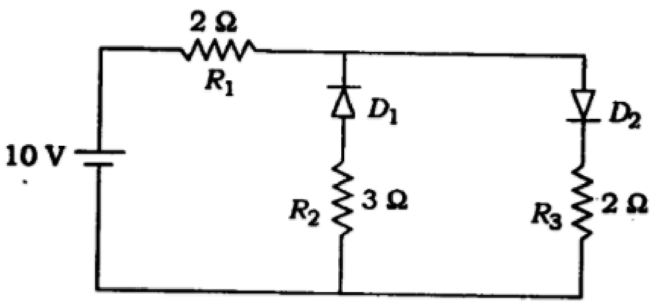
3. 

4. 

7. For the CE transistor amplifier, the audio signal voltage across the collector resistance of 2kΩ is 4V. If the current amplification factor of the transistor is 100 and the base resistance is 1kΩ, then the input signal voltage is:

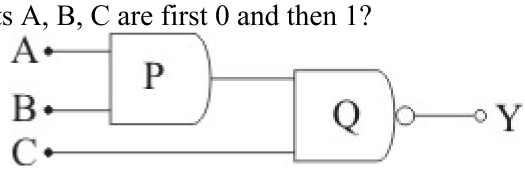
1. 10 mV
2. 20 mV
3. 30 mV
4. 15 mV

8. The given circuit has two ideal diodes connected as shown in the figure below. The current flowing through the resistance R_1 will be:



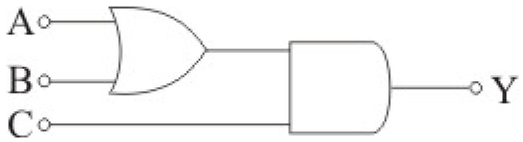
1. 2.5 A
2. 10.0 A
3. 1.43 A
4. 3.13 A

9. What is the output Y in the following circuit, when all the three inputs A, B, C are first 0 and then 1?



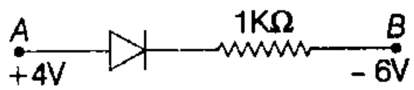
1. 0, 1
2. 0, 0
3. 1, 0
4. 1, 1

10.
To get output 1 for the following circuit, the correct choice for the input is:



1. A = 1, B = 0, C = 0
2. A = 1, B = 1, C = 0
3. A = 1, B = 0, C = 1
4. A = 0, B = 1, C = 0

11. Consider the junction diode as an ideal. The value of current flowing through AB is:



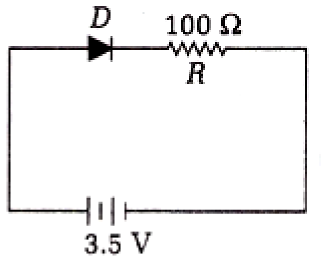
1. 10^{-2} A
2. 10^{-1} A
3. 10^{-3} A
4. 0 A

12.
An n-p-n transistor is connected in the common-emitter configuration in a given amplifier. A load resistance of 800 Ω is connected in the collector circuit and the voltage drop across it is 0.8 V. If the current amplification factor is 0.96 and the input resistance of the circuits is 192 Ω, the voltage gain and the power gain of the amplifier will respectively be:

1. 3.69, 3.84
2. 4, 4
3. 4, 3.69
4. 4, 3.84

13.

In the given figure, a diode D is connected to an external resistance R=100Ω and an e.m.f. of 3.5 V. If the barrier potential developed across the diode is 0.5 V, the current in the circuit will be:



1. 30 mA

2. 40 mA

3. 20 mA

4. 35 mA

14. The input signal given to a CE amplifier having a voltage gain of 150 is $V_i = 2\cos\left[15t + \frac{\pi}{3}\right]$. The corresponding output signal will be:

1. $30 \ \cos \ \left[15t + \frac{\pi}{3}\right]$

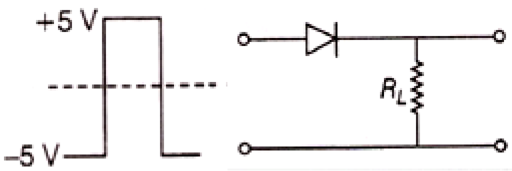
2. $75 \ \cos \ \left[15t + \frac{2\pi}{3}\right]$

3. $2 \ \cos \ \left[15t + \frac{5\pi}{3}\right]$

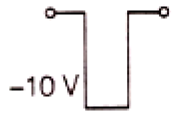
4. $300 \ \cos \ \left[15t + \frac{4\pi}{3}\right]$

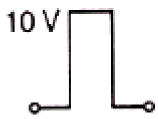
15.

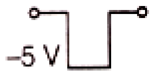
If in a p-n junction, a square input signal of 10 V is applied as shown,

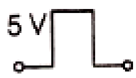


then the output across R_L will be:

1. 

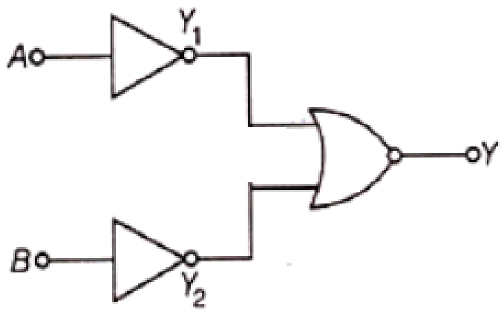
2. 

3. 

4. 

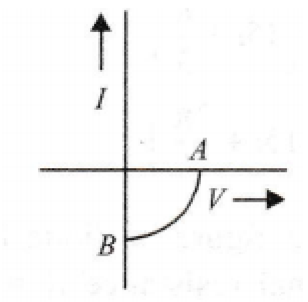
16.

Which logic gate is represented by the following combination of logic gates?



1. OR
2. NAND
3. AND
4. NOR

17. The given graph represents the V-I characteristic for a semiconductor device.



Which of the following statement is correct?

1. It is a V-I characteristic for the solar cell where point A represents open-circuit voltage and point B short circuit current.

2. It is for a solar cell and points A and B represent open-circuit voltage and current, respectively.

3. It is for a photodiode and points A and B represent open-circuit voltage and current respectively.

4. It is for a LED and points A and B represent open circuit voltage and short circuit current, respectively.

18. The barrier potential of a p-n junction depends on:

(a) type of semiconductor material
(b) amount of doping
(c) temperature

Which one of the following is correct?

1. (a) and (b) only

2. (b) only

3. (b) and (c) only

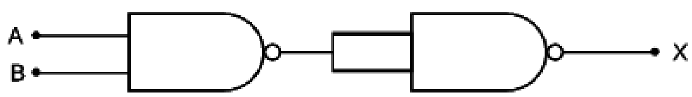
4. (a),(b) and (c)

19.
In an n-type semiconductor, which of the following statement is true?

1. Electrons are minority carriers and pentavalent atoms are dopants.
2. Holes are minority carriers and pentavalent atoms are dopants.
3. Holes are the majority carriers and trivalent atoms are dopants.
4. Electrons are majority carriers and trivalent atoms are dopants.

20.
In a common emitter (CE) amplifier having a voltage gain G, the transistor used has trans conductance 0.03 mho and current gain 25. If the above transistor is replaced with another one with trans conductance 0.02 mho and current gain 20, the voltage gain will be:
1. 1.5G
2. $\frac{1}{3}$G
3. $\frac{5}{4}$G
4. $\frac{2}{3}$G

21.
The output (X) of the logic circuit shown in figure will be:



1. $X = \overline{A \cdot B}$

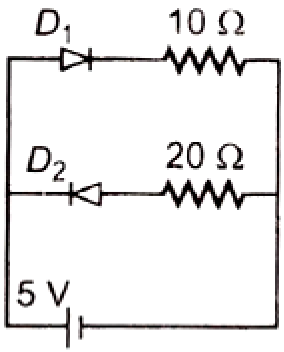
2. X = A.B

3. $X = \overline{A + B}$

4. $X = \overline{\overline{A}} \cdot \overline{\overline{B}}$

22.

Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is:



1. 0.75 A

2. zero

3. 0.25 A

4. 0.5 A

23. In a CE transistor amplifier, the audio signal voltage across the resistance of 2 kΩ is 2V. If the base resistance is 1 kΩ and the current amplification of the transistor is 100, the input signal voltage is:

1. 0.1 V

2. 1.0 V

3. 1 mV

4. 10 mV

24. C and Si both have the same lattice structure, having 4 bonding electrons in each. However, C is an insulator whereas Si is an intrinsic semiconductor. This is because:

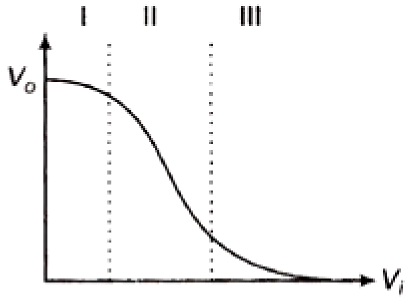
1. in the case of C, the valence band is not completely filled at absolute zero temperature.

2. in the case of C, the conduction band is partly filled even at absolutely zero temperature.

3. the four bonding electrons in the case of C lie in the second orbit, whereas in the case of Si, they lie in the third.

4. the four bonding electrons in the case of C lie in the third orbit, whereas for Si, they lie in the fourth orbit.

25. Transfer characteristic [output voltage (V_o) vs input voltage (V_i)] for a base biased transistor in CE configurations as shown in the figure. For using the transistor as a switch, it is used:



1. In region III

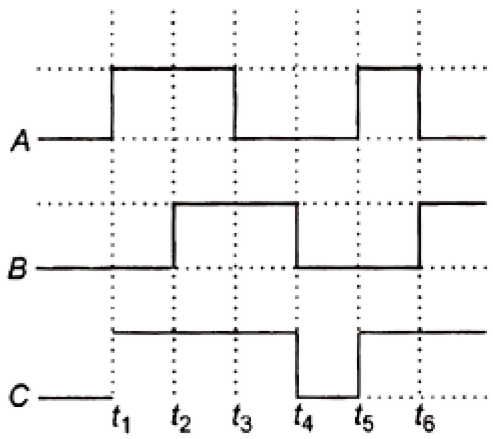
2. Both in the region (I) and (III)

3. In region II

4. In region I

26.

The figure shows a logic circuit with two inputs A and B and the output C. The voltage waveforms across A, B, and C are as given. The logic circuit gate is:



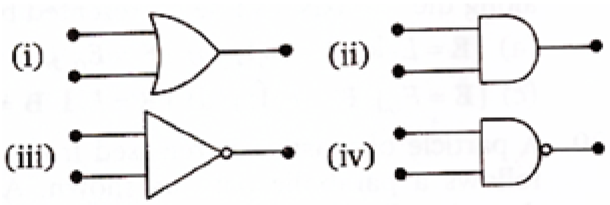
1. OR gate

2. NOR gate

3. AND gate

4. NAND gate

27. Symbolic representation of four gates is shown as:



Pick out which ones are for AND, NAND, and NOT gates, respectively.

1. (i), (iv), and (iii)

2. (ii), (iii), and (iv)

3. (ii), (iv), and (iii)

4. (ii), (iv), and (i)

28.
If a small amount of antimony is added to germanium crystal:

1. the antimony becomes an acceptor atom.

2. there will be more free electrons than holes in the semiconductor.

3. its resistance is increased.

4. it becomes a p-type semiconductor.

29.
In a forward biasing of the p-n junction:

1. the positive terminal of the battery is connected to the p-side and the depletion region becomes thick.

2. the negative terminal of the battery is connected to the n-side and the depletion region becomes thin.

3. the positive terminal of the battery is connected to the n-side and the depletion region become thin.

4. the negative terminal of the battery is connected to the p-side and the depletion region becomes thick.

30. Which one of the following statements is false?

1. Pure Si doped with trivalent impurities gives a p-type semiconductor.

2. The majority of carriers in an n-type semiconductor are holes.

3. The minority carriers in a p-type semiconductor are electrons.

4. The resistance of intrinsic semiconductors decreases with an increase in temperature.

31. The device that can act as a complete electronic circuit is:

1. Junction diode

2. Integrated circuit

3. Junction transistor

4. Zener diode

32. A common emitter amplifier has a voltage gain of 50, an input impedance of 100 Ω and an output impedance of 200 Ω. The power gain of the amplifier is:

1. 500

2. 1000

3. 1250

4. 50

33. To get an output Y = 1 from the circuit shown below, the input must be:

1. A=0 B=1 C=0

2. A=0 B=0 C=1

3. A=1 B=0 C=1

4. A=1 B=0 C=0

34.
A *p-n* photodiode is fabricated from a semiconductor with a band-gap of 2.5 eV. It can detect a signal of wavelength:

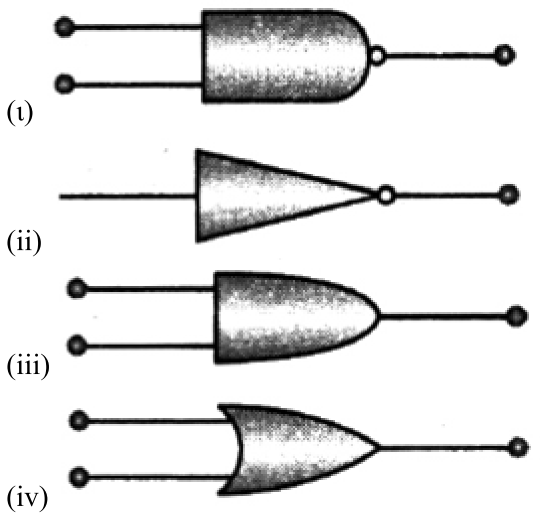
1. 6000 Å

2. 4000 nm

3. 6000 nm

4. 4000 Å

35. The symbolic representation of four logic gates:



The logic symbols for OR, NOT and NAND gates are respectively:

1. (iii), (iv), (ii)
2. (iv), (i), (iii)
3. (iv), (ii), (i)
4. (i), (iii), (iv)

36.
A transistor is operated in common-emitter configuration at V_c = 2 volt such that a change in the base current from 100 μA to 200 μA produces a change in the collector current from 5 mA to 10 mA. The current gain is:

1. 75

2. 100

3. 150

4. 50

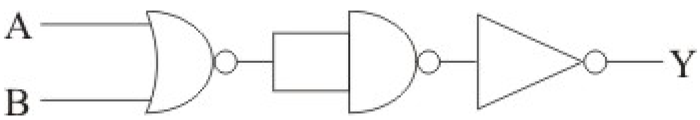
37. The voltage gain of an amplifier with 9% negative feedback is 10. Find the voltage gain without feedback will be:

1. 90
2. 10
3. 1.25
4. 100

38. A p-n photodiode is made of a material with a bandgap of 2.0 eV. The minimum frequency of the radiation that can be absorbed by the material is nearly:

1. 10×10^{14} Hz
2. 5×10^{14} Hz
3. 1×10^{14} Hz
4. 20×10^{14} Hz

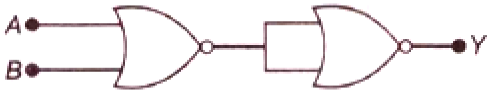
39.
The circuit is equivalent to:



1. AND gate
2. NAND gate
3. NOR gate
4. OR gate

40.

In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table:



1.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

2.

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

3.

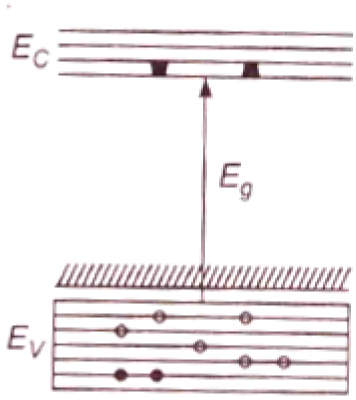
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

4.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

41.

In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The material is a/an:



1. p-type semiconductor

2. insulator

3. metal

4. n-type semiconductor

42. A transistor is operated in a common emitter configuration at constant collector voltage V_c = 1.5 V such that a change in the base current from 100 μA to 150 μA produces a change in the collector current from 5 mA to 10 mA. The current gain (β) is:

1. 67

2. 75

3. 100

4. 50

43. Which of the following is an example of forward biasing?

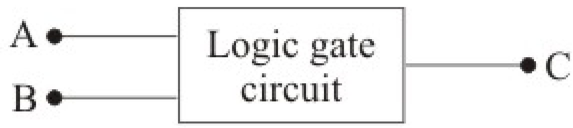
1. 

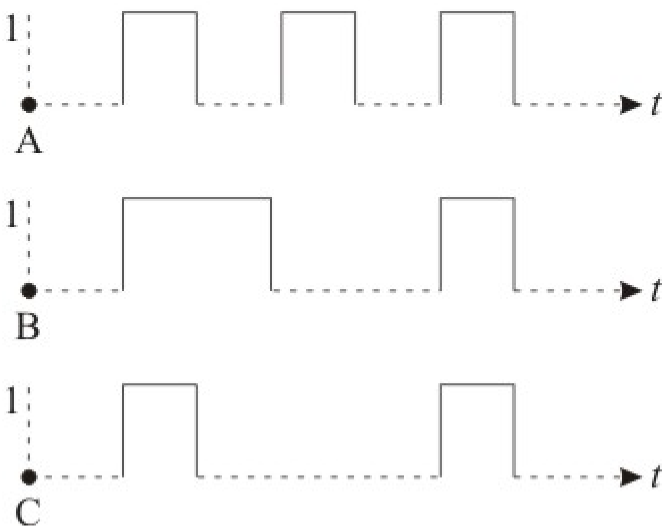
2. 

3. 

4. 

44. The following figure shows a logic gate circuit with two inputs A and B and the output C. The voltage waveforms of A, B, and C are as shown below:





The logic circuit gate is :

1. AND gate

2. NAND gate

3. NOR gate

4. OR gate

45. For a p-type semiconductor, which of the following statements is true?

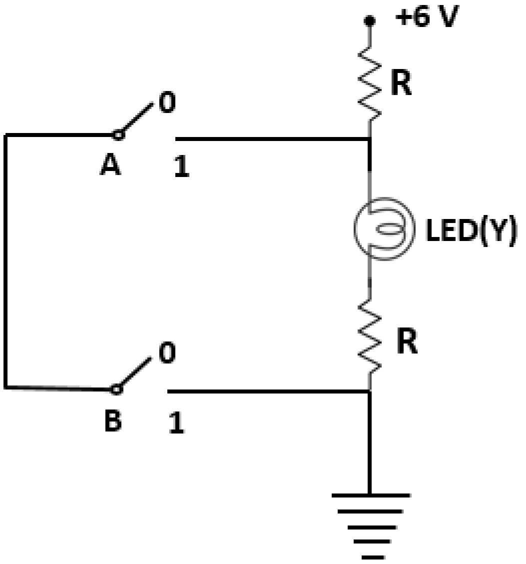
1. Electrons are the majority carriers and pentavalent atoms are the dopants.

2. Electrons are the majority carriers and trivalent atoms are the dopants.

3. Holes are the majority carriers and trivalent atoms are the dopants.

4. Holes are the majority carriers and pentavalent atoms are the dopants.

46.



The correct Boolean operation represented by the circuit diagram drawn is :

1. NOR

2. AND

3. OR

4. NAND

47. An LED is constructed from a p-n junction diode using GaAsP. The energy gap is 1.9 eV. The wavelength of the light emitted will be equal to:

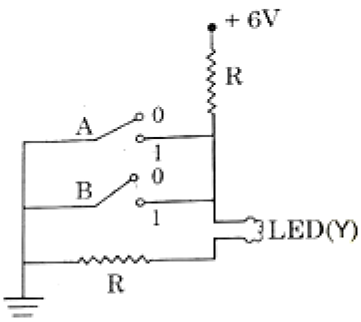
1. 10.4 $\times 10^{-26} m$

2. 654 nm

3. 654 m

4. 654 $\times 10^{-11} m$

48. The circuit diagram shown here corresponds to the logic gate:



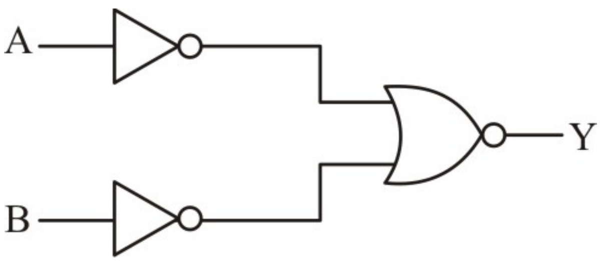
1. NOR

2. AND

3. OR

4. NAND

49. For the logic circuit shown, the truth table is:



1.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

2.

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

3.

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

4.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

50. The increase in the width of the depletion region in a p-n junction diode is due to :

1. reverse bias only
2. both forward bias and reverse bias
3. increase in forwarding current
4. forward bias only

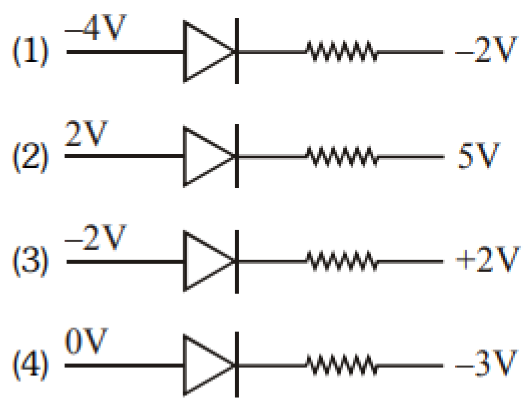
51. The solids which have the negative temperature coefficient of resistance are:

1. insulators only
2. semiconductors only
3. insulators and semiconductors
4. metals

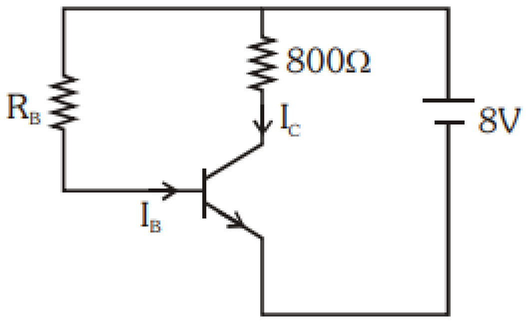
52. For transistor action, which of the following statements is correct?

1. Base, emitter, and collector regions should have the same size
2. Both emitter junction, as well as the collector junction, are forward biased
3. The base region must be very thin and lightly doped
4. Base, emitter, and collector regions should have the same doping concentrations

53. Out of the following which one is a forward-biased diode?



54. An n-p-n transistor is connected in a common emitter configuration (see figure) in which collector voltage drop across load resistance (800 Ω) connected to the collector circuit is 0.8 V. The collector current is :



1. 2 mA
2. 0.1 mA
3. 1 mA
4. 0.2 mA

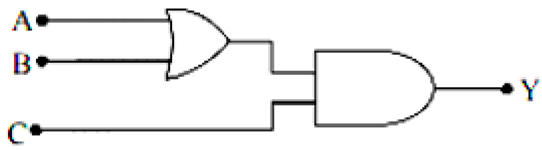
55. Which of the following gate is called universal gate?

1. OR gate
2. AND gate
3. NAND gate
4. NOT gate

56. An intrinsic semiconductor is converted into an n-type extrinsic semiconductor by doping it with:

1. Phosphorous
2. Aluminium
3. Silver
4. Germanium

57. To get output Y = 1 in given circuit which of the following input will be correct -

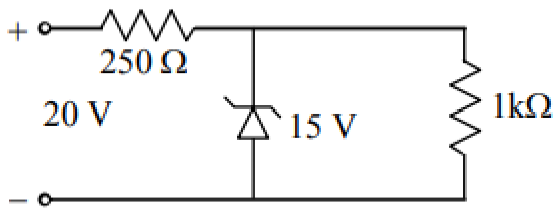


	A	B	C
1.	1	0	1
2	1	1	0
3.	0	1	0
4.	1	0	0

58. The input resistance of a silicon transistor is 100 Ω. Base current is changed by 40 μA which results in a change in collector current by 2 mA. This transistor is used as a common emitter amplifier with a load resistance of 4 KΩ. The voltage gain of the amplifier is-

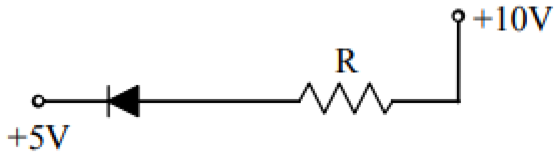
1. 3000
2. 4000
3. 1000
4. 2000

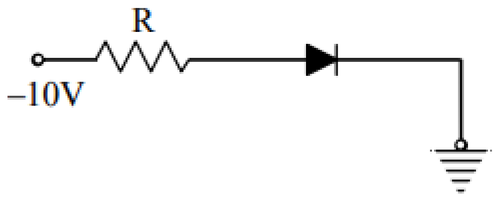
59. A Zener diode, having breakdown voltage equal to 15 V, is used in a voltage regulator circuit shown in figure. The current through the diode is :

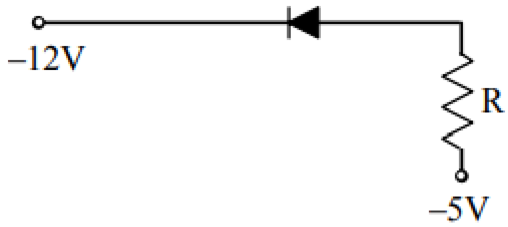


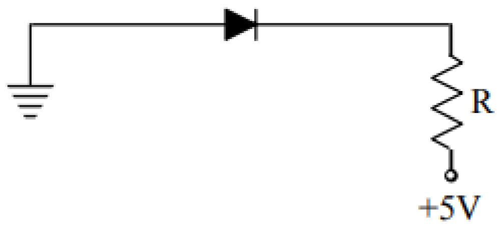
1. 5 mA
2. 10 mA
3. 15 mA
4. 20 mA

60. In the following figure, the diodes which are forward biased are :

(a) 

(b) 

(c) 

(d) 

1. (a), (b) and (d)
2. (c) only
3. (c) and (a)
4. (b) and (d)

61. Pure Si at 500 K has equal number of electron (n_e) and hole (n_h) concentrations of 1.5×10^{16} m^{-3}. Doping by indium increases n_h to 4.5×10^{22} m^{-3}. The doped semiconductor is of :

1. P-type having electron concentrations $n_e = 5 \times 10^9$ m^{-3}

2. n-type with electron concentrations $n_e = 5 \times 10^{22}$ m^{-3}

3. P-type with electron concentrations $n_e = 2.5 \times 10^{10}$ m^{-3}

4. n-type with electron concentrations $n_e = 2.5 \times 10^{23}$ m^{-3}

62. For transistor action –

(a) Base, emitter and collector regions should have similar sizae and doping concentrations.

(b) The base region must be very thin and lightly doped.

(c) The emitter-base junction is forward biased and base-collector junction is reverse
biased.

(d) Both the emitter-base junctions as well as the base collector juction are forward
biased.

Which one of the following pairs of statements is correct ?

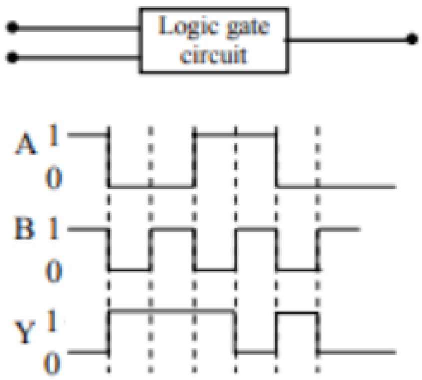
1. (a), (b)

2. (b), (c)

3. (c), (d)

4. (d), (a)

63. The following figure shows a logic gate citrcuit with two inputs A and B the output Y. The voltage waveforms of A, B and Y are as given-



The logic gate is:

1. OR gate

2. AND gate

3. NAND gate

4. NOR gate

64. Following table is for which logic gate:

Input		Output
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

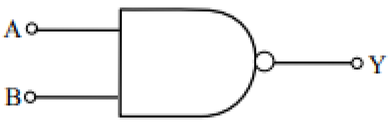
1. AND

2. OR

3. NAND

4. NOT

65. Following logic gate is :



1. AND

2. NAND

3. EX-OR

4. OR

66. One part of a device is connected with the negative terminal of a battery and another part is connected with the positive terminal of a battery. If their ends now altered, current does not flow in circuit, then the device will be :
1. P–N Junction
2. Transistor
3. Zener diode
4. Triode

67. Zener diode is used for:-

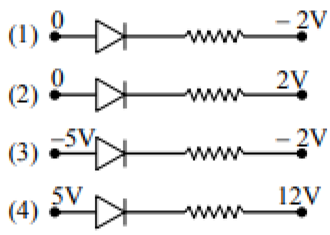
(1) Rectification

(2) Stabilisation

(3) Amplification

(4) Producing oscillations in an oscillator

68. From the following diode circuit, which diode is in forward biased condition :



69. Given Truth table is correct for :

A	B	Y
1	1	1
1	0	0
0	1	0
0	0	0

1. NAND

2. AND

3. NOR

4. OR

70. Choose the only false statement from the following:

(1) The resistivity of a semiconductor increases with an increase in temperature.

(2) Substances with an energy gap of the order of 10eV are insulators.

(3) In conductors, the valence and conduction bands may overlap.

(4) The conductivity of a semiconductor increases with increases in temperature.

71. Carbon, Silicon and Germanium atoms have four valence electrons each. Their valence and conduction bands are separated by energy band gaps represented by $(E_g)_C$, $(E_g)_{Si}$ and $(E_g)_{Ge}$ respectively. Which one of the following relationships is true in their case?

1. $(E_g)_C < (E_g)_{Ge}$

2. $(E_g)_C > (E_g)_{Si}$

3. $(E_g)_C = (E_g)_{Si}$

4. $(E_g)_C < (E_g)_{Si}$

72. Application of a forward bias to a p-n junction:

(1) widens the depletion zone.

(2) increases the number of donors on the n side.

(3) increases the potential difference across the depletion zone.

(4) increases the electric field in the depletion zone.

73. The correct relation for α, β for a transistor :

1. $\beta = \frac{1-\alpha}{\alpha}$

2. $\beta = \frac{\alpha}{1-\alpha}$

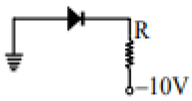
3. $\alpha = \frac{\beta-1}{\beta}$

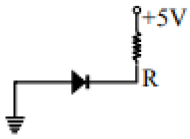
4. $\alpha\,\beta = 1$

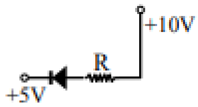
74. The cause of potential barrier in a P–N junction diode is :
1. Concentration of positive and negative ions near the junction
2. Concentration of positive charges near the junction
3. Depletion of negative charges near the junction
4. Increment in concentration of holes and electrons near the junction

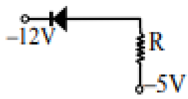
75. Common emitter circuit is used as amplifier, its current gain is 50. If input resistance is 1 kΩ and input voltage is 5 volt then output current will be :
1. 250 mA
2. 30 mA
3. 50 mA
4. 100 mA

76. Of the diodes shown in the following diagrams, which one of the diode is reverse biased ?

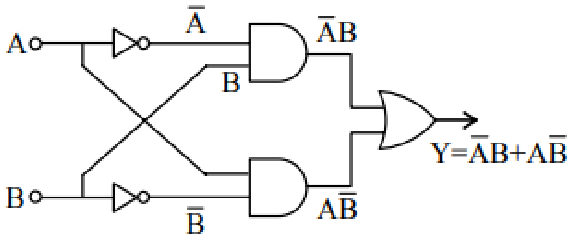
1. 

2. 

3. 

4. 

77. The truth table for the following network is :



1.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

2.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

3.

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

4. None of the above

78. Zener diode is used as -
1. Half wave rectifier
2. Full wave rectifier
3. A.C. voltage stablizer
4. D.C. voltage stablizer

79. Depletion layer has (for an unbiased PN junction) -
1. Electrons
2. Holes
3. Static ions
4. Neutral atoms

80. In semiconductors at room temperature:

(1) The valence band is completely filled and the conduction band is partially filled

(2) The valence band is completely filled

(3) The conduction band is completely empty

(4) The valence band is partially empty and the conduction band is partially filled

81. The peak voltage in the output of a half wave diode rectifier fed with a sinusoidal signal without filter is 10V. The d. c. component of the output voltage is :-

(1) $\frac{10}{\pi}$V

(2) 10 V

(3) $\frac{20}{\pi}$V

(4) $\frac{10}{\sqrt{2}}$ V

82. In a p–n junction photocell, the value of the photo electromotive force produced by monochromatic light is proportional to:

(1) The intensity of the light falling on the cell

(2) The frequency of the light falling on the cell

(3) The voltage applied at the p–n junction

(4) The barrier voltage at the p–n junction

83. The output of the OR gate is 1:

(1) If either or both inputs are 1

(2) Only if both inputs are 1

(3) If either input is zero

(4) If both inputs are zero

84. For a transistor $\frac{I_C}{I_E} = 0.96$, then current gain for common emitter configuration :-

(1) 12

(2) 6

(3) 48

(4) 24

85. In a PN junction : -

(1) High potential at N side and low potential at P side

(2) High potential at P side and low potential at N side

(3) P and N both are at same potential

(4) Undetermined

86. The given truth table is for which logic gate : -

A	B	Y
1	1	0
0	1	1
1	0	1
0	0	1

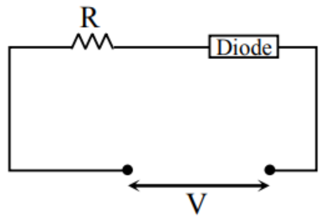
(1) NAND

(2) XOR

(3) NOR

(4) OR

87. For the given circuit of P-N junction diode which is correct : -



(1) In F.B. the voltage across R is V

(2) In R.B. the voltage across R is V

(3) In F.B. the voltage across R is 2 V

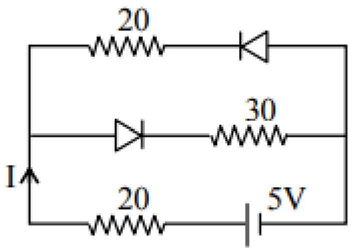
(4) In R.B. the voltage across R is 2 V

88. Following truth table represent which logic gate –

A	B	C
1	1	0
0	1	1
1	0	1
0	0	1

1. XOR
2. NOT
3. NAND
4. AND

89. The current (I) in the circuit will be:



1. $\frac{5}{40} A$

2. $\frac{5}{50} A$

3. $\frac{5}{10} A$

4. $\frac{5}{20} A$

90. For a common emmiter circuit if $\frac{I_C}{I_E} = 0.98$ then current gain for common emitter circuit will be:-
1. 49
2. 98
3. 4.9
4. 25.5

91. Reverse bias applied to a junction diode

(1) Lowers the potential barrier

(2) raises the potential barrier

(3) increases the majority carrier current

(4) increases the minority carrier current

92. A n-p-n transistor conducts when

(1) both collector and emitter are positive with respect to the base

(2) collector is positive and emitter is negative with respect to the base

(3) collector is positive and emitter is at same potential as the base

(4) both collector and emitter are negative with respect to the base

93. If a full wave rectifier circuit is operating from 50 Hz mains, the fundamental frequency in the ripple will be :

(1) 25 Hz

(2) 50 Hz

(3) 70.7 Hz

(4) 100 Hz

94. Barrier potential of a p-n junction diode does not depend on -

(1) diode design

(2) temperature

(3) forward bias

(4) doping density

95. Following diagram performs the logic function of :

(1) AND gate

(2) NAND gate

(3) OR gate

(4) XOR gate

96. The electron concentration in an n-type semiconductor is the same as hole concentration in a p-type semiconductor. An external field (electric) is applied across each of them. Compare the currents in them.

1. Current in n-type > current in p-type.

2. No current will flow in p-type, current will only flow in n-type.

3. Current in n-type = current in p-type.

4. Current in p-type > current in n-type.

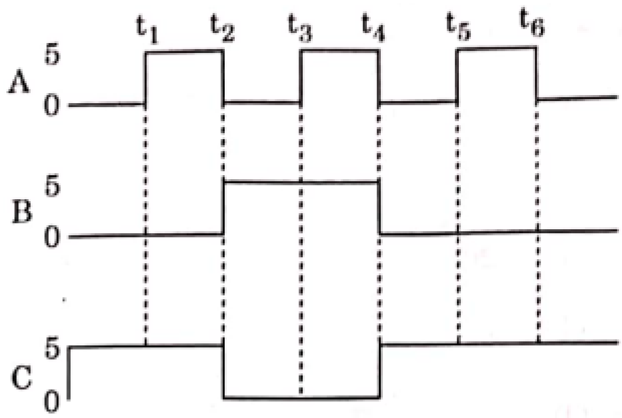
97. Consider the following **statements (A)** and **(B)** and identify the **correct answer.**

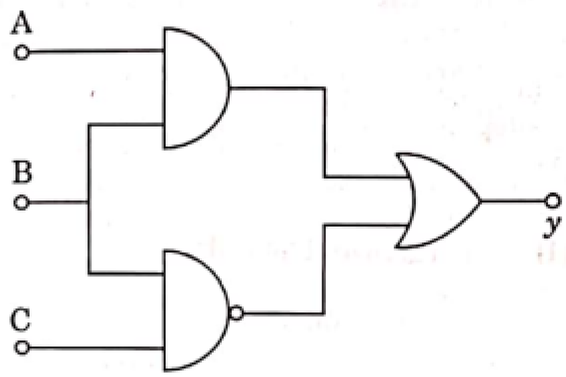
A. A zener diode is connected in reverse bias when used as a voltage regulator.

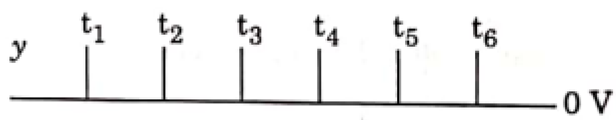
B. The potential barrier of p-n junction lies between 0.2 V to 0.3 V.

1. (A) is correct and (B) is incorrect.
2. (A) is incorrect and (B) is correct.
3. (A) and (B) both are correct.
4. (A) and (B) both are incorrect.

98. For the given circuit, the input digital signals are applied at the terminals A, B and C. What would be the output at the terminal y?





1. 

2. 

3. 

4. 

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Some Basic Concepts of Chemistry

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Concentration Based Problem	13
Moles, Atoms & Electrons	13
Equation Based Problem	6
Limiting Reagent	6
Empirical & Molecular Formula	4
Equivalent Concept	1
Introduction	1

1. Suppose the elements X and Y combine to form two compounds XY_2 and X_3Y_2. When 0.1 moles of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g, the atomic weight of X and Y are respectively-
1. 40, 30
2. 60, 40
3. 20, 30
4. 30, 20

2. Among the following the temperature dependent parameter is -
1. Molarity
2. Mole fraction
3. Weight percentage
4. Molality

3.
The number of water molecules is maximum in-

1. 18 mL of water
2. 0.18 g of water
3. 0.00224 L of water vapours at 1 atm and 273 K
4. 10^{-3} mol of water

4. If Avogadro number N_A, is changed from $6.022 \times 10^{23}\ mol^{-1}$ to $6.022 \times 10^{20}\ mol^{-1}$ this would change -
1. The definition of mass in units of grams
2. The mass of one mole of carbon
3. The ration of chemical species to each other in a balanced equation
4. The ratio of elements to each other in a compound

5. 20.0 g of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g magnesium oxide. The percentage purity of magnesium carbonate in the sample is -
(Atomic weight of Mg=24)
1. 75
2. 96
3. 60
4. 84

6. What is the mass of precipitate formed when 50 mL of 16.9% solution of $AgNO_3$ is mixed with 50 mL of 5.8% NaCl solution? (Ag = 107.8, N = 14, O = 16, Na= 23, Cl = 35.5)
1. 28 g
2. 3.5 g
3. 7 g
4. 14 g

7. What is the mole fraction of the solute in a 1.00 m aqueous solution?
1. 0.177
2. 0.1770
3. 0.0534
4. 0.0177

8. The number of water molecules is maximum in
1. 18 molecules of water
2. 1.8 g of water
3. 18 g of water
4. 18 moles of water

9. A mixture of gases contains H_2 and O_2 gases in the ratio of 1 : 4 (w/w). The molar ratio of the two gases in the mixture will be -
1. 1:4
2. 4:1
3. 16:1
4. 2:1

10. When 22.4 litres of $H_2(g)$ is mixed with 11.2 litres of $Cl_2(g)$, each at STP, the moles of HCl(g) formed is equal to :
1. 1 mol of HCl(g)
2. 2 mol of HCl(g)
3. 0.5 mol of HCl(g)
4. 1.5 mol of HCl(g)

11. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reaction is left in excess and how much? (At, wt.Mg = 24; O = 16)
1. Mg, 0.16 g
2. O_2, 0.16 g
3. Mg, 0.44 g
4. O_2, 0.28 g

12.
The weight of 70% HNO_3 concentrated nitric acid solution should be used to prepare 250 mL of 2.0M HNO_3 is -

1. 90.0 g conc. HNO_3
2. 70.0 g conc. HNO_3
3. 54.0 g conc. HNO_3
4. 45.0 g conc. HNO_3

13.
6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of solution is:
1. 0.01 M
2. 0.001 M
3. 0.1 M
4. 0.02 M

14. Mole fraction of solute in a 1.00 molal aqueous solution is
1. 0.0177
2. 0.0344
3. 1.770
4. 0.1770

15. 25.3 g of sodium carbonate, Na_2CO_3 is dissolved in enough water to make 250 mL of solution. If sodium carbonate dissociates completely, the molar concentration of sodium ion, Na^+ and carbonate ion, CO_3^{2-} are respectively -
(molar mass of Na_2CO_3 = 106g mol^{-1})
1. 0.955 M and 1.910 M
2. 1.910 M and 0.955 M
3. 1.90 M and 1.910 M
4. 0.477 M and 0.477 M

16. The number of atoms in 0.1 mole of a triatomic gas is (N_A= 6.02 x 10^{23} mol^{-1})
1. 6.026×10^{22}
2. 1.806×10^{23}
3. 3.600×10^{23}
4. 1.800×10^{22}

17. 10 g of hydrogen and 64 of oxygen were filled in a steel vessel and exploded. Amount of water produced in this reaction will be
1. 2 mol
2. 3 mol
3. 4 mol
4. 1 mol

18. Volume occupied by one molecule of water (density = 1 g cm^{-3}) is
1. 9.0×10^{-23} cm^3
2. 6.023×10^{-23} cm^3
3. 3.0×10^{-23} cm^3
4. 5.5×10^{-23} cm^3

19. The volume of oxygen gas(O_2) measured at 0^0C and 1 atm, needed to burn completely 1 L of propane gas (C_3H_8) measured under the same conditions is
1. 7 L
2. 6 L
3. 5 L
4. 10 L

20.
The moles of lead (II) chloride will be formed from a reaction between 6.5 g of
PbO and 3.2 g of HCl is -
1. 0.044
2. 0.333
3. 0.011
4. 0.029

21. Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 g mL^{-1}, volume of acid required to make one litre of 0.1 M H_2SO_4 solution is-
1. 11.10 mL
2. 16.65 mL
3. 22.20 mL
4. 5.55 mL

22. The number of moles of hydrogen molecules required to produce 20 moles of ammonia through Haber's process is -
1. 40 mol
2. 10 mol
3. 20 mol
4. 30 mol

23. The density of 2 M aqueous solution of NaOH is 1.28 g/cm^3. The molality of the solution is -
[molecular mass of NaOH = 40 $gmol^{-1}$]
1. 1.20 m
2. 1.56 m
3. 1.67 m
4. 1.32 m

24. The maximum number of atoms is present in the following -
(1) 1 g of $Mg_{(s)}$
(2) 1 g of $O_{2\,(g)}$
(3) 1 g of $Li_{(s)}$
(4) 1 g of $Ag_{(s)}$

25. Which has the maximum number of molecules among the following?
1. 64 g SO_2
2. 44 g CO_2
3. 48 g O_3
4. 8 g H_2

26. Percentage of C, H & N are given as follows :
C = 40% H = 13.33% N = 46.67%
The empirical formula will be :
1. CH_2N
2. C_2H_4N
3. CH_4N
4. CH_3N

27. The mole fraction of the solute in one molal aqueous solution is :-
(1) 0.027
(2) 0.036
(3) 0.018
(4) 0.009

28. The mass of carbon anode consumed (giving only carbondioxide) in the production of 270 kg of aluminium metal from bauxite by the Hall process is :-
(1) 90 kg
(2) 540 kg
(3) 180 kg
(4) 270 kg
(Atomic mass : Al = 27)

29. The number of moles of $KMnO_4$ reduced by one mole of KI in alkaline medium is :-
(1) One
(2) Two
(3) Five
(4) One fifth

30. Number of significant figures in the following numbers are :
(I) 161 cm
(II) 0.0161
(III) 1.61

(1) 3 , 3, 3
(2) 3 , 4 , 3
(3) 3 , 2 , 3
(4) 3 , 4 , 4

31. In the Haemoglobin (Molecular wt = 67200) iron found 0.33% (by weight). The number of iron atom will be in its one molecule :
1. 1
2. 2
3. 3
4. 4

32. $4NH_3 \ + \ 5O_2 \ \rightarrow \ 6H_2O \ \ + \ 4NO$
When one mole ammonia and one mole oxygen taken :
1. Oxygen is completely consumed
2. Ammonia is completely consumed
3. Both (1) and (2) are correct
4. No one is correct

33. A mole ratio of H_2 and O_2 gas is 8. The ratio of weight is-
1. 1 : 1
2. 2 : 1
3. 4 : 1
4. 1 : 2

34. A compound contain C, H and O. If C = 40% and H = 6.67% and rest is oxygen then empirical formula of compound will be :
1. CH_2O
2. CH_4O
3. CH_4O_2
4. CHO

35. The maximum number of molecules is present in:-
(1) 5L of N_2 gas at STP
(2) 0.5 g of H_2 gas
(3) 10g of O_2 gas
(4) 15 L of H_2 gas at STP

36. What is false for mole fraction :
1. $x < 1$
2. $-2 \le x \le 2$
3. $0 \le x \le 1$
4. Always non-negative

37. Volume of CO_2 obtained by the complete decomposition of 9.85 gm. $BaCO_3$ is :
1. 2.24 lit.
2. 1.12 lit.
3. 0.84 lit.
4. 0.56 lit

38. 1 M and 2.5 litre NaOH solution mixed with another 0.5 M and 3 litre NaOH solution. Molarity of the resultant solution is : -
1. 0.80 M
2. 1.0 M
3. 0.73 M
4. 0.50 M

39. Which has maximum number of molecules : -
(1) 7 gm N_2
(2) 2 gm H_2
(3) 16 gm NO_2
(4) 16 gm O_2

40. The percentage of C, H and N in an organic compound are 40%, 13.3% and 46.7% respectively , The empirical formula of the compound is :
(1) $C_3H_{13}N_3$
(2) CH_2N
(3) CH_4N
(4) CH_6N

41. Molarity of liquid HCl if density of liq. HCl is 1.17 gm/cc : -
1. 36.5
2. 18.25
3. 32.05
4. 42.10

42. Sp. vol. of cylinderical virus particle is $6.02 \times 10^{-2}\ cc/gm$. Whose radius and length are 7 Å & 10Å respectively. If $N_A = 6.02 \times 10^{23}$. Find mol. wt. of virus : -
1. 15.4 kg/mol
2. $1.54 \times 10^4\ kg/mol$
3. $3.08 \times 10^4\ kg/mol$
4. $3.08 \times 10^3\ kg/mol$

43. In Haber process 30 litres of dihydrogen and 30 litres of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the above condition in the end :
(1) 20 litres ammonia, 20 litres nitrogen, 20 litres hydrogen
(2) 10 litres ammonia, 25 litres nitrogen, 15 litres hydrogen
(3) 20 litres ammonia, 10 litres nitrogen, 30 litres hydrogen
(4) 20 litres ammonia, 25 litres nitrogen, 15 litres hydrogen

44. An organic compound contains 80% (by wt.) carbon and the remaining percentage of hydrogen. The right option for the empirical formula of this compound is: [Atomic wt. of C is 12, H is 1]
1. CH_3
2. CH_4
3. CH
4. CH_2

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*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Structure of Atom

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Quantum Numbers & Schrodinger Wave Equation	9
AUFBAU Principle	6
Bohr's Theory	6
Heisenberg Uncertainty Principle	4
Hydrogen Spectra	3
Planck's Theory	3
De Broglie Equation	2
Nodal Plane	2
Number of Electron, Proton & Neutron	2
Shell/Subshell	2
EMT Radiation	1
Introduction of Atomic Structure	1
Pauli's Exclusion Principle & Hund's Rule	1
Photo Electric Effect	1

1. The element Z = 114 has been discovered recently.
It will belong to which of the following family/group and electronic configuration?
1. $Carbon\ family[Rn]5\ f^{14}\ 6d^{10}7s^{2}7p^{2}$
2. $Oxygen\ family[Rn]5\ f^{14}\ 6d^{10}7s^{2}7p^{4}$
3. $Nitrogen\ family[Rn]5\ f^{14}\ 6d^{10}7s^{2}7p^{6}$
4. $Ha\log en\ family[Rn]5\ f^{14}\ 6d^{10}7s^{2}7p^{5}$

2. How many electrons can fit in the subshell for which n = 3 and l = 1?
1. 2
2. 6
3. 10
4. 14

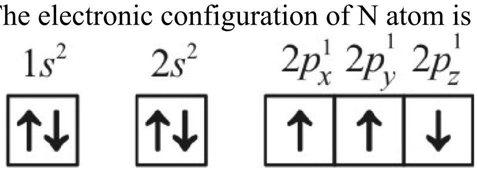
3. The wrong statement among the following is-
1. The uncertainty principle is $\Delta x \cdot \Delta p \geq \frac{h}{4\pi}$
2. Half-filled and fully filled orbitals have greater stability due to greater exchange energy,
greater symmetry, and a more balanced arrangement.
3. The energy of the 2s orbital is less than the energy of the 2p orbital in the case of hydrogen-like atoms.
4. De-Broglie's wavelength is given by $\lambda = \frac{h}{mv}$, where m= mass of the particle, v = group velocity of the particle.

4. A pairs of d-orbitals having electron density along the axes is-
1. $d_{z^2},\ d_{xz}$
2. $d_{xz},\ d_{zy}$
3. $d_{z^2},\ d_{x^2-y^2}$
4. $d_{xy},\ d_{x^2-y^2}$

5.
The Incorrect statement among the following is-
1. Total orbital angular momentum of an electron in 's' orbital is equal to zero.

2. An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers.

3. The electronic configuration of N atom is



4. The value of m for d_{z^2} is zero.

6.
Two electrons occupying the same orbital are distinguished by.
1. Magnetic quantum number
2. Azimuthal quantum number
3. Spin quantum number
4. Principal quantum number

7. Which is the correct order of increasing energy of the listed orbital's in the atom of titanium?
1. 3s 4s 3p 3d
2. 4s 3s 3p 3d
3. 3s 3p 3d 4s
4. 3s 3p 4s 3d

8. What is the maximum number of orbitals that can be identified with the following quantum number
n = 3, l = 1, m = 0
1. 1
2. 2
3. 3
4. 4

9. Calculate the energy in corresponding to light of wavelength 45 nm :
(Planck's constant h = 6.63×10^{-34} Js: speed of light c = 3×10^{8} ms^{-1})
1. 6.67×10^{15}
2. 6.67×10^{11}
3. 4.42×10^{-15}
4. 4.42×10^{-18}

10.
The value of Planck's constant is 6.63×10^{-34} Js. The speed of light is 3×10^{17} nm s^{-1}. Which value is closest to the wavelength in nanometer of a quantum of light with frequency of 6×10^{15} s^{-1} ?

1. 25
2. 50
3. 75
4. 10

11.
What is the maximum numbers of electrons that can be associated with the following set of quantum numbers?
n = 3, l = 1 and m = –1.
1. 6
2. 4
3. 2
4. 10

12.
Based on equation $E = -2.178 \times 10^{-18} J, \frac{Z^2}{n^2}$ certain conclusions are written. Which of them is not correct ?
1. Larger the value of n, the larger is the orbit radius.
2. Equation can be used to calculate the change in energy when the electron changes orbit.
3. For n = 1, the electron has a more negative energy than it does for n = 6 which mean that the electron is more loosely bound in the smallest allowed orbit.
4. The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus.

13. Maximum number of electrons in a sub shell with l = 3 and n = 4 is
1. 14
2. 16
3. 10
4. 12

14. The correct set of four quantum numbers for the valence electron of rubidium atom (Z =37) is -
1. $5, 1, 1, +\frac{1}{2}$
2. $6, 0, 0, +\frac{1}{2}$
3. $5, 0, 0, +\frac{1}{2}$
4. $5, 1, 0, +\frac{1}{2}$

15.
The total number of atomic orbitals in fourth energy level of an atom is
1. 16
2. 32
3. 4
4. 8

16. The energies E_1 and E_2 of two radiations are 25 eV and 50 eV respectively. The relation between their wavelengths i.e., λ_1 and λ_2 will be
1. $\lambda_1 = 2\lambda_2$
2. $\lambda_1 = 4\lambda_2$
3. $\lambda_1 = \frac{1}{2}\lambda_2$
4. $\lambda_1 = \lambda_2$

17. If n=6, the correct sequence for filling of electrons will be-
1. $ns \rightarrow (n-1)d \rightarrow (n-2)f \rightarrow np$
2. $ns - (n-2)f \rightarrow np \rightarrow (n-1)d$
3. $ns - np \rightarrow (n-1)d \rightarrow (n-2)f$
4. $ns \rightarrow (n-2)f \rightarrow (n-1)d \rightarrow np$

18. The rule used to determine the maximum number of electrons in a subshell of an atom is-
1. 4l+2
2. 2l+1
3. 4l-2
4. $2n^2$

19. The incorrect set of quantum number among the following is -
1. n= 4, l= 0, m= 0, s= -1/2
2. n= 5, l= 3, m= 0, s= +1/2
3. n= 3, l= 2, m= -3, s= -1/2
4. n= 3, l= 2, m= 2, s= -1/2

20. If uncertainty in position and momentum are equal, then uncertainty in velocity is
1. $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$
2. $\sqrt{\frac{h}{2\pi}}$
3. $\frac{1}{m}\sqrt{\frac{h}{\pi}}$
4. $\sqrt{\frac{h}{\pi}}$

21.
The measurement of the electron position is associated with uncertainty in momentum, which is equal to 1×10^{-18} g cm s^{-1}. The uncertainty in electron velocity will be (mass of an electron is 9×10^{-28} g)-
1. 2×10^9 cm s^{-1}
2. 1×10^9 cm s^{-1}
3. 1×10^5 cms^{-1}
4. 1×10^{11} cm s^{-1}

22.
Consider the following sets of quantum numbers :

	n	l	m	s
(i)	3	0	0	+1/2
(ii)	2	2	1	+1/2
(iii)	4	3	-2	-1/2
(iv)	1	0	-1	-1/2
(v)	3	2	3	+1/2

Which of the following sets of quantum number is not possible?
1. ii, iii and iv
2. i, ii, iii and iv
3. ii, iv and v
4. i and iii

23. An element, X has the following isotopic composition :
^{200}X: 90%
^{199}X: 8.0%
^{202}X: 2.0%
The weighted average atomic mass of the naturally-occurring element X is closest to:
1. 200 amu
2. 201 amu
3. 202 amu
4. 199 amu

24. The mass of electron is 9.11×10^{-31} kg ,planck's constant is 6.626×10^{-34} Js, the uncertainty involved in the measurement of velocity within a distance of 0.1Å is :
1. $5.79\times10^{6}\ ms^{-1}$
2. $5.79\times10^{7}\ ms^{-1}$
3. $5.79\times10^{8}\ ms^{-1}$
4. $5.79\times10^{5}\ ms^{-1}$

25. The orientation of an atomic orbital is governed by :
1. azimuthal quantum number
2. spin quantum number
3. magnetic quantum number
4. principal quantum number

26. 4d, 5p, 5f and 6p orbitals are arranged in the order of decreasing energy. The correct option is:
1. 5f>6p>4d>5p
2. 5f>6p>5p>4d
3. 6p>5f>5p>4d
4. 6p>5f>4d>5p

27. Which of the following series of transitions in the spectrum of hydrogen atom falls in visible region?
1. Brackett series
2. Lyman series
3. Balmer series
4. Paschen series

28. Orbital having 3 angular node and 3 total nodes is:
(1) 5 p
(2) 3 d
(3) 4 f
(4) 6 d

29. The number of protons, neutrons and electrons in $^{175}_{71}$Lu, respectively, are:
1. 104, 71 and 71
2. 71, 71 and 104
3. 175, 104 and 71
4. 71, 104 and 71

30. The number of angular nodes and radial nodes in 3s orbital are
1. 0 and 2, respectively
2. 1 and 0, respectively
3. 3 and 0, respectively
4. 0 and 1, respectively

31. According to the Bohr Theory, which of the following transitions in the hydrogen atom will
give rise to the least energetic photon?
1. n = 5 to n = 3
2. n = 6 to n = 1
3. n = 5 to n = 4
4. n = 6 to n = 5

32. A 0.66 kg ball is moving with a speed of 100 m/s. The associated wavelength will be
$(h=6.6\times10^{-34}\ Js)$
1. $6.6\times10^{-34}m$
2. $1.0\times10^{-35}\ m$
3. $1.0\times10^{-32}m$
4. $6.6\times10^{-32}\ m$

33. The nuclei of which one of the following pairs of nuclei are isotones :
1. $_{34}Se^{74}$,$_{31}Ga^{71}$
2. $_{38}Sr^{84}$,$_{38}Sr^{86}$
3. $_{42}Mo^{92}$,$_{40}Zr^{92}$
4. $_{20}Ca^{40}$,$_{16}S^{32}$

34. The energy value is E = 3.03×10^{-19} Joules, (h=6.6×10^{-34} J x sec., C=3×10^{8} m/sec). The value of the corresponding wavelength is
1. 65.3 nm
2. 6.53 nm
3. 3.4 nm
4. 653 nm

35. The energy of the second Bohr orbit of the hydrogen atom is –328 kJ mol^{-1}; hence the energy of the fourth Bohr orbit would be:-
(1) –1312 kJ mol^{-1}
(2) –82 kJ mol^{-1}
(3) –41 kJ mol^{-1}
(4) –164 kJ mol^{-1}

36. Which of the following molecule is not paramagnetic :
1. Cu^{++}
2. Fe^{2+}
3. Cl^{-}
4. None of the above

37. The radius of hydrogen shell is 0.53Å, then in first excited state radius of shell will be :
1. 2.12 Å
2. 1.06 Å
3. 8.5 Å
4. 4.24 Å

38. Uncertainity in position of a e^- and He is similar. If uncertainity in momentum of $e^-$is 32×10^5 , then uncertainity in momentum of He will be :
1. 32×10^5
2. 16×10^5
3. 8×10^5
4. None of the above

39. Ionization energy of second orbit of Li^{+2} will be :
1. 122.4 eV
2. 40.8 eV
3. 30.6 eV
4. 13.6 eV

40. The frequency of radiation emitted when the electron falls from n = 4 to n = 1 in a hydrogen atom will be (Given ionization energy of H = 2.18×10^{-18} J atom $^{-1}$ and h = 6.625×10^{-34} Js):
1. 1.03×10^{15} s^{-1}
2. 3.08×10^{15} s^{-1}
3. 2.00×10^{15} s^{-1}
4. 1.54×10^{15} s^{-1}

41. The value of Planck's constant is 6.63×10^{-34}Js. The velocity of light is 3.0×10^8 ms^{-1}. The closest value to the wavelength in nanometers of a quantum of light with a frequency of 8×10^{15} $s^{-1}$is-
1. 2×10^{-25}
2. 5×10^{-18}
3. 4×10^1
4. 3×10^7

42. Number of orbitals indicated by following set of quantum, numbers, n = 3, l = 2, m =+2 is-
1. 1
2. 2
3. 3
4. 4

43. A particular station of All India Radio, New Delhi, broadcasts on a frequency of 1,368 kHz (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is : [speed of light, c = 3.0×10^8 ms^{-1}]
1. 2192 m
2. 21.92 cm
3. 219.3 m
4. 219.2 m

Classification of Elements & Periodicity in Properties

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Ionization Energy (IE)	11
Atomic Size	8
Electron Affinity (EA)	4
Electronic Configuration	4
Modern Periodic Table & Periodicity	1

1.
Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2 2s^2 2p^3$ the simplest formula for this compound is :

1. Mg_2X_3
2. MgX_2
3. Mg_2X
4. Mg_3X_2

2.
In which of the following options the order of arrangement does not agree with the variation of property indicated against it?
1. B < C < N < O (increasing first ionisation enthalpy)
2. I < Br < F < Cl (increasing electron gain enthalpy)
3. Li < Na < K < Rb (increasing metallic radius)
4. $Al^{3+} < Mg^{2+} < Na^{+} < F^{-}$ (increasing ionic size)

3. The formation of the oxide ion O^{2-} (g), from oxygen atom requires first an exothermic and then an endothermic step as shown below,

$$O(g)+e^{-} \rightarrow O^{-};\ \ \Delta_f H^0 = -141\ \text{KJ}\ \ \text{mol}^{-1}$$

$$O^{-}(g)+e^{-} \rightarrow O^{2-}(g);\ \ \Delta_f H^0 = +780\ \text{KJ}\ \ \text{mol}^{-1}$$

Thus, process of formation of O^{2-} in gas phase is unfavorable even though O^{2-} is isoelectronic with neon. It is due to the fact that :
1. Electron repulsion outweighs the stability gained by achieving noble gas configuration .
2. O^{-} ion has comparatively smaller size than oxygen atom.
3. Oxygen is more electronegative.
4. Addition of electron in oxygen result in large size of the ion .

4.

The species Ar, K^{+} and Ca^{2+} contain the same number of electrons. In which order do their radii increase?
1. $Ar < K^{+} < Ca^{2+}$
2. $Ca^{2+} < Ar < K^{+}$
3. $Ca^{2+} < K^{+} < Ar$
4. $K^{+} < Ar < Ca^{2+}$

5. Which of the following orders of ionic radii is correctly represented?
1. $H^{-} > H^{+} > H$
2. $Na^{+} > F^{-} > O^{2-}$
3. $F^{-} > O^{2-} > Na^{+}$
4. $N^{3-} > Mg^{2+} > Al^{3+}$

6. Be^{2+} is isoelectronic with which of the following ions?
1. H^{+}
2. Li^{+}
3. Na^{+}
4. Mg^{2+}

7. The correct order of the decreasing ionic radii among the following isoelectronic species is :
1. $Ca^{2+} > K^{+} > S^{2-} > Cl^{-}$
2. $Cl^{-} > S^{2-} > Ca^{2+} > K^{+}$
3. $S^{2-} > Cl^{-} > K^{+} > Ca^{2+}$
4. $K^{+} > Ca^{2+} > Cl^{-} > S^{2-}$

8. Which of the following represents the correct order of increasing electron Affinity for the elements, O, S, F and Cl ?
1. Cl < F < O < S
2. O < S < F < Cl
3. F < S < O < Cl
4. S < O < Cl < F

9. Amongst the elements with following electronic configurations, which one of them may have the highest ionisation energy ?
1. $[Ne]\ 3s^2\ 3p^3$
2. $[Ne]\ 3s^2\ 3p^2$
3. $[Ar]\ 3d^{10}\ 4s^2\ 4p^3$
4. $[Ne]\ 3s^2\ 3p^1$

10.
The correct order of decreasing second ionization enthalpy of Ti(22), V(23), Cr (24) and Mn(25) is
1. Cr > Mn > V > Ti
2. V > Mn > Cr > Ti
3. Mn > Cr > Ti > V
4. Ti > V > Cr > Mn

11.
Which one of the following arrangements does not give the correct picture of the trends indicated against it?

1. $F_2 > Cl_2 > Br_2 > I_2$: Oxidising power
2. F<Cl>Br>I : Electron gain enthalpy
3. $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy
4. F> Cl > Br > I : Electronegativity

12. Among the following, the most characteristic oxidation states for lead and tin are respectively.
1. +4, +2
2. +2, +4
3. +4, +4
4. +2, +2

13. Among the following electronic configuration, an atom has the lowest ionisation enthalpy is-
1. $1s^2 2s^2 2p^5$
2. $1s^2 2s^2 2p^3$
3. $1s^2 2s^2 2p^6 3s^1$
4. $1s^2 2s^2 2p^6$

14. Identify the correct order of the size of the following :
1. $Ca^{2+} < K^+ < Ar < S^{2-} < Cl^-$
2. $Ca^{2+} < K^+ < Ar < Cl^- < S^{2-}$
3. $Ar < Ca^{2+} < K^+ < Cl^- < S^{2-}$
4. $Ca^{2+} < Ar^+ < K^+ < Cl^- < S^{2-}$

15. Which one of the following orders is **not** in accordance with the property stated against?
1. $F_2 > Cl_2 > Br_2 > I_2$: $Oxidi \sin g\ power$
2. $Hl > HBr > HCl > HF$: $Acidic\ property\ in\ water$
3. $F_2 > Cl_2 > Br_2 > I_2$: $Electronegativity$
4. $F_2 > Cl_2 > Br_2 > I_2$: $Bond\ dissociation\ energy$

16. For the second period elements the correct increasing order of first ionisation enthalpy is:
1. Li<Be<B<C<O<N<F<Ne
2. Li<Be<B<C<N<O<F<Ne
3. Li<B<Be<C<O<N<F<Ne
4. Li<B<Be<C<N<O<F<Ne

17. Identify the incorrect match.

Name	IUPAC Official Name
a. Unnilunium	(i) Mendelevium
b. Unniltrium	(ii) Lawrecium
c. Unnilhexium	(iii) Seaborgium
d. Unununnium	(iv) Darmstadtium

1. (b), (ii)
2. (c), (iii)
3. (d), (iv)
4. (a), (i)

18. Match the element in column I with that in column II.

Column-I	Column-II
(a) Copper	(i) Non-metal
(b) Fluorine	(ii) Transition metal
(c) Silicon	(iii) Lanthanoid
(d) Cerium	(iv) Metalloid

Identify the correct match :
1. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
2. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
3. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
4. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

19. Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is -
1. Cl < P < Mg < Ca
2. P < Cl < Ca < Mg
3. Ca < Mg < P < Cl
4. Mg < Ca < Cl < P

20. What is the value of electron gain enthalpy of Na^+ if IE_1 of Na = 5.1 eV?
1. + 10.2 eV
2. –5.1 eV
3. –10.2 eV
4. + 2.55 eV

21. Which one of the following arrangements represents the correct order of electron gain enthalpy (with negative sign) of the given atomic species :-
(1) F < Cl < O < S
(2) S < O < Cl < F
(3) O < S < F < Cl
(4) Cl < F < S < O

22. In which of the following molecule,the internuclear distance will be maximum :
1. CsI
2. CsF
3. LiF
4. LiI

23. The first ionization potential of Be and B will be-

1. 8.8 and 8.8
2. 6.6 and 6.6
3. 6.6 and 8.8
4. 8.8. and 6.6

24. An electronic configuration that has maximum difference between II and III ionization potential is - :
1. $1s^2 2s^2 2p^6 3s^1$
2. $1s^2 2s^2 2p^6 3s^2$
3. $1s^2 2s^2 2p^6$
4. $1s^2 2s^2 2p^5$

25. Ionic radii are:-
1. Inversely proportional to the square of effective nuclear charge.
2. Directly proportional to the effective nuclear charge.
3. Directly proportional to the square of effective nuclear charge.
4. Inversely proportional to the effective nuclear charge.

26. Incorrect order among the following is : -
1. $NH_3 < PH_3 < AsH_3$ – Acidic
2. Li < Be < B < C – I^{st} I.P.
3. $Al_2O_3 < MgO < Na_2O < K_2O$ - Basic
4. $Li^+ < Na^+ < K^+ < Cs^+$ - Ionic radius

27. An atom has electronic configuration $1s^22s^22p^63s^23p^63d^34s^2$, you will place it in which group : -
1. Fifth
2. Fifteenth
3. Second
4. Third

28. Correct order of I^{st} IP among following elements Be, B, C, N, O is : -
1. B < Be < C < O < N
2. B < Be < C < N < O
3. Be < B < C < N < O
4. Be < B < C < O < N

29. The ions O^{2-}, F^-, Na^+, Mg^{2+} and Al^{3+} are isoelectronic. Their ionic radii show :
(1) A significant increase from O^{2-} to Al^{3+}
(2) A significant decrease from O^{2-} to Al^{3+}
(3) An increase from O^{2-} to F^- and then decrease from Na^+ to Al^{3+}
(4) An decrease from O^{2-} to F^- and then increase from Na^+ to Al^{3+}

Chemical Bonding & Molecular Structure

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Hybridisation	27
M.O.T	22
Octate, Isoelectronic Species ,Lewis Structure & Formal Charge	10
Polarity	9
Types of Chemical Bond	8
V.S.E.P.R / V.B.T	7
Covalent Bond	4
Acidic, Basic Character & Fajan's Rule	3
Resonance & Nature of Compounds	3
van der Waal Force & Hydrogen Bonding	1

1. The species, having bond angles of 120 ° is :
1. SF_6
2. NCl_3
3. BCl_3
4. PH_3

2. The hybridisations of atomic orbitals of nitrogen in NO^+, NO^-_3 and NH_3 respectively are
1. sp, sp^3 and sp^2
2. sp^2, sp^3 and sp
3. sp, sp^2 and sp^3
4. sp^2, sp and sp^3

3. Which of the following pairs of ions is isoelectronic and isostructural?
1. CO_3^{2-}, NO_3^-
2. ClO_3^-, CO_3^{2-}
3. SO_3^{2-}, NO_3^-
4. ClO_2^-, SO_3^{2-}

4. The correct shape and hybridization for XeF_4 are
1. octahedral, sp^3d^2
2. trigonal bipyramidal, sp^3d^3
3. planar triangle, sp^3d^3
4. square planar, sp^3d^2

5.
Among CaH_2, BeH_2, BaH_2 the order of ionic character is
1. $BeH_2 < CaH_2 < BaH_2$
2. $CaH_2 < BeH_2 < BaH_2$
3. $BeH_2 < BaH_2 < CaH_2$
4. $BaH_2 < BeH_2 < CaH_2$

6.
Consider the following species:

CN^+, CN^-, NO and CN

Which one of these will have the highest bond order?
1. NO

2. CN^-

3. CN^+

4. CN

7.
Predict the correct order among the following.

1. lone pair-lone pair > bond pair-bond pair >lone pair-bond pair
2. bond pair-bond pair> lone pair-bond pair>lone pair-lone pair
3. lone pair-bond pair > bond pair-bond pair >lone pair-lone pair
4. lone pair-lone pair> lone pair-bond pair>bond pair-bond pair

8.
The pair of electron in the given carbanion, $CH_3C{\equiv}C^-$, is present in which orbitals?
1. sp^3
2. sp^2
3. sp
4. 2p

9.
Consider the molecules CH_4, NH_3 and H_2O. Which of the given statements is false?

1. The H-O-H bond angle in H_2O is larger than the H-C-H bond angle in CH_4
2. The H-C-H bond angle in CH_4 is larger than the H-N-H bond angle in NH_3
3. The H-C-H bond angle in CH_4, the H-N-H bond angle in NH_3 and the H-0-H bond angle in H_2O are all greater than 90°
4. The H-O-H bond angle in H_2O is smaller than the H-N-H bond angle in NH_3

10. Decreasing order of stability of O_2, O_2^-, O_2^+ and O_2^{2-} is :
1. $O_2^+ > O_2 > O_2^- > O_2^{2-}$
2. $O_2^{2-} > O_2^- > O_2 > O_2^+$
3. $O_2 > O_2^+ > O_2^{2-} > O_2^-$
4. $O_2^- > O_2^{2-} > O_2^+ > O_2$

11.
Which of the following species contains equal number of σ and π bonds?
1. HCO_3^-
2. XeO_4
3. $(CN)_2$
4. $CH_2(CN)_2$

12.

Which of the following pairs of ions are isoelectronic and isostructural?
1. CO_3^{2-}, SO_3^{2-}
2. ClO_3^-, CO_3^{2-}
3. SO_3^{2-}, NO_3^-
4. ClO_3^-, SO_3^{2-}

13.

Which of the following options represents the correct bond order?

1. $O_2^- > O_2 < O_2^+$

2. $O_2^- < O_2 > O_2^+$

3. $O_2^- < O_2 < O_2^+$

4. $O_2^- > O_2 > O_2^+$

14.
Maximum bond angle at nitrogen is present in which of the following?
1. NO_2
2. NO_2^-
3. NO_2^+
4. NO_3^-

15.

The correct order of bond order in the following species is :
1. $O_2^{2+} > O_2^+ > O_2^-$
2. $O_2^{2+} < O_2^- < O_2^+$
3. $O_2^+ > O_2^- < O_2^{2+}$
4. $O_2^- < O_2^+ > O_2^{2+}$

16. A molecule among the following having maximum dipole moment is -
1. CO_2
2. CH_4
3. NH_3
4. NF_3

17. Which one of the following species has plane triangular shape ?
1. N_3^-
2. NO_3^-
3. NO_2^-
4. CO_2

18.
An electron-deficient compound among the following is -

1. $(SiH_3)_2$

2. $(BH_3)_2$

3. PH_3

4. $(CH_3)_2$

19.
Which one of the following molecules contains no π bond?

1. H_2O

2. SO_2

3. NO_2

4. CO_2

20.
A polar molecule among the following is -
1. SF_4
2. SiF_4
3. XeF_4
4. BF_3

21.
A paramagnetic molecule among the following is -

1. O_2^-

2. CN^-

3. NO^+

4. CO

22.
XeF_2 is isostructural with:
1. ICl_2^-
2. $SbCl_3$
3. $BaCl_2$
4. TeF_2

23.
Dipole-induced dipole interactions are present in which of the following pairs:
1. Cl_2 and CCl_4
2. HCl and He atoms
3. SiF_4 and He atoms
4. H_2O and alcohol

24. Isostructural pair among the following is-
1. BCl_3 and $BrCl_3$
2. NH_3 and NO_3^-
3. NF_3 and BF_3
4. BF_4^- and NH_4^+

25. Bond order of 1.5 is shown by :
1. O_2^+
2. O_2^-
3. O_2^{2-}
4. O_2

26. Identify the wrong statement among the following.
1. Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius
2. Amongst isoelectronic species, greater the negative charge on the anion, larger is ionic radius
3. Atomic radius of the elements encreases as one move down the first group of the Periodic Table
4. Atomic radius of the elements decreases as one move across from left to right in the 2nd period of the Periodic Table

27. Which of the following species contains three bond pairs and one lone pair around the central atom?
1. H_2O
2. BF_3
3. $NH^-{}_2$
4. PCl_3

28. The pair of species with the same bond order is
1. O_2^{2-} , B_2
2. O_2^+, NO^+
3. NO,CO
4. N_2, O_2

29. Which of the two ions from the list given below have the geometry that is explained by the same hybridisation of orbitals, $NO_2^-, NO_3^-, NH_2^-, NH_4^-, SCN^-$?
1. NH_4^- and NO_3^-
2. SCN^- and NH_2^-
3. NO_2^- and NH_2^-
4. NO_2^- and NO_3^-

30. Which of the following has the minimum bond length?
1. O_2^-
2. O_2^{2-}
3. O_2
4. O_2^+

31. Which one of the following bonds produces a solid that reflects light in the visible region and whose electrical conductivity decreases with temperature and has a high melting point?
1. Metallic bonding
2. Van der Waals' bonding
3. Ionic bonding
4. Covalent bonding

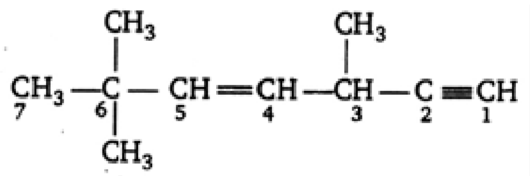
32. In which of the following pairs of molecules/ions, the central atoms have sp^2hybridization ?
1. NO_2^- *and* NH_3
2. BF_3 *and* NO_2^-
3. NH_2^-*and* H_2O
4. BF_3 *and* NH_2^-

33. A molecule/ion among the following species that does not exist under normal conditions is -
1. Be_2^+
2. Be_2
3. B_2
4. Li_2

34. In which one of the following species the central atom has the type of hybridization which is not the same as that present in the other three ?
1. SF_4
2. I_3^-
3. $SbCl_5^{2-}$
4. PCl_5

35. According to the MO theory, which of the following lists ranks the nitrogen species in terms of increasing bond order?
1. $N_2^- < N_2 < N_2^{2-}$
2. $N_2^{2-} < N_2^- < N_2$
3. $N_2 < N_2^{2-} < N_2^-$
4. $N_2^- < N_2^{2-} < N_2$

36.
The state of hybridisation of C_2, C_3, C_5 and C_6 of the hydrocarbon



is in the following sequence
1. sp, sp^3, sp^2 and sp^3
2. sp^3, sp^2, sp^2 and sp
3. sp, sp^2, sp^2 and sp^3
4. sp, sp^2, sp^3 and $sp2$

37.
In which of the following molecules/ions BF_3, NO_2^-, NH_2^-, and H_2O, the central atom is sp^2 hybridized?
1. NO_2^- and NH_2^-
2. NH_2^- and H_2O
3. NO_2^- and H_2O
4. BF_3 and NO_2^-

38. What is the dominant intermolecular force or bond that must be overcome in converting liquid CH_3OH to a gas ?
1. Hydrogen bonding
2. Dipole-dipole interaction
3. Covalent bonds
4. London dispersion force

39.
The angular shape of ozone molecule (O_3) consists of
1. 1 sigma and 2 pi bonds
2. 2 sigma and 2 pi bonds
3. 1 sigma and 1 pi bonds
4. 2 sigma and 1 pi bonds

40. Four diatomic species are listed below in different sequences. Which of these presents the correct order of their increasing bond order?
1. $O_2^- < NO < C_2^{2-} < He_2^+$
2. $NO < C_2^{2-} < O_2^- < He_2^+$
3. $C_2^{2-} < He_2^+ < NO < O_2^-$
4. $He_2^+ < O_2^- < NO < C_2^{2-}$

41. The correct order of C-O bond length among CO, CO_3^{2-}, CO_2 is :
1. $CO_2 < CO_3^{2-} < CO$
2. $CO < CO_3^{2-} < CO_2$
3. $CO_3^{2-} < CO_2 < CO$
4. $CO < CO_2 < CO_3^{2-}$

42. In which of the following pairs, the two species are iso-structural?
1. SF_4 and XeF_4
2. SO_3^{2-} and NO_3^-
3. BF_3 and NF_3
4. BrO_3^- and XeO_3

43. In which of the following molecules are all the bonds not equal?
1. ClF_3
2. BF_3
3. AlF_3
4. NF_3

44. Which of the following species has a linear shape?
1. NO_2^-
2. SO_2
3. NO_2^+
4. O_3

45. Which of the following is the most basic oxide?
1. Al_2O_3
2. Sb_2O_3
3. Bi_2O_3
4. SeO_2

46. Which of the following is **not** a correct statement?
1. The electron deficient molecules can act as Lewis acids.
2. The canonical structures have no real existance.
3. Every AB_5 molecule does in fact have square pyramidal structure.
4. Multiple bonds are always shorter than corresponding single bonds.

47. Which of the following is not isostructural with $SiCl_4$?
1. SCl_4
2. SO_4^{2-}
3. PO_4^{3-}
4. NH_4^+

48. A diatomic molecular among the following species has only π bonds according to Molecular Orbital Theory is -
1. Be_2
2. O_2
3. N_2
4. C_2

49. The number of sigma (σ) and pi (π) bonds in pent-2-en-4-yne is:
1. 13 σ bonds and no π bond
2. 10 σ bonds and 3 π bonds
3. 8 σ bonds and 5 π bonds
4. 11 σ bonds and 2 π bonds

50. Match the oxide given in column I with its property given column II

Column I	Column II
(i) Na_2O	(a) Neutral
(ii) Al_2O_3	(b) Basic
(iii) N_2O	(c) Acidic
(iv) Cl_2O_7	(d) Amphoteric

Which of the following options has all correct pairs?
1. (i)-(b), (ii)-(a), (iii)-(d), (iv)-(c)
2. (i)-(c), (ii)-(b), (iii)-(a), (iv)-(d)
3. (i)-(a), (ii)-(d), (iii)-(b), (iv)-(c)
4. (i)-(b),(ii)-(d), (iii)-(a), (iv)-(c)

51. A paramagnetic compound among the following is -
1. N_2
2. H_2
3. Li_2
4. O_2

52. Which of the following is the correct order of dipole moment?
1. $NH_3 < BF_3 < NF_3 < H_2O$
2. $BF_3 < NF_3 < NH_3 < H_2O$
3. $BF_3 < NH_3 < NF_3 < H_2O$
4. $H_2O < NF_3 < NH_3 < BF_3$

53. Which of the following set of molecules will have zero dipole moment?
1. Boron trifluoride, hydrogen fluoride, carbon dioxide, 1 3-dichlorobenzene
2. Nitrogen trifluoride, beryllium difluoride, water, 1 3 -dichlorobenzene
3. Boron trifluoride, beryllium difluoride, carbon dioxide, 1 4-dichlorobenzene
4. Ammonia, beryllium difluoride, water, 1, 4-dichlorobenzene

54. Match the following :

Oxide	Nature
(a) CO	(i) Basic
(b) BaO	(ii) Neutral
(c) Al_2O_3	(iii) Acidic
(d) Cl_2O_7	(iv) Amphoteric

Which of the following is the correct option?

	a	b	c	d
1.	(ii)	(i)	(iv)	(iii)
2.	(iii)	(iv)	(i)	(ii)
3.	(iv)	(iii)	(ii)	(i)
4.	(i)	(ii)	(iii)	(iv)

55. A molecule that can not exist-
1. Li_2
2. C_2
3. O_2
4. He_2

56. Among the compounds shown below which one revealed a linear structure?
1. NO_2
2. HOCl
3. O_3
4. N_2O

57. Match the coordination number and type of hybridization with the distribution of hybrid orbitals in space based on Valence bond theory.

Coordination number and type of hybridisation	Distribution of hybrid orbitals in space
(a) 4, sp^3	(i) Trigonal bipyramidal
(b) 4, dsp^2	(ii) Octahedral
(c) 5, sp^3d	(iii) Tetrahedral
(d) 6, d^2sp^3	(iv) Square planar

Select the correct option:
1. (a)-(ii) (b)-(iii) (c)-(iv) (d)-(i)
2. (a)-(iii) (b)-(iv) (c)-(i) (d)-(ii)
3. (a)-(iv) (b)-(i) (c)-(ii) (d)-(iii)
4. (a)-(iii) (b)-(i) (c)-(iv) (d)-(ii)

58. Identify the wrongly matched pair.

Molecule	Shape or geometry of the molecule
a. PCl_5	Trigonal
b. SF_6	Octahedral
c. $BeCl_2$	Linear
d. NH_3	Trigonal pyramidal

1. b
2. c
3. d
4. a

59. During change of O_2 to O_2^- ion, the electron adds on which one of the following orbitals ?
1. π *orbital*
2. $\sigma*$ *orbital*
3. σ *orbital*
4. $\pi*$ *orbital*

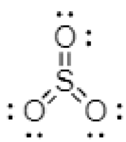
60. Four diatomic species are listed below. Identify the correct order in which the bond order is increasing in them -
1. $O_2{}^- < NO < C_2{}^{2-} < He_2{}^+$
2. $C_2{}^{2-} < He_2{}^+ < O_2{}^- < NO$
3. $He_2{}^+ < O_2{}^- < NO < C_2{}^{2-}$
4. $NO < O_2{}^- < C_2{}^{2-} < He_2{}^+$

61. The pairs of species of oxygen and their magnetic behaviors are given below. Which of the following represent the correct description?
1. O, O_2^{2-} - Both paramagnetic
2. O_2^-, O_2^{2-} - Both diamagnetic
3. O^+, O_2^{2-} - Both paramagnetic
4. O_2^+, O_2 - Both paramagnetic

62. Some of the properties of the two species, NO_3^- *and* H_3O^+ are described below. Which one of them is correct?
1. Isostructural with same hybridization for the central atom.
2. Isostructural with different hybridization for the central atom.
3. Similar in hybridization for the central atom with different structures.
4. Dissimilar in hybridization for the central atom with different structures.

63. In which of the following molecules the central atom does not have sp^3 hybridization ?
1. SF_4
2. BF_4^-
3. NH_4^+
4. CH_4

64. The most preferred structure with the lowest energy for SO_3 is :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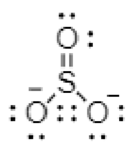
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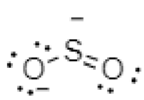
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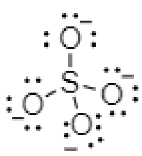

4.

65. Among the following, the compound that is electron deficient is-
1. $BaCl_2$
2. BCl_3
3. CCl_4
4. PCl_5

66. $d\pi$ - $p\pi$ bond is present in :
1. CO_3^{2-}
2. PO_4^{-3}
3. NO_3^-
4. NO_2^-

67. The compound that form linear polymer due to H-bond is :
1. H_2O
2. NH_3
3. HBr
4. HCl

68. The number of antibonding electron pair present in O_2^{2-} is :

1. 4
2. 3
3. 2
4. 1

69. The correct order of dissociation energy of N_2 and N_2^+ is-
1. $N_2 > N_2^+$
2. $N_2 = N_2^+$
3. $N_2^+ > N_2$
4. None of the above

70. Isoelectronic species are :
1. CO, CN^-, NO^+, C_2^{2-}
2. CO^-, CN, NO, C_2^-
3. CO^+, CN^+, NO^-, C_2
4. CO, CN, NO, C_2

71. Which of the following molecules has trigonal planar geometry ;
(1) NH_3
(2) BF_3
(3) PCl_3
(4) IF_3

72. Which of the following would have a permanent dipole moment -
(1) BF_3
(2) SF_4
(3) SiF_4
(4) XeF_4

73. The correct sequence of increasing covalent character is represented by -
1. $BeCl_2 < NaCl < LiCl$
2. $NaCl < LiCl < BeCl_2$
3. $BeCl_2 < LiCl < NaCl$
4. $LiCl < NaCl < BeCl_2$

74. Which of the following is the electron deficient molecule -
(1) C_2H_6
(2) SiH_4
(3) PH_3
(4) B_2H_6

75. Species that does not exhibits paramagnetism is :
1. N_2^+
2. O_2^-
3. CO
4. NO

76. In PO_4^{-3} formal charge on every oxygen atom and P-O bond order respectively are :
1. -0.75 and 1.25
2. -0.5 and 2
3. 1 and 1.5
4. -0.75 and 2

77. Among the following, the pair in which the two species are not isostructural is :-
1. IO_3^- and XeO_3
2. BH_4^- and NH_4^+
3. PF_6^- and SF_6
4. SiF_4 and SF_4

78. Increasing order of bond length is :
1. $NO^- < NO < NO^+ < O_2^-$
2. $O_2^- < NO < NO^- < NO^+$
3. $O_2^- < NO^- < NO < NO^+$
4. $NO^+ < NO < NO^- < O_2^-$

79. H_2O is dipolar, whereas BeF_2 is not. It is because:-
1. H_2O involves hydrogen bonding whereas BeF_2 is a discrete molecule.
2. H_2O is linear and BeF_2 is angular.
3. H_2O is angular and BeF_2 is linear.
4. The electronegativity of F is greater than that of O

80. In a regular octahedral molecule, MX_6 the number of X–M–X bonds at 180° is :-
(1) Two
(2) Six
(3) Four
(4) Three

81. In BrF_3 molecule, the lone pairs occupy equatorial positions to minimize :-
(1) Bond pair – bond pair repulsion only
(2) Lone pair – lone pair repulsion and lone pair– bond pair repulsion
(3) Lone pair–lone pair repulsion only
(4) Lone pair–bond pair repulsion ony

82. The dipole moment of compound AB is 10.92 D and that of compound CD is 12.45 D. The bond length AB is 2.72 A° and that of CD is 2.56 A° then for these compound true statement is :
1. More ionic nature in AB
2. More ionic nature in CD
3. Equal in both
4. Cannot be predicted

83. Among the following iso-electronic species is : -
1. CO_2, NO_2
2. NO_2^-, CO_2
3. CN^-, CO
4. SO_2, CO_2

84. $p_\pi - d_\pi$ bonding is present in :
1. NO_3^-
2. SO_3^{-2}
3. BO_3^{-3}
4. CO_3^{-2}

85. In NO_3^- ion, the number of bond pair and lone pair of electrons on nitrogen atom are respectively:

1. 2, 2
2. 3, 1
3. 1, 3
4. 4, 0

86.

Incorrect statement about peptide bond is : -

1. C–N bond length in proteins is longer than usual bond length of N-bond.

2. Spectroscopic analysis show planar structure of
$$\begin{array}{l} -C - NH - \text{group} \\ \;\; \| \\ \;\; O \end{array}$$
3. C–N bond length in proteins is smaller than usual bond length of C–N bond.

4. None of the above.

87. Which of the following two species in the pair are isostructural : -
1. XeF_2 , IF_2^-
2. NH_3 , BF_3
3. CO_3^{-2} , SO_3^{-2}
4. PCl_5 , ICI_5

88. Bond angle is maximum in :
1. NH_3
2. NH_4^+
3. PCl_3
4. SCl_2

89. The incorrect statements among the following for sigma- and pi- bonds formed between two carbon atoms is-
1. Sigma-bond is stronger than a pi-bond
2. Bond energies of sigma- and pi-bonds are of the order of 264 KJ/mol and 347 KJ/mol, respectively
3. Free rotation of atoms about a sigma bond is allowed but not in the case of a pi-bond
4. Sigma-bond determines the direction between carbon atoms but a pi-bond has no primary effect in this regard

90. Main axis of a diatomic molecule is z, molecular orbtial p_x and p_y overlaps to form, which of the following orbital : -

1. π molecular orbtial
2. σ molecular orbital
3. δ molecular orbtial
4. No bond will form

91. BF_3 is planar and electron deficient compound. Hybridization and number of electrons around the central atom, respectively are:
1. sp^2 and 6
2. sp^2 and 8
3. sp^3 and 4
4. sp^3 and 6

92. Match List - I with List - II

	List - I		List - II
(a)	PCl_5	(i)	Square pyramidal
(b)	SF_6	(ii)	Trigonal planar
(c)	BrF_5	(iii)	Octahedral
(d)	BF_3	(iv)	Trigonal bipyramidal

Choose the correct answer from the options given below
1. (a) - (iii), (b) - (i), (c) - (iv), (d) - (ii)
2. (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)
3. (a) - (iv), (b) - (iii), (c) - (i), (d) - (ii)
4. (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)

93. From the following pairs of ions which one is not an iso-electronic pair?
1. Mn^{2+}, Fe^{3+}
2. Fe^{2+}, Mn^{2+}
3. O^{2-}, F^-
4. Na^+, Mg^{2+}

94. The non-polar nature molecule among the following is-
1. $SbCl_5$
2. NO_2
3. $POCl_3$
4. CH_2O

States of Matter

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Gas Laws	6
Ideal Gas Law	3
Kinetic Theory of Gas	3
van der Waal's Correction	3
Compressibility Factor	2
Dalton's Law	2

1. Given van der Waals constant "a" for NH_3, H_2 and CO_2 are respectively 4.17, 0.244, 1.36 and 3.59, which one of the following gases is most easily liquefied?
1. NH_3
2. H_2
3. O_2
4. CO_2

2.
The correction factor 'a' to the ideal gas equation corresponds to

1. density of the gas molecules
2. volume of the gas molecules
3. electric field present between the gas molecules
4. forces of attraction between the gas molecules

3. A gas such as carbon monoxide would be most likely to obey the ideal gas law at
1. High temperature and low pressures
2. Low temperature and high pressures
3. High temperature and high pressures
4. Low temperature and low pressures

4. Equal masses of H_2, O_2 and methane have been taken in a container of volume V at temperature 27 ºC in identical conditions. The ratio of the volumes of gases H_2:O_2 : methane would be -
1. 8:16:1
2. 16:8:1
3. 16:1:2
4. 8:1:2

5.
Maximum deviation from ideal gas is expected from :
1. N_2 (g)
2. CH_4 (g)
3. NH_3 (g)
4. H_2 (g)

6.
A gaseous mixture was prepared by taking equal moles of CO and N_2. If the total pressure of the mixture was found 1 atmosphere, the partial pressure of the nitrogen (N_2) in the mixture is
1. 0.8 atm
2. 0.9 atm
3. 1 atm
4. 0.5 atm

7.
If a gas expands at constant temperature, it indicates that

1. Kinetic energy of molecules decreases
2. Pressure of the gas increases
3. Kinetic energy of molecules remains the same
4. Number of the molecules of gas increases

8. A gas at 350 K and 15 bar has molar volume 20 percent smaller than that for an ideal gas under the same conditions. The correct option about the gas and its compressibility factor (Z) is:
1. Z<1 and repulsive forces are dominant
2. Z>1 and attractive forces are dominant
3. Z>1 and repulsive forces are dominant
4. Z<1 and attractive forces are dominant

9. In water-saturated air, the mole fraction of water vapor is 0.02. If the total pressure of the saturated air is 1.2 atm, the partial pressure of dry air is-
1. 1.17 atm
2. 1.76 atm
3. 1.27 atm
4. 0.98 atm

10. The volume occupied by 1.8 g of water vapour at 374 °C and 1 bar pressure will be -
[Use R=0.083 bar LK^{-1} mol^{-1}]
1. 96.66 L
2. 55.87 L
3. 3.10 L
4. 5.31 L

11. A mixture of N_2 and Ar gases in a cylinder contains 7 g of N_2 and 8 g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N_2 is:
[Use atomic masses (in g mol^{-1}): N=14, Ar=40]
(1) 12 bar
(2) 15 bar
(3) 18 bar
(4) 9 bar

12. The minimum pressure required to compress 600 dm^3 of a gas at 1 bar to 150 dm^3 at 40°C is
1. 4.0 bar
2. 0.2 bar
3. 1.0 bar
4. 2.5 bar

13. A bubble of air is underwater at a temperature15°C and the pressure 1.5 bar. If the bubble rises to the surface where the temperature is 25°C and the pressure is 1.0 bar, what will happen to the volume of the bubble?
1. Volume will become greater by a factor of 2.5
2. Volume will become greater by a factor of 1.6
3. Volume will become greater by a factor of 1.1
4. Volume will become smaller by a factor of 0.70

14. The pressure exerted by 6.0 g of methane gas in a 0.03 m^3 vessel at 129 ºC is
(Atomic masses : C = 12.01, H = 1.01 and R = 8.314 $JK^{-1}mol^{-1}$)
1. 13409 Pa
2. 41648 Pa
3. 31684 Pa
4. 215216 Pa

15. For real gases van der Waals equation is written as
$\left(P+\frac{an^2}{V^2}\right)\left(V-nb\right) = nRT$
Where 'a' and 'b' are van der Waals constants.

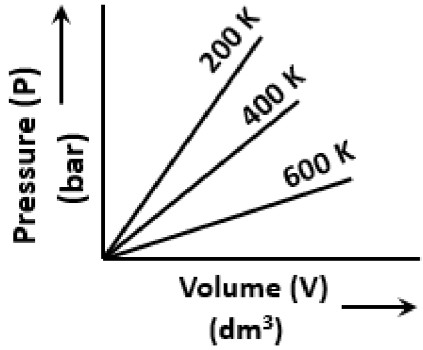
Two sets of gases are :
(I) $O_2,\ CO_2,\ H_2\ and\ He$ (II)$CH_4,\ O_2\ and\ H_2$
The gases given in set-I in increasing order of 'b' and gases given in set-II in decreasing order of 'a', are arranged below. Select the correct order from the following :
1. $(I) O_2 < He < H_2 < CO_2 (II)\ H_2 > O_2 > CH_4$
2. $(I) H_2 < He < O_2 < CO_2 (II)\ CH_4 > O_2 > H_2$
3. $(I) H_2 < O_2 < He < CO_2 (II)\ O_2 > CH_4 > H_2$
4. $(I) He < H_2 < CO_2 < O_2 (II)\ CH_4 > H_2 > O_2$

16. Average molar kinetic energy of CO and N_2 at same temperature is :
1. $KE_1 = KE_2$
2. $KE_1 > KE_2$
3. $KE_1 < KE_2$
4. Can't say anything. Both volumes are not given

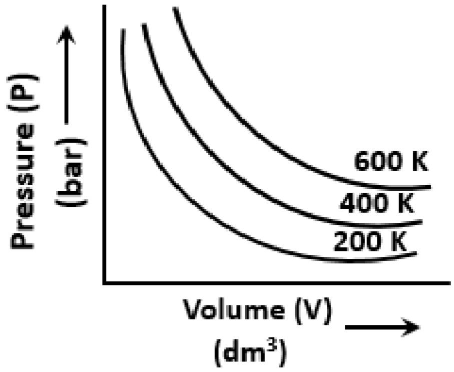
17. 400 ml gas at 500 torrs and 666.6 ml gas at 600 torrs taken in a container of 3 liters than the total pressure of a mixture is
1. 200 torr
2. 400 torr
3. 600 torr
4. 50 torr

18. Van der Waal's real gas acts as an ideal gas, under which conditions: -
1. High temperature, Low pressure
2. Low temperature, High pressure
3. High temperature, High pressure
4. Low temperature, Low pressure

19. Choose the correct option for graphical representation of Boyle's law, which shows a graph of pressure vs. volume of a gas at different temperatures :



1.



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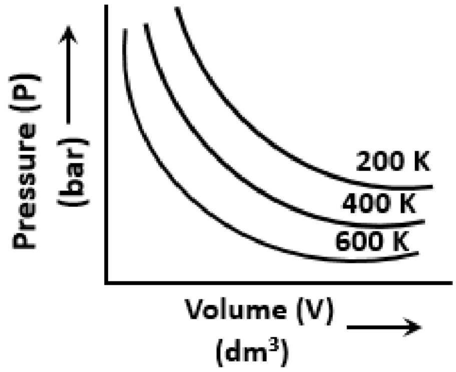

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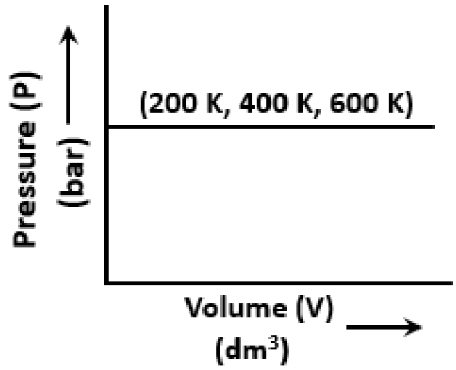


4.

20. Choose the correct option for the total pressure (in atm.) in a mixture of 4 g O_2 and 2 g H_2 confined in a total volume of one litre at 0˚C is :
[Given R=0.082 L atm mol^{-1} K^{-1}, T=273 K]
1. 25.18
2. 26.02
3. 2.518
3. 2.602

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Thermodynamics

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Gibbs Energy Change	19
Thermochemistry	13
Enthalpy & Internal energy	12
Spontaneity & Entropy	11
First Law of Thermodynamics	8
2nd & 3rd Law of Thermodynamics	5
Cp & Cv	1
Thermodynamics' Properties and process	1

1. For a sample of perfect gas when its pressure is changed isothermally from P_i to P_f, the entropy change is given by
1. $\Delta s = nR \ In \left(\frac{p_f}{p_i}\right)$
2. $\Delta s = nR \ In \left(\frac{p_i}{p_f}\right)$
3. $\Delta s = nRT \ In \left(\frac{p_f}{p_i}\right)$
4. $\Delta s = RT \ In \left(\frac{p_i}{p_f}\right)$

2. For a given reaction, $\Delta H = 35.5 \ KJmol^{-1}$ and $\Delta S = 83.6 \ JK^{-1}mol^{-1}$ .The reaction is spontaneous at: (Assume that ΔH and ΔS do not vary with temperature)
1. T>425K
2. All temperatures
3. T>298K
4. T<425K

3. A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5atm from an initial volume of 2.50 L to a final volume of 4.50L. The change in internal energy U of the gas in joules will be:
1. -500J
2. -505J
3. -506J
4. -508J

4. The bond dissociation energies of X_2 , Y_2 and XY are in the ratio of 1 : 0.5 : 1. ΔH for the formation of XY is – 200 kJ mol^{-1}. The bond dissociation energy of X_2 will be

1. 200 kJ mol^{-1}
2. 100 kJ mol^{-1}
3. 800 kJ mol^{-1}
4. 400 kJ mol^{-1}

5. The correct thermodynamic conditions for the spontaneous reaction at all temperatures is
1. ΔH > O and ΔS< 0
2. ΔH < O and ΔS> 0
3. ΔH < O and ΔS< 0
4. ΔH > 0 and ΔS = 0

6. The heat of combustion of carbon to CO_2 is -393.5 KJ/mol. The heat changed upon the formation of 35.2 g of CO_2 from carbon and oxygen gas is -
1. -315 KJ
2. +315 KJ
3. -630 KJ
4. +630 KJ

7. Which of the following statement is correct for a reversible process in a state of equilibrium?
1. ΔG = - 2.30RT log K
2. ΔG = 2.30RT log K
3. ΔG^o = - 2.30RT log K
4. ΔG^o = 2.30RT log K

8. Given the Gibbs free energy change, ΔG^o = + 63.3 kJ, for the following reaction,
$Ag_2CO_3(g) \rightarrow 2Ag^+(aq) + CO_3^{2-}(aq)$
K_{sp} of Ag_2CO_3(s) in water at 25 ºC is (R = 8.314 $JK^{-1} mol^{-1}$)
1. 3.2×10^{26}
2. 8.0×10^{-12}
3. 2.9×10^{-3}
4. 7.9×10^{-2}

9. Which of the following statements is correct for the spontaneous adsorption of a gas ?
1. ΔS is negative and therefore, ΔH should be highly positive
2. ΔS is negative and therefore, ΔH should be highly negative
3. ΔS is positive and therefore, ΔH should be negative
4. ΔS is positive and therefore, ΔH should also be highly positive

10. For the reaction :
$X_2O_4(l) \rightarrow 2XO_2(g)$
ΔU = 2.1 kcal, ΔS = 20 cal K^{-1} at 300 K
The value of ΔG is -
1. 2.7 kcal
2. -2.7 kcal
3. 9.3 kcal
4. -9.3 kcal

11. In which of the following reactions, standard reaction entropy changes (ΔS^0) is positive and standard Gibb's energy change (ΔG^0) decreases sharply with increasing temperature?
1. $C(graphite) + \frac{1}{2}O_2(g) \to CO(g)$
2. $CO(g) + \frac{1}{2}O_2(g) \to CO_2(g)$
3. $Mg(s) + \frac{1}{2}O_2(g) \to MgO(s)$
4. $\frac{1}{2}C(graphite) + \frac{1}{2}O_2(g) \to \frac{1}{2}CO_2(g)$

12. The enthalpy of fusion of water is 1.435 kcal/mol. The molar entropy change for the melting of ice at 0^oC is
1. 10.52 cal/(mol K)
2. 21.04 cal/(mol K)
3. 5.260 cal/(mol K)
4. 0.526 cal/(mol K)

13. Standard enthalpy of vaporization $\Delta_{vap}H^0$ for water at 100^0C is 40.66 Kj mol^{-1}. The internal energy of vaporization of water at 100^0C (in kJ mol^{-1}) is
(Assume water vapour to behave like an ideal gas).
1. +37.56
1. -43.76
3. +43.76
4. +40.66

14. Which of the following is correct option for free expansion of an ideal gas under adiabatic condition?
1. $q \neq 0,\ \Delta T = 0,\ W = 0$
2. $q = 0,\ \Delta T = 0,\ W = 0$
3. $q = 0,\ \Delta T < 0,\ W \neq 0$
4. $q = 0,\ \Delta T \neq 0,\ W = 0$

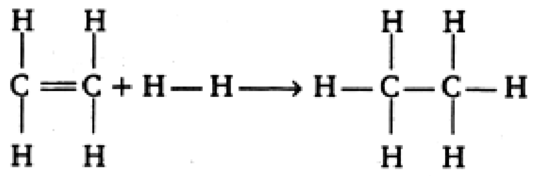
15. The given reaction is
$4H(g) \to 2H_2(g)$ is -869.6 kJ
The enthalpy change for the reaction is -869.6 kJ. The dissociation energy of the H-H bond is -

1. -869.6 kJ
2. +434.8kJ
3. +217.4kJ
4. -434.8 kJ

16. Standard entropies of X_2, Y_2 and XY_3 are 60, 40 and $50JK^{-1}mol^{-1}$ respectively. For the reaction
$\frac{1}{2}X_2 + \frac{3}{2}Y_2 \leftrightharpoons XY_3$; $\Delta H = -30$ kJ to be at equilibrium, the temperature should be
1. 750 K
2. 1000 K
3. 1250 K
4. 500 K

17. From the following bond energies :
H—H bond energy: 431.37 kJ mol^{-1}
C=C bond energy: 606.10 kJ mol^{-1}
C—C bond energy: 336.49 kJ mol^{-1}
C—H bond energy: 410.50 kJ mol^{-1}

Enthalpy for the reaction,



will be

1. 1523.6 kJ mol^{-1}
2. -243.6 kJ mol^{-1}
3. -120.0 kJ mol^{-1}
4. 553.0 kJ mol^{-1}

18. The values of ΔH and ΔS for the reaction, $C_{(graphite)} + CO_2(g) \to 2CO(g)$ are 170 kJ and 170 JK^{-1}, respectively. This reaction will be spontaneous at
1. 710 K
2. 910 K
3. 1110 K
4. 510 K

19.
Which of the following are not state functions?
(I) q + W
(II) q
(III) W
(IV) H - TS
1. (I) and (IV)
2. (II), (III) and (IV)
3. (I), (II) and (III)
4. (II) and (III)

20.
For the gas phase reaction,
$PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$
which of the following conditions are correct?
1. ΔH = 0 and ΔS < 0
2. ΔH > 0 and ΔS > 0
3. ΔH < 0 and ΔS < 0
4. ΔH > 0 and ΔS < 0

21.
Standard free energies of formation(in kJ/mol) at 298 K are -237.2, -394.4 and -8.2 for H_2O(l), CO_2(g) and pentane (g), respectively. The value of E_{cell} for the pentane-oxygen fuel cell is
1. 1.968 V
2. 2.0968 V
3. 1.0968 V
4. 0.0968 V

22.
Bond dissociation enthalpy of H_2, Cl_2 and HCl are 434, 242 and 431 kJ mol^1 respectively. Enthalpy of formation of HCl is
1. 93 kJ mol^{-1}
2. - 245 kJ mol^{-1}
3. -93 kJ mol^{-1}
4. 245 kJ mol^{-1}

23. Consider the following reactions :
(i) $H^+(aq) + OH^-(aq) = H_2O(l)$
$\Delta H = -x_1$ $kJmol^{-1}$
(ii) $H_2(g) + 1/2O_2(g) = H_2O(l)$
$\Delta H = -x_2$ $kJmol^{-1}$
(iii) $CO_2(g) + H_2(g) = CO(g) + H_2O(l)$
$\Delta H = -x_3$ $kJmol^{-1}$
(iv) $C_2H_2(g) + 5/2O_2(g) = 2CO_2 + H_2O(l)$
$\Delta H = -x_4$ $kJmol^{-1}$
Enthalpy of formation of $H_2O(i)$ is :
1. $-x_3\ kJ\ mol^{-1}$
2. $-x_4\ kJ\ mol^{-1}$
3. $-x_1\ kJ\ mol^{-1}$
4. $-x_2\ kJ\ mol^{-1}$

24. Given that the bond energy of H—H and Cl-Cl is 430 kJ mol^{-1} and 240 kJ mol^{-1} respectively and ΔH_f for HCl is -90 kJ mol^{-1}. Bond enthalpy of HCl is :
1. 290 $kJ\ mol^{-1}$
2. 380 $kJ\ mol^{-1}$
3. 425 $kJ\ mol^{-1}$
4. 245 $kJ\ mol^{-1}$

25.
Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?
1. Carbon and hydrogen suitable reducing agents for metal sulphides
2. The $\Delta_f G^0$ of the sulphide is greater than those for CS_2 and H_2S
3. the $\Delta_f G^0$ is negative for roasting of sulphur ore to oxide.
4. Roasting of the sulphide to the oxide is thermodynamically feasible

26. Identify the correct statement for change of Gibbs energy for a system (ΔG_{system}) at constant temperature and pressure:
1. If $\Delta G_{system} > 0$, the process is spontaneous
2. If $\Delta G_{system} = 0$, the system has attained equilibrium
3. If $\Delta G_{system} = 0$, the system is still moving in a particular direction.
4. If $\Delta G_{system} < 0$, the process is not spontaneous

27. Assume each reaction is carried out in an open container. For which reaction will $\Delta H = \Delta E$?
1. $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$
2. $C(s) + 2H_2O(g) \rightarrow 2H_2(g) + CO_2(g)$
3. $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$
4. $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

28. The enthalpy and entropy change for the reaction: $Br_2(l) + Cl_2(g) \rightarrow 2BrCl(g)$, are 30kJ mol^{-1} and 105 JK^{-1} mol^{-1} respectively. The temperature at which the reaction will be in equilibrium is:
1. 285.7 K
2. 273 K
3. 450 K
4. 300 K

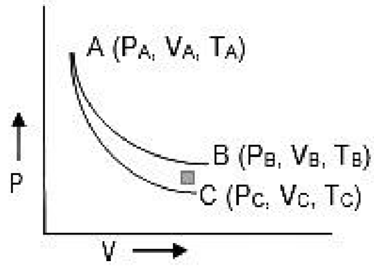
29. The enthalpy of combustion of H_2, cyclohexene (C_6H_{10}) and cyclohexane (C_6H_{12}) are -241, -3800 and -3920 kJ per mol respectively. Heat of hydrogenation of cyclohexene is :
1. -121 kJ per mol
2. +121 kJ per mol
3. +242 kJ per mol
4. -242 kJ per mol

30. Under isothermal condition, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is: [Given that 1 L bar=100 J]
1. 30 J
2. -30 J
3. 5 kJ
4. 25 J

31. In which case change in entropy is negative?
1. $2H(g) \rightarrow H_2(g)$
2. Evaporation of water
3. Expansion of a gas at a constant temperature
4. Sublimation of solid to gas

32. An ideal gas expands isothermally from $10^{-3} m^3$ to 10^{-2} m^3 at 300 K against a constant pressure of 10^5 Nm^{-2}. The work done by the gas is:
1. +270 kJ
2. -900 J
3. +900 kJ
4. -900 kJ

33. Reversible expansion of an ideal gas under isothermal and adiabatic conditions are as shown in the figure:



AB→Isothermal expansion
AC→Adiabatic expansion
Which of the following options is not correct?
1. $\Delta S_{isothermal} > \Delta S_{adiabatic}$
2. $T_A = T_B$
3. $W_{isothermal} > W_{adiabatic}$
4. $T_C > T_A$

34. Hydrolysis of sucrose is given by the following reaction
Sucrose + $H_2O \rightleftharpoons$ Glucose + Fructose
If the equilibrium constant (K_c) is 2×10^{13} at 300 K, the value of $\Delta_r G^\ominus$ at the same temperature will be:
1. 8.314 J mol^{-1} $K^{-1}\times$300 K$\times$ln (2×10^{13})
2. 8.314 J mol^{-1} $K^{-1}\times$300 K$\times$ln (3×10^{13})
3. -8.314 J mol^{-1} $K^{-1}\times$300 K$\times$ln (4×10^{13})
4. -8.314 J mol^{-1} $K^{-1}\times$300 K$\times$ln (2×10^{13})

35. For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, the correct option is:
1. $\Delta_r H > 0$ and $\Delta_r S < 0$
2. $\Delta_r H < 0$ and $\Delta_r S > 0$
3. $\Delta_r H < 0$ and $\Delta_r S < 0$
4. $\Delta_r H > 0$ and $\Delta_r S > 0$

36. The correct option for free expansion of an ideal gas under adiabatic condition is:
1. $q = 0, \;\; \Delta T < 0 \; and \; w > 0$
2. $q < 0, \;\; \Delta T = 0 \; and \; w = 0$
3. $q > 0, \;\; \Delta T > 0 \; and \; w > 0$
4. $q = 0, \;\; \Delta T = 0 \; and \; w = 0$

37. If for a certain reaction $\Delta_r H$ is 30 kJ mol^{-1} at 450 K,the value of $\Delta_r S$ (in JK^{-1} mol^{-1}) for which the same reaction will be spontaneous at the same temperature is
(1) 70
(2) –33
(3) 33
(4) -70

38. At standard conditions, if the change in the enthalpy for the following reaction is -109 kJ mol^{-1}
$H_{2(g)}+Br_{2(g)} \rightarrow 2HBr_{(g)}$
Given that bond energy of H_2 and Br_2 is 435 kJ mol^{-1} and 192 kJ mol^{-1}, respectively, what is the bond energy (in kJ mol^{-1}) of HBr?
1. 368
2. 736
3. 518
4. 259

39. Consider the following processes :

	ΔH (kJ/mol)
½ A → B	+ 150
3B → 2C + D	–125
E + A → 2D	+350

For B + D → E + 2C, ΔH will be-
1. 325 kJ/mol
2. 525 kJ/mol
3. –175 kJ.mol
4. –325 kJ/mol

40. For vaporization of water at 1 atmospheric pressure, the values of ΔH and ΔS are 40.63 kJ mol^{-1} and 108.8 JK^{-1} mol^{-1}, respectively. The temperature when Gibbs energy change (ΔG) for this transformation will be zero, is -
1. 393.4 K
2. 373.4 K
3. 293.4 K
4. 273.4 K

41. Three moles of an ideal gas expanded spontaneously into vaccum. The work done will be
1. 3 Joules
2. 9 Joules
3. Zero
4. Infinite

42. The following two reactions are known

$Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g);$
$\Delta H = -26.88\ kJ$
$FeO(s) + CO(g) \rightarrow Fe(s) + CO_2(g);$
$\Delta H = -16.5\ kJ$
The value of ΔH for the following reaction
$Fe_2O_3(s) + CO(g) \rightarrow 2FeO(s) + CO_2(g)$ is
1. -43.3 kJ
2. -10.3 kJ
3. +6.2 kJ
4. +10.3 kJ

43. Match List – I (Equations) with List – II (Type of processes) and select the correct option.

List –I Equation	List – II Type of processes
(a) $K_p > Q$	(i) Non spontaneous
(b) $\Delta G^{\circ} < RT \ln Q$	(ii) Equilibrium
(c) $K_p = Q$	(iii) Spontaneous and endothermic
(d) $T > \frac{\Delta H}{\Delta S}$	(iv) Spontaneous

Options :

	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(ii)	(i)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(ii)	(i)	(iv)	(iii)
(4)	(i)	(ii)	(iii)	(iv)

44. A reaction occurs spontaneously if -
(1) TΔS > ΔH and ΔH is +ve and ΔS are –ve
(2) TΔS = ΔH and both ΔH and ΔS are +ve
(3) TΔS < ΔH and both ΔH and ΔS are +ve
(4) TΔS > ΔH and both ΔH and ΔS are +ve

45. Which of the following pairs of a chemical reaction is certain to result in a spontaneous reaction -
(1) Endothermic and decreasing disorder
(2) Exothermic and increasing disorder
(3) Endothermic and increasing disorder
(4) Exothermic and decreasing disorder

46. Identify the correct statement regarding entropy:
1. At absolute zero of temperature, the entropy of all crystalline substances is
taken to be zero
2. At absolute zero of temperature, the entropy of a perfectly crystalline substance is +ve
3. At absolute zero of temperature, entropy of a perfectly crystalline substance is taken to be zero
4. At $0^{\circ}C$, the entropy of a perfectly crystalline substance is taken to be zero

47. One mole of an ideal gas at 300 K is expanded isothermally from an initial volume of 1 litre to 10 litres. The ΔE for this process is (R = 2 cal. $mol^{-1}K^{-1}$) :
1. 1381.1 cal.
2. Zero
3. 163.7 cal.
4. 9 lit. atm

48. If the bond energies of H–H, Br – Br, and H –Br are 433, 192, and 364 kJ mol^{-1} respectively the ΔH^{o} for the reaction $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$ is-
(1) + 103 kJ
(2) +261kJ
(3) –103 kJ
(4) –261 kJ

49. What is true for a cyclic process :
a. W = 0
b. ΔE = 0
c. ΔH = 0
d. $\Delta E \neq 0$

1. a, b
2. b, c
3. c, d
4. a, d

50. A system is expanded under adiabatic process :

1. Temperature increase
2. ΔE decreases
3. ΔE increases
4. None of the above

51. Which of the following is true for a reaction in which all the reactant & product are liquids :
1. $\Delta H = \Delta E$
2. $\Delta H = \Delta W$
3. $\Delta H > \Delta E$
4. None of the above

52. Considering entropy (S) as a thermodynamic parameter, the criterion for the spontaneity of any process is :-
1. $\Delta S_{system} - \Delta S_{surrounding} > 0$
2. $\Delta S_{system} > 0$ only
3. $\Delta S_{surroundings} > O$ only
4. $\Delta S_{system} + \Delta S_{surrounding} > 0$

53. Standard enthalpy and standard entropy changes for the oxidation of ammonia at 298 K are –382.64 kJ mol^{-1} and –145.6 JK^{-1} mol^{-1}, respectively. Standard Gibbs energy change for the same reaction at 298 K is :-
(1) –339.3 kJ mol^{-1}
(2) – 439.3 kJ mol^{-1}
(3) –523.2 kJ mol^{-1}
(4) –221.1 kJ mol^{-1}

54. The work done during the expansion of a gas from a volume of 4 dm^3 to 6 dm^3 against a constant external pressure of 3 atm is :-
(1) –608 J
(2) + 304 J
(3) –304 J
(4) –6 J

55.
$2Zn + O_2 \rightarrow 2ZnO \quad \Delta G^\circ = -616\ J$
$2Zn + S_2 \rightarrow 2ZnS \quad \Delta G^\circ = -293\ J$
$S_2 + 2O_2 \rightarrow 2SO_2 \quad \Delta G^\circ = -408 J$
ΔG° for the following reaction is:
$2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$
1. -731 J
2. -1317 J
3. -501 J
4. +731 J

56. At 27ºC latent heat of fusion of a compound is 2930 J/mol. Entropy change is :
1. 9.77 J/mol K
2. 10.77 J/mol K
3. 9.07 J/mol K
4. 0.977 J/mol K

57. For the reaction $C_2H_5OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$ which one is true :
1. $\Delta H = \Delta E - RT$
2. $\Delta H = \Delta E + RT$
3. $\Delta H = \Delta E + 2RT$
4. $\Delta H = \Delta E - 2RT$

58. Unit of entropy is : -
(1) $JK^{-1}\ mol^{-1}$
(2) $J\ mol^{-1}$
(3) $J^{-1}K^{-1}\ mol^{-1}$
(4) $JK\ mol^{-1}$

59. In a closed insulated container a liquid is stirred with a paddle to increase the temperature. Correct option regarding this among the following is : -
(1) $\Delta E = W \neq 0, q = 0$
(2) $\Delta E = W = q \neq 0$
(3) $\Delta E = 0, W = q \neq 0$
(4) $W = 0, \Delta E = q \neq 0$

60. Heat of combustion ΔHº for C(s), $H_2(g)$ and $CH_4(g)$ are – 94, – 68 and – 213 Kcal/mol. then ΔHº for C(s) + $2H_2(g) \rightarrow CH_4(g)$ is : -
(1) – 17 Kcal
(2) – 111 Kcal
(3) – 170 Kcal
(4) – 85 Kcal

61. For the given reaction
$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$, the heat of formations of $H_2O_2(l)$ and H_2O (l) are -188 kJ/mol & -286 KJ/mol respectively. The change in the enthalpy of the reaction will be-
1. – 196 kJ/mol
2. + 196 kJ/mol
3. + 948 kJ/mol
4. – 948 kJ/mol

62. When 1 mol gas is heated at constant volume ,temp is raised from 298 to 308 K. Heat supplied to the gas is 500 J. Then correct statement among the following is : -
1. q = w = 500 J, ΔU = 0
2. q = ΔU = 500J, w = 0
3. q = w = 500 J, ΔU = 0
4. ΔU = 0, q = w = – 500 J

63. Enthalpy of $CH_4 + \frac{1}{2}O_2 \rightarrow CH_3OH$ is negative. If enthalpy of combustion of CH_4 and CH_3OH and x and y respectively. Then which relation is correct : -
1. x > y
2. x < y
3. x = y
4. x ≥ y

64. For the reaction :
$C_3H_8(g) + 5O_2(g) \rightarrow 3\,CO_2(g) + 4H_2O(l)$ at constant temperature, ΔH – ΔE is-
1. + RT
2. – 3RT
3. + 3RT
4. – RT

65. What is the entropy change (in JK^{-1} mol^{-1}) when one mole of ice is converted into water at 0ºC ? (The enthalpy change for the conversion of ice to liquid water is 6.0 KJ mol^{-1} at 0ºC)
(1) 20.13
(2) 2.013
(3) 2.198
(4) 21.98

66. Formation of a solution from two components can be considered as :
(i) Pure solvent → separated solvent molecules, ΔH_1
(ii) Pure solute → separated solute molecules, ΔH_2
(iii) Separated solvent and solute molecules → solution, ΔH_3
Solution so formed will be ideal if : -
(1) $\Delta H_{Soln} = \Delta H_1 + \Delta H_2 + \Delta H_3$
(2) $\Delta H_{Soln} = \Delta H_1 + \Delta H_2 - \Delta H_3$
(3) $\Delta H_{Soln} = \Delta H_1 - \Delta H_2 - \Delta H_3$
(4) $\Delta H_{Soln} = \Delta H_3 - \Delta H_1 - \Delta H_2$

67. For which one of the following equations is ΔH°_{react} equal to ΔH°_f for the product :
(1) $N_2(g) + O_3(g) \rightarrow N_2O_3(g)$
(2) $CH_4(g) + 2Cl_2(g) \rightarrow CH_2Cl_2(l) + 2HCl(g)$
(3) $Xe(g) + 2F_2(g) \rightarrow XeF_4(g)$
(4) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

68. The molar heat capacity of water at constant pressure, C, is 75 JK^{-1} mol^{-1}. When 1.0 kJ of heat is supplied to 100 g of water which is free to expand, the increase in temperature of water is :
(1) 1.2 K
(2) 2.4 K
(3) 4.8 K
(4) 6.6 K

69. Which one among the following is the correct option for right relationship between C_p and C_V for one mole of ideal gas ?
1. $C_P = RC_V$
2. $C_V = RC_P$
3. $C_P + C_V = R$
4. $C_P - C_V = R$

70. For irreversible expansion of an ideal gas under isothermal condition, the correct option is :
1. $\Delta U = 0, \ \ \Delta S_{total} \neq 0$
2. $\Delta U \neq 0, \ \ \Delta S_{total} = 0$
3. $\Delta U = 0, \ \ \Delta S_{total} = 0$
4. $\Delta U \neq 0, \ \ \Delta S_{total} \neq 0$

Equilibrium

(Expected Questions in NEET 2022: 3)

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1. The equilibrium constant of the following are:

$N_2 + 3H_2 \rightleftarrows 2NH_3 \quad K_1$

$N_2 + O_2 \rightleftarrows 2NO \quad K_2$

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O \quad K_3$

The equilibrium constant (K) of the reaction:

$2NH_3 + \frac{5}{2}O_2 \overset{K}{\rightleftarrows} 2NO + 3H_2O$

1. $K_2K_3^3/K_1$
2. K_2K_3/K_1
3. $K_2^3K_3/K_1$
4. $K_1K_3^3/K_2$

2.
The concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is $2.2 \times 10^{-4} mol\ L^{-1}$. The solubility product of $Ag_2C_2O_4$ is

1. 2.66×10^{-12}
2. 4.5×10^{-11}
3. 5.3×10^{-12}
4. 2.42×10^{-8}

3. The solubility of AgCl (s) with solubility product 1.6 x 10^{-10} in 0.1 M NaCl solution would be

1. 1.26×10^{-5} M
2. 1.6×10^{-9} M
3. 1.6×10^{-11} M
4. zero

4. Boric acid is an acid because its molecule

1. contains replaceable H^+ ion
2. gives up a proton
3. accepts OH^- from water releasing proton into the solution
4. combines with proton from water molecules

5. which of the following fluoro-compounds is most likely to behave as a Lewis base?

1. BF_3
2. PF_3
3. CF_4
4. SiF_4

6.
A 20 litre container at 400 K contains CO_2 (g) at pressure 0.4 atm and an excess of SrO (neglect the volume of solid SrO). The volume of the container is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of CO_2 attains its maximum value, will be:

Given that : $SrCO_3(s) \leftrightharpoons SrO(s) + CO_2(g)$, $kp = 1.6\ atm$

1. 10 litre
2. 2 litre
3. 4 litre
4. 5 litre

7.
Following solutions were prepared by mixing different volumes of NaOH and HCl of different concentrations :

A) $60\ mL\ \frac{M}{10}HCl\ +\ 40\ mL\ \frac{M}{10}NaOH$

B) $55\ mL\ \frac{M}{10}HCl\ +\ 45\ mL\ \frac{M}{10}NaOH$

C) $75\ mL\ \frac{M}{5}HCl\ +\ 25\ mL\ \frac{M}{5}NaOH$

D) $100\ mL\ \frac{M}{10}HCl\ +\ 100\ mL\ \frac{M}{10}NaOH$

pH of which one of them will be equal to 1?

1. B
2. A
3. D
4. C

8. The solubility of $BaSO_4$ in water is 2.42×10^{-3} g/litre at 298 K. The value of the solubility product will be- (Molar mass of $BaSO_4$ = 233 $gmol^{-1}$)

1. $1.08 \times 10^{-10}\ mol^2\ L^{-2}$
2. $1.08 \times 10^{-12}\ mol^2\ L^{-2}$
3. $1.08 \times 10^{-14}\ mol^2\ L^{-2}$
4. $1.08 \times 10^{-8}\ mol^2\ L^{-2}$

9.
Which one of the following conditions will favour maximum formation of the product in the reaction,
$A_2\,(g) \; + \; B_2\,(g) \; \leftrightharpoons \; X_2\,(g) \; \Delta_r\,H \; = \; -X\,k\,J$?

1. Low temperature and high pressure
2. Low temperature and low pressure
3. High temperature and high pressure
4. High temperature and low pressure

10.
Among the following the correct order of acidity is
1. $HClO < HClO_2 < HClO_3 < HClO_4$
2. $HClO_2 < HClO < HClO_3 < HClO_4$
3. $HClO_4 < HClO_2 < HClO < HClO_3$
4. $HClO_3 < HClO_4 < HClO_2 < HClO$

11.
MY and NY_3, two nearly insoluble salts, have the same K_{sp} values of 6.2 x 10^{-13} at room temperature. The true statement regarding to MY and NY_3 is-
1. The molar solubility of MY in water is less than that of NY_3.

2. The salts MY and NY_3 are more soluble in 0.5 M KY than in pure water

3. The addition of the salt of KY to a solution of MY and NY_3 will have no effect on their solubilities

4. The molar solubilities of MY and NY_3 in water are identical.

12. When equal volumes of 0.1 M NaOH and 0.01 M HCl are mixed, then the pH of the resulting solution is-
1. 12.65
2. 2.0
3. 7.0
4. 1.04

13. Acidic buffer cannot be formed by following combination -
1. $HClO_4$ and $NaClO_4$
2. $CH_3\,COOH$ and $CH_3\,COONa$
3. $H_2\,CO_3$ and $Na_2\,CO_3$
4. $H_3\,PO_4$ and $Na_3\,PO_4$

14. If the equilibrium constant for $N_2(g) + O_2(g) \rightleftarrows 2\,NO(g)$ is K, the equilibrium constant for
$\frac{1}{2}N_2\left(g\right) + \frac{1}{2}O_2\left(g\right) \rightleftarrows NO\left(g\right)$ will be,
1. $K^{\frac{1}{2}}$
2. $\frac{1}{2}K$
3. K
4. K^2

15. Aqueous solution of which of the following compounds is the best conductor of electric current?
1. Acetic acid, $C_2H_4O_2$
2. Hydrochloric acid, HCl
3. Ammonia, NH_3
4. Fructose, $C_6H_{12}O_6$

16.

If the value of an equilibrium constant for a particular reaction is 1.6 x 10^{12}, then at equilibrium the system will contain-

1. All reactants

2. Mostly reactants

3. Mostly products

4. Similar amounts of reactants and products

17.

The K_{SP} of Ag_2CrO_4, AgCl, AgBr and AgI are respectively, 1.1 x 10^{-12}, 1.8 x 10^{-10}, 5.0 x 10^{-13}, 8.3 x 10^{-17}. Which one of the following salts will precipitate last if $AgNO_3$ solution is added to the solution containing equal moles of NaCl, NaBr, NaI, and Na_2CrO_4?

1. AgI

2. AgCl

3. AgBr

4. Ag_2CrO_4

18. Which of the following salts will give highest pH in water ?
1. KCl
2. NaCl
3. Na_2CO_3
4. $CuSO_4$

19.
For the reversible reaction :
$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ + heat
The equilibrium shifts in forward direction -
1. by increasing the concentration of $NH_3(g)$
2. by decreasing the pressure
3. by decreasing the concentration of $N_2(g)$ and $H_2(g)$
4. by increasing pressure and decreasing temperature

20.
Which of these is least likely to act as Lewis base?
1. F^-
2. BF_3
3. PF_3
4. CO

21.
Among the following compound, the strongest acid is-

1. $HClO_3$

2. $HClO_4$

3. H_2SO_3

4. H_2SO_4

22. pH of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product K_{sp} of Ba $(OH)_2$ is
1. 3.3×10^{-7}
2. 5.0×10^{-7}
3. 4.0×10^{-6}
4. 5.0×10^{-6}

23. Equimolar solutions of the following substances were prepared separately. Which one of these will record the highest pH value?
1. $BaCl_2$
2. $AlCl_3$
3. $LiCl$
4. $BeCl_2$

24. Buffer solutions have constant acidity and alkalinity because
1. These give unionized acid or base on reaction with added acid or alkali
2. Acids and alkalies in these solutions are shielded from attack by other ions
3. They have large excess of H^+ or OH^- ions
4. The have fixed value of pH

25.
A buffer solution is prepared in which the concentration of NH_3 is 0.30 M and the concentration of NH_4^+ is 0.20 M. if the equilibrium constant, K_b for NH3 equals 1.8×10^{-5} ,what is the pH of this solution?
(log 2.7 = 0.43)

1. 9.43
2. 11.72
3. 8.73
4. 9.08

26. The value of ΔH for the reaction is less than zero. Formation of $X_2(g) + 4Y_2(g) \leftrightharpoons 2XY_4(g)$ will be favoured at

1. Low pressure and low temperature
2. High temperature and low pressure
3. High pressure and low temperature
4. High temperature and high pressure

27. For the reaction $N_2(g) + O_2(g) \leftrightharpoons 2NO(g)$ the equilibrium constant is K_1. The equilibrium constant is K_2 for the reaction $2NO(g) + O_2(g) \leftrightharpoons 2NO_2(g)$
The value of K for the reaction given below is-
$NO_2(g) \leftrightharpoons \frac{1}{2}N_2(g) + O_2(g)$
1. $\frac{1}{4}(4K_1K_2)$
2. $\left[\frac{1}{K_1K_2}\right]^{1/2}$
3. $\frac{1}{(K_1K_2)}$
4. $\frac{1}{(2K_1K_2)}$

28. pH of a saturated solution of $Ba(OH)_2$ is 12, the value of its K_{sp} will be -
1. $4.00 \times 10^{-6}\ M^3$
2. $4.00 \times 10^{-7}\ M^3$
3. $5.00 \times 10^{-6}\ M^3$
4. $5.00 \times 10^{-7}\ M^3$

29. What is $[H^+]$ in mol/L of a solution that is 0.20 M in CH_3COONa and 0.10 M in CH_3COOH ?(K a for $CH_3COOH = 1.8 \times 10^{-5}$)
1. 3.5×10^{-4}
2. 1.1×10^{-5}
3. 1.8×10^{-5}
4. 9.0×10^{-6}

30. The equilibrium reaction that does not have an equal K_c and K_p value-
1. $2NO(g) \rightleftharpoons N_2(g) + O_2(g)$
2. $SO_2(g) + NO_2(g) \rightleftharpoons SO_3(g) + NO(g)$
3. $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$
4. $2C(s) + O_2(g) \rightleftharpoons 2CO_2(g)$

31. In a buffer solution containing equal concentration of B^- and HB, the K_b for B^- is 10^{-10}. The pH of buffer solution is-
1. 10
2. 7
3. 6
4. 4

32. Which of the following molecular hydrides acts as a Lewis acid ?
1. NH_3
2. H_2O
3. B_2H_6
4. CH_4

33. The tendency of BF_3, BCl_3 and BBr_3 to behave as Lewis acid decreases in the sequence
1. $BCl_3 > BF_3 > BBr_3$
2. $BBr_3 > BCl_3 > BF_3$
3. $BBr_3 > BF_3 > BCl_3$
4. $BF_3 > BCl_3 > BBr_3$

34.
Which of the following molecules acts as a Lewis acid?
1. $(CH_3)_3B$
2. $(CH_3)_2O$
3. $(CH_3)_3P$
4. $(CH_3)_3N$

35.
The ionization constant of ammonium hydroxide is 1.77×10^{-5} at 298 K. Hydrolysis constant of ammonium Chloride is
1. 5.65×10^{-10}
2. 6.50×10^{-12}
3. 5.65×10^{-13}
4. 5.65×10^{-12}

36. What is the $[OH^-]$ in the final solution prepared by mixing 20.0 mL of 0.050 M HCl with 30.0 mL of 0.10 M $Ba(OH)_2$?
1. 0.10 M
2. 0.40 M
3. 0.0050 M
4. 0.12 M

37.
The dissociation constants for acetic acid and HCN at 25 °C are 1.5×10^{-5} and 4.5×10^{-10}, respectively. The equilibrium constant for the equilibrium,

$CN^- + CH_3COOH \rightleftarrows HCN + CH_3Coo^-$

would be
1. 3.0×10^{5}
2. 3.0×10^{-5}
3. 3.0×10^{-4}
4. 3.0×10^{4}

38. Equal volumes of three acid solutions of pH 3, 4 and 5 are mixed in a vessel. What will be the H^+ ion concentration in the mixture?
1. 1.11×10^{-4} M
2. 3.7×10^{-4} M
3. 3.7×10^{-3} M
4. 1.11×10^{-3} M

39.
The dissociation equilibrium of a gas AB_2 can be represented as
$2AB_2(g) \rightleftharpoons 2AB(g) + B_2(g)$
The degree of dissociation is 'x' and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium constant K_P and total pressure p is

1. (2KP/p)
2. $(2Kp/p)^{1/3}$
3. $(2KP/p)^{1/2}$
4. (KP/P)

40.
The value of K_{P1} and K_{p2} for the reactions

$X \leftrightharpoons Y + Z \ldots\ldots (i)$
$and\ A \leftrightharpoons 2B \ldots\ldots (ii)$

are in ratio of 9 : 1. If degree of dissociation of X and. A be equal, then total pressure at equilibrium(i) and (ii) are in the ratio

1. 3 : 1
2. 1 : 9
3. 36 : 1
4. 1 : 1

41. The value of equilibrium constant of the reaction $\mathrm{HI}(\mathrm{g}) \leftrightharpoons \frac{1}{2}\mathrm{H}_2(\mathrm{g}) + \frac{1}{2}\mathrm{I}_2$ is 8.0. The equilibrium constant of the reaction $\mathrm{H}_2(\mathrm{g}) + \mathrm{I}_2(\mathrm{g}) \leftrightharpoons 2\,\mathrm{HI}(\mathrm{g})$ will be-
1. $\frac{1}{16}$
2. $\frac{1}{64}$
3. 16
4. $\frac{1}{8}$

42. The pOH of a solution at 25 °C that contains 1×10^{-10} M of hydronium ions is-
1. 7.00
2. 4.00
3. 9.00
4. 1.00

43. A weak acid, HA, has a K_a of 1.00×10^{-5}. If 0.100 mole of this acid is dissolved in one litre of water, the percentage of acid dissociated at equilibrium is closest to :
1. 99.0%
2. 1%
3. 99.9%
4. 0.100%

44.
The following equilibrium constants are given :
$N_2 + 3H_2 \rightleftharpoons 2NH_3; K_1$
$N_2 + O_2 \rightleftharpoons 2NO; K_2$
$H_2 + 1/2O_2 \rightleftharpoons H_2O; K_3$
The equilibrium constant for the oxidation of NH_3 by oxygen to give NO is:
1. $K_2K_3^3/K_1$
2. $K_2K_3^2/K_1$
3. $K_2^2K_3/K_1$
4. K_1K_2/K_3

45. Ionic species having the greatest proton affinity to form stable compound is -
1. HS^-
2. NH_2^-
3. F^-
4. I^-

46. Which one of the following orders correctly represents the increasing acid strengths of the given acids?
1. $HOCl < HOClO < HOClO_2 < HOClO_3$
2. $HOClO < HOCl < HOClO_3 < HOClO_2$
3. $HOClO_2 < HOClO_3 < HOClO < HOCl$
4. $HOClO_3 < HOClO_2 < HOClO < HOCl$

47.
For the reaction,

$CH_4(g) + 2O_2(g) \rightleftharpoons CO_2(g) + 2H_2O(l)$

$\Delta_rH = -170.8\ \mathrm{kJ\ mol^{-1}}$
Which of the following statements is not true?
1. At equilibrium, the concentrations of $CO_2(g)$ and water (l) are not equal.
2. The equilibrium constant for the reaction is given by $K_p = \frac{[CO_2]}{[CH_4][O_2]}$
3. Addition of $CH_4(g)\ or\ O_2(g)$ at equilibrium will cause a shift to the right
4. The reaction is exothermic

48. Which of the following pairs constitutes a buffer?
1. $HNO_2\ and\ NaNO_2$
2. $NaOH\ and\ NaCl$
3. $HNO_3\ and\ NH_4NO_3$
4. $HCl\ and\ KCl$

49. The hydrogen ion concentration of a 10^{-8} M HCl aqueous solution at 298 K ($K_w = 10^{-14}$) is :
1. $1.0 \times 10^{-6}\ M$
2. $1.0525 \times 10^{-7}\ M$
3. $9.525 \times 10^{-8}\ M$
4. $1.0 \times 10^{-8}\ M$

50. Which will make basic buffer:
1. 100 mL of 0.1 M HCl+100 mL of 0.1 M NaOH
2. 50 mL of 0.1 M NaOH+25 mL of 0.1 M CH_3COOH
3. 100 mL of 0.1 M CH_3COOH+100 mL of 0.1 M NaOH
4. 100 mL of 0.1 M HCl+200 mL of 0.1 M NH_4OH

51. pH of a saturated solution of $Ca(OH)_2$ is 9. The solubility product (K_{sp}) of $Ca(OH)_2$ is:
1. 0.5×10^{-10}
2. 0.5×10^{-15}
3. 0.25×10^{-10}
4. 0.125×10^{-15}

52. Conjugate base of Bronsted acids H_2O and HF are respectively -
1. H_3O^+ and H_2F^+, respectively
2. OH^- and H_2F^+, respectively
3. H_3O^+ and F^-, respectively
4. OH^- and F^-, respectively

53. The pH of 0.01 M NaOH (aq) solution will be-
1. 7.01
2. 2
3. 12
4. 9

54. Which of the following cannot act both as Bronsted acid and as Bronsted base?
1. HCO_3^-
2. NH_3
3. HCl
4. HSO_4^-

55. The molar solubility of CaF_2 $(K_{sp} = 5.3 \text{ x } 10^{-11})$ in 0.1 M solution of NaF will be-
1. $5.3 \text{ x } 10^{-11}$ mol L^{-1}
2. $5.3 \text{ x } 10^{-8}$ mol L^{-1}
3. $5.3 \text{ x } 10^{-9}$ mol L^{-1}
4. $5.3 \text{ x } 10^{-10}$ mol L^{-1}

56. Find out the solubility of $Ni(OH)_2$ in 0.1 M NaOH. Given that the ionic product of $Ni(OH)_2$ is 2x 10^{-15}
(1) 2 x 10^{-8} M.
(2) 1 x 10^{-13} M
(3) 1 x 10^{8} M
(4) 2 x 10^{-13}

57. The salt solution basic in nature among the following is-
1. Ammonium chloride
2. Ammonium sulphate
3. Ammonium nitrate
4. Sodium acetate

58. Given that the equilibrium constant for the reaction
$2SO_{2(g)} + O_{2(g)} \leftrightharpoons 2SO_{3(g)}$
has a value of 278 at a particular temperature. The value of the equilibrium constant for the following reaction at the same temperature is:
$SO_{3(g)} \leftrightharpoons SO_{2(g)} + 1/2\, O_{2(g)}$
1. 3.6×10^{-3}
2. 6.0×10^{-2}
3. 1.3×10^{-5}
4. 1.8×10^{-3}

59. Given reaction: $A_{2(g)} + B_{2(g)} \leftrightharpoons 2AB_{(g)}$
At equilibrium , the concentrations of $A_2 = 3.0 \times 10^{-3}$ M ; $B_2 = 4.2 \times 10^{-3}$ M and AB = 2.
If the reaction takes place in a sealed vessel at $527^\circ C$, then the value of K_C will be :
1. 3.9
2. 0.6
3. 4.5
4. 2.0

60. In qualitative analysis, the metals of Group I can be separated from other ions by precipitating them as chloride salts. A solution initially contains Ag^+ and Pb^{2+} at a concentration of 0.10 M. Aqueous HCl is added to this solution until the Cl– concentration is 0.10 M. What will the concentration of Ag^+ and Pb^{2+} be at equilibrium?
$(K_{sp} \text{ for AgCl} = 1.8 \times 10^{-10})$
$(K_{sp}\ for\ PbCl_2 = 1.7 \times 10^{-5})$
1. $[Ag^+] = 1.8 \times 10^{-11}\ M$; $[Pb^{2+}] = 1.7 \times 10^{-4} M$
2. $[Ag^+] = 1.8 \times 10^{-7}\ M$; $[Pb^{2+}] = 1.7 \times 10^{-6} M$
3. $[Ag^+] = 1.8 \times 10^{-11}\ M$; $[Pb^{2+}] = 8.5 \times 10^{-5} M$
4. $[Ag^+] = 1.8 \times 10^{-9}\ M$; $[Pb^{2+}] = 1.7 \times 10^{-3} M$

61. The reaction
$2A + B(g) \rightleftharpoons 3C(g) + D(g)$
is begun with the concentrations of A and B both at an intial value of 1.00 M. When equilibrium is reached, the concentration of D is measured and found to be 0.25 M. The value for the equilibrium constant for this reaction is given by the expression.
1. $\left[(0.75)^3(0.25)\right] \div \left[(0.50)^2(0.75)\right]$
2. $\left[(0.75)^3(0.25)\right] \div \left[(0.50)^2(0.25)\right]$
3. $\left[(0.75)^3(0.25)\right] \div \left[(0.75)^2(0.25)\right]$
4. $\left[(0.75)^3(0.25)\right] \div \left[(1.00)^2(1.00)\right]$

62. The equilibrium constant Kp for the following reaction is-
$MgCO_{3(s)} \rightleftharpoons MgO_{(s)} + CO_{2(g)}$
1. $Kp = P_{CO_2}$
2. $Kp = P_{CO_2} \times \frac{P_{CO_2} \times P_{MgO}}{P_{MgCO_3}}$
3. $Kp = \frac{P_{CO_2} + P_{MgO}}{P_{MgCO_3}}$
4. $Kp = \frac{P_{MgCO_3}}{P_{CO_2} \times P_{MgO}}$

63. Correct relation between dissociation constant's of a di-basic acid :
1. $Ka_1 = Ka_2$
2. $Ka_1 > Ka_2$
3. $Ka_1 < Ka_2$
4. $Ka_1 = \frac{1}{Ka_2}$

64. For any reversible reaction, if we increase the concentration of the reactants, then effect on equilibrium constant :

1. Depends on the amount of concentration
2. Unchanged
3. Decrease
4. Increase

65. Equilibrium constants K_1 and K_2 for the following equilibria :
$NO(g) + \frac{1}{2}O_2 \xrightarrow{K_1} NO_2(g)$ and
$2NO_2(g) \overset{K_2}{\rightleftharpoons} 2NO(g) + O_2(g)$
are related as -
1. $K_2 = \frac{1}{K_1}$
2. $K_2 = \frac{K_1}{2}$
3. $K_2 = \frac{1}{K_1^2}$
4. $K_2 = K_1^2$

66. Conjugate acid of NH_2^-:
1. NH_4OH
2. NH_4^+
3. NH^{-2}
4. NH_3

67. Incorrect statement about pH and H^+ is :
1. pH of neutral water is not zero.
2. Adding 1M solution of CH_3COOH and 1M solution of NaOH, the pH will be 7.
3. H^+ of dilute and hot H_2SO_4 is more than concentrate and cold H_2SO_4
4. Mixing solution of CH_3COOH and HCl, pH will be less than 7

68. At 25ºC, the dissociation constant of a base, BOH, is 1.0×10^{-12}. The concentration of hydroxyl ions in 0.01M aqueous solution of the base would be:-
(1) 1.0×10^{-6} mole L^{-1}
(2) 1.0×10^{-7} mole L^{-1}
(3) 2.0×10^{-6} mole L^{-1}
(4) 1.0×10^{-5} mole L^{-1}

69.
$A + B \leftrightharpoons C + D \; Cons\tan t = K_1$
$E + F \rightleftharpoons G + H \; Cons\tan t = K_2$
then C + D + E + F ⇒ product. The constant of reaction will be :
1. $\frac{K_1}{K_2}$
2. $\frac{K_2}{K1}$
3. $K_1 K_2$
4. None of these

70. The fertilizer which makes the soil acidic :
1. $(NH_4)_2SO_4$
2. Super phosphate of lime .
3. CH_3COONa
4. $Ca(NO_3)_2$

71. Among the following examples , the species that behave as a lewis acid are :
BF_3 , $SnCl_2$, $SnCl_4$

1. Stannous chloride, stannic chloride
2. BF_3, stannous chloride
3. Only BF_3
4. BF_3, stannous chloride , stannic chloride

72. 4 gm of NaOH is dissolved in 1000 ml of water. The H^+ ion concentration will be -
1. 10^{-1} M
2. 10^{-13} M
3. 10^{-4} M
4. 10^{-10} M

73. The solubility product of a sparingly soluble salt AX_2 is 3.2×10^{-11}. It's solubility (in moles/litre) is:-
(1) 3.1×10^{-4}
(2) 2×10^{-4}
(3) 4×10^{-4}
(4) 5.6×10^{-6}

74. A compound BA_2 has $K_{sp} = 4 \times 10^{-12}$; solubility of this compound will be :
1. 10^{-3}
2. 10^{-4}
3. 10^{-5}
4. 10^{-6}

75. The rapid change of pH near the stoichiometric point of an acid-base titration is the basis of indicator detection. pH of the solution is related to ratio of the concentrations of the conjugate acid (HIn) and base (In^-) forms of the indicator by the expression -
1. $\log \frac{[HIn]}{[In^-]} = pK_{In} - pH$
2. $\log \frac{[HIn]}{[In^-]} = pH - pK_{In}$
3. $\log \frac{[In^-]}{[HIn]} = -pH + pK_{In}$
4. All of the above.

76. For a reaction , $BaO_2(s) \rightleftharpoons BaO(s) + O_2(g)$; $\Delta H = +$ ve.
At equilibrium condition, pressure of O_2 depends on : -
1. Increase mass of BaO_2
2. Increase mass of BaO
3. Increase temperature on equilibrium.
4. Increase mass of BaO_2 and BaO both.

77. Solubility of MX_2 – type electrolytes is 0.5×10^{-4} Mole/lit. then find out K_{sp} of elctrolytes : -
1. 5×10^{-12}
2. 25×10^{-10}
3. 1×10^{-13}
4. 5×10^{-13}

78. The compound with highest pH among the following is : -
(1) CH_3COOK
(2) Na_2CO_3
(3) NH_4Cl
(4) $NaNO_3$

79. Solution of 0.1 N NH_4OH and 0.1 N NH_4Cl has pH 9.25. Then pk_b of NH_4OH is : -
1. 9.25
2. 4.75
3. 3.75
4. 8.25

80. A compound among the following that can be classified as not a protonic acid,is :
(1) $B(OH)_3$
(2) $PO(OH)_3$
(3) $SO(OH)_2$
(4) $SO_2(OH)_2$

81. The reaction quotient (Q) for the reaction :
$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
is given by $Q = \frac{[NH_3]^2}{[N_2][H_2]^3}$. The reaction will proceed from right to left if :
1. $Q = K_C$
2. $Q < K_C$
3. $Q > K_C$
4. $Q = 0$
(where K_C is the equilibrium constant)

82. The solubility product of AgI at 25°C is 1.0×10^{-16} $mol^2\ L^{-2}$. The solubility of AgI in 10^{-4} N solution of KI at 25°C is approximately (in mol L^{-1}) :
1. 1.0×10^{-16}
2. 1.0×10^{-12}
3. 1.0×10^{-10}
4. 1.0×10^{-8}

83. The ionization constant of CH_3COOH is 1.7×10^{-5} and the concentration of H^+ ions is 3.4×10^{-4}. Then find out the initial concentration of CH_3COOH molecules-
1. 3.4×10^{-4}
2. 3.4×10^{-3}
3. 6.8×10^{-4}
4. 6.8×10^{-3}

84. If solubility of a M_2S salt is 3.5×10^{-6} mol $litre^{-1}$, then solubility product of M_2S is-
1. 1.7×10^{-6} $mol^3\ litre^{-3}$
2. 1.7×10^{-16} $mol^3\ litre^{-3}$
3. 1.7×10^{-18} $mol^3\ litre^{-3}$
4. 1.7×10^{-12} $mol^3\ litre^{-3}$

85. The pK_b of dimethylamine and pk_a of acetic acid are 3.27 and 4.77 respectively at T (K). The correct option for the pH of dimethylammonium acetate at solution is:
1. 7.75
2. 6.25
3. 8.50
4. 5.50

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Redox Reactions

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Oxidizing & Reducing Agents	11
Emf & Electrode Potential	4
Introduction to Redox and Oxidation Number	4
Balancing of Equations	3
Application of Electrode Potential	2
Equivalent Weight	1

1.
The correct order of N-compounds in its decreasing order of oxidation states is -
1. HNO_3, NO, N_2, NH_4Cl
2. HNO_3 , NO , NH_4Cl , N_2
3. HNO_3 , NH_4Cl , NO , N_2
4. NH_4Cl , N_2 , NO , HNO_3

2.
For the redox reaction,
$MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$
the correct coefficients of the reactants for the balanced equation are -
1. 16, 5, 2
2. 2, 5, 16
3. 2, 16, 5
4. 5, 16, 2

3. (a) $H_2O_2 + O_3 \rightarrow H_2O + 2O_2$
(b) $H_2O_2 + Ag_2O \rightarrow 2Ag + H_2O + O_2$

Role of hydrogen peroxide in the above reactions is respectively:
1. oxidizing in (a) and reducing in (b)
2. reducing in (a) and oxidizing in (b)
3. reducing in (a) and (b)
4. oxidizing in (a) and (b)

4. The change in oxidation number of chlorine when Cl_2 gas reacts with hot and concentrated sodium hydroxide solution is -
1. Zero to +1 and Zero to -5
2. Zero to -1 and Zero to +5
3. Zero to -1 and Zero to +3
4. Zero to +1 and Zero to -3

5. Compound among the following having nitrogen in highest oxidation number is -
1. N_2H_4
2. NH_3
3. N_3H
4. NH_2OH

6. Oxidation numbers of P in PO_4^{3-}, of S in SO_4^{2-} and that of Cr in $Cr_2O_7^{2-}$ are respectively,
1. +5, +6 and +6
2. +3, +6 and +5
3. +5, +3 and +6
4. -3, +6 and +6

7.
$[Fe(CN)_6]^{4-} \rightarrow [Fe(CN)_6]^{3-} + e^-;\ E^o = -0.35\ V$
$Fe^{2+} \rightarrow Fe^{3+} + e^-;\ E^o = -0.77\ V$
The strongest oxidizing agent in the above equation is -
1. $[Fe(CN)_6]^{4-}$
2. Fe^{2+}
3. Fe^{3+}
4. $[Fe(CN)_6]^{3-}$

8. Number of moles of MnO_4^- required to oxidise one mole of ferrous oxalate completely in acidic medium will be

1. 0.6 mole
2. 0.4 mole
3. 7.5 moles
4. 0.2 mole

9. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ion in acidic solution is :
1. $\frac{3}{5}$
2. $\frac{4}{5}$
3. $\frac{2}{5}$
4. 1

10. Disproportionation reaction among the following is -
(a) $2Cu^+ \rightarrow Cu^{2+} + Cu^0$
(b) $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$
(c) $2KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + MnO_2 + O_2$
(d) $2MnO_4^- + 3Mn^{2+} + 2H_2O \rightarrow 5MnO_2 + 4H^{\oplus}$
1. (a) and (d) only
2. (a) and (b) only
3. (a), (b) and (c)
4. (a), (c) and (d)

11. The oxidation state of Cr in CrO_6 is -
1. -6
2. +12
3. +6
4. +4

12. The standard electrode potential (E°) value of Al^{3+}/Al, Ag^+/Ag, K^+/K, and Cr^{3+}/Cr are -1.66V, 0.80 V, -2.93 V, & -0.79 V respectively. The correct decreasing order of reducing power of the metal is-
1. Ag>Cr>Al>K
2. K>Al>Cr>Ag
3. K>Al>Ag>Cr
4. Al>K>Ag>Cr

13. What is the change in oxidation number of carbon in the following reaction?
$CH_{4(g)} + 4Cl_{2(g)} \rightarrow CCl_{4(l)} + 4HCl_{(g)}$
1. 0 to +4
2. -4 to +4
3. 0 to -4
4. +4 to +4

14. The oxidation number of the underlined atom in the following species
(1) $Cu_2\underline{O}$ is -1
(2) $\underline{Cl}O_3^-$ is +5
(3) $K_2\underline{Cr}_2O_7$ is +6
(4) $H\underline{Au}Cl_4$ is +3
Identify the incorrect option.

15. Identify the reaction from following having top position in EMF series (Standard reduction potential) according to their electrode potential at 298 K.
1. $Mg^{2+} + 2e^- \rightarrow Mg_{(s)}$
2. $Fe^{2+} + 2e^- \rightarrow Fe_{(s)}$
3. $Au^{3+} + 3e^- \rightarrow Au_{(s)}$
4. $K^+ + le^- \rightarrow K_{(s)}$

16. Standard reduction potentials of the half reactions are given below :
$F_{2(g)} + 2e^- \rightarrow 2F^-_{(aq)}$; $E^\circ = +2.85\ V$
$Cl_{2(g)} + 2e^- \rightarrow 2Cl^-_{(aq)}$; $E^\circ = +1.36\ V$
$Br_{2(g)} + 2e^- \rightarrow 2Br^-_{(aq)}$; $E^\circ = +1.06\ V$
$I_{2(g)} + e^- \rightarrow 2I^-_{(aq)}$; $E^\circ = +0.53\ V$
The strongest oxidizing and reducing agents respectively are -
1. Br_2 and Cl^-
2. Cl_2 and Br^-
3. Cl_2 and I_2
4. F_2 and I^-

17. A solution contains Fe^{2+}, Fe^{3+} and I^- ions. This solution was treated with iodine at 35°C. E° for Fe^{3+}/Fe^{2+} is +0.77 V and E° for $I_2/2I^-$ = 0.536 V.
The favourable redox reaction is-
1. Fe^{2+} will be oxidized to Fe^{3+}
2. I_2 will be the reduced to I^-
3. There will be no redox reaction
4. I^- will be oxidized to I_2

18. The compound that contains zero oxidation state of Fe :
1. $[Fe(CN)_6]^{-4}$
2. $[Fe(CN)_6]^{-3}$
3. $Fe(CO)_5$
4. All of the above .

19. $a\,Zn + b\,NO_3^- + cH^+ \rightarrow d\,NH_4^+ + e\,H_2O + f\,Zn^{+2}$
; a , b, c, d, e and f respectively are :

	a	b	c	d	e	f
(1)	2	4	6	8	4	2
(2)	1	4	10	3	1	4
(3)	4	1	10	1	3	4
(4)	10	4	1	3	4	2

20. Which is the best description of the behavior of bromine in the reaction given below:-
$H_2O + Br_2 \rightarrow HOBr + HBr$
(1) Both oxidized and reduced
(2) Oxidized only
(3) Reduced only
(4) Proton acceptor only

21. Oxidation numbers of A, B and C are + 2, +5 and –2 respectively possible formula of compound is :
1. $A_2(BC_2)_2$
2. $A_3(BC_4)_2$
3. $A_2(BC_3)_2$
4. $A_3(B_2C)_2$

22. A non feasible reaction among the following is : -
1. $2\,KI + Br_2 \rightarrow 2KBr + I_2$
2. $2\,KBr + I_2 \rightarrow 2KI + Br_2$
3. $2\,KBr + Cl_2 \rightarrow 2KCl + Br_2$
4. $2H_2O + 2F_2 \rightarrow 4HF + O_2$

23. Standard electrode potentials are
$Fe^{+2}/Fe\ E^\circ = -0.44$
$Fe^{+3}/Fe^{+2}\ E^\circ = 0.77$
If Fe^{+2} , Fe^{+3} and Fe block are kept together, then :-
1. Fe^{+3} increases
2. Fe^{+3} decreases
3. $\frac{Fe^{+2}}{Fe^{+3}}$ remains unchanged
4. Fe^{+2} decreases

24. The oxidation states(O.S.) of sulphur in the anions $SO_3{}^{2-}$, $S_2O_4{}^{2-}$ and $S_2O_6{}^{2-}$ follow the order -
1. $S_2O_4{}^{2-} < SO_3{}^{2-} < S_2O_6{}^{2-}$
2. $SO_3{}^{2-} < S_2O_4{}^{2-} < S_2O_6{}^{2-}$
3. $S_2O_4{}^{2-} < S_2O_6{}^{2-} < SO_3{}^{2-}$
4. $S_2O_6{}^{2-} < S_2O_4{}^{2-} < SO_3{}^{2-}$

25. The metal displacement reaction among the following is -
1. $Fe + 2HCl \rightarrow FeCl_2 + H_2 \uparrow$
2. $2\,Pb\,(NO_3)_2 \rightarrow 2PbO + 4\,NO_2 + O_2 \uparrow$
3. $2\,KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$
4. $Cr_2\,O_3 + 2Al \xrightarrow{\Delta} Al_2\,O_3 + 2\,Cr$

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Hydrogen

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Hard & Soft Water	3
H_2O_2 (Hydrogen Peroxide)	2
Hydrogen- Types & Isotopes	2
Preparation & Properties	2
Water	1

1.
An incorrect statement among the following regarding hydrogen is -
1. Hydrogen never acts as cation in ionic salts
2. Hydronium ion, H_3O^+ exists freely in solution
3. Dihydrogen does not act as a reducing agent
4. Hydrogen has three isotopes of which protium is the most common

2. The reaction of aqueous $KMnO_4$ with H_2O_2 in acidic conditions gives:
1. Mn^{4+} and O_2
2. Mn^{2+} and O_2
3. Mn^{2+} and O_3
4. Mn^{4+} and MnO_2

3. The ease of adsorption of the hydrated alkali metal ions on ion-exchange resins follows the order
1. $Li^+ < K^+ < Na^+ < Rb^+$
2. $Rb^+ < K^+ < Na^+ < Li^+$
3. $K^+ < Na^+ < Rb^+ < Li^+$
4. $Na^+ < Li^+ < K^+ < Rb^+$

4. The method used to remove the temporary hardness of water is-
1. Synthetic resins method
2. Calgon's method
3. Clark's method
4. Ion-exchange method

5. Match the following and identify the correct option

(a) $CO(g)+H_2(g)$	(i) $Mg(HCO_3)_2+Ca(HCO_3)_2$
(b) Temporary hardness of water	(ii) An electron deficient hydride
(c) B_2H_6	(iii) Synthesis gas
(d) H_2O_2	(iv) Non-planar structure

	(a)	(b)	(c)	(d)
1.	(iii)	(ii)	(i)	(iv)
2.	(iii)	(iv)	(ii)	(i)
3.	(i)	(iii)	(ii)	(iv)
4.	(iii)	(i)	(ii)	(iv)

6. Some statements about water are given below:
(a) Heavy water is used as a moderator in nuclear reactors.
(b) Heavy water is more associated than ordinary water.
(c) Heavy water is a more effective solvent than ordinary water.
Which of the above statements are correct?
1. (a), (b) and (c)
2. (b) and (c)
3. (a) and (c)
4. (a) and (b)

7. The pair that on reaction will not evolve H_2 gas is :

1. Copper and HCl (aqueous)
2. Iron and steam
3. Iron and H_2SO_4 (aqueous)
4. Sodium and ethyl alcohol

8. H_2O_2 on oxidation gives :
1. O^{-2}
2. OH^-
3. O_2^-
4. O_2

9. Pure water can be obtain from sea water by :

1. Centrifugation
2. Plasmolysis
3. Reverse osmosis
4. Sedimentation

10. Tritium, a radioactive isotope of hydrogen, emits which of the following particles?
1. Gamma (γ)
2. Neutron (n)
3. Beta (β^-)
4. Alpha (α)

The s-Block Elements

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Reasoning Questions	7
Compounds of Ca and Na - Preparations, Properties & Uses	4
Biological Importance of s Block Elements and & their ores	3

1. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field?
1. K
2. Rb
3. Li
4. Na

2. The suspension of slaked lime in water is known as
1. lime water
2. quick lime
3. milk of lime
4. washing of lime

3. In context with beryllium, which one of the following statements is incorrect?
1. it is rendered passive by nitric acid
2. it forms Be_2C
3. its salts rarely hydrolyze
4. its hydride is electron-deficient and polymeric

4. The most acidic oxide among the following is -
1. MgO
2. BeO
3. BaO
3. CaO

5.
Which of the following statements is false?
1. Ca^{2+} ions are important in blood clotting
2. Ca^{2+} ions are not important in maintaining the regular beating of the heart
3. Mg^{2+} ions are important in the green parts of plants
4. Mg^{2+} ions form a complex with ATP

6. A compound that releases CO_2 most easily upon heating is -
1. K_2CO_3
2. Na_2CO_3
3. $MgCO_3$
4. $CaCO_3$

7.

Which of the following biologically important ions is also a constituent of sodium pump?
1. Ca^{2+}
2. Mg^{2+}
3. K^{+}
4. Fe^{2+}

8.

Solubility of the alkaline earth's metal sulphates in water decreases in the sequence-

1. Mg > Ca > Sr >Ba
2. Ca > Sr > Ba > Mg
3. Sr > Ca > Mg > Ba
4. Ba > Mg > Sr > Ca

9. Which one of the alkali metals forms only, the normal oxide, M_2O on heating in air?
1. Rb
2. K
3. Li
4. Na

10. An active ingredient in bleaching powder for bleaching action is -
1. $Ca(OCl)_2$
2. CaO_2Cl
3. $CaCl_2$
4. $CaOCl_2$

11. A compound that has higher hydration enthalpy than the lattice enthalpy is :
1. $CaSO_4$
2. $BeSO_4$
3. $BaSO_4$
4. $SrSO_4$

12. Property of the alkaline earth metals that increases with their atomic number
1. Solubility of their hydroxides in water
2. Solubility of their sulphates in water
3. Ionization Energy
4. Electro-negativity

13. Which one of the following compounds is a peroxide?
1. KO_2
2. BaO_2
3. MnO_2
4. NO_2

14. An oxide that does not react with sodium hydroxide is:

1. B_2O_3

2. CaO

3. SiO_2

4. BeO

15. In the case of alkali metals, the covalent character decreases in the order
1. MCl>MI>MBr>MF
2. MF>MCl>MBr>MI
3. MF>MCl>MI>MBr
4. MI>MBr>MCl>MF

16. The correct order of increasing thermal stability of K_2CO_3, $MgCO_3$, $CaCO_3$ and $BeCO_3$ is:
1. $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$
2. $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$
3. $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$
4. $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$

17. In which of the following the hydration energy is higher than the lattice energy?
1. $BaSO_4$
2. $MgSO_4$
3. $CaSO_4$
4. $SrSO_4$

18. The correct order of the mobility of the alkali metal ions in aqueous solution is :
1. $Li^+ > Na^+ > K^+ > Rb^+$
2. $Na^+ > K^+ > Rb^+ > Li^+$
3. $K^+ > Rb^+ > Na^+ > Li^+$
4. $Rb^+ > K^+ > Na^+ > Li^+$

19. Which of the following is an amphoteric hydroxide?
1. $Be(OH)_2$
2. $Sr(OH)_2$
3. $Ca(OH)_2$
4. $Mg(OH)_2$

20. Crude sodium chloride obtained by crystallization of brine solution does not contain-
(1) $MgSO_4$
(2) Na_2SO_4
(3) $MgCl_2$
(4) $CaSO_4$

21. Which of the alkali metal choride (MCl) forms its dehydrate salt ($MCl.2H_2O$) easily?
(1) LiCl
(2) CsCl
(3) RbCl
(4) KCl

22. HCl was passed through a solution of $CaCl_2$, $MgCl_2$, and NaCl. Compound(s) that gets crystallize is -
1. Only NaCl
2. Only $MgCl_2$
3. NaCl, $MgCl_2$, and $CaCl_2$
4. Both $MgCl_2$ and $CaCl_2$

23. Identify the correct statement from the following.
1. The order of hydration enthalpies of alkaline earth cations
$Be^{2+} < Mg^{2+} < Ca^{2+} < Sr^{2+} < Ba^{2+}$
2. Lithium and Magnesium show some similarities in their physical properties as they are diagonally placed in the periodic tables.
3. Lithium is softer among all alkali metals.
4. Lithium chloride is deliquescent and crystallizes as a hydrate, $LiCl\cdot6H_2O$.

24. Among the following which one has the highest cation to anion size ratio?
1. CsF
2. LiF
3. NaF
4. CsI

25. The compound A on heating gives a colourless gas and a residue that is dissolved in water to obtain B. Excess of CO_2 is bubbled through aqueous solution of B, C is a solid. Solid C on gentle heating gives back A. The compound A is -
1. Na_2CO_3
2. K_2CO_3
3. $CaSO_4.2H_2O$
4. $CaCO_3$

26. Match List I with List II for the compositions of substances and select the correct answer using the code given below the lists-

List-I Substances	List-II Composition
(A) Plaster of paris	(i) $CaSO_4$. 2HO
(B) Epsomite	(ii) $CaSO_4.½H_2O$
(C) Kieserite	(iii) $MgSO_4.7H_2O$
(D) Gypsum	(iv) $MgSO_4.H_2O$
	(v) $CaSO_4$

Code :

	(A)	(B)	(C)	(D)
1.	(iv)	(iii)	(ii)	(i)
2.	(iii)	(iv)	(i)	(ii)
3.	(ii)	(iii)	(iv)	(i)
4.	(i)	(ii)	(iii)	(v)

27. When A + Water → C + B, B is reacted with D, gas C again obtained. 'D' gives 'C' with H_2SO_4. B gives yellow colour with bunsen flame. C is a flamable gas then what would be A, B, C and D :
1. K, H_2, NaOH, Zn
2. Na, NaOH, H_2 , Zn
3. Li, H_2, LiOH, Zn
4. None of the above

28. A solid compound 'X' on heating gives CO_2 gas and a residue. The residue mixed with water forms 'Y'. On passing an excess of CO_2 through 'Y' in water, a clear solution, 'Z' is obtained. On boiling 'Z', compound 'X' is reformed. The compound 'X' is :-
1. $CaCO_3$
2. Na_2CO_3
3. K_2CO_3
4. $Ca(HCO_3)_2$

29. Among the following alkaline earth metal halides, one which is covalent and soluble in organic solvents is:
1. Magnesium chloride
2. Beryllium chloride
3. Calcium chloride
4. Strontium chloride

30. The structures of beryllium chloride in solid-state, and vapour phase, are :
1. Dimer, and Linear, respectively.
2. Chain in both.
3. Chain, and dimer, respectively.
4. Linear in both.

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The p-Block Elements (Class 11)

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Boron Family- Preparations, Properties & Uses	8
Carbon Family - Preparations, Properties & Uses	8
Properties of Structure of SiO2 & Other Compounds	3
Anomalous Behavior of B & C	1
Compounds of Boron- Preparations, Properties & Uses	1
Properties of Glass, Pb & Sn compounds	1

1. AlF_3 is soluble in HF only in the presence of KF due to the formation of-
1. $K_3(AlF_3H_3)$
2. $K_3(AlF_6)$
3. AlH_3
4. $K(AlF_3H)$

2. The correct statement regarding inert pair effect is -
1. Sn^{2+} is oxidizing agent while Pb^{4+} is a reducing agent
2. Sn^{2+} and Pb^{2+} both are an oxidizing agents
3. Sn^{4+} is a reducing agent while Pb^{4+} is oxidizing agent
4. Sn^{2+} is a reducing agent while Pb^{4+} is oxidizing agent

3. An element that cannot form MF_6^{3-} ion is -
1. Ga
2. Al
3. B
4. In

4.
The correct order of atomic radii in group 13 elements is-
1. B < Al < In < Ga < Tl
2. B < Al < Ga < In < Tl
3. B < Ga < Al < Tl < In
4. B < Ga < Al < In < Tl

5. In which of the following pairs, both the species are not isostructural?
1. $SiCl_4$, PCl_4^+
2. Diamond, silicon carbide
3. NH_3, PH_3
4. XeF_4, XeO_4

6. The stability of +1 oxidation state among Al, Ga, In and Tl increases in the sequence
1. Ga<In<Al<Tl
2. Al<Ga<In<Tl
3. Tl<In<Ga<Al
4. In<Tl<Ga<Al

7.
Which of these is not a monomer for a high molecular mass silicone polymer ?
1. Me_2SiCl_2
2. Me_3SiCl
3. $PhSiCl_3$
4. $MeSiCl_3$

8.
The basic structural unit of silicates is :

1. SiO_4^{4-}

2. SiO_3^{2-}

3. SiO_4^{2-}

4. SiO

9. A compound among the following is least likely to behave as Lewis base -
1. NH_3
2. BF_3
3. OH^-
4. H_2O

10.
Silicate among the following have one oxygen atom of $[SiO_4]^{4-}$ is shared -
1. Sheet silicate
2. Pyrosilicate
3. Three dimensional silicate
4. Linear chain silicate

11. The stability of +1 oxidation state increases in the sequence
1. Al <Ga<In<Tl
2. Tl<In<Ga<Al
3. In<Tl<Ga<Al
4. Ga<In<Al<Tl

12. The incorrect statement among the following is -
1. SnF_4 is ionic in nature
2. PbF_4 is covalent in nature
3. $SiCl_4$ is easily hydrolysed
4. GeX_4 (X=F, Cl, Br, I) is more stable than GeX_2

13. Which of the following species is not stable?
1. $[SiCl_6]^{2-}$
2. $[SiF_6]^{2-}$
3. $[GeCl_6]^{2-}$
4. $[Sn(OH)_6]^{2-}$

14. Aluminium chloride in acidified aqueous solution forms a complex 'A'. Formula of A and hybridisation state of Al in 'A' is respectively-
1. $[Al(H_2O)_6]^{3+}$, sp^3d^2
2. $[Al(H_2O)_4]^{3+}$, sp^3
3. $[Al(H_2O)_4]^{3+}$, dsp^2
4. $[Al(H_2O)]^{3+}$, d^2sp^3

15. Which of the following compounds is used in cosmetic surgery?
1. Silica
2. Silicates
3. Silicones
4. Zeolites

16. Identify the correct statements from the following:
a. $CO_2(g)$ is used as a refrigerant ice-cream and frozen food.
b. The structure of C_{60} customs twelve 6 carbon rings and twenty-five 5 carbon rings
c. ZSM-5, a type of zeolite, is used to convent alcohol into gasoline.
d. CO is a colorless and odorless gas
1. (a) and (c) only
2. (b) and (c) only
3. (c) and (d) only
4. (a), (c) and (c) only

17. Which of the following oxide is amphoteric in nature?
(1) SnO_2
(2) SiO_2
(3) GeO_2
(4) CO_2

18. Which of the following oxide is amphoteric?
1. CO_2
2. SnO_2
3. CaO
4. SiO_2

19. Which of the following statements is incorrect?
1. $NaHCO_3$ on heating gives Na_2CO_3
2. Pure sodium metal dissolves in liquid ammonia to give a blue solution.
3. NaOH reacts with glass to give sodium silicate
4. Aluminium reacts with excess NaOH to give $Al(OH)_3$

20. Incorrect statement among the following about the zeolites is:-
(1) They have open structure which enables them to take up small molecules.
(2) Zeolites are aluminosilicates having three dimensional network.
(3) Some of the SiO_4^{4-} units are replaced by AlO_4^{5-} and AlO_6^{9-} ions in zeolites.
(4) They are used as cation exchangers.

21. In Borax bead test which compound is formed :
(1) Orthoborate
(2) Metaborate
(3) Double oxide
(4) Tetraborate

22.
$PbO_2 \rightarrow PbO \qquad \Delta G_{298} < 0$
$SnO_2 \rightarrow SnO \qquad \Delta G_{298} > 0$
The most probable oxidation state of Pb & Sn will be-
1. Pb^{+4}, Sn^{+4}
2. Pb^{+4} , Sn^{+2}
3. Pb^{+2} , Sn^{+2}
4. Pb^{+2} , Sn^{+4}

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*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Some Basic Concepts of Chemistry

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Concentration Based Problem	13
Moles, Atoms & Electrons	13
Equation Based Problem	6
Limiting Reagent	6
Empirical & Molecular Formula	4
Equivalent Concept	1
Introduction	1

1. Suppose the elements X and Y combine to form two compounds XY_2 and X_3Y_2. When 0.1 moles of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g, the atomic weight of X and Y are respectively-
1. 40, 30
2. 60, 40
3. 20, 30
4. 30, 20

2. Among the following the temperature dependent parameter is -
1. Molarity
2. Mole fraction
3. Weight percentage
4. Molality

3.
The number of water molecules is maximum in-

1. 18 mL of water
2. 0.18 g of water
3. 0.00224 L of water vapours at 1 atm and 273 K
4. 10^{-3} mol of water

4. If Avogadro number N_A, is changed from $6.022 \times 10^{23}\ mol^{-1}$ to $6.022 \times 10^{20}\ mol^{-1}$ this would change -
1. The definition of mass in units of grams
2. The mass of one mole of carbon
3. The ration of chemical species to each other in a balanced equation
4. The ratio of elements to each other in a compound

5. 20.0 g of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g magnesium oxide. The percentage purity of magnesium carbonate in the sample is -
(Atomic weight of Mg=24)
1. 75
2. 96
3. 60
4. 84

6. What is the mass of precipitate formed when 50 mL of 16.9% solution of $AgNO_3$ is mixed with 50 mL of 5.8% NaCl solution? (Ag = 107.8, N = 14, O = 16, Na= 23, Cl = 35.5)
1. 28 g
2. 3.5 g
3. 7 g
4. 14 g

7. What is the mole fraction of the solute in a 1.00 m aqueous solution?
1. 0.177
2. 0.1770
3. 0.0534
4. 0.0177

8. The number of water molecules is maximum in
1. 18 molecules of water
2. 1.8 g of water
3. 18 g of water
4. 18 moles of water

9. A mixture of gases contains H_2 and O_2 gases in the ratio of 1 : 4 (w/w). The molar ratio of the two gases in the mixture will be -
1. 1:4
2. 4:1
3. 16:1
4. 2:1

10. When 22.4 litres of $H_2(g)$ is mixed with 11.2 litres of $Cl_2(g)$, each at STP, the moles of HCl(g) formed is equal to :
1. 1 mol of HCl(g)
2. 2 mol of HCl(g)
3. 0.5 mol of HCl(g)
4. 1.5 mol of HCl(g)

11. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reaction is left in excess and how much? (At, wt.Mg = 24; O = 16)
1. Mg, 0.16 g
2. O_2, 0.16 g
3. Mg, 0.44 g
4. O_2, 0.28 g

12.
The weight of 70% HNO_3 concentrated nitric acid solution should be used to prepare 250 mL of 2.0M HNO_3 is -

1. 90.0 g conc. HNO_3
2. 70.0 g conc. HNO_3
3. 54.0 g conc. HNO_3
4. 45.0 g conc. HNO_3

13.
6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of solution is:
1. 0.01 M
2. 0.001 M
3. 0.1 M
4. 0.02 M

14. Mole fraction of solute in a 1.00 molal aqueous solution is
1. 0.0177
2. 0.0344
3. 1.770
4. 0.1770

15. 25.3 g of sodium carbonate, Na_2CO_3 is dissolved in enough water to make 250 mL of solution. If sodium carbonate dissociates completely, the molar concentration of sodium ion, Na^+ and carbonate ion, CO_3^{2-} are respectively -
(molar mass of Na_2CO_3 = 106g mol^{-1})
1. 0.955 M and 1.910 M
2. 1.910 M and 0.955 M
3. 1.90 M and 1.910 M
4. 0.477 M and 0.477 M

16. The number of atoms in 0.1 mole of a triatomic gas is (N_A= 6.02 x 10^{23} mol^{-1})
1. 6.026×10^{22}
2. 1.806×10^{23}
3. 3.600×10^{23}
4. 1.800×10^{22}

17. 10 g of hydrogen and 64 of oxygen were filled in a steel vessel and exploded. Amount of water produced in this reaction will be
1. 2 mol
2. 3 mol
3. 4 mol
4. 1 mol

18. Volume occupied by one molecule of water (density = 1 g cm^{-3}) is
1. 9.0×10^{-23} cm^3
2. 6.023×10^{-23} cm^3
3. 3.0×10^{-23} cm^3
4. 5.5×10^{-23} cm^3

19. The volume of oxygen gas(O_2) measured at 0^0C and 1 atm, needed to burn completely 1 L of propane gas (C_3H_8) measured under the same conditions is
1. 7 L
2. 6 L
3. 5 L
4. 10 L

20.
The moles of lead (II) chloride will be formed from a reaction between 6.5 g of
PbO and 3.2 g of HCl is -
1. 0.044
2. 0.333
3. 0.011
4. 0.029

21. Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 g mL^{-1}, volume of acid required to make one litre of 0.1 M H_2SO_4 solution is-
1. 11.10 mL
2. 16.65 mL
3. 22.20 mL
4. 5.55 mL

22. The number of moles of hydrogen molecules required to produce 20 moles of ammonia through Haber's process is -
1. 40 mol
2. 10 mol
3. 20 mol
4. 30 mol

23. The density of 2 M aqueous solution of NaOH is 1.28 g/cm^3. The molality of the solution is -
[molecular mass of NaOH = 40 $gmol^{-1}$]
1. 1.20 m
2. 1.56 m
3. 1.67 m
4. 1.32 m

24. The maximum number of atoms is present in the following -
(1) 1 g of $Mg_{(s)}$
(2) 1 g of $O_{2\ (g)}$
(3) 1 g of $Li_{(s)}$
(4) 1 g of $Ag_{(s)}$

25. Which has the maximum number of molecules among the following?
1. 64 g SO_2
2. 44 g CO_2
3. 48 g O_3
4. 8 g H_2

26. Percentage of C, H & N are given as follows :
C = 40% H = 13.33% N = 46.67%
The empirical formula will be :
1. CH_2N
2. C_2H_4N
3. CH_4N
4. CH_3N

27. The mole fraction of the solute in one molal aqueous solution is :-
(1) 0.027
(2) 0.036
(3) 0.018
(4) 0.009

28. The mass of carbon anode consumed (giving only carbondioxide) in the production of 270 kg of aluminium metal from bauxite by the Hall process is :-
(1) 90 kg
(2) 540 kg
(3) 180 kg
(4) 270 kg
(Atomic mass : Al = 27)

29. The number of moles of $KMnO_4$ reduced by one mole of KI in alkaline medium is :-
(1) One
(2) Two
(3) Five
(4) One fifth

30. Number of significant figures in the following numbers are :
(I) 161 cm
(II) 0.0161
(III) 1.61

(1) 3 , 3, 3
(2) 3 , 4 , 3
(3) 3 , 2 , 3
(4) 3 , 4 , 4

31. In the Haemoglobin (Molecular wt = 67200) iron found 0.33% (by weight). The number of iron atom will be in its one molecule :
1. 1
2. 2
3. 3
4. 4

32. $4NH_3 + 5O_2 \rightarrow 6H_2O + 4NO$
When one mole ammonia and one mole oxygen taken :
1. Oxygen is completely consumed
2. Ammonia is completely consumed
3. Both (1) and (2) are correct
4. No one is correct

33. A mole ratio of H_2 and O_2 gas is 8. The ratio of weight is-
1. 1 : 1
2. 2 : 1
3. 4 : 1
4. 1 : 2

34. A compound contain C, H and O. If C = 40% and H = 6.67% and rest is oxygen then empirical formula of compound will be :
1. CH_2O
2. CH_4O
3. CH_4O_2
4. CHO

35. The maximum number of molecules is present in:-
(1) 5L of N_2 gas at STP
(2) 0.5 g of H_2 gas
(3) 10g of O_2 gas
(4) 15 L of H_2 gas at STP

36. What is false for mole fraction :
1. $x < 1$
2. $-2 \le x \le 2$
3. $0 \le x \le 1$
4. Always non-negative

37. Volume of CO_2 obtained by the complete decomposition of 9.85 gm. $BaCO_3$ is :
1. 2.24 lit.
2. 1.12 lit.
3. 0.84 lit.
4. 0.56 lit

38. 1 M and 2.5 litre NaOH solution mixed with another 0.5 M and 3 litre NaOH solution. Molarity of the resultant solution is : -
1. 0.80 M
2. 1.0 M
3. 0.73 M
4. 0.50 M

39. Which has maximum number of molecules : -
(1) 7 gm N_2
(2) 2 gm H_2
(3) 16 gm NO_2
(4) 16 gm O_2

40. The percentage of C, H and N in an organic compound are 40%, 13.3% and 46.7% respectively , The empirical formula of the compound is :
(1) $C_3H_{13}N_3$
(2) CH_2N
(3) CH_4N
(4) CH_6N

41. Molarity of liquid HCl if density of liq. HCl is 1.17 gm/cc : -
1. 36.5
2. 18.25
3. 32.05
4. 42.10

42. Sp. vol. of cylinderical virus particle is $6.02 \times 10^{-2}\ cc/gm$. Whose radius and length are 7 Å & 10Å respectively. If $N_A = 6.02 \times 10^{23}$. Find mol. wt. of virus : -
1. 15.4 kg/mol
2. $1.54 \times 10^4\ kg/mol$
3. $3.08 \times 10^4\ kg/mol$
4. $3.08 \times 10^3\ kg/mol$

43. In Haber process 30 litres of dihydrogen and 30 litres of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the above condition in the end :
(1) 20 litres ammonia, 20 litres nitrogen, 20 litres hydrogen
(2) 10 litres ammonia, 25 litres nitrogen, 15 litres hydrogen
(3) 20 litres ammonia, 10 litres nitrogen, 30 litres hydrogen
(4) 20 litres ammonia, 25 litres nitrogen, 15 litres hydrogen

44. An organic compound contains 80% (by wt.) carbon and the remaining percentage of hydrogen. The right option for the empirical formula of this compound is: [Atomic wt. of C is 12, H is 1]
1. CH_3
2. CH_4
3. CH
4. CH_2

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Hydrocarbons

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Alkanes, Alkenes and Alkynes - Chemical Properties	22
Aliphatic Hydrocarbon -Nomenclature, Isomerism & Mechanism	9
Aromatic Hydrocarbons - Reactions & Mechanism	6
Aliphatic Hydrocarbon - Methods of Preparation	5
Aromatic Hydrocarbons - Benzene - Structure, Preparation & Chemical Reactions	5
Alkanes, Alkenes and Alkynes - Conformations and Hybridisation	4
Aliphatic Hydrocarbon- Physical Properties	1
Aromatic Hydrocarbons - Nomenclature, Isomerism & Huckel's Rule	1

1.
The correct order of acidity is-

1.
$CH \equiv CH > CH_3 - C \equiv CH > CH_2 = CH_2 > CH_3 - CH_3$

2.
$CH \equiv CH > CH_2 = CH_2 > CH_3 - C \equiv CH > CH_3 - CH_3$

3.
$CH_3 - CH_3 > CH_2 = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

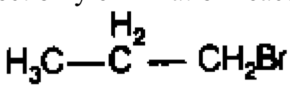
4.
$CH_2 = CH_2 > CH_3 - CH_3 > CH_3 - C \equiv CH > CH \equiv CH$

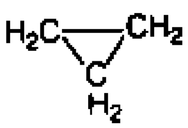
2.
Predict the correct intermediate and product in the following reaction:

$$H_3C - C \equiv CH \xrightarrow[HgSO_4]{H_2O,\ H_2SO_4} \underset{(A)}{\text{Intermediate}} \rightarrow \underset{(B)}{\text{Product}}$$

1. A : $H_3C - \underset{\underset{OH}{|}}{C} = CH_2$; B : $H_3C - \underset{\underset{SO_4}{|}}{C} = CH_2$
2. A : $H_3C - \underset{\underset{O}{||}}{C} - CH_3$; B : $H_3C - C \equiv CH$
3. A : $H_3C - \overset{\overset{OH}{|}}{C} = CH_2$; B : $H_3C - \overset{\overset{O}{||}}{C} - CH_3$
4. A : $H_3C - \underset{\underset{SO_4}{|}}{C} = CH_2$; B : $H_3C - \underset{\underset{O}{||}}{C} - CH_3$

3. Which of the following compounds shall not produce propene by reaction with HBr followed by elimination or direct only elimination reaction?

1. 

2. 

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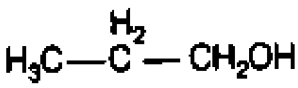
4. 

4. The compound that will react most readily with gaseous bromine has the formula is-
1. C_3H_6
2. C_2H_2
3. C_4H_{10}
4. C_2H_4

5.
Hydrocarbon (A) reacts with bromine by substitution reaction to form an alkyl bromide B, B undergoes the Wurtz reaction to give a gaseous hydrocarbon containing less than four carbon atoms.
The formula of (A) is-
1. $CH \equiv CH$
2. $CH_2 = CH_2$
3. $CH_3 - CH_3$
4. CH_4

6.
The compound C_7H_8 undergoes the following reactions :

$$C_7H_8 \xrightarrow{3\,Cl_2\,/\,hv} A \xrightarrow{Br_2\,/\,Fe} B \xrightarrow{Zn\,/\,HCl} C$$

The product 'C' is-

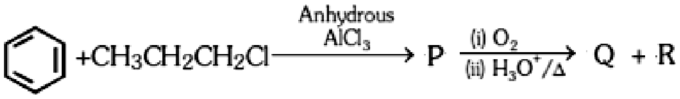
1. m–Bromotoluene

2. o–Bromotoluene

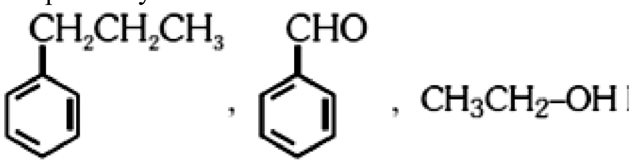
3. 3–Bromo–2,4,6–trichlorotoluene

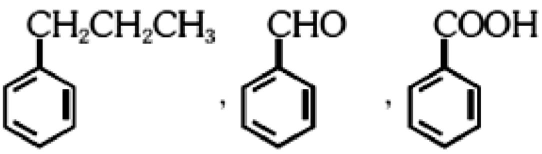
4. p–Bromotoluene

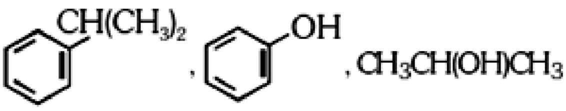
7.

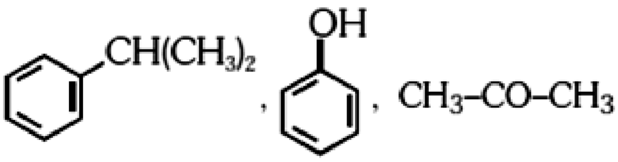


P, Q, and R in the above-mentioned sequence of reactions are respectively -

1. 

2. 

3. 

4. 

8.
The molecule among the following that has hybridization sp^2 , sp^2 , sp , and sp from left to right atoms is-
1. $HC \equiv C - C \equiv H$

2. $CH_2 = CH - C \equiv CH$

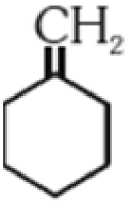
3. $CH_2 = CH - CH = CH_2$

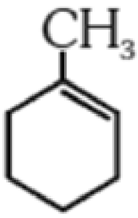
4. $CH_2 - CH = CH - CH_3$

9. The correct statement regarding the comparison of staggered and eclipsed conformations of ethane is-
1. The eclipsed conformation of ethane is more stable than staggered conformation because eclipsed conformation has no torsional strain.
2. The eclipsed conformation of ethane is more stable than staggered conformation even though the eclipsed conformation has a torsional strain.
3. The staggered conformation of ethane is more stable than eclipsed conformation because staggered conformation has no torsional strain.
4. The staggered conformation of ethane is less stable than eclipsed conformation because staggered conformation has a torsional strain.

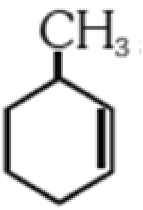
10.
$$H - C \equiv CH \xrightarrow[\text{(ii) } CH_3CH_2Br]{\text{(i) } NaNH_2 / liq.NH_3} X \xrightarrow[\text{(ii) } CH_3CH_2Br]{\text{(i) } NaNH_2 / liq.NH_3} Y$$
X and Y in the above-mentioned reaction are respectively -
1. X = 2–Butyne; Y = 3–Hexyne
2. X = 2-Butyne; Y = 2-Hexyne
3. X = 1-Butyne; Y = 2-Hexyne
4. X = 1-Butyne; Y = 3–Hexyne

11. HCl with an alkene X reacts in accordance with Markovnikov's rule,
to give a product 1-Chloro-1-methylcyclohexane. The structure of alkene (X) is -

1. 

2. 

3. (1) and (2)

4. 

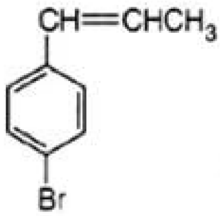
12.

The reaction of $C_6H_5CH=CHCH_3$ with HBr produces-

1. $C_6H_5\underset{|}{\overset{}{C}}H\,CH_2\,CH_3$ with Br on the CH: $C_6H_5CH(Br)CH_2CH_3$

2. $C_6H_5CH_2CH(Br)CH_3$

3. $C_6H_5CH_2CH_2CH_2Br$

4. 

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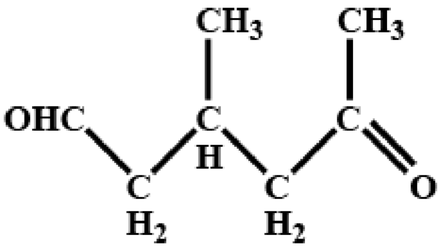
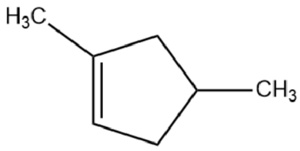
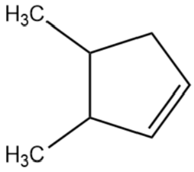
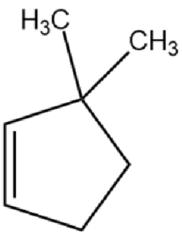
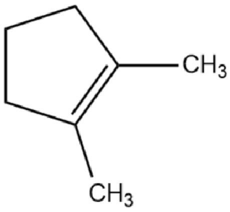


Above mentioned single molecule is obtained from ozonolysis. The starting cyclic compound is -

1. 

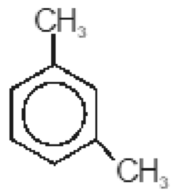
2. 

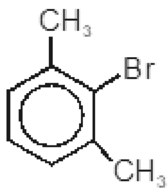
3. 

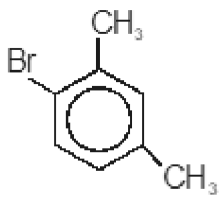
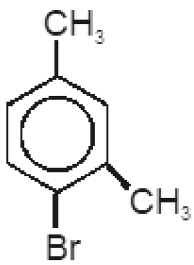
4. 

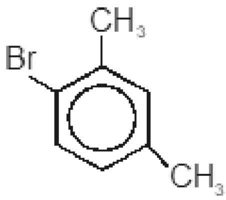
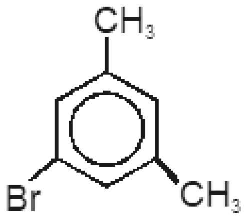
14.

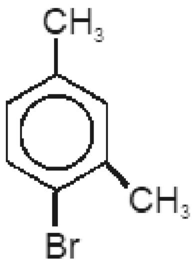
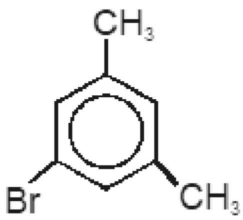
What products are formed when the following compound is treated with Br_2 in the presence of $FeBr_3$?



1.  only

2.  and 

3.  only 

4.  and 

15. $CH_3\,CH_2\,CH = CH_2 \xrightarrow[H_2O_2]{HBr} Y \xrightarrow{C_2H_5\,ONa} Z$

Product Z in the above-mentioned reaction is -

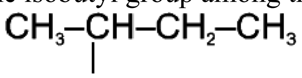
1. $CH_3-(CH_2)_3-O-CH_2CH_3$
2. $(CH_3)_2CH_2-O-CH_2CH_3$
3. $CH_3(CH_2)_4-O-CH_3$
4. $CH_3CH_2-CH(CH_3)-O-CH_2CH_3$

16. Which of the following organic compounds has same hybridization as its combustion product –(CO_2) ?

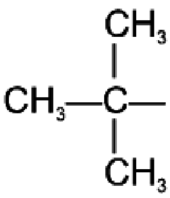
1. Ethane
2. Ethyne
3. Ethene
4. Ethanol

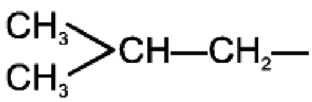
17.
Which of the following compounds will not undergo Friedal-Craft’s reaction easily:
1. Xylene
2. Nitrobenzene
3. Toluene
4. Cumene

18.
The isobutyl group among the following is-

1. 

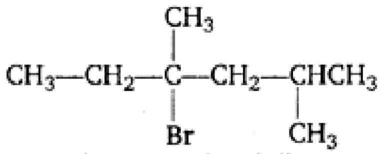
2. **CH_3–CH_2–CH_2–CH_2–**

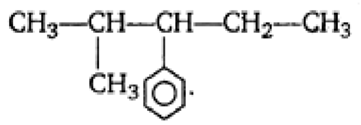
3. 

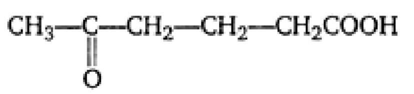
4. 

19. The incorrect IUPAC name among the following is -

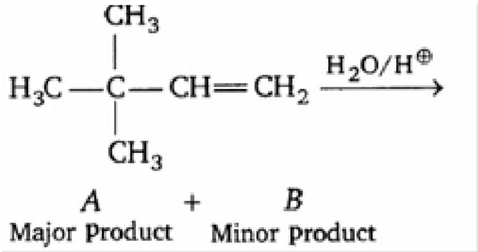
1. $\underset{\text{1−bromo prop−2−ene}}{Br - CH_2 - CH = CH_2}$

2. 
4-bromo-2, 4-dimethylhexane

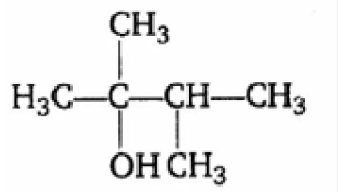
3. 
2-methyl-3-phenylpentane

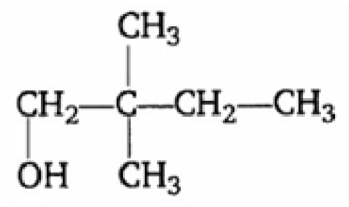
4. 
5-oxohexanoic acid

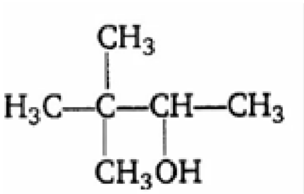
20.

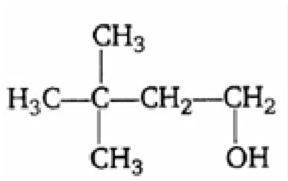


The major product in the above mentioned reaction is-

1. 

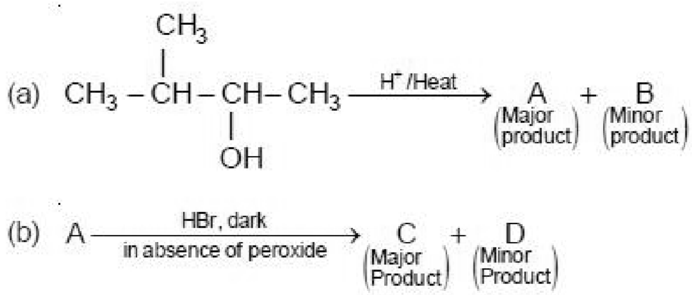
2. 

3. 

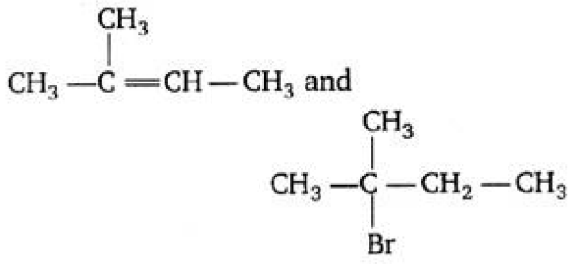
4. 

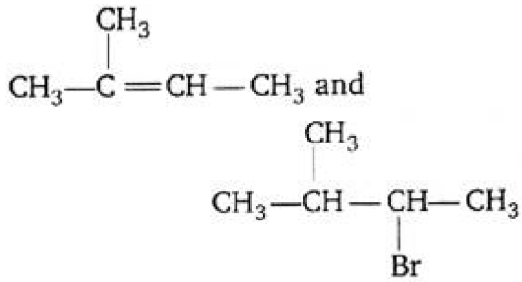
21. The linear molecules among the following is -
1. $CH_3 - C \equiv C - CH_3$
2. $CH_2 = CH - CH_2 - C \equiv CH$
3. $CH_3 - CH_2 - CH_2 - CH_3$
4. $CH_3 - CH = CH - CH_3$

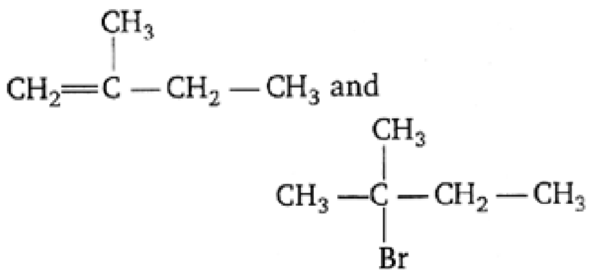
22.

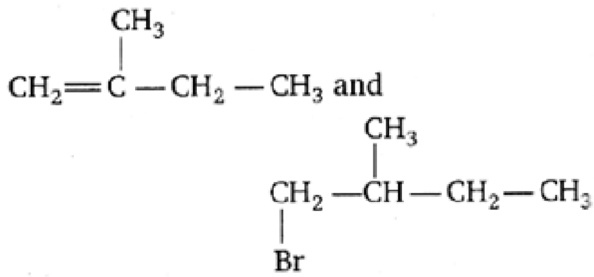


The major products A. and C. in the above mentioned reaction are respectively-

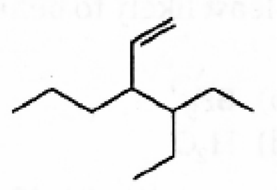
1. 

2. 

3. 

4. 

23. The correct IUPAC name of the given compound is-



1. 3-Ethyl-4-ethenylheptane
2. 3-Ethyl-4-propylhex-5-ene
3. 3-(1-Ethyl propyl) hex-1-ene
4. 4-Ethyl-3-propylhex-1-ene

24. Liquid hydrocarbons can be converted to a mixture of gaseous hydrocarbons by
1. oxidation
2. cracking
3. distillation under reduced pressure
4. hydrolysis

25. The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives 'X' and the reaction in presence of light gives 'Y'. Thus, X' and 'Y' are respectively-
1. X= Benzal chloride, Y= o-chlorotoluene
2. X= m-chlorotoluene, Y= p-chlorotoluene
3. X= o and p-chlorotoluene, Y= trichloromethyl benzene
4. X= Benzyl chloride, Y= m-chlorotoluene

26. Nitrobenzene can be prepared from benzene by using a mixutre of conc. HNO_3 and conc. H_2SO_4. In the mixture, nitric acid acts as a/an:
1. reducing agent
2. acid
3. base
4. catalyst

27. Benzene reacts with CH_3Cl in the presence of anhydrous $AlCl_3$ to form-
1. Toluene
2. Chlorobenzene
3. Benzylchloride
4. Xylene

28. In the given hydrocarbon,

$$\underset{6}{CH_3} - \underset{5}{CH} = \underset{4}{CH} - \underset{3}{CH_2} - \underset{2}{C} \equiv \underset{1}{CH}$$

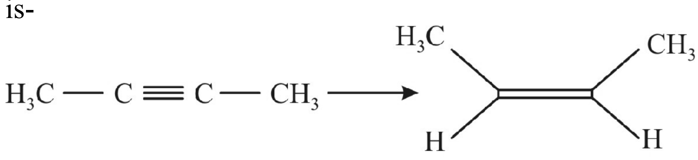
The state of hybridization of carbons 1, 3 and 5 are-

1. sp^2, sp, sp^3
2. sp , sp^3, sp^2
3. sp, sp^2, sp^3
4. sp^3, sp^2, sp

29. An alkene "A" on reaction with O_3 and $Zn - H_2O$ gives propanone and ethanal in equimolar ratio. Addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is:

1. $H_3C - \underset{Cl}{\underset{|}{CH}} - \underset{CH_3}{\underset{|}{\overset{CH_3}{\overset{|}{CH}}}}$
2. $Cl - CH_2 - CH_2 - \underset{CH_3}{\underset{|}{\overset{CH_3}{\overset{|}{CH}}}}$
3. $H_3C - CH_2 - \overset{CH_2Cl}{\overset{|}{CH}} - CH_3$
4. $H_3C - CH_2 - \underset{Cl}{\underset{|}{\overset{CH_3}{\overset{|}{C}}}} - CH_3$

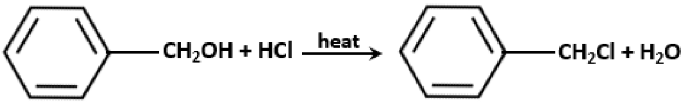
30. The most suitable reagent for the following conversion is-

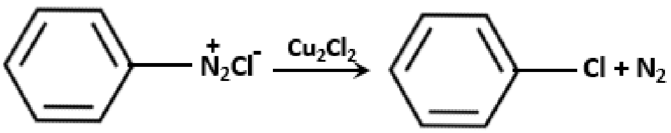


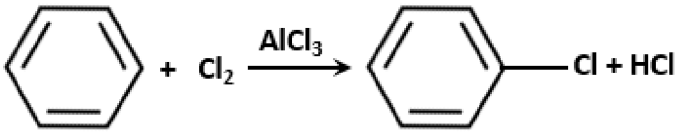
cis-2-butene

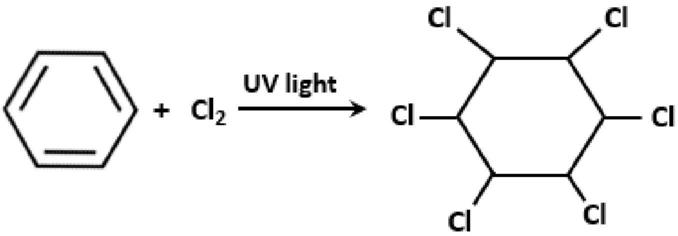
1. Hg^{2+}/H^+ , H_2O
2. Na/liquid NH_3
3. H_2, Pd/C, quinoline
4. Zn/HCl

31. The reaction among the following that proceeds through an electrophilic substitution reaction, is:

1.


2.


3.


4.


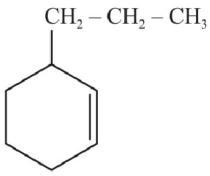
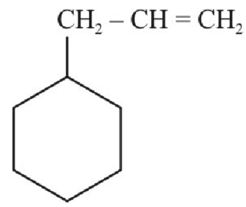
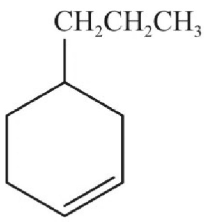
32. The alkane that gives only one monochloro product on chlorination with Cl_2 in presence of diffused sunlight is -
1. 2,2,-dimethylbutane
2. neopentane
3. n-pentane
4. Isopentane

33. In the following reaction
$H_3CC \equiv CH \xrightarrow[873\text{ K}]{\text{Red Hot Iron Tube}} A$
The number of (σ) bonds present in the product (A) is-
1. 21
2. 9
3. 24
4. 18

34. Elimination reaction of 2-Bromopentane to form pent-2-ene is-
(a) β-Elimination reaction
(b) Follows Zaitsev rule
(c) Dehydrohalogenation reaction
(d) Dehydration reaction
1. (a), (c), (d)
2. (b), (c), (d)
3. (a), (b), (d)
4. (a), (b), (c)

35. Which of the following alkane cannot be made in good yield by Wurtz reaction?
1. 2,3-Dimethylbutane
2. n-Heptane
3. n-Butane
4. n-Hexane

36. An alkene on ozonolysis gives methanal as one of the products. Its structure is:


1.

2.

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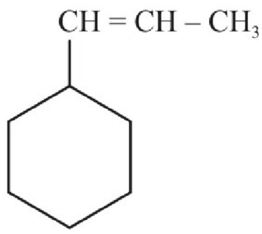

4.

37. Which of the following is a free radical substitution reaction ?
(1) Benzene with $Br_2/AlCl_3$
(2) Acetylene with HBr
(3) Methane with Br_2/hv
(4) Propene with $HBr/(C_6H_5COO)_2$

38. The reagent that can be used to distinguish between 1-butyne and 2-butyne is:
1. HCl
2. O_2
3. Br_2
4. $NaNH_2$

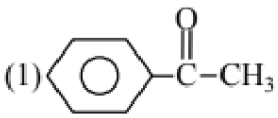
39. In Friedal craft reaction Toluene can be prepared by :
1. $C_6H_6 + CH_3Cl$
2. $C_6H_5Cl + CH_4$
3. $C_6H_6 + CH_2Cl_2$
4. $C_6H_6 + CH_3COCl$

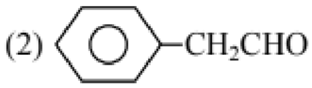
40. The reagent used to converts propene to 1-propanol is
1. H_2O, H_2SO_4
2. B_2H_6, H_2O_2, OH^-
3. $Hg(OAc)_2, NaBH_4/H_2O$
4. Aq. KOH

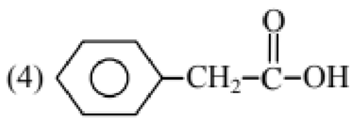
41. Which of the following is not the characteristic of arenes :
1. More stability
2. Resonance
3. Delocalization of π electrons
4. Electrophilic addition

42. 2-Bromopentane reacts with ethanolic KOH gives main product :
1. Cis-2-pentene
2. Trans-2-pentene
3. 1-pentene
4. None of the above

43. Phenyl acetylene reacts with dil. H_2SO_4 in presence of $HgSO_4$ gives :





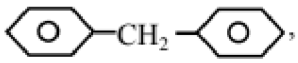


44. Compound 'A' on chlorination gives compound 'B'. 'B' reacts with alc. KOH to give gas 'C' which decolorizes Baeyer reagent. Ozonolysis of compound 'C' gives only HCHO compound. Compound 'A' is
1. C_2H_6
2. C_2H_4
3. C_4H_{10}
4. C_2H_5Cl

45. Reaction of HBr with propene in the presence of peroxide gives :-
(1) 3-bromo propane
(2) Allyl bromide
(3) n-propyl bromide
(4) Isopropyl bromide

46. Using anhydrous $AlCl_3$ as catalyst, which one of the following reactions produces ethylbenzene (PhEt) :-
1. $CH_3-CH=CH_2+C_6H_6$
2. $H_2C=CH_2+C_6H_6$
3. $H_3C-CH_3+C_6H_6$
4. $H_3C-CH_2OH+C_6H_6$

47. The molecular formula of diphenyl methane,



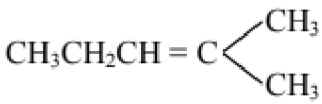
, is $C_{13}H_{12}$.

The number of structural isomers possible when one of the hydrogens is replaced by a chlorine atom is :-
1. 4
2. 8
3. 7
4. 6

48. On ozonolysis , the alkene that gives the following produt is :

$$CH_3CH_2CHO \text{ and } CH_3\underset{\underset{O}{\|}}{C}CH_3$$

1.



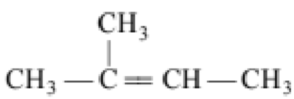
2. $CH_3CH_2CH=CHCH_2CH_3$

3. $CH_3CH_2CH=CHCH_3$

4.
$$CH_3-\underset{\underset{CH_3}{|}}{C}=CHCH_3$$

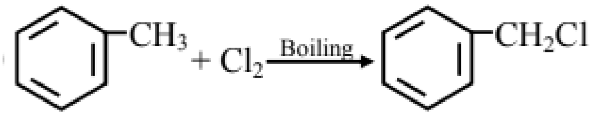
49. A compound of the molecular formula is C_7H_{16} shows optical isomerism, the compound will be-
1. 2,3-Dimethyl pentane
2. 2,2-Dimethyl butane
3. 2-Methyl hexane
4. None of the above

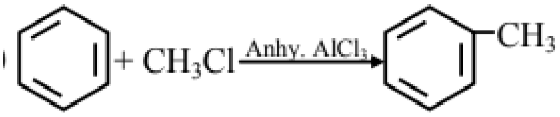
50. The compound

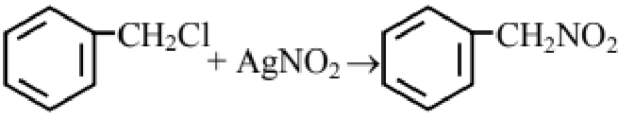


on reaction with $NaIO_4$ in the presence of $KMnO_4$ given :
1. CH_3COCH_3
2. $CH_3COCH_3+CH_3COOH$
3. $CH_3COCH_3+CH_3CHO$
4. $CH_3CHO+CO_2$

51. Among the following the free-radical substitution reaction is-

1. 

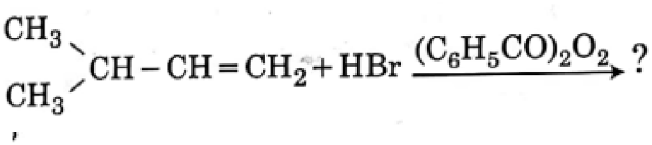
2. 

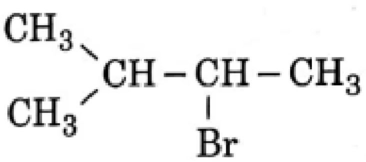
3. 

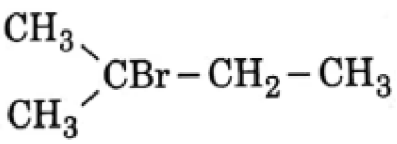
4. $CH_3CHO + HCN \rightarrow CH_3CH(OH)CN$

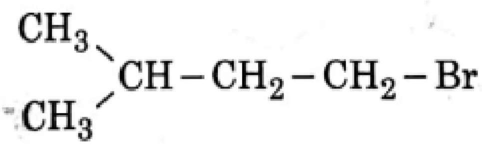
52. The dihedral angle of the least stable conformer of ethane is-
1. 60°
2. 0°
3. 120°
4. 180°

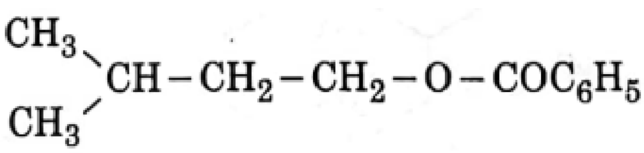
53. The major product of the following chemical reaction is:



1. 

2. 

3. 

4. 

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Environmental Chemistry

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Air Pollution - Smog	4
Air Pollution - Greenhouse Effect	3
Air Pollution - Acid Rain	1
Air Pollution - Ozone	1
Water Pollution - Biological Oxygen Demand	1

1. Which oxide of nitrogen is not a common pollutant introduced into the atmosphere both due to natural and human activity?
1. N_2O_5
2. NO_2
3. N_2O
4. NO

2. Which one of the following is not a common component of Photochemical Smog?
1. Ozone
2. Acrolein
3. Peroxyacetyl nitrate
4. Chlorofluorocarbons

3. The incorrect statement among the following regarding photochemical smog is -
1. Carbon monoxide does not play any role in photochemical smog formation.
2. Photochemical smog is an oxidising agent in character.
3. Photochemical smog is formed through photochemical reaction involving solar energy.
4. Photochemical smog does not cause irritation in eyes and throat.

4.
Which one of the following statements is not true?
1. Concentration of dissolved oxygen below 5 ppm is good for the growth of fish
2. Clean water would have a BOD value of less than 5 ppm
3. Oxides of sulphur, nitrogen and carbon are the most widespread air pollutant
4. pH of drinking water should be between 6.5-8.5

5.
Green chemistry means such reactions that :
1. Produce colour during reactions.
2. Reduce the use and production of hazardous chemicals.
3. Are related to the depletion of ozone layer.
4. Study the reactions in plants.

6. Among the following, the one that is not a greenhouse gas is:
1. Sulphur dioxide
2. Nitrous oxide
3. Methane
4. Ozone

7. The incorrect statement about carbon monoxide is-
1. It reduces the oxygen-carrying ability of blood.
2. The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.
3. It is produced due to incomplete combustion.
4. It forms carboxyhaemoglobin.

8. Which of the following statement is NOT true about acid rain ?
(1) It is due to reaction of SO_2, NO_2 and CO_2 with rain water
(2) Causes no damage to monuments like Taj Mahal.
(3) It is harmful to plants.
(4) Its pH is less than 5.6

9. The compound responsible for depletion of the ozone layer in the upper strata of the atmosphere :-
(1) Ferrocene
(2) Fullerenes
(3) Freons
(4) Polyhalogens

10. Match List-1 with List-II

List-I	List-II
(a) $2\,SO_2(g) + O_2(g) \rightarrow 2\,SO_3(g)$	(i) Acid rain
(b) $HOCl\left(g\right) \xrightarrow{hv} OH + Cl$	(ii) Smog
(c) $CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$	(iii) Ozone depletion
(d) $NO_2\left(g\right) \xrightarrow{hv} NO\left(g\right) + O\left(g\right)$	(iv) Tropospheric pollution

Choose the correct answer from the options given below.
1. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
2. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
3. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
4. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

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*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

Solid State

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Density & Packing Fraction	14
Introduction & Crystal System	12
Voids ,Radius Ratio & Coordination Number	11
Imperfections in Solids & Semi-Conductors	6

1. Incorrect statement among the following is -

1. Density decreases in case of crystals with Schottky's defect.

2. NaCl(s) is insulator, silicon is semiconductor, silver is conductor, quartz is piezo electric crystal.

3. Frenkel defect is favoured in those ionic compounds in which sizes of cation and anions have large difference in sizes.

4. $Fe_{0.98}$O has non stoichiometric metal excess defect.

2.
Iron exhibits bcc structure at room temperature. Above 900 °C, it transforms to fcc structure. The ratio of density of iron at room temperature to that at 900 °C is -
(Molar mass and atomic radii of iron remains constant with temperature)

1. $\frac{\sqrt{3}}{\sqrt{2}}$
2. $\frac{4\sqrt{3}}{3\sqrt{2}}$
3. $\frac{3\sqrt{3}}{4\sqrt{2}}$
4. $\frac{1}{2}$

3.
Lithium has a bcc structure. Its density is 530 kg m^{-3} and its atomic mass is 6.94 g mol^{-1} . The edge length of a unit cell of lithium metal is:
(N_A= 6.02 X 10^{23} mol^{-1})

1. 352 pm

2. 527 pm

3. 264 pm

4. 154 pm

4. The correct statement regarding defects in the crystalline solid is -

1. Schottky defects have no effect on the density of crystalline solids.

2. Frenkel defects decreases the density of crystalline solids.

3. Frenkel defect is a dislocation defect.

4. Frenkel defect is found in halides of alkaline metals.

5. The vacant space in BCC lattice cell is :

1. 26%

2. 48%

3. 23%

4. 32%

6.

A given metal crystallizes out with a cubic structure having edge length of 361 pm. If there are four metal atoms in one unit cell, the radius of one atom is -

1. 40 pm
2. 127 pm
3. 80 pm
4. 108 pm

7. If a is the length of the side of a cube, the distance between the body centered atom and one corner atom in the cube will be:

1. $\frac{2}{\sqrt{3}}a$

2. $\frac{4}{\sqrt{3}}a$

3. $\frac{\sqrt{3}}{4}a$

4. $\frac{\sqrt{3}}{2}a$

8.
A metal has a fcc lattice. The edge length of the unit cell is 404 pm. The density of the metal is 2.72 g cm^{-3}. The molar mass of the metal is :
(N_A Avogadro's constant = 6.02×10^{23} mol^{-1})

1. 30 g mol^{-1}
2. 27 g mol^{-1}
3. 20 g mol^{-1}
4. 40 g mol^{-1}

9.
The number of carbon atoms per unit cell of the diamond unit cell is:

1. 8
2. 6
3. 1
4. 4

10. A metal crystallizes with a fcc lattice. The edge of the unit cell is 408 pm. The diameter of the metal atom is :

1. 288 pm
2. 408 pm
3. 144 pm
4. 204 pm

11. The number of octahedral void(s) per atom present in a cubic close-packed structure is :

1. 1
2. 3
3. 2
4. 4

12. AB crystallizes in a body-centered cubic lattice with edge length 'a' equal to 387 pm. The distance between two oppositely charged ions in the lattice is

1. 335 pm
2. 250 pm
3. 200 pm
4. 300 pm

13.
Sodium has body centered packing. Distance between two nearest atoms is 3.7 Å . The lattice parameter is -

1. 6.8 Å
2. 4.3 Å
3. 3.0 Å
4. 8.5 Å

14. Copper crystallises in a face-centred cubic lattice with a unit cell length of 361 pm.The radius of the copper atom is

1. 128 pm
2. 157 pm
3. 181 pm
4. 108 pm

15. If the lattice parameter for a crystalline structure is 3.6 Å, then the atomic radius in fcc crystal is :

1. 1.81 Å
2. 2.10 Å
3. 2.92 Å
4. 1.27 Å

16. Lithium metal crystallises in a body centred cubic crystal. If the length of the side of the unit cell of lithium is 351 pm, the atomic radius of the lithium will be :

1. 240.8 pm

2. 151.8 pm

3. 75.5 pm

4. 300.5 pm

17.
Which of the following statements is not correct?
1. The fraction of the total volume occupied by die atoms in a primitive cell is 0.48

2. Molecular solids are generally volatile

3. The number of carbon atoms in an unit cell of diamond is 8

4. The number of Bravais lattices in which a crystal can be categorized is 14

18. If 'a' stands for the edge length of the cubic systems : simple cubic, body centred cubic and face centred cubic, then the ratio of radii of the spheres in these systems will be respectively :

1. $\frac{1}{2}$a; $\frac{\sqrt{3}}{4}$a : $\frac{1}{2\sqrt{2}}$a

2. $\frac{1}{2}$a; $\sqrt{3}$a : $\frac{1}{\sqrt{2}}$a

3. $\frac{1}{2}$a; $\frac{\sqrt{3}}{2}$a : $\frac{\sqrt{2}}{2}$a

4. 1a; $\sqrt{3}$a : $\sqrt{2}$a

19.
Percentage of free space in a body centred cubic unit cell is -

1. 30%

2. 32%

3. 34%

4. 28%

20.
Silicon give p-type of semiconductor on dope with -

1. Germanium.

2. Arsenic.

3. Selenium.

4. Boron.

21. For a cubic crystal structure which one of the following relations indicating the cell characteristic is correct?

1. $a \neq b \neq c\ and\ \alpha \neq \beta\ and\ \gamma \neq 90^\circ$

2. $a \neq b \neq c\ and\ \alpha = \beta = \gamma = 90^\circ$

3. $a = b = c\ and\ \alpha \neq \beta = \gamma = 90^\circ$

4. $a = b = c\ and\ \alpha = \beta = \gamma = 90^\circ$

22. The fraction of total volume occupied by the atoms present in a simple cube is :

1. $\frac{\pi}{6}$

2. $\frac{\pi}{3\sqrt{2}}$

3. $\frac{\pi}{4\sqrt{2}}$

4. $\frac{\pi}{4}$

23. If NaCl is doped with 10^{-4}mol% of $SrCl_2$, the concentration of cation vacancies will be (N_A= $6.02\times10^{23}mol^{-1}$) :

1. $6.02 \times 10^{15}\ mol^{-1}$

2. $6.02 \times 10^{16}\ mol^{-1}$

3. $6.02 \times 10^{17}\ mol^{-1}$

4. $6.02 \times 10^{14}\ mol^{-1}$

24. CsBr crystallises in a body centred cubic lattice. The unit cell length is 436.6 pm. Given that the atomic mass of Cs = 133 and that of Br = 80 amu and Avogadro number being 6.02×10^{23} mol^{-1}, the density of CsBr is :

1. 42.5 g/cm^3

2. 0.425 g/cm^3

3. 8.25 g/cm^3

4. 4.25 g/cm^3

25. The appearance of colour in solid alkali metal halides is generally due to :

1. F-centres.

2. Schottky defect.

3. Frenkel defect.

4. Interstitial positions.

26. A compound is formed by cation C and anion A. The anions form hexagonal close packed (hcp) lattice and the cations occupy 75% of octahedral voids. The formula of the compound is:

1. C_3A_4

2. C_2A_3

3. C_3A_2

4. C_4A_3

27. The formula of nickel oxide with metal deficiency defect in its crystal is $Ni_{0.98}O$. The crystal contains Ni^{2+} and Ni^{3+} ions. The fraction of nickel existing as Ni^{2+} ions in the crystal is-

1. 0.96

2. 0.04

3. 0.50

4. 0.31

28. An element has a body-centered cubic (BCC) structure with a cell edge of 288 pm. The atomic radius is:

1. $\frac{\sqrt{2}}{4} \times 288$ pm

2. $\frac{4}{\sqrt{3}} \times 288$ pm

3. $\frac{4}{\sqrt{2}} \times 288$ pm

4. $\frac{\sqrt{3}}{4} \times 288$ pm

29. A compounds that can show both, Frenkel as well as Schottky defects is -

(1) AgBr

(2) AgI

(3) NaCl

(4) ZnS

30. Structure of a mixed oxide is cubic close-packed (CCP). The cubic unit cell of mixed oxide is composed of oxide ions. One fourth of the tetrahedral voids are occupied by divalent metal A and the octahedral voids are occupied by a monovalent metal B. The formula of the oxide is -

1. A_2BO_2
2. $A_2B_3O_4$
3. AB_2O_2
4 ABO_2

31. Copper has face-centered cubic (fcc) lattice with interatomic spacing equal to 2.54Å. The value of lattice constant for this lattice is-

(1) 3.59Å

(2) 2.54 Å

(3) 1.27 Å

(4) 5.08 Å

32. The cations and anions are arranged in alternate form in :

1. Metallic crystal

2. Ionic crystal

3. Co-valent crystal

4. Semi-conductor crystal

33. A cube of any crystal A-atom placed at every corners and B-atom placed at every centre of face. The formula of compound is :

1. AB

2. AB_3

3. A_2B_2

4. A_2B_3

34. Schottky defect shows :

1. Same number of cation and anions decrease from lattice.
2. Cations and anions are replaces from their sites.
3. Maximum number of cations and anions are same.
4. None of the above.

35. The edge length of face centred unit cubic cells is 508 pm. If the radius of the cation is 110 pm, the radius of the anion is :
1. 144 pm
2. 398 pm
3. 288 pm
4. 618 pm

36. Number of atom per unit cell in B.C.C. : -

(1) 9

(2) 4

(3) 2

(4) 1

37. On the basis of unit cell concept a crystal has :

1. 7 systems
2. 14 systems
3. 230 systems
4. 32 systems

38. A compound formed by elements X and Y crystallizes in a cubic structure in which the X atoms are at the corners of a cube and the Y atoms are at the face-centers. The formula of the compound is :-

(1) X_3Y

(2) XY

(3) XY_2

(4) XY_3

39. MgO and NaCl has similar structure. In MgO , magnesium is surrounded by how many oxygen atoms :
1. 2
2. 4
3. 6
4. 1

40. The pyknometric density of sodium chloride crystal is 2.165×10^3 kg m^{-3} while its X-ray density is 2.178×10^3 kg m^{-3}. The fraction of unoccupied sites in sodium chloride crystal is :

(1) 5.96

(2) 5.96×10^{-2}

(3) 5.96×10^{-1}

(4) 5.96×10^{-3}

41. Zn convert it's melted state to its solid state, it has HCP structure, then number of nearest atom is : -
1. 6
2. 8
3. 12
4. 4

42. The number of tetrahedral and octahedral voids in hexagonal primitive unit cell are repectively:

1. 2, 1

2. 12, 6

3. 8, 4

4. 6, 12

43. The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cells is :

1. 2

2. 3

3. 7

4. 5

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*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there

Solutions

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Raoult's Law	10
Osmosis & Osmotic Pressure	7
Depression of Freezing Point	6
Introduction/ Colligative properties	5
Relative Lowering of Vapour Pressure	5
Elevation of Boiling Point	4
Dalton’s Law of Partial Pressure	2
Van’t Hoff Factor	2
Azeotrope	1

1. The van't Hoff factor (i) for a dilute aqueous solution of the strong electrolyte barium hydroxide is-

1. 0
2. 1
3. 2
4. 3

2. The incorrect statement among following for an ideal solution is -

1. $\Delta H_{mix} = 0$
2. $\Delta U_{mix} = 0$
3. $\Delta P = P_{obs.} - P_{calculated\ by\ Raoult's\ Law} = 0$
4. $\Delta G_{mix} = 0$

3. If the molality of the dilute solutions is doubled, the value of molal depression constant (K_f) will be-

1. Halved
2. Tripled
3. Unchanged
4. Doubled

4.
At 100 °C the vapour pressure of a solution of 6.5 g of a solute in 100 g water is 732 mm. If K_b = 0.52, the boiling point of this solution will be-
1. 100^0C
2. 102^0C
3. 103^0C
4. 101^0C

5.
Consider the following statements about the composition of the vapour over an ideal 1:1 molar mixture of benzene and toluene. The correct statement is-
Assume that the temperature is constant at 25^0c.
(Given, vapour pressure data at 25 °C, benzene= 12.8 kPa, toluene= 3.85 kPa)
1. The vapour will contain a higher percentage of toluene
2. The vapour will contain equal amounts of benzene and toluene
3. Not enough information is given to make a prediction
4. The vapour will contain a higher percentage of benzene

6.

for an ideal solution, the non zero value will be for-

1. ΔH_{mix}
2. ΔS_{mix}
3. ΔV_{mix}
4. $\Delta P = P_{observed} - P_{Raoult}$

7.

The boiling point of 0.2 mol kg^{-1} solution of X in water is greater than equimolal solution of Y in water.

The correct statements in this case is-

1. X is undergoing dissociation in water.
2. Molecular mass of X is greater than the molecular mass of Y.
3. Molecular mass of X is less he molecular mass of y.
4. Y is undergoing dissociation in water while X undergoes no change.

8.

The electrolyte having same value of Van't Hoff factor (i) as that of $Al_2(SO_4)_3$ (if all are 100% ionized) is-

1. K_2SO_4

2. $K_3[Fe(CN)_6]$

3. $Al(NO_3)_3$

4. $K_4[Fe(CN)_6]$

9. Of the following 0.10m aqueous solutions, the one will exhibit the largest freezing point depression is-

1. KCl

2. $C_6H_{12}O_6$

3. $Al_2(SO_4)_3$

4. K_2SO_4

10. p_A and p_B are the vapor pressure of pure liquid components, A and B, respectively of an ideal binary solution. If x_A represents the mole fraction of component A, the total pressure of the solution will be

1. $p_A + x_A(p_B - p_A)$

2. $p_A + x_A(p_A - P_B)$

3. $p_B + x_A(p_B - p_A)$

4. $p_B + x_A(p_A - p_B)$

11.
The freezing point depression constant for water is -1.86 °C m^{-1}. If 5.00 g Na_2SO_4 is dissolved in 45.0 g H_2O, the freezing point is changed by -3.82 °C. The van't Hoff factor for Na_2SO_4 is-

1. 2.63

2. 3.11

3. 0.381

4. 2.05

12.
The van't Hoff factor, i, for a compound that undergoes dissociation and association in a solvent, is respectively -

1. Less than one and less than one

2. Greater than one and less than one

3. Greater than one and greater than one

4. Less than one and greater than one

13. An aqueous solution is 1.00 molal in KI. Vapour pressure of the solution can be increase by-

1. Addition of NaCl

2. Addition of Na_2SO_4

3. Addition of 1.00 molal KI

4. Addition of water

14. A solution of sucrose(molar mass = 342g mol^{-1}) has been prepared by dissolving 68.5 g of sucrose in 1000 g of water. The freezing point of the solution obtained will be (k_f for water= 1.86 K kg mol^{-1})

1. -0.372 °C

2. -0.520 °C

3. +0.372 °C

4. -0.570 °C

15. A 0.0020 m aqueous solution of an ionic compound $Co(NH_3)_5(NO_2)Cl$ freezes at - 0.0073C. Number of moles of ions which 1 mol of ionic compound produces on being dissolved in water will be -

(k_f = -1.86 $^oC/m$)

1. 2

2. 3

3. 4

4. 1

16. 0.5 molal aqueous solution of a weak acid (*HX*) is 20% ionised.The lowering in freezing point of the solution is :

[K_f for water=1.86 K kg mol^{-1}]

1. -1.12 K

2. 0.56 K

3. 1.12 K

4. -0.56 K

17. A solution containing 10g per dm^3 of urea (molecular mass = 60g mol^{-1}) is isotonic with a 5% solution of a non-volatile solute. The molecular mass of this non-volatile solute is -

1. 25g mol^{-1}.

2. 300g mol^{-1}.

3. 350g mol^{-1}.

4. 200g mol^{-1}.

18. 1.00 g of non-electrolyte solute (molar mass 250 g mol^{-1}) was dissolved in 51.2 g of benzene. If the freezing point depression constant, K_f of benzene is 5.12 mol^{-1} kg K, the freezing point of benzene will be lowered by -

1. 0.4 K

2. 0.3 K

3. 0.5 K

4. 0.2 K

19. A solution of acetone in ethanol :

1. shows a negative deviation from Raoult's law

2. shows a positive deviation from Raoult's law

3. behaves like a near ideal solution

4. obeys Raoult's law

20. During osmosis, the flow of water through a semi-permeable membrane is -

1. From a solution having higher concentration only

2. From both sides of the semi-permeable membrane with equal flow rates

3. From both sides of the semi-permeable membrane with unequal flow rates

4. From a solution having lower concentration only

21. For an ideal solution, the correct option is-

1. $\Delta_{mix} G = 0$ at constant T and P

2. $\Delta_{mix} S = 0$ at constant T and P

3. $\Delta_{mix} V \neq 0$ at constant T and P

4. $\Delta_{mix} H = 0$ at constant T and P

22. The mixture that forms maximum boiling azeotrope is-

1. Heptane+Octane
2. Water+Nitric acid
3. Ethanol +Water
4. Acetone+Carbon disulfide

23. The correct statement regarding a solution of two component A and B exhibiting positive deviation from idea behavior is -

1. Intermolecular attractive force between A-A and B-B are stronger than those between A-B
2. $\Delta_{mix}H = 0$ at constant T and P
3. $\Delta_{mix}V = 0$ at constant T and P
4. Intermolecular attractive forces between A-A and B-B are equal to those between A-B

24. The mixture shows positive deviation from Raoult's law is-

1. Benzene + Toluene
2. Acetone + Chloroform
3. Chloroethane + Bromoethane
4. Ethanol + Acetone

25. The freezing point of depression constant (K_f) of benzene is 5.12 K kg mol^{-1}. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is- (rounded off upto two decimal places) :

1. 0.80 K
2. 0.40 K
3. 0.60 K
4. 0.20 K

26. If 8g of a non-electrolyte solute is dissolved in 114 g of n-octane to reduce its vapour pressure to 80%, the molar mass (in g mol^{-1}) of the solute is -

[Molar mass of n-octane is 114 g mol^{-1}]

1. 40
2. 60
3. 80
4. 20

27. Isotonic solutions have same-

1. Vapour pressure
2. Freezing temperature
3. Osmotic pressure
4. Boiling temperature

28. Vapour pressure of chloroform $(CHCl_3)$ and dichloromethane (CH_2Cl_2) at $25^\circ C$ are 200 mmHg and 41.5 mmHg respectively. Vapour pressure of the solution obtained by mixing 25.5 g of $(CHCl_3)$ and 40 g of (CH_2Cl_2) at the same temperature will be: (Molecular mass of $(CHCl_3)$ = 119.5 u and molecular mass of (CH_2Cl_2) = 85 u)

1. 90.40 mm Hg
2. 119.5 mm Hg
3. 75 mm Hg
4. 173.9 mm Hg

29. A 0.1 molal aqueous solution of a weak acid (HA) is 30% ionized. If K_f for water is 1.86°C/m, the freezing point of the solution will be -

1. –0.24°C

2. –0.18°C

3. –0.54°C

4. –0.36°C

30. 200 mL of an aqueous solution of a protein contains it's 1.26 g. The Osmotic pressure of this solution at 300 K is found to be 2.57×10^{-3} bar.The molar mass of protein will be

(R = 0.083 L bar mol^{-1} K^{-1}):

1. 61038 g mol^{-1}

2. 51022 g mol^{-1}

3. 122044 g mol^{-1}

4. 31011 g mol^{-1}

31. The vapour pressure of two liquids 'P' and 'Q' are 80 and 60 torr, respectively. The total vapour pressure of solution obtained by mixing 3 mole of P and 2 mole of Q would be :-

(1) 68 torr

(2) 140 torr

(3) 72 torr

(4) 20 torr

32. A solution of urea (mol. mass 56 g mol^{-1}) boils at 100.18ºC at the atmospheric pressure. If K_f and K_b for water are 1.86 and 0.512K kg mol^{-1} respectively, the above solution will freeze at:-

(1) –6.54ºC

(2) –0.654ºC

(3) 6.54ºC

(4) 0.654ºC

33. A solution has a 1 :4 mole ratio of pentane to hexane. The vapour pressures of the pure hydrocarbons at 20ºC are 440 mm Hg for pentane and 120 mm Hg for hexane. The mole fraction of pentane in the vapour phase would be-

(1) 0.200

(2) 0.478

(3) 0.549

(4) 0.786

34. The addition of water vapours does not change the density of -

1. CCl_4

2. CS_2

3. Ether

4. Coke

35. 1% (w/w)solution of a compound is isotonic with 5% (w/w)sucrose (sugar) solution. Then molecular wt. of compound will be :
1. 32.4
2. 68.4
3. 129.6
4. 34.2

36. Mole fraction of solute is 0.2 in solution then lowering in V.P (ΔP) = 10. If lowering in V.P.(ΔP) = 20 then mole fraction of solvent will be in solution :
1. 0.2
2. 0.4
3. 0.6
4 0.8

37. From the colligative properties of solution which one is the best method for the determination of molecular weight of proteins & polymers :

1. Osmotic pressure

2. Lowering in vapour pressure

3. Lowering is freezing point

4. Elevation in boiling point

38. A solution contains non volatile solute of molecular mass M_2. The molecular mass of solute in terms of osmotic pressure is : -

1. $M_2 = \left(\frac{m_2}{\pi}\right) VRT$

2. $M_2 = \left(\frac{m_2}{V}\right) \frac{RT}{\pi}$

3. $M_2 = \left(\frac{m_2}{V}\right) \pi RT$

4. $M_2 = \left(\frac{m_2}{V}\right) \frac{\pi}{RT}$

Note:

$m_2 \rightarrow$ mass of solute

$V \rightarrow$ Volume of solution

$\Pi \rightarrow$ Osmotic pressure

39. The ideal solution indicates -

(1) A – B attraction force is greater than A – A and B – B

(2) A – B attraction force is less than A – A and B – B

(3) Attraction force remains same in A – A and B – B

(4) Volume of the solution is different from the sum of the volume of solute and solvent

40. Beans get cooked earlier in a pressure cooker, because: -

1. Boiling point increase with increasing pressure

2. Boiling point decrease with increasing pressure

3. Extra pressure of pressure cooker, softens the beans

4. Internal energy is not lost while cooking in a pressure cooker

41. The following solutions were prepared by dissolving 10g of glucose ($C_6H_{12}O_6$) in 250 ml of water (P_1). 10g of urea (CH_4N_2O) in 250 ml of water (P_2) and 10 g of sucrose ($C_{12}H_{22}O_{11}$) in 250 ml of water (P_3). The decreasing order of osmotic pressure of these solutions is:

1. $P_2 > P_3 > P_1$

2. $P_3 > P_1 > P_2$

3. $P_2 > P_1 > P_3$

4. $P_1 > P_2 > P_3$

42. The correct option for the value of vapour pressure of a solution at 45°C with benzene to octane in a molar ratio 3:2 is :

[At 45°C vapour pressure of benzene is 280 mm Hg and that of octane is 420 mm Hg. Assume Ideal gas]

1. 336 mm of Hg

2. 350 mm of Hg

3. 160 mm of Hg

4. 168 mm of Hg

Electrochemistry

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Electrode & Electrode Potential	13
Faraday's Law of Electrolysis	11
Relation between Emf ,G, Kc & pH	10
Kohlrausch Law & Cell Constant	8
Conductance & Conductivity	3
Batteries & Salt Bridge	2
Electrochemical Series	2
Electrolytic & Electro-Chemical Cell	2
Nernst Equation	2

1. The molar conductivity of a 0.5 mol/dm^3 solution of $AgNO_3$ with electrolytic conductivity of 5.76 x 10^{-3} Scm^{-1} at 298 K is -

1. $11.5\ Scm^2\ /\ mol$

2. $21.5\ Scm^2\ /\ mol$

3. $31.5\ Scm^2\ /\ mol$

4. $41.5\ Scm^2\ /\ mol$

2. During the electrolysis of molten sodium chloride, the time required to produce 0.10 mol of chlorine gas using a current of 3 amperes is

1. 55 minutes

2. 110 minutes

3. 220 minutes

4. 330 minutes

3.

In the electrochemical cell:
$Zn\ |\ ZnSO_4\ (0.01\ M)\ ||\ CuSO_4(1.0\ M)\ |\ Cu$, the emf of this Daniel cell is E_1. When the concentration of $ZnSO_4$ is changed to 1.0 M and that of $CuSO_4$ changed to 0.01M, the emf changes to E_2. From the followings, which one is the relationship between E_1 and E_2 ? (Given, $\frac{RT}{F} = 0.059$)

1. $E_1 < E_2$

2. $E_1 > E_2$

3. $E_2 = 0 \neq E_1$

4. $E_1 = E_2$

4. If the E_{cell} for a given reaction has a negative value, which of the following gives correct relationships for the values of ΔG^o and K_{eq}?

1. $\Delta G^o > 0;\ K_{eq} < 1$

2. $\Delta G^o > 0;\ K_{eq} > 1$

3. $\Delta G^o < 0;\ K_{eq} > 1$

4. $\Delta G^o < 0;\ K_{eq} < 1$

5. The number of electrons delivered at the cathode during electrolysis by a current of 1 ampere in 60 seconds is :

(Charge on electron = 1.60x 10^{-19}C)

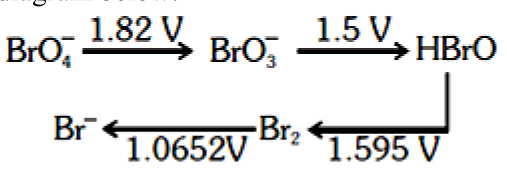
1. 6×10^{23}

2. 6×10^{20}

3. 3.75×10^{20}

4. 7.48×10^{20}

6.
Consider the change in oxidation state of Bromine corresponding to different emf values as shown in the diagram below:



Then the species undergoing disproportionation is:-

1. BrO_3^-

2. BrO_4^-

3. Br_2

4. HBrO

7.
The pressure of H_2 required to make the potential of H_2 -electrode zero in pure water at 298 K is :
1. 10^{-12}atm
2. 10^{-10}atm
3. 10^{-4}atm
4. 10^{-14}atm

8.

A device that converts energy of combustion of fuels like hydrogen and methane, directly into electrical energy is known as :

1. Fuel cell
2. Electrolytic cell
3. Dynamo
4. Ni-Cd cell

9. When 0.1 mol MnO_4^{2-} is oxidized the quantity of electricity required to completely oxidise MnO_4^{2-}- to MnO_4^{-} is :

1. 96500 C

2. 2 x 96500 C

3. 9650 C

4. 96.50 C

10. The weight of silver (at.wt. = 108) displaced by a quantity of electricity which displaces 5600 mL of O_2at STP will be :

1. 5.4 g

2. 10.8 g

3. 54.0 g

4. 108.0 g

11.
A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at one atm pressure. The oxidation potential of electrode would be :

1. 0.59 V
2. 0.118 V
3. 1.18 V
4. 0.059 V

12.
At 25 ºC molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 $ohm^{-1}cm^2\ mol^{-1}$ and at infinite dilution, its molar conductance is 238 $ohm^{-1}\ cm^2\ mol^{-1}$. The degree of ionization of ammonium hydroxide at the same concentration and temperature is :

1. 20.800%

2. 4.008%

3. 40.800%

4. 2.080%

13. A button cell used in watches functions as following

$Zn(s) + Ag_2O(s) + H_2O(l) \rightleftharpoons 2Ag(s) + Zn^{2+}(aq) + 2OH^-(aq)$

If half cell potentials are :

$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s); E^o = -0.76$ V

$Ag_2O(s) + H_2O(l) + 2e^- \rightarrow 2Ag(s) + 2OH^-(aq); E^o = 0.34$ V

The cell potential will be:

1. 0.42 V

2. 0.84 V

3. 1.34 V

4. 1.10 V

14. Limiting molar conductivity of NH_4OH (i.e., $\Lambda^0_{m(NH_4OH)}$ is equal to -

1. $\Lambda^0_{m(NaOH)} + \Lambda^0_{m(NaCl)} - \Lambda^0_{m(NaOH)}$

2. $\Lambda^0_{m(NaOH)} + \Lambda^0_{m(NaCl)} - \Lambda^0_{m(NH_4Cl)}$

3. $\Lambda^0_{m(NH_4OH)} + \Lambda^0_{m(NH_4Cl)} - \Lambda^0_{m(HCl)}$

4. $\Lambda^0_{m(NH_4Cl)} + \Lambda^0_{m(NaOH)} - \Lambda^0_{m(NaCl)}$

15.
Standard electrode potential of three metals X, Y and Z are -1.2 V, +0.5 V and -3.0 V respectively. The reducing power of these metals will be :

1. Y > X > Z

2. Z > X > Y

3. X > Y > Z

4. Y > Z > X

16.

If the E^0_{cell} for a given reaction has a negative value then which of the following gives the correct relationships for the values of ΔG^0 and K_{eq}?

1. $\Delta G^0 < 0;\ K_{eq} > 1$

2. $\Delta G^0 < 0;\ K_{eq} < 1$

3. $\Delta G^0 > 0;\ K_{eq} < 1$

4. $\Delta G^0 > 0;\ K_{eq} > 1$

17.
The electrode potentials for

$$Cu^{2+}(aq) + e^- \rightarrow Cu^+(aq)$$

and $Cu^+(aq) + e^- \rightarrow Cu(s)$

are +0.15 V and +0.50 V respectively. The value of $E^0_{Cu^{2+}/Cu}$ will be :

1. 0.325 V

2. 0.650 V

3. 0.150V

4. 0.500 V

18.
Standard electrode potential for Sn^{4+}/Sn^{2+} couple is +0.15 V and that for the Cr^{3+}/Cr couple is -0.74. These two couple in their standard state are connected to make a cell. The cell potential will be :

1. +0.89 V

2. +0.18 V

3. +1.83 V

4. +1.199 V

19. In producing chlorine by electrolysis 100 kW power a t 125 V is being consumed. How much chlorine per minute is liberated (ECE of chlorine is 0.367 X 10-6 kgC^{-1})

1. $1.76 \times 10^{-3}\ kg$

2. $9.67 \times 10^{-3}\ kg$

3. $17.61 \times 10^{-3}\ kg$

4. $3.67 \times 10^{-3}\ kg$

20. For the reduction of silver ions with copper metal, the standard cell potential was found to be + 0.46 V a t 25 °C. The value of standard Gibbs energy, ΔG^o will be :

(F = 96500C mol^{-1})

1. -89.0 kJ

2. -89.0 J

3. -44.5 kJ

4. -98.0 kJ

21.
$Al_2O_3$is reduced by electrolysis at low potentials and high currents. If 4.0 x 10^4 A of current is passed through molten Al_2O3 for 6 hours, what mass of aluminium is produced ? (Assume 100% current efficiency, at. mass of Al = 27 g mol^{-1})
1. 9.0 x 10^3 g
2. 8.1 X 10^4 g
3. 2.4 x 10^5 g
4. 1.3 X 10^4 g

22. The molar conductance of $\frac{M}{32}$ solution of a weak monobasic acid is 8.0 ohm^{-1} $cm^2$and at infinite dilution is 400 ohm^{-1} cm^2. The dissociation constant of this acid is :

1. 1.25×10^{-5}

2. 1.25×10^{-6}

3. 6.25×10^{-4}

4. 1.25×10^{-4}

23. Given,
(i) $Cu^{2+} + 2e^- \rightarrow Cu$ E^o = 0.337 V
(ii) $Cu^{2+} + e^- \rightarrow Cu^+$ E^o = 0.153 V
Electrode potential, E^0 for the reaction,
$Cu^+ + e^- \rightarrow Cu$, will be :

1. 0.52 V

2. 0.90 V

3. 0.30 V

4. 0.38 V

24.
Kohlrausch's law states that at :

1. Finite dilution, each ion makes definite contribution to equivalent conductance of an electrolyte, whatever be the nature of the other ion of the electrolyte.

2. Infinite dilution, each ion makes definite contribution to equivalent conductance of an electrolyte depending on the nature of the other ion of the electrolyte.

3. Infinite dilution, each ion makes definite contribution to conductance of an electrolyte whatever be the nature of the other ion of the electrolyte.

4. Infinite dilution, each ion makes definite contribution to equivalent conductance of an electrolyte, whatever be the nature of the other ion of the electrolyte.

25.
The sequence of ionic mobility in aqueous solution is :
1. $K^+ > Na^+ > Rb^+ > Cs^+$

2. $Cs^+ > Rb^+ > K^+ > Na^+$

3. $Rb^+ > K^+ > Cs^+ > Na^+$

4. $Na^+ > K^+ > Rb^+ > Cs^+$

26. A steady current of 1.5 A flows through a copper voltmeter for 10 min. If the electrochemical equivalent of copper is 30×10^{-5} gC^{-1}, the mass of copper deposited on the electrode will be :

1. 0.40 g

2. 0.50 g

3. 0.67 g

4. 0.27 g

27. The equilibrium constant of the reaction :
$Cu(s) + 2Ag^{+}(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$;
E^0=0.46 V at 298 K is :

1. 2.4×10^{10}

2. 2.0×10^{10}

3. 4.0×10^{10}

4. 4.0×10^{15}

28.
In producing chlorine through electrolysis 100 W power at 125 V is being consumed. Liberation of chlorine per min is -
(ECE of chlorine is 0.367×10^{-6} kg/C)
1. 17.6 mg
2. 21.3 mg
3. 24.3 mg
4. 13.6 mg

29. If $E^o_{Fe^{2+}/Fe}$ = -0.441 V and $E^o_{Fe^{3+}/Fe^{2+}}$ = 0.771 V, the standard emf of the reaction :

$Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$ will be :

1. 0.330 V

2. 1.653 V

3. 1.212 V

4. 0.111 V

30. A hypothetical electrochemical cell is shown below $A|A^{+}(xM) \,||\, B^{+}(yM)|\, B$
The Emf measured is +0.20V. The cell reaction is :

1. $A^{+} + B \rightarrow A + B^{+}$

2. $A^{+} + e^{-} \rightarrow A; B^{+} + e^{-} \rightarrow B$

3. The cell reaction cannot be predicted.

4. $A + B^{+} \rightarrow A^{+} + B$

31. For the cell reaction $2\,Fe^{3+}(aq) + 2I^{-}(aq) \rightarrow 2\,Fe^{2+}(aq) + I_2(aq)$

$E^{\ominus}_{cell} = 0.24$ V at 298 K. The standard Gibbs energy $(\Delta, G^{\ominus})$ of the cell reaction is:

[Given:$F = 96500$ C mol^{-1}]

1. 23.16 kJ mol^{-1}

2. -46.32 kJ mol^{-1}

3. -23.16 kJ mol^{-1}

4. 46.32 kJ mol^{-1}

32. For a cell involving one electron $E^{\ominus}_{cell} = 0.59V$ at 298 K, the equilibrium constant for the cell reaction is:
$\left[\text{Given that } \frac{2.303\ RT}{F} = 0.059\ V \text{ at } T = 298\ K\right]$

1. 1.0×10^{30}

2. 1.0×10^{2}

3. 1.0×10^{5}

4. 1.0×10^{10}

33. Following limiting molar conductivities are given as

$\lambda_m^0(H_2SO_4) = x\ Scm^2\ mol^{-1}$

$\lambda_m^0(K_2SO_4) = y\ Scm^2\ mol^{-1}$

$\lambda_m^0(CH_3COOK) = z\ Scm^2\ mol^{-1}$

$\lambda_m^0(in\ Scm^2\ mol^{-1})\ for\ CH_3COOH$ will be-

1. $x - y + 2z$

2. $x + y + z$

3. x-y+z

4. $\frac{(x-y)}{2} + z$

34. The number of Faradays (F) required to produce 20 g of calcium from molten $CaCl_2$ (Atomic mass of Ca=40 g mol^{-1}) is:

(1) 2

(2) 3

(3) 4

(4) 1

35. On electrolysis of dilute sulphuric acid using Platinum (Pt) electrode, the product obtained at the anode will be:

1. Oxygen gas

2. H_2S gas

3. SO_2 gas

4. Hydrogen gas

36. In a typical fuel cell, the reactants (R) and product (P) are :-

(1) $R = H_{2(g)},\ O_{2(g)};\ P = H_2O_{2(l)}$

(2) $R = H_{2(g)},\ O_{2(g)};\ P = H_2O_{(l)}$

(3) $R = H_{2(g)},\ O_{2(g)},\ Cl_2(g);\ P = HClO_{4(aq)}$

(4) $R = H_{2(g)},\ N_{2(g)};\ P = NH_{3(aq)}$

37. The Gibb's energy for the decomposition of Al_2O_3 at $500^\circ C$ is as follows:

$\frac{2}{3}Al_2O_3 \rightarrow \frac{4}{3}Al\ +\ O_2; \Delta rG\ =\ +960\ kJ\ mol^{-1}$

The potential difference needed for the electrolytic reduction of aluminium oxide (Al_2O_3) at $500^\circ C$ is at least,

1. 3.0 V

2. 2.5 V

3. 5.0 V

4. 4.5 V

38. Molar conductivities $(\wedge^\circ{}_m)$ at infinite dilution of NaCl, HCl and CH_3COONa are 126.4, 425.9 and 91.0 S $cm^2\ mol^{-1}$ respectively. $(\wedge^\circ{}_m)$ for CH_3COOH will be:

1. $180.5\ S\ cm^2 mol^{-1}$

2. $290.8\ S\ cm^2 mol^{-1}$

3. $390.5\ S\ cm^2 mol^{-1}$

4. $425.5\ \ S\ cm^2 mol^{-1}$

39. The correct expression that represents the equivalent conductance at infinite dilution of $Al_2(SO_4)_3$ is: (Given that $\wedge^\circ_{Al^{3+}}$ and $\wedge^\circ_{SO_4^{2-}}$ are the equivalent conductances at infinite dilution of the respective ions)

1. $\wedge^\circ_{Al^{3+}} + \wedge^\circ_{SO_4^{2-}}$

2. $\left(\wedge^\circ_{Al^{3+}} + \wedge^\circ_{SO_4^{2-}}\right)\times 6$

3. $\frac{1}{3}\wedge^\circ_{Al^{3+}} + \frac{1}{2}\wedge^\circ_{SO_4^{2-}}$

4. $2\wedge^\circ_{Al^{3+}} + 3\wedge^\circ_{SO_4^{2-}}$

40. Consider the following relations for emf of a electrochemical cell :
(a) emf of cell = (Oxidation potential of anode) – (Reduction potential of cathode)
(b) emf of cell = (Oxidation potential of anode) + (Reduction potential of cathode)
(c) emf of cell = (Reduction potential of anode) + (Reduction potential of cathode)
(d) emf of cell = (Oxidation potential of anode) – (Oxidation potential of cathode)

The correct relation among the given options is :

1. (a) and (b)

2. (c) and (d)

3. (b) and (d)

4. (c) and (a)

41. The concentration of $ZnCl_2$ solution will change when it is placed in a container which is made of :
1. Al
2. Cu
3. Ag
4. None

42. The cell reaction of an electrochemical cell is $Cu^{2+}(C_1) + Zn \rightarrow Cu + Zn^{2+}(C_2)$.

The change in free energy will be the function of :

1. $ln(C_1 + C_2)$
2. $ln(\frac{C_2}{C_1})$
3. lnC_2
4. lnC_1

43. 4.5g of aluminium (at. mass 27 amu) is deposited at cathode from Al^{3+} solution by a certain quantity of electric charge. The volume of hydrogen produced at STP from H^+ ions in solution by the same quantity of electric charge will be -

(1) 44.8L

(2) 11.2L

(3) 22.4L

(4) 5.6L

44. For the disproportionation of copper :

$2Cu^+ \rightarrow Cu^{+2} + Cu,\ E^\circ$ is :-
(Given E° for Cu^{+2}/Cu is 0.34 V & E^o for Cu^{+2}/Cu^+ is 0.15 V)

1. 0.49 V

2. – 0.19 V

3. 0.38 V

4. – 0.38 V

45. Cell reaction is spontaneous when :

1. ΔG^o is negative

2. ΔG^o is positive

3. E°_{Red} is positive

4. E°_{Red} is negative

46. At infinite dilution equivalent conductances of Ba^{+2} & Cl^{-} ions are 127 & 76 $ohm^{-1}cm^{-1}$ eq^{-1} respectively. Equivalent conductance ($ohm^{-1}cm^{-1}$ eq^{-1})of $BaCl_2$ at infinite dilution is :

1. 139.5

2. 101.5

3. 203

4. 279

47. The value of E^0 cell for the following reaction is -

$Cu^{2+} + Sn^{2+} \rightarrow Cu + Sn^{4+}$

(Given , equilibrium constant is 10^6)

1. 0.17
2. 0.01
3. 0.05
4. 1.77

48. The standard Emf of a galvanic cell involving cell reaction with n = 2 is found to be 0.295 V at 25ºC. The equilibrium constant of the reaction would be :-

(Given F = 96500 C mol^{-1}; R = 8.314 JK^{-1} mol^{-1})

1. 4.0×10^{12}

2. 1.0×10^{2}

3. 1.0×10^{10}

4. 2.0×10^{11}

49. In electrolysis of NaCl when Pt electrode is taken then H_2 is liberated at cathode while with Hg cathode it forms sodium amalgam : -

(1) Hg is more inert than Pt

(2) More voltage is required to reduce H^+ at Hg than at Pt

(3) Na is dissolved in Hg while it does not dissolve in Pt

(4) Concentration of H^+ ions is larger when Pt electrode is taken.

50. On the basis of the information available from the reaction :

$\frac{4}{3}Al + O_2 \rightarrow \frac{2}{3}Al_2O_3, \ \Delta G = -827 \ KJ \ mol^{-1}$

of O_2, the minimum e.m.f. required to carry out electrolysis of Al_2O_3 is : (F=96500 C mol^{-1})

(1) 2.14 V

(2) 4.28 V

(3) 6.42 V

(4) 8.56 V

51. The EMF of a Daniel cell at 298 K is E_1 Zn|$ZnSO_4$(0.01 M) || $CuSO_4$(1.0 M)|Cu .
When the concentration of $ZnSO_4$ is 1.0 M and that of $CuSO_4$ is 0.01 M, the EMF is changed to E_2. The correct relationship between E_1 and E_2 is :

1. $E_1 > E_2$

2. $E_1 < E_2$

3. $E_1 = E_2$

4. $E_2 = 0 \neq E1$

52. The molar conductance of NaCl, HCI, and CH_3COONa at infinite dilution are 126.45, 426.16, and 91.0 S cm mol^{-1} respectively. The molar conductance of CH_3COOH at infinite dilution is. Choose the right option for your answer.

1. 698.28 S cm^2 mol^{-1}

2. 540.48 S cm^2 mol^{-1}

3. 201.28 S cm^2 mol^{-1}

4. 390.71 S cm^2 mol^{-1}

53. The molar conductivity of 0.007 M acetic acid is 20 S cm^2 mol^{-1}. The dissociation constant of acetic acid is -

$\left[\Lambda^\circ{}_{H^+} = 350 \text{ S cm}^2 \text{ mol}^{-1}\right]$

$\left[\Lambda^\circ{}_{CH_3COO^-} = 50 \text{ S cm}^2 \text{ mol}^{-1}\right]$

1. 1.75×10^{-5} mol L^{-1}

2. 2.50×10^{-5} mol L^{-1}

3. 1.75×10^{-4} mol L^{-1}

4. 2.50×10^{-4} mol L^{-1}

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CHEMICAL KINETICS

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Definition, Rate Constant, Rate Law	20
First Order Reaction Kinetics	20
Arrhenius Equation	12
Order, Molecularity and Mechanism	8

1. A first order reaction has a specific reaction rate of 10^{-2} sec^{-1}. How much time will it take for 20g of the reactant to reduce to 5 g?

1. 138.6 sec

2. 346.5 sec

3. 693.0 sec

4. 238.6 sec

2. Which one of the following statements is not correct?

1. The value of equilibrium constant is changed in the presence of a catalyst in the reaction at equilibrium.

2. Enzymes catalyse mainly bio-chemical reactions

3. Coenzymes increase the catalytic activity of enzyme

4. Catalyst does not initiate any reaction

3. The correct difference between first- and second-order reactions is that

1. the rate of a first-order reaction does not depend on reactant concentration; the rate of a second-order reaction does depend on reactant concentrations.

2. the half-life of a first-order reaction does not depend on $[A]_o$; the half-life of a second-order reaction does depend on $[A]_0$

3. a first-order reaction can be catalyzed; a second-order reaction cannot be catalyzed.

4. the rate of a first-order reaction does depend on reactant concentrations; the rate of a second-order reaction does not depend on reactant concentrations

4.
When initial concentration of the reactant is doubled, the half-life period of a zero order reaction
1. is halved
2. is doubled
3. is tripled
4. remains unchanged

5.
The addition of a catalyst during a chemical reaction alters which of the following quantities?
1. Internal energy
2. Enthalpy
3. Activation energy
4. Entropy

6.
The rate of a first-order reaction is 0.04 mol l^{-1} s^{-1} at 10 seconds and 0.03 mol l^{-1} s^{-1} at 20 seconds after initiation of the reaction. The half-life period of the reaction is:
1. 44.1 s
2. 54.1 s
3. 24.1 s
4. 34.1 s

7. The rate Constant of reaction $A \rightarrow B$ is 0.6 X 10^{-3} mole per second. If the Concentration of A is 5, then concentration of B after 20 min is

1. 1.08M

2. 3.60M

3. 0.36M

4. 0.72M

8.

The activation energy of a reaction can be determined from the slope of which of the following graphs?
1. ln K vs T
2. ln $\frac{K}{T}$ vs T
3. ln K vs $\frac{I}{T}$
4. ln $\frac{T}{K}$ vs $\frac{I}{T}$

9.

When initial concentration of a reactant is doubled in a reaction, its half-life period is not affected. The order of the reaction is :

1. 0

2. 1

3. 1.5

4. 2

10.
What is the activation energy for a reaction if its rate doubles when the temperature is raised from 20^oC to 35^oC? ($R = 8.314\ J\ mol^{-1}\ K^{-1}$)
1. $269\ kJ\ mol^{-1}$
2. $34.7\ kJ\ mol^{-1}$
3. $15.1\ kJ\ mol^{-1}$
4. $342\ kJ\ mol^{-1}$

11.
A reaction having equal energies of activation for forward and reverse reaction has:

1. $\Delta G = 0$

2. $\Delta H = 0$

3. $\Delta H = \Delta G = \Delta S = 0$

4. $\Delta S = 0$

12. In a reaction, A + B Product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled. Rate law for the reaction can be written as

1. $Rate\ = k[A][B]^2$

2. $Rate\ = k[A]^2[B]^2$

3. $Rate\ = k[A][B]$

4. $Rate\ = k[A]^2[B]$

13. In a zero order reaction for every 10 ° rise of temperature, the rate is doubled. If the temperature is increased from 10 °C to 100 °C, the rate of the reaction will become

1. 256 times

2. 512 times

3. 64 times

4. 128 times

14.
The incorrect statement regarding order of reaction is:

1. Order is not influenced by the stoichiometric coefficient of the reactants.

2. Order of reaction is the sum of power to the concentration terms of reactants to express the rate of reaction.

3. Order of reaction is always whole number.

4. Order can be determined by experiments only.

15. For the reaction,
$N_2O_5(g) \rightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$
the value of rate of disappearance of N_2O_5 is given as 6.25 x 10^{-3} mol $L^{-1}s^{-1}$. The rate of formation of NO_2 and O_2 is given respectively as

1. $6.25 \times 10^{-3} mol\ L^{-1}s^{-1}\ and\ 6.25 \times 10^{-3} mol\ L^{-1}s^{-1}$.

2. $1.25 \times 10^{-2} mol\ L^{-1}s^{-1}\ and\ 3.125 \times 10^{-3} mol\ L^{-1}s^{-1}$.

3. $6.25 \times 10^{-3} mol\ L^{-1}s^{-1}\ and\ 3.125 \times 10^{-3} mol\ L^{-1}s^{-1}$.

4. $1.25 \times 10^{-2} mol\ L^{-1}s^{-1}\ and\ 6.25 \times 10^{-3} mol\ L^{-1}s^{-1}$.

16. For an endothermic reaction, the energy of activation is E_a, and the enthalpy of reaction is ΔH (both of these in kJ/mol). The minimum value of E_a will be

1. Less than ΔH

2. Equal to ΔH

3. More than ΔH

4. Equal to zero

17.

During the kinetic study of the reaction, 2A + B→C + D, following results were obtained

Run	[A]/ mol L^{-1}	[B]/ mol L^{-1}	Initial rate of formation of D/mol L^{-1}
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.40×10^{-2}

Based on the above data which one of the following is correct?

1. rate= $k[A]^2[B]$

2. rate= $k[A][B]$

3. rate= $k[A]^2[B]^2$

4. rate= $k[A][B]^2$

18. Half-life period of a first order reaction is 1386 s. The specific rate constant of the reaction is

1. $5.0 \times 10^{-3} s^{-1}$

2. $0.5 \times 10^{-2} s^{-1}$

3. $0.5 \times 10^{-3} s^{-1}$

4. $5.0 \times 10^{-2} s^{-1}$

19. For the reaction, A + B → products, it is observed that
(1) On doubling the initial concentration of A only, the rate of reaction is also doubled and
(2) On doubling the initial concentrations of both A and B, there is a change by a factor of 8 in the rate of the reaction.
The rate of this reaction is, given by

1. $rate = k\,[A]^2[B]$

2. $rate = k\,[A][B]^2$

3. $rate = k\,[A]^2[B]^2$

4. $rate = k\,[A][B]$

20. For the reaction, $N_2 + 3H_2 \rightarrow 2NH_3$, if $\frac{d[NH_3]}{dt}$=2 x 10^{-4} mol $L^{-1}s^{-1}$, the value of $\frac{-d[H_2]}{dt}$ would be :

1. $3 \times 10^{-4}\ mol\ L^{-1}\ s^{-1}$

2. $4 \times 10^{-4}\ mol\ L^{-1}\ s^{-1}$

3. $6 \times 10^{-4}\ mol\ L^{-1}\ s^{-1}$

4. $1 \times 10^{-4}\ mol\ L^{-1}\ s^{-1}$

21. In the reaction,
$BrO_3^-(aq) + 5\,Br^-(aq) + 6H^+ \rightarrow 3Br_2(l) + 3H_2O(l)$
The rate of appearance of bromine (Br_2) is related to rate of disappearance of bromide ions as following

1. $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$

2. $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br]}{dt}$

3. $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$

4. $\frac{d[Br_2]}{dt} = \frac{3}{5}\frac{d[Br^-]}{dt}$

22. The rate constants k_1 and k_2 for two different reactions are 10^{16}. $e^{-2000/T}$ and 10^{15}. $e^{-1000/T}$, respectively. The temperature at which $k_1 = k_2$ is

1. 1000 K

2. $\frac{2000}{2.303}$ K

3. 2000 K

4. $\frac{1000}{2.303}$ K

23. The bromination of acetone occurs in acid solution is represented by this equation.
$CH_3COCH_3(aq) + Br_2(aq) \rightarrow$
$CH_3COCH_2Br(aq) + H^+(aq) + Br^-(aq)$
These kinetic data were obtained for given reaction concentrations.
Initial concentrations, M

$[CH_3COCH_3]$	$[Br_2]$	$[H^+]$
0.30	0.05	0.05
0.30	0.10	0.05
0.30	0.10	0.10
0.40	0.05	0.20

Initial rate, disappearance of Br_2, Ms^{-1}

5.7×10^{-5}

5.7×10^{-5}

1.2×10^{-4}

3.1×10^{-4}

Based on the above data, the rate equation is

1. Rate $= k\,[CH_3COCH_3]\,[H^+]$

2. Rate $= k\,[CH = COCH_3]\,[Br_2]$

3. Rate $= k\,[CH_3COCH_3]\,[Br_2]\,[H^+]^2$

4. Rate $= k\,[CH_3COCH_3]\,[Br_2]\,[H^+]$

24. The reaction of hydrogen and iodine monochloride is given as :
$H_2(g) + 2ICl(g) \rightarrow 2HCl(g) + I_2(g)$
This reaction is of first order with respect to $H_2(g)$ and $ICl(g)$, following mechanisms were proposed :
Mechanism A :
$H_2(g) + 2ICl(g) \rightarrow 2HCl(g) + I_2(g)$
Mechanism B :
$H_2(g) + ICl(g) \rightarrow HCl(g) + HI(g)$; slow
$HI(g) + ICl(g) \rightarrow HCl(g) + I_2(g)$; fast

1. B Only
2. A and B both
3. Neither A nor B
4. A only

25. In a first order reaction $A \rightarrow B$, if k is rate constant and initial concentration of the reactant A is 0.5 M then the half-life is :

1. $\frac{0.693}{0.5k}$
2. $\frac{\log 2}{k}$
3. $\frac{\log\ 2}{k\sqrt{0.5}}$
4. $\frac{In\ 2}{k}$

26. If 60% of a first order reaction was completed in 60 min, 50% of the same reaction would be completed in approximately:
(log 4 = 0.60, log 5 = 0.69)

1. 50 min
2. 45 min
3. 60 min
4. 40 min

27. For the reaction ,

$2A + B \rightarrow 3C + D$

Incorrect expression for rate of reaction is:

1. $-\frac{d[C]}{3\,dt}$
2. $-\frac{d[B]}{dt}$
3. $\frac{d[D]}{dt}$
4. $-\frac{d[A]}{2dt}$

28. Consider the reaction
$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
The equality relationship between $\frac{d[NH_3]}{dt}$ and $-\frac{d[H_2]}{dt}$ is :

1. $\frac{d[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$
2. $+\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$
3. $+\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$
4. $+\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$

29. If the rate constant for a first order reaction is k, the time (t) required for the completion of 99% of the reaction is given by:

1. t=2.303/k
2. t=0.693/k
3. t=6.909/k
4. t=4.606/k

30. For the chemical reaction $N_2(g)+3H_2(g) \rightleftharpoons 2NH_3(g)$ the correct option is:

1. $3\frac{d[H_2]}{dt} = 2\frac{d[NH_3]}{dt}$

2. $-\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$

3. $-\frac{d[N_2]}{dt} = 2\frac{d[NH_3]}{dt}$

4. $-\frac{d[N_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

31. A first order reaction has a rate constant of 2.303 $\times 10^{-3}$ s^{-1}. The time required for 40 g of this reactant to reduce to 10 g will be [Given that $\log_{10} 2 = 0.3010$]

(1) 230.3 s

(2) 301 s

(3) 2000 s

(4) 602 s

32. For a reaction, activation energy $E_a = 0$ and the rate constant at 200 K is $1.6\ X\ 10^6 s^{-1}$. The rate constant at 400K will be [Given that gas constant, R=8.314 J $K^{-1}\ mol^{-1}$]

(1) $3.2\ x\ 10^4 s^{-1}$

(2) $1.6\ x\ 10^6 s^{-1}$

(3) $1.6\ \ x\ 10^3 s^{-1}$

(4) $3.2\ x\ 10^6 s^{-1}$

33. The rate constant for a first order reaction is $4.606 \times 10^{-3}\ s^{-1}$. The time required to reduce 2.0 g of the reactant to 0.2 g is:

1. 200 s

2. 500 s

3. 1000 s

4. 100 s

34. An increase in the concentration of the reactants of a reaction leads to change in:

(1) heat of reaction

(2) threshold energy

(3) collision frequency

(4) activation energy

35. The half-life for a zero order reaction having 0.02 M initial concentration of reactant is 100 s. The rate constant (in mol L^{-1} s^{-1}) for the reaction is

(1) 1.0×10^{-4}

(2) 2.0×10^{-4}

(3) 2.0×10^{-3}

(4) 1.0×10^{-2}

36. The unit of rate constant for a zero-order reaction is -

1. s^{-1}

2. mol $L^{-1}s^{-1}$

3. L mol^{-1} s^{-1}

4. L^2 mol^{-2} s^{-1}

37. The half life of a certain enzyme catalysed reaction is 138 s, that follow the 1st order kinetics.The time required for the concentration of the substance to fall from 1.28 mg L^{-1} to 0.04 mg L^{-1}, is-

1. 276 s

2. 414 s

3. 552 s

4. 690 s

38. The rate of the reaction $2N_2O_5 \rightarrow 4\,NO_2 + O_2$ can be written in three ways:

$$\frac{-d[N_2O_5]}{dt} = k[N_2O_5]$$
$$\frac{d[NO_2]}{dt} = k'[N_2O_5]$$
$$\frac{d[O_2]}{dt} = k''[N_2O_5]$$

The relationship between k and k′ and between k and k″ are-

1. k′ = k, k″= k

2. k′= 2k; k″= k

3. k′= 2k, k″= k/2

4. k′ = 2k; k″= 2k

39. The rate of the reaction

$2NO + Cl_2 \rightarrow 2NOCl$ is given by the rate equation

rate = $k[NO]^2[Cl_2]$

The value of the rate constant can be increased by -

1. Increasing the concentration of NO.
2. Increasing the concentration of the Cl_2
3. Increasing the temperature
4. All of the above.

40. A 300 gram radioactive sample has half life of 3 hour's. After 18 hour's remaining quantity will be :

1. 4.68 gram

2. 2.34 gram

3. 3.34 gram

4. 9.37 gram

41. The rate of reaction between two reactants A and B decreases by a factor of 4 if the concentration of reactant B is doubled. The order of this reaction with respect to reactant B is :-

(1) 2

(2) –1

(3) 1

(4) –2

42. For a first-order reaction A → B the reaction rate at a reactant concentration of 0.01M is found to be 2.0×10^{-5} mole $L^{-1}\,s^{-1}$. The half-life period of the reaction is:-

1. 300s

2. 30s

3. 220s

4. 347s

43. The concentration of a solution is changed from 0.2 to 0.4, then what will be rate and rate constant. The reaction is of first order and rate constant is $K = 1 \times 10^{-6}$:

1. 2×10^{-7} ; 1×10^{-6}

2. 1×10^{-7} ; 1×10^{6}

3. 4×10^{-7} ; 1×10^{-6}

4. 2×10^{-3} ; 1×10^{-3}

44. Half life of a radioactive sample is 4 days. After 16 days how much quantity of matter remain undecayed :

1. $\frac{1}{4}$

2. $\frac{1}{8}$

3. $\frac{1}{16}$

4. $\frac{1}{32}$

45. The rate of a first-order reaction is 1.5×10^{-2} mol L^{-1} min^{-1} at 0.5 M concentration of the reactant. The half life of the reaction is:-

(1) 23. 1min

(2) 8.73 min

(3) 7.53 min

(4) 0.383 min

46. The bombardment of α-particle on N_7^{14} emits proton then new atom will be :

1. O_8^{17}

2. O_8^{16}

3. C_6^{14}

4. Ne

47. Half life of a substance is 77 days then it's decay constant (days^{-1}) will be :

1. 0.9
2. 0.09
3. 0.009
4. 0.013

48. For the reaction $H^+ + BrO_3^- + 3Br^- \to 5Br_2 + H_2O$ the correct representation of the consumption & formation of reactants and products is :

1. $\frac{d[Br^-]}{dt} = -\frac{3}{5}\frac{d[Br_2]}{dt}$

2. $\frac{d[Br^-]}{dt} = \frac{3}{5}\frac{d[Br_2]}{dt}$

3. $\frac{d[Br^-]}{dt} = -\frac{5}{3}\frac{d[Br_2]}{dt}$

4. $\frac{d[Br^-]}{dt} = \frac{5}{3}\frac{d[Br_2]}{dt}$

49. ${}_{92}U^{235}$, nucleus absorb a neutron and disintegrate in ${}_{54}Xe^{139}$, ${}_{38}Sr^{94}$ and x . The product x is : -

(1) 3 - neutrons

(2) 2 - neutrons

(3) α - particle

(4) β - particle

50. $3A \to 2B$, rate of reaction $\frac{+d[B]}{dt}$ is equal to :-

1. $-\frac{3}{2}\frac{d[A]}{dt}$

2. $-\frac{2}{3}\frac{d[A]}{dt}$

3. $-\frac{1}{3}\frac{d[A]}{dt}$

4. $+2\frac{d[A]}{dt}$

51. $2A \to B + C$; It would be a zero order reaction when : -

(1) The rate of reaction is proportional to square of concentration of A

(2) The rate of reaction remains same at any concentration of A

(3) The rate remains unchanged at any concentration of B and C

(4) The rate of reaction doubles if concentraion of B is increased to double.

52. For the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$ rate and rate constant are 1.02×10^{-4} and 3.4×10^{-5} sec^{-1} respectively, then the concentration of N_2O_5 at that time will be : -

1. 1.732 mol L^{-1}

2. 3.0 mol L^{-1}

3. 1.02×10^{-4} mol L^{-1}

4. 3.4×10^{5} mol L^{-1}

53. When a biochemical reaction is carried out in a laboratory outside the human body in the absence of enzyme, then the rate of reaction obtained is 10^{-6} times, then activation energy of reaction in the presence of enzyme is : -

1. $\frac{6}{RT}$
2. P is required.
3. Different from, E_a obtained in laboratory.
4. Data is insufficient.

54. The activation energy for a simple chemical reaction A → B is E_a in forward direction. The activation energy for reverse reaction :

(1) Is negative of E_a

(2) Is always less than E_a

(3) Can be less than or more than E_a

(4) Is always double of E_a

55. The reaction A → B follows first order kinetics. The time taken for 0.8 mole of A to produce 0.6 mole of B is 1 hour. The time taken for conversion of 0.9 mole of A to produce 0.675 mole of B is :

(1) 1 hour

(2) 0.5 hour

(3) 0.25 hour

(4) 2 hour

56. The following equilibria are given :

$N_2 + 3H_2 \rightleftharpoons 2NH_3 \quad K_1$
$N_2 + O_2 \rightleftharpoons 2NO \quad K_2$
$H_2 + \frac{1}{2}O_2 \rightleftharpoons H_2O \quad K_3$

The equilibrium constant of the reaction

$2NH_3 + \frac{5}{2}O_2 \rightleftharpoons 2NO + 3H_2O$ in terms of K_1, K_2 and K_3 is:

1. $K_1K_2K_3$

2. $\frac{K_1K_2}{K_3}$

3. $\frac{K_1K_3^2}{K_2}$

4. $\frac{K_2K_3^3}{K_1}$

57. If the rate of the reaction is equal to the rate constant, the order of the reaction is -

(1) 0

(2) 1

(3) 2

(4) 3

58. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation,
$k = A.e^{-E^*/RT}$. Activation energy (E*) of the reaction can be calculated by plotting :

1. k vs T

2. k vs $\frac{1}{\log T}$

3. log k vs $\frac{1}{T}$

4. log k vs $\frac{1}{\log T}$

59. The radioisotope, tritium $\left({}_{1}^{3}H\right)$ has a half-life of 12.3 years. If the initial amount of tritium is 32 mg, how many milligrams of its would remain after 49.2 years :

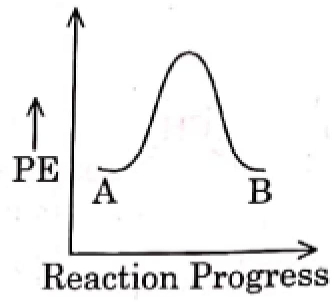
1. 1 mg

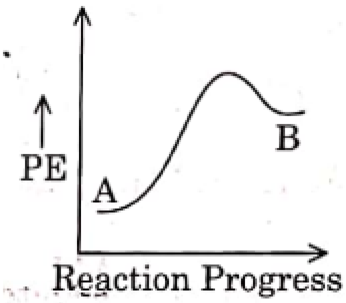
2. 2 mg

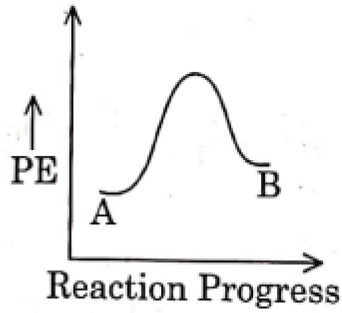
3. 4 mg

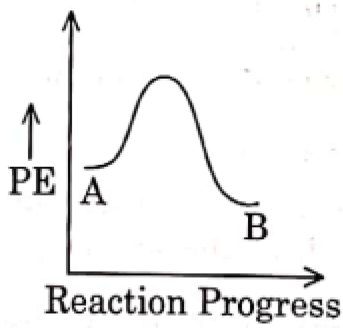
4. 8 mg

60. For a reaction A→B, enthalpy of reaction is $-4.2\ \mathrm{kJ\ mol^{-1}}$ and enthalpy of activation is $9.6\ \mathrm{kJ\ mol^{-1}}$. The correct potential energy profile for the reaction is shown in option.

1. 

2. 

3. 

4. 

61. The slope of Arrhenius Plot (ln k v/s $\frac{1}{T}$) of the first-order reaction is -5×10^3 K. The value of E_a of the reaction is-

[Given R=8.314 JK^{-1} mol^{-1}]

1. 166 kJ mol^{-1}

2. -83 kJ mol^{-1}

3. 41.5 kJ mol^{-1}

4. 83.0 kJ mol^{-1}

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SURFACE CHEMISTRY

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Colloidal Solution	14
Adsorption and Absorption	4
Adsorption Isotherm	3
Catalyst	3

1. The coagulation values in millimoles per litre of the electrolytes used for the coagulation of $As_2S_3$are given below
I. (NaCl)= 52, II. ($BeCl_2$) = 0.69 , III. ($MgSO_4$) = 0.22

The correct order of their coagulating power is-

1. I>II>III

2. II>I>III

3. III>II>I

4. III>I>II

2.
Coagulating power of an ion depends on -

1. The magnitude of the charge on the alone.
2. Size of the ion alone.
3. Both magnitude and sign of the charge the ion.
4. The sign of the charge on the ion alone.

3.
The characteristics associated with adsorption is -

1. ΔG, ΔH and ΔS all are negative.

2. ΔG and ΔH are negative but ΔS is positive.

3. ΔG and ΔS are negative but ΔH is positive.

4. ΔG is negative but ΔH and ΔS are positive.

4.
Fog is a colloidal solution of -

1. Gas in liquid

2. Solid in gas

3. Gas in gas

4. Liquid in gas

5.

Which property of colloidal solution is independent of charge on the colloidal particles?
1. Coagulation
2. Electrophoresis
3. Electroosmosis
4. Tyndall effect

6. Which property of colloids is not dependent on the charge on colloidal particles ?

1. Coagulation

2. Electrophoresis

3. Electro-osmosis

4. Tyndall effect

7. In Freundlich adsorption isotherm, the value of 1/n is -

1. Between 0 and 1 in all cases.

2. Between 2 and 4 in all cases.

3. 1 in case of physical adsorption.

4. 1 in case of chemisorption.

8. Which one of the following statements is incorrect about enzyme catalysis?

1. Enzymes are mostly proteinous in nature.

2. Enzyme action is specific.

3. Enzymes are denaturized by ultraviolet rays at high temperature.

4. Enzymes are least reactive at optimum temperature.

9. If x is amount of adsorbate and m is amount of adsorbent, which of the following relations is not related to adsorption process?

1. $\frac{x}{m} = f(T)$ at constant P

2. $p = f(T)$ at constant (x/m)

3. $\frac{x}{m} = p \times T$

4. $\frac{x}{m} = f(p)$ at constant T

10. A plot of log *x*/*m* *versus* log *p* for the adsorption of a gas on a solid gives a straight line with slope equal to :

1. log k

2. n

3. $\frac{1}{n}$

4. log 1/k

11. Which mixture of the solutions will lead to the formation of negatively charged colloidal $[AgI]I^-$ sol?

1. 50 mL of 0.1 M $AgNO_3$ + 50 mL of 0.1 M KI

2. 50 mL of 1 M $AgNO_3$ + 50 mL of 0.5 M KI

3. 50 mL of 1 M $AgNO_3$ + 50 mL of 2 M KI

4. 50 mL of 2M $AgNO_3$ + 50 mL of 1.5 M KI

12. The correct option representing a Freundlich adsorption isotherm is-

(1) $\frac{x}{m} = kp^{0.3}$

(2) $\frac{x}{m} = kp^{2.5}$

(3) $\frac{x}{m} = kp^{-0.5}$

(4) $\frac{x}{m} = kp^{-1}$

13. Measuring Zeta potential is useful in determining the following property of colloidal solution -

1. Solubility.

2. Stability of the colloidal particles.

3. Size of the colloidal particles.

4. Viscosity.

14. In which of the sols, the colloidal particles are with a negative charge?

(1) TiO_2

(2) Hemoglobin

(3) Starch

(4) Hydrated Al_2O_3

15. Which one of the following forms micelles in aqueous solution above certain concentration -

(1) Glucose

(2) Urea

(3) Dodecy1 trimetly1 ammonium chloride

(4) Pyridinium chloride

16. At the critical micelle concentration (CMC) the surfactant molecules :
1. Associate
2. Dissociate
3. Decompose
4. Become completely soluble

17. According to hardy Schultze law the order of coagulation power of cations will be

1. $Na^+ > Ba^{+2} > Al^{+3}$

2. $Al^{+3} > Ba^{+2} > Na^+$

3. $Ba^{+2} > Al^{+3} > Na^+$

4. $Al^{+3} > Na^+ > Ba^{+2}$

18. Which one of the following method is commonly used method for destruction of colloid :

1. Dialysis

2. Condensation

3. Filteration by animal membrane

4. By adding electrolyte

19. Position of the nonpolar & polar part in Micelle is-

(1) Polar at the outer surface but non-polar at an inner surface

(2) Polar at inner surface non-polar at an outer surface

(3) Distributed over all the surface

(4) Are present on the surface only

20. Which of the following is correct : -
1. Cyclo heptane is an aromatic compound
2. Diastase is an enzyme
3. Acetophenone is an ether
4. All the above

21. Which is not correct regarding the adsorption of a gas on the surface of solid: -
1. On increasing temperature adsorption increase continuously
2. Enthalpy & entropy change is negative
3. Adsorption is more for some specific substance
4. Reversible

22. According to the adsorption theory of catalysis, the speed of the reaction increase because :

(1) The concentration of reactant molecules at the active centers of the catalyst becomes high due to adsorption

(2) In the process of adsorption, the activation energy of the molecules becomes large

(3) Adsorption produces heat which increases the speed of the reaction

(4) Adsorption lowers the activation energy of the reaction.

23. The right option for the statement "Tyndall effect is exhibited by", is:

1. Starch solution

2. Urea solution

3. NaCl solution

4. Glucose solution

General Principles & Processes of Isolation of Elements

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Introduction - Flux, Leaching, Roasting & Calcination	10
Metallurgy of individual elements	5
Refining Process	3
Ellingham Diagram	1

1. Extraction of gold and silver involves leaching with CN^- ion. Silver is later recovered by:

1. Distillation
2. Zone refining
3. Displacement with Zn
4. Liquation

2. Considering Ellingham diagram, which of the following metals can be used to reduce alumina?

1. Fe.
2. Zn
3. Mg
4. Cu

3.
Match items of Column I with the items of Column II and assign the correct code.

Column I	Column II
A) Cyanide process	1) Ultra pure Ge
B) Froth floatation Process	2) Dressing of ZnS
C) Electrolytic Reduction	3) Extraction of Al
D) Zone refining	4) Extracting of Au

1. A-2, B-3, C-1, D-4
2. A-1, B-2, C-3, D-4
3. A-3, B-4, C-2, D-1
4. A-4, B-2, C-3, D-1

4. In the extraction of copper from its sulphide ore, the metal finally obtained by the reduction of cuprous oxide with

1. Iron (II) sulphide
2. Carbon monoxide
3. Copper (I) sulphide
4. Sulphur dioxide

5.
Roasting of sulphides gives the gas X as a by-product. This is a colorless gas with choking smell of burnt sulphur and caused great damage to respiratory organs as a result of acid rain. Its aqueous solution is acidic, acts as a oxidizing agent and its acid has never been isolated. The gas X is:

1. SO_2
2. CO_2
3. SO_3
4. H_2S

6. Aluminium is extracted from alumina Al_2O_3 by electrolysis of a molten mixture of :

1. $Al_2O_3 + HF + NaAlF_4$
2. $Al_2O_3 + CaF_2 + NaAlF_4$
3. $Al_2O_3 + Na_3AlF_6 + CaF_2$
4. $Al_2O_3 + KF + Na_3AlF_6$

7. Which one of the following is a mineral of iron?

1. Malachite
2. Cassiterite
3. Pyrolusite
4. Magnetite

8. In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide with

1. Copper (l) sulphide (Cu_2S)

2. Sulphur dioxide (SO_2)

3. Iron Sulphide (FeS)

4. Carbon monoxide (CO)

9.
Which of the following elements is present as the impurity to the maximum extent in the pig Iron?

1. Carbon

2. Silicon

3. Phosphorus

4. Manganese

10.
A pair of metals that can be purified by van Arkel method is -

1. Zr and Ti

2. Ag and Au

3. Ni and Fe

4. Ga and In

11. Sulphide ores of metals are usually concentrated by froth flotation process. Which one of the following sulphide ores offers an exception and is concentrated by chemical leaching?

1. Argentite

2. Galena

3. Copper pyrite

4. Sphalerite

12. Which one is malachite from the following?

1. $CuCO_3 . Cu(OH)_2$

2. $CuFeS_2$

3. $Cu(OH)_2$

4. Fe_3O_4

13. Identify the incorrect statement

1. The scientific and technological process used for isolation of the metal from its ore is known as metallurgy

2. Minerals are naturally occurring chemical substances in the earth's crust

3. Ores are minerals that may contain a metal

4. Gangue is an ore contaminated with undesired materials

14. The correct statement among the following is :

1. Blister copper has blistered appearance due to evolution of CO_2

2. Vapour phase refining is carried out for Nickel by Van Arkel method.

3. Pig iron can be moulded into a variety of shapes.

4. Wrought iron is impure iron with 4% carbon.

15. The following reactions take place in the blast furnace in the preparation of impure iron.
Identify the reaction pertaining to the formation of the slag.

1. $2C(s) + O_2(g) \rightarrow 2CO\ (g)$
2. $Fe_2O_3(s) + 3CO\ (g) \rightarrow 2Fe(l) + 3CO_2(g)$
3. $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
4. $CaO(s) + SiO_2(s) \rightarrow CaSiO_3(s)$

16. Maximum impurity in Pig iron is :

1. Mn
2. Phosphorous
3. Graphite
4. Sulphur

17. The method of zone refining of metals is based on the principle of-

1. Greater mobility of the pure metal than that of the impurity

2. Higher melting point of the impurity than that of the pure metal

3. Greater noble character of the solid metal than that of the impurity

4. Greater solubility of the impurity in the molten state than in the solid

18. Which one of the following methods can be used to obtain highly pure metal which is liquid at room temperature?

1. Distillation

2. Zone refining

3. Electrolysis

4. Chromatography

19. The maximum temperature that can be achieved in blast furnace is :

1. Upto 1900 K

2. Upto 5000 K

3. Upto 1200 K

4. Upto 2200 K

The p-Block Elements (Group 15 to 18)

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Group 15 -Preparation, Properties & Uses	14
Group 17 - Preparation, Properties & Uses	14
Group 16- Preparation, Properties & Uses	8
Group 18- Preparation, Properties & Uses	5
Interhalogen Compounds	2

1.
Match the interhalogen compounds of column I with the geometry in column-II and assign the correct code:

Column-I	Column-II
(A) XX'	(i) T-shape
(B) XX'_3	(ii) Pentagonal bipyramidal
(C) XX'_5	(iii) Linear
(D) XX'_7	(iv) Square Pyramidal

1. A-(iii) B-(i) C-(iv) D-(ii)
2. A-(i) B-(iv) C-(iii) D-(ii)
3. A-(iv) B-(iii) C-(ii) D-(i)
4. A-(iii) B-(iv) C-(i) D-(ii)

2. Which of the following pairs of the compound is isostructural?

1. TeF_2 , XeF_2
2. IBr_2^-, XeF_2
3. IF_3 , XeF_2
4. $BeCl_2$, XeF_2

3. The reaction among the following that does not show-oxidising behaviour of H_2SO_4 is -

1. $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$
2. $3S + 2H_2SO_4 \rightarrow 3SO_2 + 2H_2O$
3. $C + 2H_2SO_4 \rightarrow CO_2 + 2SO_2 + 2H_2O$
4. $CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

4. Among the following, which one is a wrong statement?

1. PH_5 and $BiCl_5$ do not exist
2. $p\pi$ - $d\pi$ bonds are present in SO_2
3. SeF_4 and CH_4 have same shape
4. I^+_3 has bent geometry

5.
Which of the following statements is **not** true for halogens?
1. All form monobasic oxyacids.
2. All are oxidizing agents.
3. All but fluorine show positive oxidation states.
4. Chlorine has the highest electron-gain enthalpy.

6. In the structure of ClF_3, the number of lone pairs of electrons on central atom 'Cl' is

1. 1
2. 2
3. 3
4. 4

7. Match the compounds given in Column I with the hybridization and shape given in Column II and mark the correct option.

Column I	**Column II**
A) XeF_6	1) Distorted octahedral
B) XeO_3	2) Square planar
C) $XeOF_4$	3) Pyramidal
D) XeF_4	4) Square pyramidal

1. A-1 B-2 C-4 D-3
2. A-4 B-3 C-1 D-2
3. A-4 B-1 C-2 D-3
4. A-1 B-3 C-4 D-2

8.
Which is the correct statement for the given acids?

1. Phosphinic acid is a monoprotic acid while phosphonic acid is a diprotic acid
2. Phosphinic acid is a diprotic acid while phosphonic acid is a monoprotic acid
3. Both are triprotic acids
4. Both are diprotic acids

9.
Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?
1. $Cl_2 > Br_2 > F_2 > I_2$
2. $Br_2 > I_2 > F_2 > Cl_2$
3. $F_2 > Cl_2 > Br_2 > I_2$
4. $I_2 > Br_2 > Cl_2 > F_2$

10. Which of the statements given below is incorrect?

1. Cl_2O_7 is an anhydride of perchloric acid

2. O_3 molecule is bent

3. ONF is isoelectronic with NO_2^-

4. OF_2 is an oxide of fluorine

11. The variation of the boiling point of the hydrogen halides is in the order HF > HI >HBr>HCl, What explains the higher boiling point of hydrogen fluoride?

1. The electro negativity of flourine is much higherthan for other elements in the group

2. There is strong hydrogen bonding between HF molecules

3. The bond energy of HF molecules is greater than in other hydrogen halides

4. The effect of nuclear shielding is much reducedin flourine which polarizes the HF molecule

12. Strong reducing behavior of H_3PO_2 is due to-

1. Presence of one-OH group and two P-H bonds

2. High electron gain enthalpy of phosphorus

3. High oxidation state of phosphorus

4. Presence of two -OH groups and one P-H bonds

13. Acidity of diprotic acids in aqueous solutions increases in the order:

1. $H_2S<H_2Se<H_2Te$

2. $H_2Se<H_2S<H_2Te$

3. $H_2Te<H_2S<H_2Se$

4. $H_2Se<H_2Te<H_2S$

14.
A compound among the following that does not give oxygen on heating is -

1. $Zn(ClO_3)_2$

2. $K_2Cr_2O_7$

3. $(NH_4)_2Cr_2O_7$

4. $KClO_3$

15. The incorrect statement among the following regarding oxoacids of phosphorus is -

1. Orthophosphoric acid is used in the manufacture of triple superphosphate

2. Hypophoshphorous acid is a diprotic acid

3. All oxoacids contain tetrahedral four coordinated phosphorus

4. All oxoacids contain at least one P=O unit and one P-OH group

16. Oxidation states of P in $H_4P_2O_5$, $H_4P_2O_6$, $H_4P_2O_7$, are respectively

1. +3, +5, +4

2. +5, +3, +4

3. +5, +4, +3

4. +3, +4, +5

17. Among the following which is the strongest oxidising agent ?

1. F_2

2. Br_2

3. I_2

4. Cl_2

18. The electronegativity difference between N and F is greater than that between N and H yet the dipole moment of NH_3 (1.5 D) is larger than that of NF_3 (0.2 D). This is because :

1. in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in the same direction

2. in NH_3 the atomic dipole and bond dipole are in the same direction whereas in NF_3 these are in opposite directions

3. in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in opposite directions

4. in NH_3 the atomic dipole and bond dipole is in the opposite directions whereas in NF_3 these are in the same directions

19. The number of unpaired electrons in a paramagnetic diatomic molecule of an element with atomic number 16 is :

1. 2

2. 3

3. 4

4. 1

20. Which is the correct thermal stability order for $\mathrm{H_2E(E = O,\ S,\ Se,\ Te\ and\ Po)}$?

1. $\mathrm{H_2Se < H_2Te < H_2Po < H_2O < H_2S}$

2. $\mathrm{H_2S < H_2O < H_2Se < H_2Te < H_2Po}$

3. $\mathrm{H_2O < H_2S < H_2Se < H_2Te < H_2Po}$

4. $\mathrm{H_2Po < H_2Te < H_2Se < H_2S < H_2O}$

21. Match the Xenon compounds in Coloumn-I with its structure in Column-II and assign the correct code:

	Column-I		Column-II
(a)	XeF_4	(i)	pyramidal
(b)	XeF_6	(ii)	square planar
(c)	$XeOF_4$	(iii)	distorted octahedral
(d)	XeO_3	(iv)	square pyramidal

Code:

	(a)	(b)	(c)	(d)
1.	(iii)	(iv)	(i)	(ii)
2.	(i)	(ii)	(iii)	(iv)
3.	(ii)	(iii)	(iv)	(i)
4.	(ii)	(iii)	(i)	(iv)

22. Match the following:

(a) Pure nitrogen (i) Chlorine

(b) Haber process (ii) Sulphuric acid

(c) Contact process (iii) Ammonia

(d) Deacon's process (iv) Sodium azide or Barium azide

The correct matching among the following is -

	(a)	(b)	(c)	(d)
1.	(iv)	(iii)	(ii)	(i)
2.	(i)	(ii)	(iii)	(iv)
3.	(ii)	(iv)	(i)	(iii)
4.	(iii)	(iv)	(ii)	(i)

23. The incorrect statement among the following related to PCl_5 is:

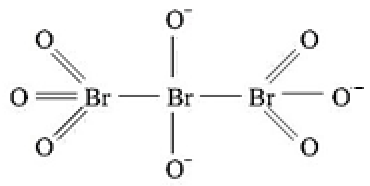
1. PCl_5 molecules is non-reactive

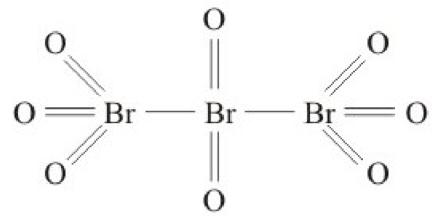
2. Three equatorial $P-Cl$ bonds make an angle of 120° with each other

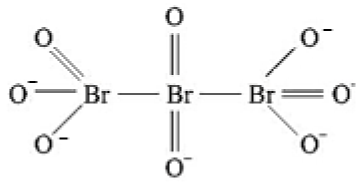
3. Two axial $P-Cl$ bonds make an angle of 180° with each other

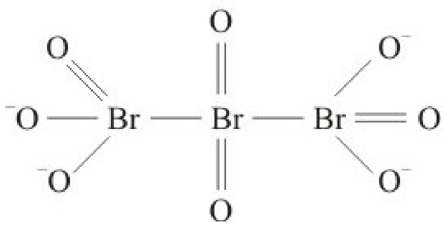
4. Axial $P-Cl$ bonds are longer than equatorial $P-Cl$ bonds

24. The correct structure of tribromo octoxide is:

1. 

2. 

3. 

4. 

25. A compound 'X' upon reaction with H_2O produces a colorless gas 'Y' with a rotten fish smell. Gas 'Y' is absorbed in a solution of $CuSO_4$ to give Cu_3P_2 as one of the products. The compound 'X' is-

1. Ca_3P_2

2. NH_4Cl

3. As_2O_3

4. $Ca_3(PO_4)_2$

26. Which of the following oxoacids of phosphorus has the strongest reducing property?

(1) $H_4P_2O_7$

(2) H_3PO_3

(3) H_3PO_2

(4) H_3PO_4

27. Identify the correct formula of 'oleum' from the following

1. $H_2S_2O_7$

2. H_2SO_3

3. H_2SO_4

4. $H_2S_2O_8$

28. Which of the following compound of sulphur has $-O-O-$linkage?

1. H_2SO_4, sulphuric acid

2. $H_2S_2O_8$, peroxodisulphuric acid

3. $H_2S_2O_7$, pyrosulphuric acid

4. H_2SO_3, sulphurous acid

29. Match the compounds of Xe in column I with the molecular structure in column II.

Column-I	Column-II
(a) XeF_2	(i) Square planar
(b) XeF_4	(ii) Linear
(c) XeO_3	(iii) Square pyramidal
(d) $XeOF_4$	(iv) Pyramidal

1. (a)-(ii) , (b)-(i) , (c)-(iii) , (d)-(iv)

2. (a)-(ii) , (b)-(iv) , (c)-(iii) , (d)-(i)

3. (a)-(ii) , (b)-(iii) , (c)-(i) , (d)-(iv)

4. (a)-(ii) , (b)-(i) , (c)-(iv) , (d)-(iii)

30. In which of the following arrangements the given sequence is not strictly according to the property indicated against it ?

(1) $H_2O < H_2S < H_2Se < H_2Te$: $increa\sin g\ pK_a\ values$

(2) $NH_3 < PH_3 < AsH_3 < SbH_3$: $increa\sin g\ acidic\ character$

(3) $CO_2 < SiO_2 < SnO_2 < PbO_2$: $increa\sin g\ oxidi\sin g\ power$

(4) $HF < HCl < HBr < HI$: $increa\sin g\ acidic\ strength$

31. Match List-I (substances) with List-II (processes) employed in the manufacture of the substances and select the correct option.

List –I Substances	List – II Processes
(a) Sulphuric acid	(i) Haber's Process
(b) Steel	(ii) Bessemer's Process
(c) Sodium carbonate	(iii) Leblanc Process
(d) Ammonia	(iv) Contact Process

Options :

	(a)	(b)	(c)	(d)
1.	(i)	(ii)	(iii)	(iv)
2.	(iv)	(iii)	(ii)	(i)
3.	(iv)	(ii)	(iii)	(i)
4.	(i)	(iv)	(ii)	(iii)

32. Which statement is wrong:

1. Bond energy of $F_2 > Cl_2$

2. Electronegativity of F > Cl

3. F is more oxidizing than Cl

4. Electron affinity of Cl > F

33. Compound that has planar structure :

1. XeF_4

2. $XeOF_2$

3. XeO_2F_2

4. XeO_4

34. Oxidation number of P in pyrophosphoric acid is :

1. + 5
2. + 2
3. + 3
4. + 4

35. A compound having two direct bonds between P and H atom is :

1. H_3PO_2

2. H_3PO_3

3. H_3PO_4

4. $H_4P_2O_7$

36. General behaviour of O_3 is :

(1) Gives electrons.
(2) Gives O_2
(3) Reaction with H_2
(4) Accept electrons.

37. Correct statement among the following is : -

(1) Silicon exhibits 8 coordination number in it's compound.

(2) Bond energy of F_2 is less than Cl_2

(3) Mn(III) oxidation state is more stable than Mn (II) in aqueous state.

(4) Elements of 15^{th} gp shows only + 3 and + 5 oxidation states.

38. Incorrect statement among the following is :

(1) Among halide ions, iodide is the most powerful reducing agent.

(2) Fluorine is the only halogen that does not show a variable oxidation state.

(3) HOCl is a stronger acid than HOBr

(4) HF is a stronger acid than HCl

39. In X- H ----- Y, X and Y both are electronegative elements :

1. Electron density on X will increase and on H will decrease.
2. In both electron density will increase.
3. In both electron density will decrease.
4. On X electron density will decrease and on H increases.

40. Nitrogen form N_2, but phosphorous form P_2, it's at a time convert in P_4, reason is : -

1. Triple bond present between phosphorous atom.
2. $p\pi - p\pi$ bonding is weak in phosphorous.
3. $p\pi - p\pi$ bonding is strong in phosphorous.
4. Multiple bond form easilly phosphorous.

41. **Statement I:**

Acid strength increases in the order given as HF << HCl << HBr << HI.

Statement II:

As the size of the elements F, Cl, Br, I increase down the group, the bond strength of HF, HCI, HBr, and HI decreases and so the acid strength increases.

In the light of the above statements, choose the correct answer from the options given below.

1. Statement I is correct but Statement II is false.

2. Statement I is incorrect but Statement II is true.

3. Both Statement I and Statement II are true.

4. Both Statement I and Statement II are false.

42. The incorrect statement about noble gases is -

1. Noble gases have weak dispersion forces.

2. Noble gases have large positive values of electron gain enthalpy.

3. Noble gases are sparingly soluble in water.

4. Noble gases have very high melting and boiling points.

43. In which one of the following arrangements the given sequence is not strictly according to the properties indicated against it?

1. NH_3<PH_3<AsH_3<SbH_3 : Increasing acidic character

2. CO_2<SiO_2<SnO_2<PbO_2 : Increasing oxidizing power

3. HF<HCl<HBr<HI : Increasing acidic strength

4. H_2O<H_2S<H_2Se<H_2Te : Increasing pK_a values

The d & f Block Elements

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
d-Block Elements- Properties & Uses	44
f-Block Elements- Properties & Uses	11
Chemistry of Mn and Cr Compounds	5
Lanthanoid /Actinoid Contraction	5

1. A gas that can readily decolorized acidified $KMnO_4$ solution:

1. SO_2

2. NO_2

3. P_2O_5

4. CO_2

2. Zinc can be coated on iron to produce galvanised iron but the reverse is not possible because:

1. Zinc is lighter than iron.

2. Zinc has a lower melting point than iron.

3. Zinc has lower negative reduction potential than iron.

4. Zinc has a higher negative reduction potential than iron.

3. Which one of the following statements related to lanthanons is incorrect?

1. Europium shows +2 oxidation state.

2. The basicity decreases as the ionic radius decreases from pr to Lu.

3. All the lanthanons are much more reactive than aluminium.

4. Ce^{+4} solution are widely used as oxidizing agent in volumetric analysis.

4. The reason for greater range of oxidation states in actinoids is attributed to:

1. Actinoid Contraction

2. 5f, 6d and 7s levels having comparable energies.

3. 4f and 5d levels being close in energies.

4. The radioactive nature of actinoids

5.
An ion among the following that exhibits d–d transition and paramagnetism is -

1. CrO_4^{2-}
2. $Cr_2O_7^{2-}$
3. MnO_4^{-}
4. MnO_4^{2-}

6. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the ***correct*** code :

Column I	Column II
a. Co^{3+}	i. $\sqrt{8}$ B.M.
b. Cr^{3+}	ii. $\sqrt{35}$ B.M.
c. Fe^{3+}	iii. $\sqrt{15}$ B.M.
d. Ni^{2+}	iv. $\sqrt{24}$ B.M.

1. a-iv; b-iii; c-ii; d-i

2. a-i; b-ii; c-iii; d-iv

3. a-iv; b-i; c-ii; d-iii

4. a-iii; b-iv; c-i; d-ii

7.
When copper is heated with conc. HNO_3 it produces :

1. $Cu(NO_3)$ and NO

2. $Cu(NO_3)_2$, NO and NO_2

3. $Cu(NO_3)_2$ and N_2O

4. $Cu(NO_3)_2$ and NO_2

8.
The electronic configurations of Eu (Atomic no. 63), Gd (Atomic no. 64) and Tb (Atomic no. 65) are :

1. [Xe] $4f^6$ $5d^1$ $6s^2$, [Xe]$4f^7$ $5d^1$ $6s^2$ and [Xe] $4f^9$ $6s^2$

2. [Xe] $4f^6$ $5d^1$ $6s^2$, [Xe] $4f^7 5d^1$ $6s^2$ and [Xe]$4f^8$ $5d^1$ $6s^2$

3. [Xe] $4f^7$ $6s^2$, [Xe]$4f^7$ $5d^1$ $6s^2$ and [Xe] $4f^9$ $6s^2$

4. [Xe] $4f^7$ $6s^2$, (Xe]$4f^8$ $6s^2$ and [Xe]$4f^8$ $5d^1$ $6s^2$

9.
The correct statement among the following when SO_2 is passed through acidified $K_2Cr_2O_7$ solution is -

1. The solution is decolorized.

2. SO_2 is reduced.

3. Green coloured $Cr_2(SO_4)_3$ is formed.

4. The solution turns blue.

10. Gadolinium belongs to 4f series. It's atomic number is 64. Which of the following is the correct electronic configuration of gadolinium?

1. $[Xe]4\,f^8\,6d^2$

2. $[Xe]4\,f^9\,5s^1$

3. $[Xe]4\,f^7\,5d^1 6s^2$

4. $[Xe]4\,f^6\,5d^2 6s^2$

11. Assuming complete ionization, same moles of which of the following compounds will require the least amount of acidified $KMnO_4$ for complex oxidation?

1. $FeSO_4$

2. $FeSO_3$

3. FeC_2O_4

4. $Fe(NO_2)_2$

12.

Because of lanthanoid contraction, which of the following pairs of elements have nearly same atomic radii? (Numbers in the parenthesis are atomic numbers).
1. Ti (22) and Zr (40)
2. Zr (40) and Nb (41)
3. Zr (40) and Hf (72)
4. Zr (40) and Ta (73)

13.

Which of the following processes does not involve oxidation of iron?
1. Rusting of iron sheets
2. Decolourisation of blue $CuSO_4$ solution by iron
3. Formation of $Fe(CO)_5$ from Fe
4. Liberation of H_2 from steam by iron a high temperature

14. In acidic medium, H_2O_2 changes $Cr_2O_7^{-2}$ to CrO_5 which has two (–O – O–) bonds Oxidation state of Cr in CrO_5 is :

1. +5

2. +3

3. +6

4. -10

15. Reason of lanthanoid contraction is:

1. Negligible screening effect of 'f' orbitals

2. Increasing nuclear charge

3. Decreasing nuclear charge

4. Decreasing screening effect

16.
Diamagnetic lanthanoid ion among the following is -
(At nos. Ce = 58, Sm = 62, Eu = 63, Yb = 70)

1. Sm^{2+}
2. Eu^{2+}
3. Yb^{2+}
4. Ce^{2+}

17.
$KMnO_4$ can be prepared from K_2MnO_4 as per the reaction:
$$3\,MnO_4^{2-} + 2H_2O \rightleftharpoons 2\,MnO_4^{-} + MnO_2 + 4\,OH^{-}$$
The reaction can go to completion by removing OH^{-} ions by adding:
1. KOH
2. CO_2
3. SO_2
4. HCl

18.
The incorrect statement among the following regarding interstitial compounds is -
1. They are chemically reactive.

2. They are much harder than the pure metal.

3. They have higher melting points than the pure metal.

4. They retain metallic conductivity.

19. The incorrect statement among the following is -

1. On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky colour is observed.

2. $Na_2Cr_2O_7$ is preffered over $K_2Cr_2O_7$ in volumetric analysis.

3. $K_2Cr_2O_7$ solution in acidic medium is orange.

4. $K_2Cr_2O_7$ solution becomes yellow in increasing the pH beyond 7

20.
For the four successive transition elements (Cr, Mn, Fe and Co), the stability of +2 oxidation state will be there in which of the following order?
(At. No Cr= 24, Mn= 25, Fe=26, Co= 27)

1. Fe>Mn>Co>Cr

2. Co>Mn>Fe>Cr

3. Cr>Mn>Co>Fe

4. Mn>Fe>Cr>Co

21.
Actinoids exhibit more number of oxidation states than lanthanoids. It is because of :

1. The greater metallic character of the lanthanoids than that of the corresponding actinoids.

2. More energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals.

3. The lesser energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals.

4. More active nature of the actinoids.

22. Acidified $K_2Cr_2O_7$ solution turns green when Na_2SO_3 is added to it. This is due to the formation of

1. CrO_4^{2-}

2. $Cr_2(SO_3)_3$

3. $CrSO_4$

4. $Cr_2(SO_4)_3$

23. Which of the following ions will exhibit colour in aqueous solutions?

1. La^{3+} (Z=57)

2. Ti^{3+} (Z=22)

3. Lu^{3+} (Z=71)

4. Sc^{3+} (Z=21)

24. Which one of the following ions has electronic configuration [Ar] $3d^6$?
(At. no :Mn = 25, Fe= 26, Co= 27, Ni = 28)

1. Ni^{3+}

2. Mn^{3+}

3. Fe^{3+}

4. Co^{3+}

25. Which of the following pairs has the same size?

1. $Fe^{2+},\ Ni^{2+}$

2. $Zr^{4+},\ Ti^{4+}$

3. $Zr^{4+},\ Hf^{4+}$

4. $Zn^{2+},\ Hf^{4+}$

26.
Which one of the elements with the following outer orbital configurations may exhibit the largest number of oxidation states?

1. $3d^3, 4s^2$

2. $3d^5, 4s^1$

3. $3d^5, 4s^2$

4. $3d^2, 4s^2$

27. Identify the incorrect statement among the following :

1. There is a decrease in the radii of the atoms or ions as one proceeds from La to Lu.

2. Lanthanoid contraction is the accumulation of successive shrinkages

3. As a result of lanthanoid contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements

4. Shielding power of 4f electrons is quite weak.

28. Which one of the following ions is the most stable in aqueous solution?
(At. No. Ti = 22, V = 23, Cr = 24, Mn = 25)

1. Cr^{3+}

2. V^{3+}

3. Ti^{3+}

4. Mn^{3+}

29. The d-electron configurations of Cr^{2+}, Mn^{2+}, Fe^{2+} and Ni^{2+} and $3d^4$, $3d^5$, $3d^6$ and $3d^8$ respectively. Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour?
(At. No. Cr = 24, Mn = 25, Fe = 26, Ni = 28)

1. $[Mn(H_2O)_6]^{2+}$

2. $[Fe(H_2O)_6]^{2+}$

3. $[Ni(H_2O)_6]^{2+}$

4. $[Cr(H_2O)_6]^{2+}$

30. Actinoids exhibit more number of oxidation states than lanthanoids. The main reason for this is :

1. More energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals

2. Greater metallic character of the lanthanoids than that of the corresponding actinoids

3. Lesser energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals

4. More active nature of the actinoids

31. The manganate and permanganate ions are tetrahedral, due to:

1. The π-bonding involves overlap of d-orbitals of oxygen with d-orbitals of manganese

2. The π-bonding involves overlap of p-orbitals of oxygen with d-orbitals of manganese

3. There is no π-bonding

4. The π-bonding involves overlap of p-orbitals of oxygen with p-orbitals of manganese

32. Match the catalyst with the process:

Catalyst	Process
(i) V_2O_5	(a) The oxidation of ethylene to ethanal
(ii) $TiCl_4 + Al(CH_3)_3$	(b) Polymerisation of alkynes
(iii) $PdCl_2$	(c) Oxidation of SO_2 in the manufacture of H_2SO_4
(iv) Nickel complexes	(d) Polymerisation of ethylene

Which of the following is the correct matching of Catalyst & Process?

(1) (i)-(c), (ii)-(d), (iii)-(a), (iv)-(b)

(2) (i)-(a), (ii)-(b), (iii)-(c), (iv)-(d)

(3) (i)-(a), (ii)-(n), (iii)-(b), (iv)-(d)

(4) (i)-(c), (ii)-(a), (iii)-(d), (iv)-(b)

33. When neutral or faintly alkaline $KMnO_4$ is treated with potassium iodide, iodide ion is converted into 'X', 'X' is-

1. I_2

2. IO_4^-

3. IO_3^-

4. IO^-

34. The calculated spin only magnetic moment of Cr^{2+} ion is :

1. 4.90 BM

2. 5.92 BM

3. 2.84 BM

4. 3.87 BM

35. Identify the incorrect statement.

1. The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes.

2. Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.

3. The oxidation states of chromium in CrO_4^{2-} and $Cr_2O_7^{2-}$ are not the same.

4. $Cr^{2+}(d^4)$ is a stronger reducing agent than $Fe^{2+}(d^6)$ in water.

36. Urea reacts with water to form A which will decompose to form B. B when passed through Cu^{2+} (aq), deep blue color solution C is formed. What is the formula of C from the following?

1. $\left[\mathrm{Cu}\left(\mathrm{NH}_3\right)_4\right]^{2+}$

2. $\mathrm{Cu}\left(\mathrm{OH}\right)_2$

3. $\mathrm{CuCO}_3 . \mathrm{Cu}\left(\mathrm{OH}\right)_2$

4. CuSO_4

37. Identify the incorrect statement from the following:

(1) Zirconium and Hafnium have identical radii of 160 pm and 159 pm, respectively as a consequence of lanthanoid contraction.

(2) Lanthanoids reveal only +3 oxidation state.

(3) The lanthanoid ions other than the f^0 type and the f^{14} type are all paramagnetic.

(4) The overall decrease in atomic and ionic radii from lanthanum to lutetium is called lanthanoid contraction.

38. Match the following aspects with the respective metal.

Aspects	Metal
(a) The metal which reveals a maximum number of oxidation states	(i) Scandium
(b) The metal although placed inn 3d block is considered not as a transition element	(ii) Copper
(c) The metal which does not exhibit variable oxidation states	(iii) Manganese
(d) The metal which in +1 oxidation state in aqueous solution undergoes disproportionation	(iv) Zinc

Select the correct option :
(1) (a)-(i) (b)-(iv) (c)-(ii) (d)-(iii)

(2) (a)-(iii) (b)-(iv) (c)-(i) (d)-(ii)

(3) (a)-(iii) (b)-(i) (c)-(iv) (d)-(ii)

(4) (a)-(ii) (b)-(iv) (c)-(i) (d)-(iii)

39. The catalytic activity of transition metals and their compounds is ascribed mainly to:

1. their unfilled d-orbitals
2. their ability of adopt variable oxidation states
3. their chemical reactivity
4. their magnetic behaviour

40. Which one of the following does not correctly represent the correct order of the property indicated against it ?
1. $Ti^{3+} < V^{3+} < Cr^{3+} < Mn^{3+}$: increasing magnetic moment
2. $Ti < V < Cr < Mn$: increasing melting point
3. Ti < V < Mn < Cr : increasing 2nd ionization enthalpy
4. Ti < V < Cr < Mn : increasing number of oxidation states

41. The most common oxidation state of lanthanoid is -

1. 2

2. 5

3. 3

4. 4

42. Which of the following exhibits only a +3 oxidation state?
1. Th
2. Ac
3. Pa
4. U

43. Four successive members of the first series of the transition metals are listed below. For which one of them does the standard potential $\left(E^{\circ}{}_{M^{2+}/M}\right)$ value have a positive sign?
1. Ni (Z = 28)
2. Cu (Z = 29)
3. Fe (Z = 26)
4. Co (Z = 27)

44. The aqueous solution containing which one of the following ions will be colourless -

(1) Fe^{2+}

(2) Mn^{2+}

(3) Ti^{3+}

(4) Sc^{3+}

[Atomic number : Sc = 21, Fe = 26, Ti = 24, Mn = 25]

45. Four successive members of the first row transition elements are listed below with their atomic numbers. which one of them is expected to have the highest third ionization enthalpy :-

(1) Vanadium (Z = 23)

(2) Manganese (Z = 25)

(3) Chromium (Z = 24)

(4) Iron (Z = 26)

46. Colourless ion among the following is:

1. Cr^{+4}

2. Sc^{+3}

3. Ti^{+3}

4. V^{+3}

47. An element among the following that exhibit maximum oxidation state is :

1. Cr

2. Mn

3. Fe

4. V

48. The main reason for larger number of oxidation states exhibited by the actinoids than the corresponding lanthanoids, is :-

(1) Lesser energy difference between 5f and 6d orbitals than between 4f and 5d orbitals

(2) More energy difference between 5f and 6d orbitals than between 4f and 5d orbitals

(3) Greater reactive nature of the actinoids than the lanthanoids

(4) Larger atomic size of actinoids than the lanthanoids

49. Ion that gives color with the water :

1. Cu^{+}

2. Cr^{3+}

3. Na^{+}

4. None of the above.

50. Maximum oxidation state is shown by :
1. La
2. Gd
3. Eu
4. Am

51. A coloured and paramagnetic compound among the following is -

1. CuF_2

2. $K_2Cr_2O_7$

3. $KMnO_4$

4. $K_4\left[Fe(CN)_6\right]$

52. Lanthanoids are :-

(1) 14 elements in the seventh period (atomic no. = 90 to 103) that are filling 5f sublevel.

(2) 14 elements in the sixth period (atomic no. 58 to 71) that are filling 4f sublevel

(3) 14 elements in the seventh period (atomic no. = 58 to 71) that are filling 4f sublevel

(4) 14 elements in the sixth period (atomic no. 90 to 103) that are filling 4f sublevel

53. An element among the following that can form more than one binary compound with chlorine is:-

1. Zn

2. K

3. Ca

4. Fe

54. $FeCr_2O_4$ reacts with Na_2CO_3 gives the product :

1. Na_2CrO_4

2. $Na_2Cr_2O_7$

3. Fe_3O_4

4. FeO

55. A set of ions among the following has $3d^2$ electronic configuration is:-

1. $Ti^+, V^{4+}, Cr^{6+}, Mn^{7+}$

2. $Ti^{4+}, V^{3+}, Cr^{2+}, Mn^{3+}$

3. $Ti^{2+}, V^{3+}, Cr^{4+}, Mn^{5+}$

4. $Ti^{3+}, V^{2+}, Cr^{3+}, Mn^{4+}$

56. General electronic configuration of lanthanoids is :

(1) $(n-2)\,f^{1-14}\,(n-1)\,s^2\,p^6\,d^{0-1}\,ns^2$

(2) $(n-2)\,f^{10-14}\,(n-1)\,d^{0-1}\,ns^2$

(3) $(n-2)\,f^{0-14}\,(n-1)\,d^{10}\,ns^2$

(4) $(n-2)\,d^{0-1}\,(n-1)\,f^{1-14}\,ns^2$

57. An element among the following that shows maximum number of oxidation states is:-

(1) Cr

(2) Fe

(3) Mn

(4) V

58. Zn gives H_2 gas with H_2SO_4 & HCl but not with HNO_3 because :-

1. Zn act as oxidising agent when react with HNO_3

2. HNO_3 is weaker acid then H_2SO_4 & HCl

3. In electrochemical series Zn is above hydrogen

4. $NO_3^{\ominus}$ is reduced in preference to hydronium ion.

59. Incorrect statement among the following options is :

1. $La(OH)_3$ is less basic than $Lu(OH)_3$
2. In Lanthanide series ionic radius of Ln^{+3} ions decreases.
3. La is actually an element of transition series rather Lanthanide.
4. Atomic radius of Zr and Hf are same because of Lanthanide contraction.

60. The catalytic activity of transition metals is due to :

1. High enthalpy of atomization

2. Paramagnetic behaviour

3. Colour of hydrated ions

4. Variable oxidation states

61. The basic character of the transition metal monoxides follows the order :

1. VO > CrO > TiO > FeO

2. CrO > VO > FeO > TiO

3. TiO > FeO > VO > CrO

4. TiO > VO > CrO > FeO

(Atomic nos. Ti = 22, V = 23, Cr = 24, Fe = 26)

62. The correct order of ionic radii of Y^{3+}, La^{3+}, Eu^{3+}, and Lu^{3+} is : -

1. $Y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$

2. $Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$

3. $Lu^{3+} < Eu^{3+} < La^{3+} < Y^{3+}$

4. $La^{3+} < Eu^{3+} < Lu^{3+} < Y^{3+}$

Atomic nos. Y = 39, La = 57, Eu = 63, Lu = 71.

63. Zr (Z=40) and Hf (Z=72) have similar atomic and ionic radii because of:

1. lanthanoid contraction

2. having similar chemical properties

3. belonging to same group

4. diagonal relationship

64. The incorrect statement among the following is :

1. Lanthanoids are good conductors of heat and electricity.

2. Actinoids are highly reactive metals, especially when finely divided.

3. Actinoid contraction is greater for element to element than Lanthanoid contraction.

4. Most of the trivalent Lanthanoid ions are colorless in the solid-state.

65. Match List-I with List-II

List-I	List-II
(a) $\left[Fe(CN)_6\right]^{3-}$	(i) 5.92 BM
(b) $\left[Fe(H_2O)_6\right]^{3+}$	(ii) 0 BM
(c) $\left[Fe(CN)_6\right]^{4-}$	(iii) 4.90 BM
(d) $\left[Fe(H_2O)_6\right]^{2+}$	(iv) 1.73 BM

Choose the correct answer from the options given below.

1. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
2. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
3. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
4. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

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Coordination Compounds

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
VBT & CFT & their Limitations	24
Isomerism in Coordination Compounds	18
Introduction and Classification / Nomenclature	11
Organometallic Complexes & their Uses	7
Ligands	5
Werner's Theory	1

1. The correct order of the stoichiometries of AgCl formed when $AgNO_3$ in excess is treated with the complexes: $CoCl_3.6NH_3$, $CoCl_3 .5NH_3$, $CoCl_3.4NH_3$ respectively is:

1. 3AgCl, 1AgCl, 2AgCl

2. 3AgCl, 2AgCl, 1AgCl

3. 2AgCl, 3AgCl, 1AgCl

4. 1AgCl, 3AgCl, 2AgCl

2. Correct increasing order for the wavelengths of absorption in complexes of $Co^{3+}$are:

1. $\left[Co(H_2O)_6\right]^{3+} < \left[Co(en)_3\right]^{3+} < \left[Co(NH_3)_6\right]^{3+}$

2. $\left[Co(H_2O)_6\right]^{3+} < \left[Co(NH_3)_6\right]^{3+} < \left[Co(en)_3\right]^{3+}$

3. $\left[Co(NH_3)_6\right]^{3+} < \left[Co(en)_3\right]^{3+} < \left[Co(H_2O)_6\right]^{3+}$

4. $\left[Co(en)_3\right]^{3+} < \left[Co(NH_3)_6\right]^{3+} < \left[Co(H_2O)_6\right]^{3+}$

3. Pick out the correct statement with respect to $[Mn(CN)_6]^{3-}$

1. It is sp^3d^2 hybridised and tetrahedral

2. It is d^2sp^3 hybridised and octahedral

3. It is dsp^2 hybridised and square planar

4. It is sp^3d^2 hybridised and octahedral

4.
The type of isomerism shown by the complex $\left[CoCl_2\,(en)_2\right]^+$ is :

1. Geometrical isomerism
2. Coordination isomerism
3. Ionization isomerism
4. Linkage isomerism

5.
The geometry and magnetic behaviour of the complex $[Ni(CO)_4]$ are

1. square planar geometry and diamagnetic
2. tetrahedral geometry and diamagnetic
3. square planar geometry and paramagnetic
4. tetrahedral geometry and paramagnetic

6.
Iron carbonyl, $Fe\,(CO)_5$ is
1. Tetranuclear

2. Mononuclear

3. Trinuclear

4. Dinuclear

7. Number of possible isomers for the complex $\left[Co\,(en)_2\,Cl_2\right]Cl$ will be (en=ethylenediamine)

1. 2

2. 1

3. 3

4. 4

8. The hybridization involved in complex $\left[Ni\,(CN)_4\right]^{2-}$ is :

(Atomic number of Ni=28)

1. dsp^2

2. sp^3

3. d^2sp^2

4. d^2sp^3

9. The sum of coordination number and oxidation number of the metal M in the complex $[M(en)_2(C_2O_4)]Cl$ is -

1. 9

2. 6

3. 7

4. 8

10. The IUPAC name of complex ion, $[Fe(CN)_6]^{3-}$ is

1. Hexacyanoiron(III) ion

2. Hexacyanitoferrate(III) ion

3. Tricynoferrate(III) ion

4. Hexacyanidoferrate(III) ion

11.

An ion has magnetic moment 2.84 BM is -

(At. no. Ni = 28, Ti = 22, Cr = 24, Co = 27)

1. Ni^{2+}
2. Ti^{3+}
3. Cr^{2+}
4. Co^{2+}

12.

Cobalt (III) chloride forms several octahedral complexes with ammonia.

A compound among the following that doesnot give test for chloride ions with silver nitrate at 25 °C is -

1. $CoCl_3 . 3NH_3$

2. $CoCl_3 . 4NH_3$

3. $CoCl_3 . 5NH_3$

4. $CoCl_3 . 6NH_3$

13.

The correct statement among the following is:

1. $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a low-spin configuration.

2. $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a low-spin configuration.

3. $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a high-spin configuration.

4. $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a high-spin configuration.

14. An ion that has magnetic moment 2.83 BM is -

(Atomic Number: Ti=22, Cr=24, Mn=25, Ni=28)

1. Ti^{3+}

2. Ni^{2+}

3. Cr^{3+}

4. Mn^{2+}

15. An anticancer agent among the following is -

1. $\text{mer} - [\text{Co}(\text{NH}_3)_3\,\text{Cl}]$

2. $\text{Cis} - [\text{PtCl}_2(\text{NH}_3)_2]$

3. $\text{Cis} - \text{K}_2[\text{Pt}\ \ \text{Cl}_2\,\text{Br}_2]$

4. $\text{NH}_2\,\text{CoCl}_4$

16.
A magnetic moment of 1.73 BM will be shown by one among the following :
1. $[Ni(CN)_4]^{2-}$
2. $TiCl_4$
3. $[CoCl_6]^{4-}$
4. $[Cu(NH_3)_4]^{2+}$

17.
An excess of $AgNO_3$ is added to 100 mL of a 0.01M solution of dichlorotetraaquachromium (III) chloride.
The number of moles of AgCl precipitated would be :
1. 0.002
2. 0.003
3. 0.01
4. 0.001

18. Which one of the following is an outer orbital complex and exhibits paramagnetic behavior?

1. $[Ni(NH_3)_6]^{2+}$
2. $[Zn(NH_3)_6]^{2+}$
3. $[Cr(NH_3)_6]^{3+}$
4. $[Co(NH_3)_6]^{3+}$

19. The d-electron configurations of Cr^{2+}, Mn^{2+}, Fe^{2+}, and Co^{2+} are d^4, d^5, d^6, and d^7 respectively.

Minimum paramagnetic behavior is shown by -
(At. No Cr= 24, Mn= 25, Fe=26, Co= 27)

1. $[Fe(H_2O)_6]^{2+}$
2. $[Co(H_2O)_6]^{2+}$
3. $[Cr(H_2O)_6]^{2+}$
4. $[Mn(H_2O)_6]^{2+}$

20. Of the following complex ions, which is diamagnetic in nature?

1. $[Ni(CN)_4]^{2-}$
2. $[CuCl_4]^{2-}$
3. $[CoF_6]^{3-}$
4. $[NiCl_4]^{2-}$

21.
The complex $[Co(NH_3)_6][Cr(CN)_6]$ and $[Cr(NH_3)_6][Co(CN)_6]$ shows -

1. Ionisation isomerism
2. Co-ordination isomerism
3. Geometrical isomerism
4. Linkage isomerism

22.
The number of geometrical isomers shown by $[Pt(Py)(NH_3)BrCl]$ -

1. 4
2. 0
3. 2
4. 3

23. Which of the following complex ions is not expected to absorb visible light ?

1. $[Ni(CN)_4]^{2-}$
2. $[Cr(NH_3)_6]^{3+}$
3. $[Fe(H_2O)_6]^{2+}$
4. $[Ni(H_2O)_6]^{2+}$

24. The existence of two different coloured complexes with the composition of $[Co(NH_3)_4Cl_2]^+$ is due to-

1. linkage isomerism
2. Geometrical isomerism
3. Coordination isomerism
4. Ionisation isomerism

25.
An ion among the following that does not show optical isomerism is -
(en = ethylenediamine)

1. $[Co(en)_2Cl_2]^+$

2. $[Co(NH_3)_3Cl_3]$

3. $[Co(en)Cl_2(NH_3)_2]^+$

4. $[Co(en)_3]^{3+}$

26.
A complex ions among the following is expected to absorb visible light-
(At. no. Zn = 30, Sc = 21, Ti = 22, Cr = 24)

1. $[Sc(H_2O)_3(NH_3)_3]^{3+}$

2. $[Ti(en)_2(NH_3)_2]^{4+}$

3. $[Cr(NH_3)_6]^{3+}$

4. $[Zn(NH_3)_6]^{2+}$

27. Out of TiF_6^{2-}, CoF_6^{3-}, Cu_2Cl_2 and $NiCl_4^{2-}$ (Z of Ti = 22, Co=27, Cu = 29, Ni= 28) the colourless species are

1. TiF_6^{2-} *and* CoF_6^{3-}

2. Cu_2Cl_2 *and* $NiCl_4^{2-}$

3. TiF_6^{2-} *and* Cu_2Cl_2

4. CoF_6^{3-} *and* $NiCl_4^{2-}$

28. The complexes with the highest paramagnetic behavior among the following is -

(where gly = glycine, en = ethylenediamine and bpy = bipyridyl moieties)
(At no : Ti= 22, V = 21, Fe = 26, Co = 27)

1. $[V(gly)_2(OH)_2(NH_3)_2]^+$

2. $[Fe(en)(bpy)(NH_3)_2]^{2+}$

3. $[Co(OX)_2(OH)_2]^-$

4. $[Ti(NH_3)_6]^{3+}$

29. CFSE (in octahedral field) will be maximum in -

(Atomic number Co = 27)

1. $[Co(H_2O)_6]^{3+}$

2. $[Co(NH_3)_6]^{3+}$

3. $[Co(CN)_6]^{3-}$

4. $[Co(C_2O_4)_3]^{3-}$

30. A compound among the following that gives a pair of enantiomorphs is -
(en = $NH_2CH_2CH_2NH_2$)

1. $[Co(NH_3)_4Cl_2]NO_2$

2. $[Cr(NH_3)_6][Co(CN)_6]$

3. $[Co(en)_2Cl_2]Cl$

4. $[Pt(NH_3)_4][PtCl_6]$

31. A pair that contain both the ions coloured in aqueous solution is -

(At. no. : Sc = 21, Ti = 22, Ni = 28, Cu = 29, Co= 27)

1. $Ni^{2+},\ Ti^{3+}$
2. $Sc^{3+},\ Ti^{3+}$
3. $Sc^{3+},\ Co^{2+}$
4. $Ni^{2+},\ Cu^{+}$

32. $[Co(NH_3)_4(NO_2)_2]Cl$ exhibits :

1. linkage isomerism, ionization isomerism and optical isomerism
2. linkage isomerism, ionization isomerism and geometrical isomerism
3. ionization isomerism, geometrical isomerism and optical isomerism
4. linkage isomerism, geometrical isomerism and optical isomerism

33. $[Cr(H_2O)_6]Cl_3$ (at. No. of Cr = 24) has a magnetic moment of 3.83 BM, the correct distribution of $3d$electrons in the chromium of the complex is :

1. $3d^1_{x^2-y^2}, 3d^1_{z^2}, 3d^1_{xy}$
2. $3d^1_{xy}, 3d^1_{x^2-y^2}, 3d^1_{yz}$
3. $3d^1_{xy}, 3d^1_{zy}, 3d^1_{xz}$
4. $3d^1_{xy}, 3d^1_{yz}, 3d^1_{z^2}$

34. What is the correct electronic configuration of the central atom in $K_4[Fe(CN)_6]$ based on crystal field theory?

1. $e^4\ t_{2g}^2$
2. $t_{2g}^4\ e_g^2$
3. $t_{2g}^6\ e_g^0$
4. $e^3\ t_{2g}^3$

35. The crystal field stabilization energy (CFSE) for $[CoCl_6]^{4-}$ is 18000 cm^{-1}, the CFSE for $[CoCl_4]^{2-}$ will be :

1. 6000 cm^{-1}
2. 16000 cm^{-1}
3. 18000 cm^{-1}
4. 8000 cm^{-1}

36. Correct order of increasing field strength of ligands among the following is -

1. $SCN^- < F^- < CN^- < C_2O_4^{2-}$
2. $F^- < SCN^- < C_2O_4^{2-} < CN^-$
3. $CN^- < C_2O_4^{2-} < SCN^- < F^-$
4. $SCN^- < F^- < C_2O_4^{2-} < CN^-$

37. The complex that is not expected to exhibit isomerism is :

1. $[Pt(NH_3)_2Cl_2]$
2. $[Ni(NH_3)_2Cl_2]$
3. $[Ni(en)_3]^{2+}$
4. $[Ni(NH_3)_4(H_2O)_2]^{2+}$

38. The carbonyl compound having the strongest C–O bond is :

1. $Fe(CO)_5$

2. $Mn(CO)_6^+$

3. $Cr(CO)_6$

4. $V(CO)_6^-$

39. Among the given complex, the complex having highest paramagnetic behaviour is :

1. $[Zn(NH_3)_6]^{2+}$

2. $[Ti(NH_3)_6]^{3+}$

3. $[Cr(NH_3)_6]^{3+}$

4. $[Co(NH_3)_6]^{3+}$

(At. No. Ti = 22, Cr = 24, Co = 27, Zn = 30)

40. Which one of the following pair represents stereo isomerism :-

(1) Linkage isomerism and Geometrical isomerism

(2) Chain isomerism and Rotational isomerism

(3) Optical isomerism and Geometrical isomerism

(4) Structural isomerism and Geometrical isomerism

41. A complex compound which is formed by ligands nitrate and chloride. It gives two moles of AgCl precipitate with $AgNO_3$. What will be its formulae :

1. $[Co(NH_3)_5NO_3]Cl_2$

2. $[Co(NH_3)_5Cl]NO_3Cl$

3. $[Co(NH_3)_4Cl_2]NO_3$

4. $[Co(NH_3)_4ClNO_3]Cl$

42. Shape of $Fe(CO)_5$ is :

1. Octahedral

2. Square planar

3. Trigonal bipyramidal

4. Square pyramidal

43. Which one of the following is expected to exhibit optical isomerism ? (en = ethylenediamine)

1. cis – $[Pt(NH_3)_2Cl_2]$

2. cis – $[Co(en)_2Cl_2]$

3. trans– $[Co(en)_2Cl_2]$

4. trans – $[Pt(NH_3)_2Cl_2]$

44. Mg is present in :

1. Chlorophyll

2. Haemoglobin

3. Vitamin-12

4. Vitamin-B

45. Number of isomers of $[Pt(NH_3)_4][CuCl_4]$ complex are :

1. 2
2. 3
3. 4
4. 5

46. The coodination compound that will give four isomers is :

1. $[Fe(en)_3]Cl_3$

2. $[Co(en)_2Cl_2]Cl$

3. $[Fe(PPh_3)_3NH_3ClBr]Cl$

4. $[Co(PPh_3)_3Cl]Cl_3$

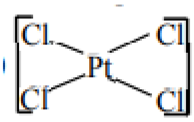
47. The IUPAC name of $[Co(NH_3)_3ClBrNO_2]$ will be :

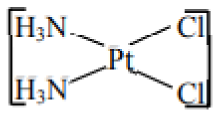
(1) Triamminebromochloronitrocobaltate (III)
(2) Triamminebromochloronitrocobalt (III)
(3) Triamminebromonitrochlorocobalt (III)
(4) Triamminenitrobromochlorocobalt (III)

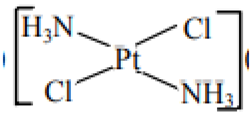
48. In $[Cr(NH_3)_6]\ Br_3$, number of unpaired electrons in Cr is :

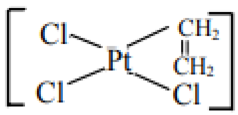
1. 4
2. 3
3. 1
4. 2

49. Anticancer agent among the following is :-

1. 

2. 

3. 

4. 

50. In an octahedral structure, the pair of d orbitals involved in d^2sp^3 hybridization is :-

1. $d_{xz}, d_x^2 - y^2$

2. d_z^2, d_{xz}

3. d_{xy}, d_{yz}

4. $d_x^2 - y^2, d_z^2$

51. CN^- is a strong field ligand. This is due to the fact that :-

(1) It is a pseudohalide.

(2) It can accept electrons from metal species.

(3) It forms high spin complexes with metal species.

(4) It carries negative charge .

52. Considering H_2O as a weak field ligand, the number of unpaired electrons in $[Mn(H_2O)_6]^{2+}$ will be –
(At. no. of Mn = 25)

(1) Five

(2) Two

(3) Four

(4) Three

53. Among $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$, $[NiCl_4]^{2-}$ species, the hybridization states at the Ni atom are respectively :-

(At. No. of Ni = 28)

1. sp^3, dsp^2, sp^3

2. sp^3, sp^3, dsp^2

3. dsp^2, sp^3, sp^3

4. sp^3, dsp^2, dsp^2

54. Coordination compound that would exhibit optical isomerism is :

(1) Diamminedichloroplatinum (II)

(2) Trans-dicyanobis (ethylenediamine) chromium (III) chloride

(3) Tris – (ethylenediamine) cobalt (III) chloride

(4) Pentaamminenitrocobalt (III) iodide

55. Atomic number of Cr and Fe are respectively 24 and 26 . Among the following the one that is paramagnetic with the spin of electron is : -

1. $\left[Cr\,(CO)_6\right]$

2. $\left[Fe\,(CO)_5\right]$

3. $\left[Fe\,(CN)_6\right]^{-4}$

4. $\left[Cr\,(NH_3)_6\right]^{+3}$

56. The hypothetical complex chlorodiaquatriamminecobalt (III) chloride can be represented as-

1. $\left[CoCl\,(NH_3)_3(H_2O)_2\right]Cl_2$

2. $\left[Co\,(NH_3)_3(H_2O)Cl_3\right]$

3. $\left[Co\,(NH_2)_3(H_2O)_2\,Cl\right]$

4. $\left[Co\,(NH_3)_3(H_2O)_3\,Cl_3\right]$

57. The coordination compound that give maximum number of isomers : -

1. $\left[Co(NH_3)_4Cl_2\right]$

2. $\left[Ni(en)(NH_3)_4\right]^{+2}$

3. $\left[Ni\,(C_2O_4)\,(en)_2\right]$

4. $\left[Cr(SCN)_2(NH_3)_4\right]^{+}$

58. According to IUPAC nomenclature, sodium nitroprusside is named as -

1. Sodium nitroferricyanide

2. Sodium nitroferrocyanide

3. Sodium pentacyanidonitrosyl ferrate (II)

4. Sodium pentacyanonitrosyl ferrate (III)

59. The number of unpaired electrons in the complex ion $[CoF_6]^{3-}$ is-

(A + No = Co = 27)

1. 2

2. 3

3. 4

4. Zero

60. The octahedral complex that will not show geometrical isomerism is:
(A and B are monodentate ligands)

(1) $[MA_2B_4]$

(2) $[MA_3B_3]$

(3) $[MA_4B_2]$

(4) $[MA_5B]$

61. Vitamin B_{12} contains :

1. Fe(II)

2. Co(III)

3. Zn(II)

4. Ca(II)

62. The coordination number of Ni in $[Ni(C_2O_4)_3]^{4-}$ is :

1. 3

2. 6

3. 4

4. 2

63. The organometallic compound that is σ and π bonded is : -

1. $\left[Fe\left(\eta^5 - C_5H_5\right)_2\right]$

2. $K\left[PtCl_3\left(\eta^2 - C_2H_4\right)\right]$

3. $\left[Co(CO)_5NH_3\right]^{+2}$

4. $Fe(CH_3)_3$

64. Incorrect option among the following is : -

1. $Ni(CO)_4$,Tetrahedral, paramagnetic
2. $Ni(CN)_4^{-2}$,Square planar, diamagnetic
3. $Ni(CO)_4$ Tetrahedral, diamagnetic
4. $\left[Ni(Cl)_4\right]^{-2}$ Tetrahedral, paramagnetic

65. The complex that will exhibit maximum ionic conductivity in aqueous solution is : -

1. $K_4\left[Fe(CN)_6\right]$

2. $\left[Co(NH_3)_6\right]Cl_3$

3. $\left[Cu(NH_3)_4\right]Cl_2$

4. $\left[Ni(CO)_4\right]$

66. Ethylene diaminetetraacetate (EDTA) ion is :

1. Bidentate ligand with two "N" donor atoms

2. Tridentate ligand with three "N" donor

3. Hexadentate ligand with four "O" and two atoms "N" donor atoms

4. Unidentate ligand

Haloalkanes & Halarenes

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Chemical Properties	25
Mechanism of Reactions	8
Physical Properties	4
Iodoform, Freons & DDT	1
Isomerism & Chirality	1

1. The compound among the following that can be used as the halide component for Friedel-Crafts reaction is-

1. Chlorobenzene
2. Bromobenzene
3. Chloroethene
4. Isopropyl chloride

2. Consider the reaction,

CH_3-CH_2-CH_2-Br + NaCN - CH_3-CH_2-CH_2-CN + NaBr

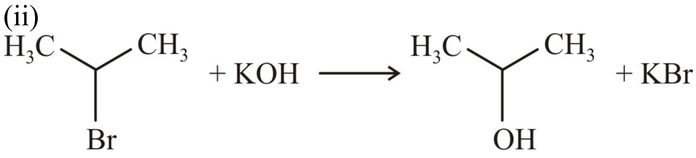
This reaction will be the fastest in -

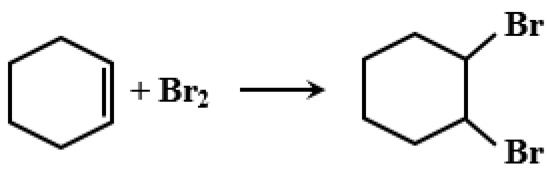
1. Ethanol
2. Methanol
3. N,N'-dimethylformamide (DMF)
4. Water

3. For the following reactions,

(i) $CH_3CH_2CH_2Br + KOH \rightarrow CH_3CH{=}CH_2 + KBr + H_2O$

(ii)





(iii)

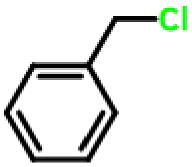
The correct statement among the following is -

1. (i) Elimination, reaction, (ii) is substitution and (iii) is addition reaction
2. (i) Elimination, (ii) and (iii) are substitution reactions
3. (i) Substitution, (ii) and (iii) are addition reactions
4. (i) and (ii) are elimination reactions and (iii) is addition reaction

4. The correct statement among the following regarding S_N1 reaction is -

1. 100% racemisation
2. Inversion more than retention leading to partial racemisation
3. 100% retention
4. 100% Inversion

5. A compound among the following undergoes racemisation upon hydrolysis with aquous KOH is -

(i) 

(ii) $CH_3CH_2CH_2Cl$

(iii) $CH_3 - \underset{}{\overset{\overset{\displaystyle CH_3}{|}}{CH}} - CH_2\,Cl$

(iv) $CH_3 - \overset{\overset{\displaystyle Cl}{|}}{CH} - C_2H_5$

1. (i) and (ii)

2. (ii) and (iv)

3. (iv) only

4. (i) and (iv)

6. $CH_3 - Br \xrightarrow{KCN} A \xrightarrow{H_3O^+} B \xrightarrow[ether]{LiAlH_4} C$

The end product (C) in the above mentioned reaction is -

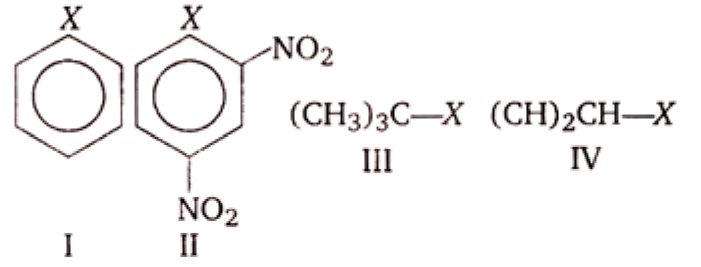
1. Acetone

2. Methane

3. Acetaldehyde

4. Ethyl alcohol

7.



The correct sequence of increasing reactivity of C-X bond towards nucleophile in the following compounds is -

1. I<II<IV<III

2. II<III<I<IV

3. IV<III<I<II

4. III<II<I<IV

8. The reaction that cannot form new carbon-carbon bonds is -

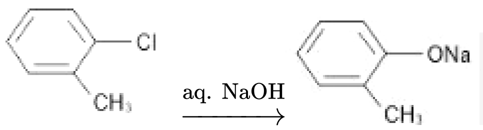
1. Reimer-Tiemann reaction

2. Cannizaro reaction

3. Wurtz reaction

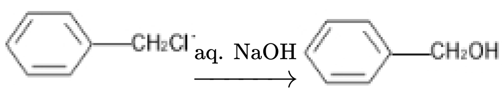
4. Friedel-Crafts acylation

9. The hydrolysis reaction that takes place at the slowest rate among the following is-

1. 

2. $H_3CCH_2Cl \xrightarrow{aq.\ NaOH} H_3CCH_2OH$

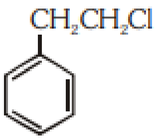
3. $H_2C = CHCH_2Cl \xrightarrow{aq.\ NaOH} H_2C = CHCH_2OH$

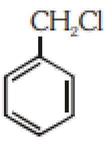
4. 

10. A compound that does not undergo S_N1 reaction with OH^- is -

1. $CH_2 = CH - CH_2Cl$

2. $(CH_3)_3CCl$

3. 

4. 

11. In the following reaction

$$C_6H_5\,CH_2\,Br \xrightarrow[2.\ H_3O^+]{1.\ Mg,\ Ether} X,$$

The product 'X' is -

1. $C_6H_5\,CH_2\,OH$

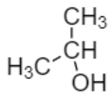
2. $C_6H_5\,CH_3$

3. $C_6H_5\,CH_2\,CH_2\,C_6H_5$

4. $C_6H_5\,CH_2\,OCH_2\,C_6H_5$

12. (a) CH_3CH_2OH

(b) CH_3COCH_3

(c) 

(d) CH_3OH

Iodoform reaction is given by -

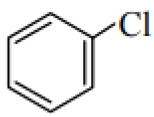
1. Only (b)

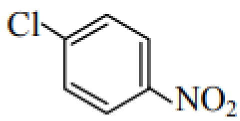
2. (a), (b) and (c)

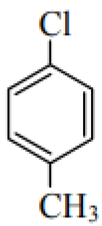
3. (a) and (b)

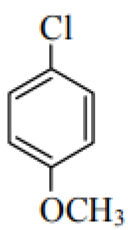
4. (a), (c) and (d)

13. Which of the following compounds undergoes nucleophilic substitution reaction most easily ?

1. 

2. 

3. 

4. 

14. Consider the reactions :

(i) $(CH_3)_2CH - CH_2Br \xrightarrow{C_2H_5OH}$

$(CH_3)_2CH - CH_2OC_2H_5 + HBr$

(ii) $(CH_3)_2CH - CH_2Br \xrightarrow{C_2H_5O^-}$

$(CH_3)_2CH - CH_2OC_2H_5 + Br^-$

The mechanisms of reactions (i) and (ii) are respectively :

1. S_N2 and S_N1

2. S_N1 and S_N2

3. S_N1 and S_N1

4. S_N2 and S_N2

15. Which of the following undergoes nucleophilic substitution exclusively by SN^1 mechanism :

(1) Ethyl chloride

(2) Isopropyl chloride

(3) Benzyl chloride

(4) Chlorobenzene

16. The –OH group of an alcohol or the carboxylic acid can be replaced by – Cl using :

(1) Hypochlorous acid

(2) Chlorine

(3) Hydrochloric acid

(4) Phosphorous pentachloride

17. Reactivity order of halides for dehydrohalogenation is : -

(1) R – F > R – Cl > R – Br > R – I

(2) R – I > R – Br > R – Cl > R – F

(3) R – I > R – Cl > R – Br > R – F

(4) R – F > R – I > R – Br > R – Cl

18. $CH_3CH_2Cl \xrightarrow{NaCN} X \xrightarrow{Ni/H_2} Y \xrightarrow{\text{Acetic anhydride}} Z$

Z in the above reaction sequence is :-

(1) $CH_3CH_2CH_2NHCOCH_3$

(2) $CH_3CH_2CH_2NH_2$

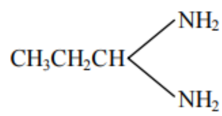
(3) $CH_3CH_2CH_2CONHCH_3$

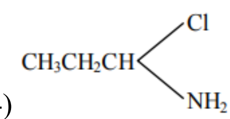
(4) $CH_3CH_2CH_2CONHCOCH_3$

19. When $CH_3CH_2CHCl_2$ is treated with $NaNH_2$, the product formed is : -

(1) $CH_3 - CH = CH_2$

(2) $CH_3 - C \equiv CH$

(3) 

(4) 

20.
$$\begin{array}{l} CH_3 - CH_2 - \underset{\displaystyle Cl}{\underset{|}{CH}} - CH_3 \end{array}$$
obtained by chlorination of n-butane, will be : -
1. Meso form
2. Racemic mixture
3. d-form
4. l-form

21. An organic compound A(C_4H_9Cl) on reaction with Na/diethyl ether gives a hydrocarbon which on monochlorination gives only one chloro derivative then, A is : -

1. t-butyl chloride
2. sec. butyl chloride
3. Iso butyl chloride
4. n-butyl chloride

22. The correct sequence of bond enthalpy of 'C-X' bond for the following compounds is -

1. CH_3-F< CH_3-Cl> CH_3-Br >CH_3-I

2. CH_3-Cl> CH_3-F> CH_3-Br > CH_3-I

3. CH_3-F< CH_3-Cl < CH_3-Br < CH_3-I

4. CH_3-F> CH_3-Cl> CH_3-Br > CH_3-I

23. The major product formed in dehydrohalogenation reaction of 2-Bromo pentane is Pent-2-ene.This product formation is based on-

1. Hofmann Rule

2. Huckel's Rule

3. Saytzeff's Rule

4. Hund's Rule

Alcohols, Phenols & Ethers

(Expected Questions in NEET 2022: 2)

Subtopic Name	Number of Questions
Alcohols: Preparation & Properties	20
Phenols: Preparation & Properties	13
Ethers: Preparation & Properties, Uses	5
Mechanism of Dehydration, Methanol & Ethanol	4

1. The heating of phenylmethyl ethers with HI produces-

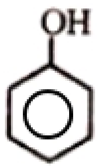
1. Iodobenzene

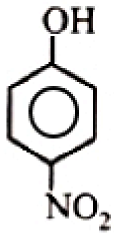
2. Phenol

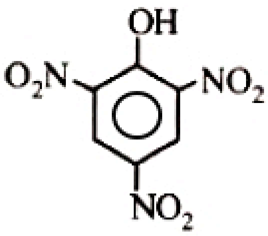
3. Benzene

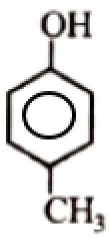
4. Ethyl chloride

2. The most acidic compound among the following is -

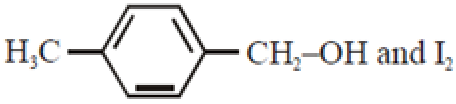
1. 

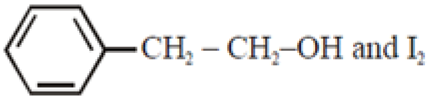
2. 

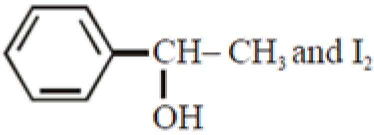
3. 

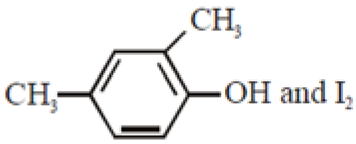
4. 

3. Compound A, $C_8H_{10}O$ is found to react with NaOI (produced by reacting Y with NaOH) and yields a yellow precipitate with a characteristic smell. A and Y are respectively-

1. 

2. 

3. 

4. 

4. The compound A on treatment with Na gives B, and with PCl_5 gives C. B and C react together to give diethyl ether.

A, B and C are respectively-

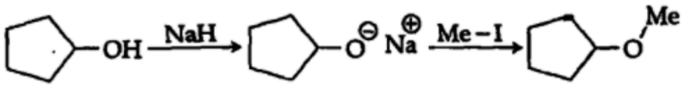
1. $C_2H_5\,OH,\ C_2H_6,\ C_2H_5\,CI$

2. $C_2H_5\,OH,\ C_2H_5\,CI,\ C_2H_5\,ONa$

3. $C_2H_5\,Cl,\ C_2H_6,\ C_2H_5\,OH$

4. $C_2H_5\,OH,\ C_2H_5\,ONa\ ,C_2H_5\,Cl$

5.



The above mentioned reaction can be classified as-

1. Alcohol formation reaction

2. Dehydration reaction

3. Williamson alcohol synthesis reaction

4. Williamson ether synthesis reaction

6. Reaction of phenol with chloroform in the presence of dilute sodium hydroxide finally introduces a functional group X.

X is -

1. $-CH_2Cl$

2. $-COOH$

3. $-CHCl_2$

4. $-CHO$

7. Which of the following reaction(s) can be used for the preparation of alkyl halides?

I. $\mathrm{CH_3\,CH_2\,OH + HCl} \xrightarrow{\text{anh. ZnCl}_2}$
II. $\mathrm{CH_3\,CH_2\,OH + HCl} \rightarrow$
III. $\mathrm{(CH_3)_3}COH + HCl \rightarrow$
IV. $\mathrm{(CH_3)_2}CHOH + HCl \xrightarrow{anh.\ ZnCl_2}$

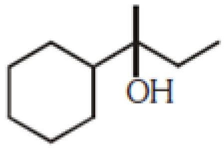
1. I, III and IV

2. I and II

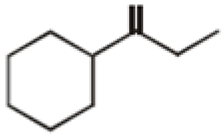
3. Only IV

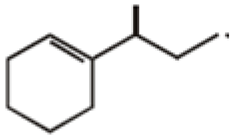
4. III and IV

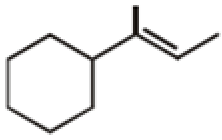
8.
Which of the following is not the product of dehydration of

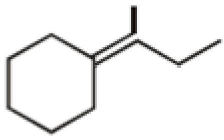


?

1. 

2. 

3. 

4. 

9.

The reaction,

$$\mathrm{CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - ONa + CH_3\,CH_2\,Cl}$$

$$\xrightarrow[-\mathrm{NaCl}]{} \mathrm{CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - O - CH_2 - CH_3}$$

is called
1. Williamson synthesis
2. Williamson continuous etherification process
3. Etard reaction
4. Gatterman-Koch reaction

10. Anisole is produced by the following set of reactants is -

1. CH_3CHO ; RMgX

2. C_6H_5OH ; NaOH ; CH_3I

3. C_6H_5OH ; neutral $FeCl_3$

4. $C_6H_5 - CH_3$; CH_3COCl ; $AlCl_3$

11.
Ether among the following will produce methyl alcohol on treatment with hot concentrated HI -

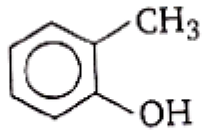
1. $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - O - CH_3$

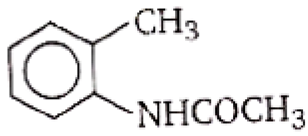
2. $CH_3 - \overset{\displaystyle CH_3}{\overset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}} - O - CH_3$

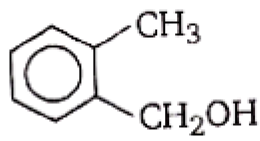
3. $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - O - CH_3$

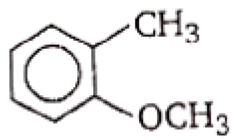
4. $CH_3 - CH_2 - CH_2 - CH_2 - O - CH_3$

12. The most reactive compound among the following towards electrophilic aromatic substitution reaction is -

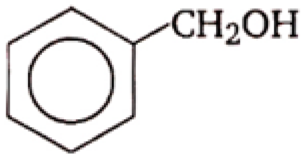
1. 

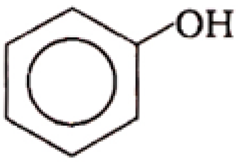
2. 

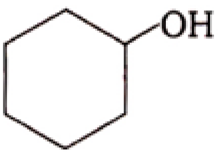
3. 

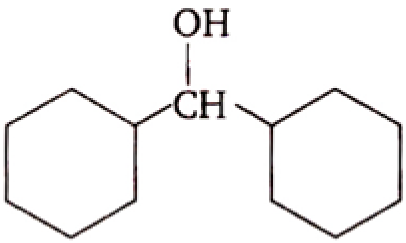
4. 

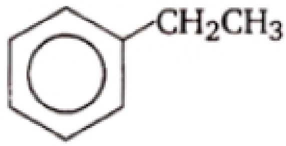
13. The most acidic compound among the following is -

1. 

2. 

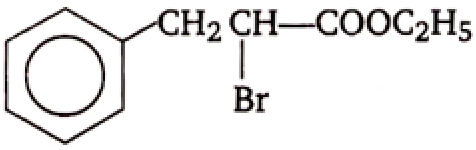
3. 

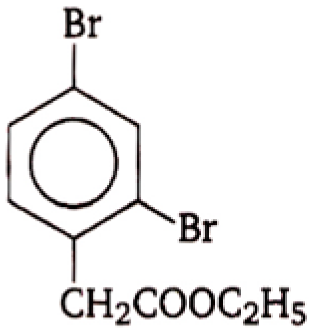
4. 

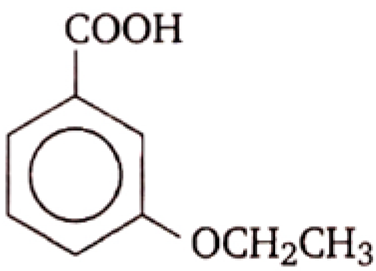
14. 

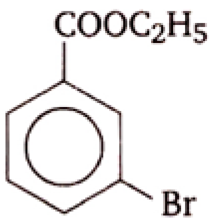
$\xrightarrow[KOH]{KMnO_4} B \xrightarrow[FeCl_3]{Br_2} C \xrightarrow[H^+]{C_2H_5OH} D$

The product 'D' in the above mentioned reaction is-

1. 

2. 

3. 

4. 

15. , Phenol $\xrightarrow{\text{Zn dust}}$ X $\xrightarrow[\text{Anhy. AlCl}_3]{CH_3Cl}$ Y $\xrightarrow{\text{Alkaline KMnO}_4}$ Z

The product 'Z' in the above mentioned reaction is-

1. Toluene

2. Benzaldehyde

3. Benzoic acid

4. Benzene

16.

Ethanol $\xrightarrow{PBr_3}$ X $\xrightarrow{\text{alc. KOH}}$ Y $\xrightarrow[\text{(ii) } H_2O, \text{ heat}]{\text{(i) } H_2SO_4, \text{ room temperature}}$ Z;

The product 'B' in the above mentioned reaction is-

1. $CH_2 = CH_2$

2. $CH_3CH_2 - O - CH_2 - CH_3$

3. $CH_3 - CH_2 - O - SO_3H$

4. CH_3CH_2OH

17.

$$CH_3 - \underset{}{\overset{\overset{\large CH_3}{|}}{CH}} - CH_2 - O - CH_2 - CH_3 + HI \rightarrow$$

The product formed in the above mentioned reaction is -

1. $CH_3 - \overset{\overset{\large CH_3}{|}}{CH} - CH_2 - I + CH_3 - CH_2OH$

2. $CH_3 - \underset{\underset{\large CH_3}{|}}{CH} - CH_3 + CH_3 - CH_2OH$

3. $CH_3 - \underset{\underset{\large CH_3}{|}}{CH} - CH_2OH + CH_3 - CH_3$

4. $CH_3 - \overset{\overset{\large CH_3}{|}}{CH} - CH_2 - OH + CH_3 - CH_2 - I$

18. $CH_3 - O - CH(CH_3)_2 + HI \rightarrow$ B (Product)

The product 'B' in the above mentioned reaction is-

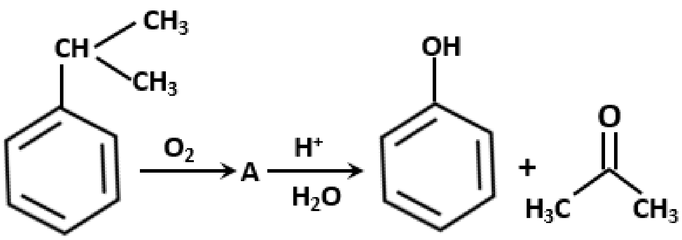
1. $CH_3OH + (CH_3)_2CHI$

2. $ICH_2OCH(CH_3)_2$

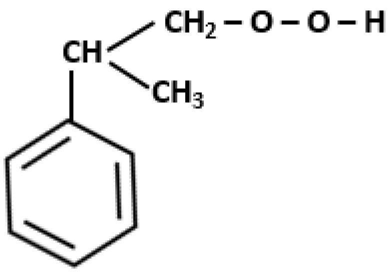
3. $CH_3OC(CH_3)_2$

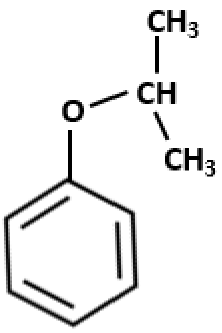
4. $CH_3I + (CH_3)_2CHOH$

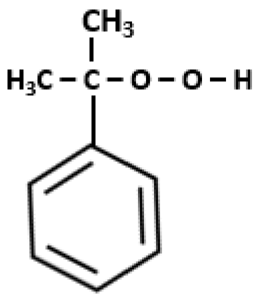
19.

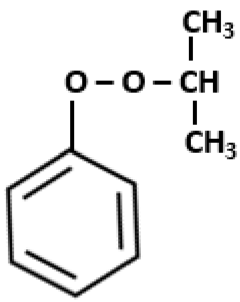


The structure of intermediate A in the following reaction is:

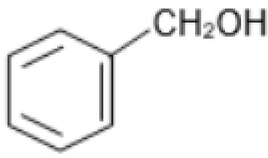
1. 

2. 

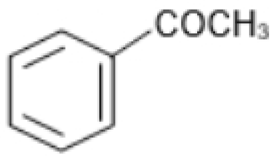
3. 

4. 

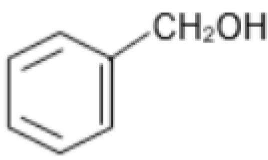
20. The reaction that does not give benzoic acid as the major product is-

1. 

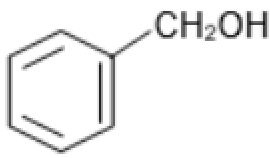
$\xrightarrow{K_2Cr_2O_7}$

2. 

$\xrightarrow[(ii)\,H_3O^+]{(i)\,NaOCl}$

3. 

$\xrightarrow{PCC}$

4. 

$\xrightarrow{KMnO_4/H^+}$

21. When vapour of a secondary alcohol is passed over heated copper at 573 K, the product formed is -

1. A carboxylic acid

2. An aldehyde

3. A ketone

4. An alkene

22. The major products C and D formed in the following reaction respectively are-

$H_3C\text{-}CH_2\text{-}CH_2\text{-}OC(CH_3)_3 \xrightarrow[\Delta]{\text{excess HI}} C+D$

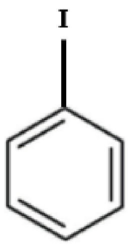
1. $H_3C - CH_2 - CH_2 - I$ and I-$C(CH_3)_3$

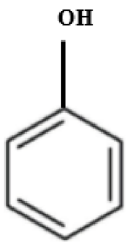
2. $H_3C - CH_2 - CH_2 - OH$ and I-$C(CH_3)_3$

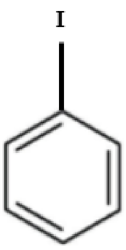
3. $H_3C - CH_2 - CH_2 - I$ and HO-$C(CH_3)_3$

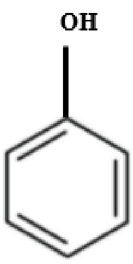
4. $H_3C - CH_2 - CH_2 - OH$ and HO-$C(CH_3)_3$

23. Anisole on reaction with HI gives-

1.  + CH_3COOH

2.  + C_2H_5I

3.  + C_2H_5OH

4.  + CH_3I

24. The reaction between acetone and methylmagnesium chloride followed by hydrolysis will give:

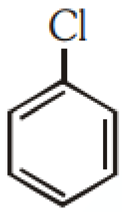
1. sec-Butyl alcohol

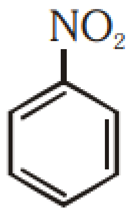
2. tert-Butyl alcohol

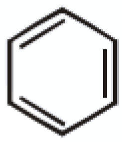
3. iso-Butyl alcohol

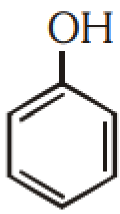
4. iso-Propyl alcohol

25. The most reactive compound among the following for electrophilic aromatic substitution is-

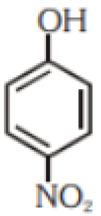
1. 

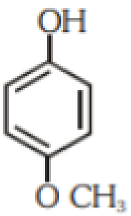
2. 

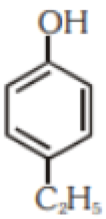
3. 

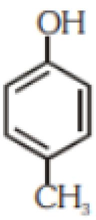
4. 

26. The strongest acid among the following is -

1. 

2. 

3. 

4. 

27. $CH_3CH_2CH = CH_2 \xrightarrow[H_2O,\ H_2O_2,\ OH^-]{B_2H_6} Z$

Z in the above reaction is -

1. $CH_3\ CH_2\ CH_2\ CH_2\ OH$

2. $CH_3\ CH_2\ \underset{\overset{|}{OH}}{C}\ HCH_3$

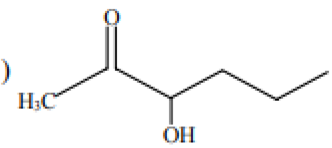
3. $CH_3\ CH_2\ CH_2\ CHO$

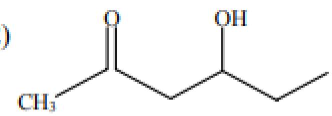
4. $CH_3\ CH_2\ CH_2\ CH_3$

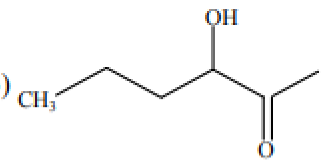
28. The compound that is used as antifreeze in automobile radiators is:

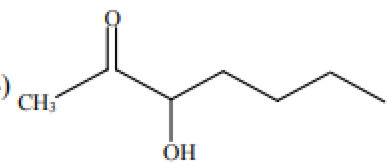
1. Glycol
2. Nitrophenol
3. Ethyl alcohol
4. Methyl alcohol

29. Which one of the following compounds will be most readily dehydrated ?

(1) 

(2) 

(3) 

(4) 

30. Among the following four compounds

(a) Phenol

(b) methyl phenol

(c) meta-nitrophenol

(d) para-nitrophenol

The acidity order is –

1. c > d > a > b

2. a > d > c > b

3. b > a > c > d

4. d > c > a > b

31. Which of the following does not give nucleophilic substitution with alcohol :
1. CH_3COCl
2. Acetic anhydride
3. Ether
4. None

32. Which of the following statement is correct for the stability of ions of ethyl alcohol and phenol :

1. Delocalisation of π-electrons in phenoxide ion

2. Delocalisation of electrons in ethoxide ion

3. Inductive effect of ethyl and phenyl group

4. Localisation of sigma-electrons in phenoxide ion

33. The compound that gives p-cresol with p-methyl diazonium chloride is :

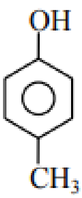
1. H_2O

2. H_3PO_2

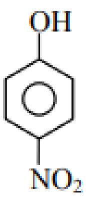
3. HCOOH

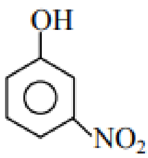
4. C_6H_5OH

34. Order of acidic strength of the following compound will be :

(A) 

(B) C_6H_5OH

(C) 

(D) 

1. C > D > B > A
2. D > C > B > A
3. A > B > C > D
4. B > A > C > D

35. The compound that will not form a yellow precipitate on heating with an alkaline solution of iodine is :-

1. $CH_3\,CH_2\,CH(OH)\,CH_3$

2. $CH_3\,OH$

3. $CH_3\,CH_2\,OH$

4. $CH_3\,CH(OH)\,CH_3$

36. n-propyl alcohol and isopropyl alcohol can be chemically distinguished by which reagent : -

(1) PCl_5

(2) Reduction

(3) Oxidation with Potassium dichromate

(4) Ozonolysis

37. When phenol is treated with $CHCl_3$ and NaOH, the product formed is :-

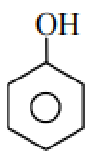
(1) Benzaldehyde

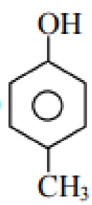
(2) Salicylaldehyde

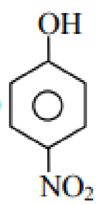
(3) Salicylic acid

(4) Benzoic acid

38. The correct acidic order of following is : -

(I) 

(II) 

(III) 

1. I > II > III
2. III > I > II
3. II > III > I
4. I > III > II

39. Incorrect statement among the following is : -

1. $FeCl_3$ is used in detection of phenol.
2. Fehling solution is used in detection of glucose.
3. Tollen reagent is used in detection of unsaturation.
4. $NaHSO_3$ is used in detection of carbonyl compound.

40. In preparation of alkene from alcohol using Al_2O_3 which is effective factor : -

1. Porousity of Al_2O_3
2. Temperature
3. Concentration
4. Surface area of Al_2O_3

41. Correct statement among the solution is : -

1. Any aldehyde gives secondary alcohol on reduction.
2. Reaction of vegetable oil with H_2SO_4 give glycerin.
3. C_2H_5OH, iodine with NaOH gives iodoform.
4. Sucrose on reaction with NaCl give invert sugar.

42. What is the IUPAC name of the organic compound formed in the following chemical reaction ?

$$\text{Acetone} \xrightarrow[\text{(ii) } H_2O,\ H^+]{\text{(i)} C_2H_5\text{ MgBr,dry Ether}} \text{Product}$$

1. pentan-3-ol

2. 2-methyl butan-2-ol

3. 2-methyl propan-2-ol

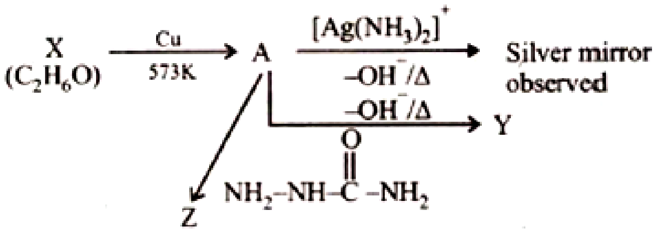
4. pentan-2-ol

Aldehydes, Ketones & Carboxylic Acids

(Expected Questions in NEET 2022: 3)

Subtopic Name	Number of Questions
Aldehydes & Ketones: Preparation & Properties	23
Isomers & Reaction Mechanism	15
Name Reaction	13
Carboxylic Acids: Preparation & Properties	7
Acid Derivatives - Preparation, Properties & Uses	5

1.



A, X, Y, and Z in the above mentioned reaction is -

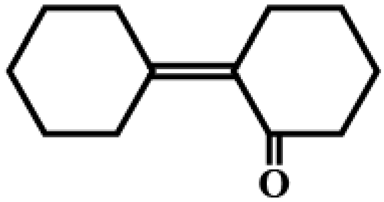
1. A- Methoxymethane, X-Ethanol, Y-Ethanoic acid, Z-Semicarbazone.

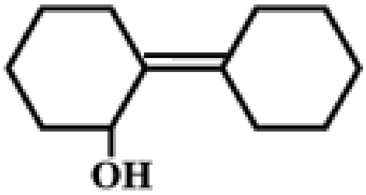
2. A- Ethanal, X-Ethanol, Y-But-2-enal, Z-Semicarbazone.

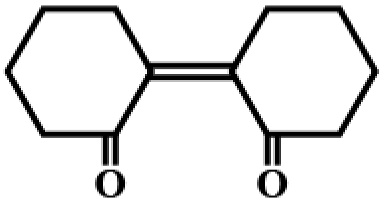
3. A- Ethanol, X-Acetaldehyde, Y-Butanone, Z-Hydrazone.

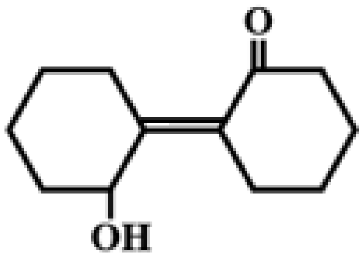
4. A- Methoxymethane, X-Ethanoic acid, Y-Acetate, Z-Hydrazine.

2. Cyclohexanone undergoes aldol condensation followed by heating to give -

1. 

2. 

3. 

4. 

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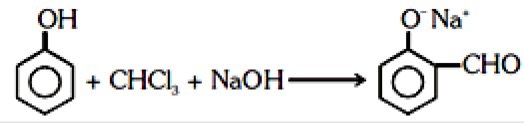


The electrophile involved in the above reaction is -

1. Dichloromethyl cation $\left(\overset{\oplus}{C}HCl_2\right)$

2. Formyl cation $\left(\overset{\oplus}{C}HO\right)$

3. Dichloromethyl anion $\left(\overset{\oplus}{C}HCl_2\right)$

4. Dichlorocarbene ($:CCl_2$)

4. Carboxylic acids have higher boiling points than aldehydes, ketones and even alcohols of comparable molecular mass. It is due to -

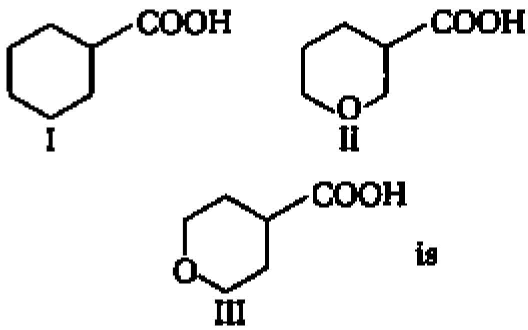
1. Formation of intramolecular H-bonding

2. Formation of carboxylate ion

3. More extensive association of carboxylic acid via van der waals force of attraction

4. Formation of intermolecular H-bonding

5. The correct order of strengths of the carboxylic acids are-



1. I>II>III

2. II>III>I

3. III>II>I

4. II>I>III

6.
The correct statement regarding a carbonyl compound with a hydrogen atom on its alpha-carbon, is-

1. A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as aldehyde-ketone equilibration.

2. A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation.

3. A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as keto-enol tautomerism.

4. A carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol.

7.
A reagents that can distinguish cis-cyclopenta-1,2-diol from the trans-isomer is -

1. Ozone

2. MnO_2

3. Aluminium isopropoxide

4. Acetone

8.
The product formed by the reaction of an aldehyde with a primary amine is-

1. Ketone

2. Carboxylic acid

3. Aromatic acid

4. Schiff base

9. Reaction of a carbonyl compound with one of the following reagents involves nucleophilic addition followed by the elimination of water. The reagents is-

1. A Grignard reagent

2. Hydrazine in presence of feebly acidic solution

3. Hydrocyanic acid

4. Sodium hydrogen sulphite

10. Treatment of cyclopentanone with methyl lithium gives -

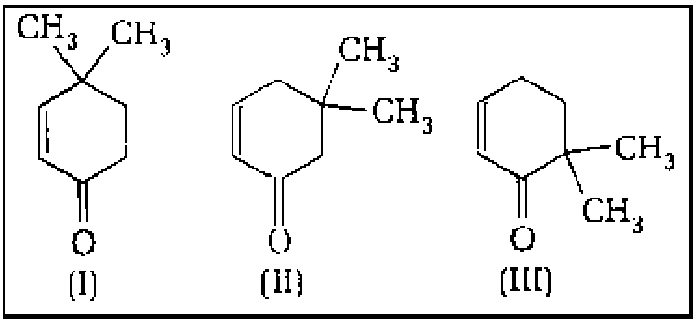
1. Cyclopentanonyl cation

2. Cyclopentanonyl radical

3. Cyclopentanonyl biradical

4. Cyclopentanonyl anion

11.



compounds that can exhibit tautomerism is -

1. I and II

2. I and III

3. II and III

4. I, II and III

12.

An organic compound X having molecular formula $C_5H_{10}O$ yields phenyl hydrazone and gives negative response to the iodoform test and Tollen's test. It produces n-pentane on reduction. X could be
1. pentanal
2. 2-pentanone
3. 3-pentanone
4. n-amyl alcohol

13. Which of the following will not be soluble in sodium hydrogen carbonate?

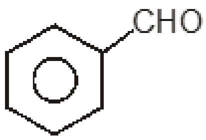
1. 2, 4, 6-trinitrophenol

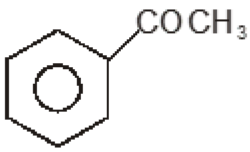
2. Benzoic acid

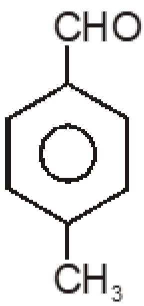
3. o-Nitrophenol

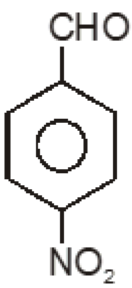
4. Benezenesulphonic acid

14.
Most reactive towards Nucleophilic addition reaction is-

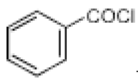
1. 

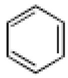
2. 

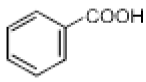
3. 

4. 

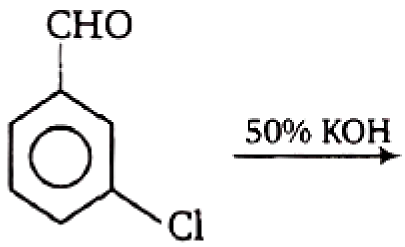
15. Benzaldehyde cannot be prepared by-

1.  + H_2 in presence of Pd-$BaSO_4$

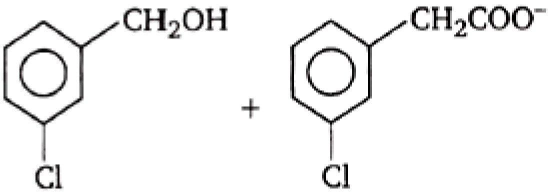
2.  + CO + HCl in presence of anhydrous $AlCl_3$

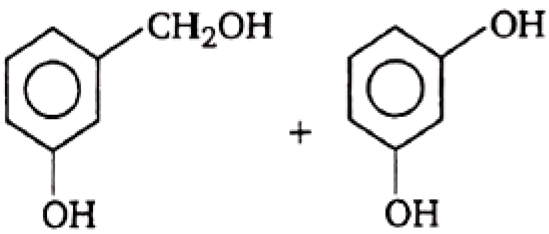
3.  + Zn/Hg and conc. HCl

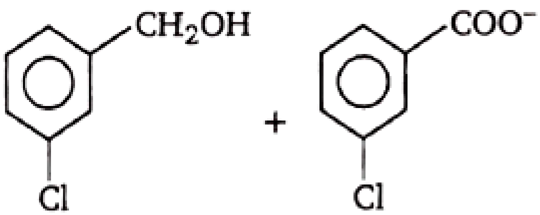
4.  + CrO_2Cl_2 in CS_2 followed by H_3O^+

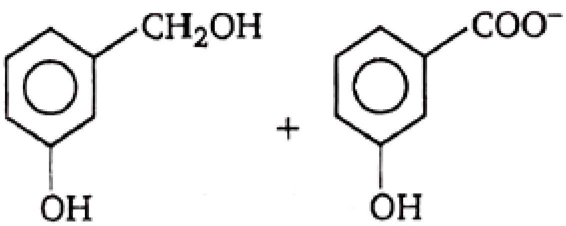
16. 

The products of the above mentioned reaction are-

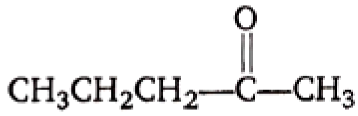
1. 

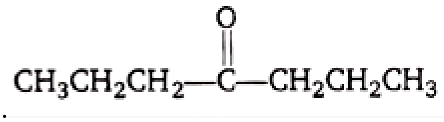
2. 

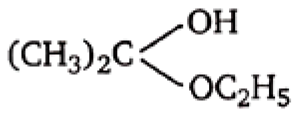
3. 

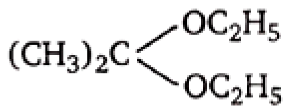
4. 

17. Acetone is treated with excess ethanol in the presence of hydrochloric acid. The product obtained is-

1. 

2. 

3. 

4. 

18. The correct order of decreasing acid strength of trichloroacetic acid (A), trifluoroacetic acid (B), acetic acid (C) and formic acid (D) is-

1. B > A > D > C
2. B > D > C > A
3. A > B > C > D
4. A > C > B >D

19. CH_3CHO and $C_6H_5CH_2CHO$ can be distinguished by-

1. Benedict test
2. Iodoform test
3. Tollen's reagent test
4. Fehling solution test

20. Acid that does not exhibit optical isomerism-

1. Maleic acid

2. α-amino acid

3. Lactic acid

4. Tartaric acid

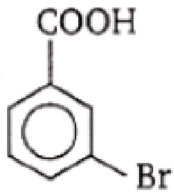
21. Clemmensen reduction of a ketone is carried out in the presence of-

1. Zn-Hg with HCl

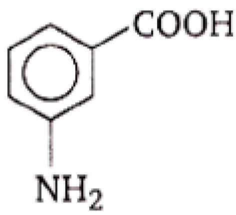
2. $LiAlH_4$

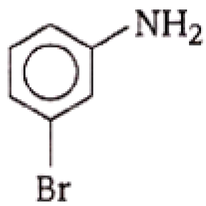
3. H_2 and Pt as a catalyst

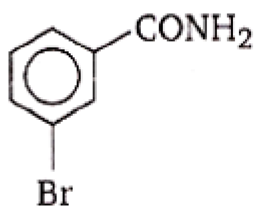
4. Glycol with KOH

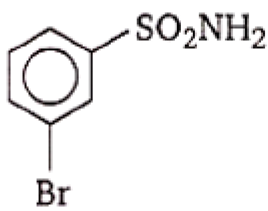
22.  $\xrightarrow{SOCl_2} B \xrightarrow{NH_3} C \xrightarrow[Br_2]{Na\,OH} D$

The product 'D' in the above mentioned reaction is-

1. 

2. 

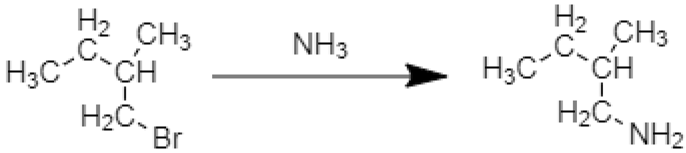
3. 

4. 

23. The example of nucleophilic substitution reaction among the following is-

1. $\mathrm{RCHO} + \mathrm{R'MgX} \rightarrow \mathrm{R} - \underset{\substack{| \\ \mathrm{OH}}}{\mathrm{CH}} - \mathrm{R'}$

2.



3. $\mathrm{CH_3\,CHO} + \mathrm{HCN} \rightarrow \mathrm{CH_3\,CH(OH)CN}$

4.
$\mathrm{CH_3} - \mathrm{CH} = \mathrm{CH_2} + \mathrm{H_2O} \xrightarrow{\mathrm{H^+}} \mathrm{CH_3} - \underset{\substack{| \\ \mathrm{OH}}}{\mathrm{CH}} - \mathrm{CH_3}$

24.
Propanoic acid with Br2/P yields a dibromo product. Its structure would be

1. CH_2Br - CHBr - COOH

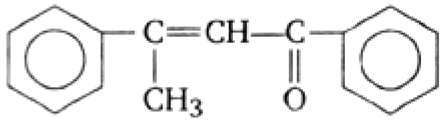
2. $H{-}\underset{\substack{| \\ Br}}{\overset{\substack{Br \\ |}}{C}}{-}CH_2COOH$

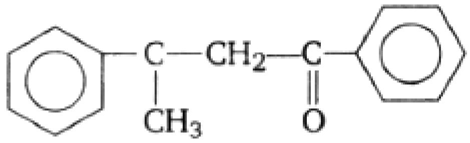
3. $CH_2Br{-}CH_2{-}COBr$

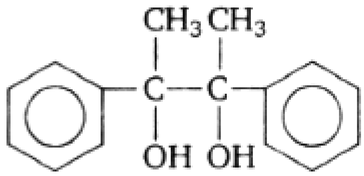
4. $CH_3{-}\underset{\substack{| \\ Br}}{\overset{\substack{Br \\ |}}{C}}{-}COOH$

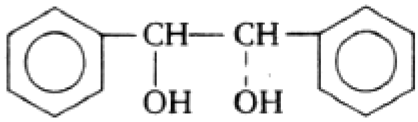
25. Acetophenone yields a stable compound A with C_2H_5ONa in basic medium.

The structure of A is-

1. 

2. 

3. 

4. 

26.
A strong base can abstract an α- hydrogen from-

1. Alkene
2. Amine
3. Ketone
4. Alkane

27. Reduction of aldehydes and ketones into hydrocarbons using amalgam and conc. HCl is called-

1. Clemmensen reduction
2. Cope reduction
3. Dow reduction
4. Wolff-Kishner reduction

28. A compounds with molecular formula C_5H_{10} yields acetone on ozonolysis is -

1. 2-Methyl-2-butene

2. 2-Methyl-1-butene

3. Cyclopentane

4. 3-Methyl-1-butene

29. A compound that yields the corresponding alcohol and acid on hydrolysis of 50% aqueous sodium hydroxide is -

1. $C_6H_5CH_2CHO$

2. C_6H_5CHO

3. $CH_3CH_2CH_2CHO$

4. $CH_3-\overset{\overset{\displaystyle O}{||}}{C}-CH_3$

30. The product formed in aldol condensation is-

1. A beta-hydroxy acid

2. A beta-hydroxy aldehyde or a beta-hydroxy ketone

3. An alpha-hydroxy aldehyde or ketone.

4. An alpha-beta unsaturated ester

31. A carbonyl compound reacts with hydrogen cyanide to form cyanohydrins, that forms a racemic mixture of α-hydroxy acid on hydrolysis. The carbonyl compound is-

1. Acetaldehyde

2. Acetone

3. Diethyl ketone

4. Formaldehyde

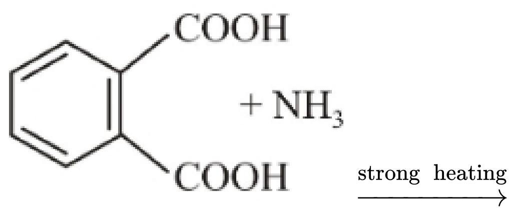
32. Nucleophilic addition reaction will be most favored in-

1. $CH_3CH_2CH_2COCH_3$

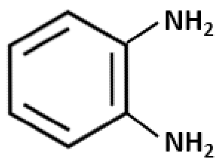
2. $(CH_3)_2C=O$

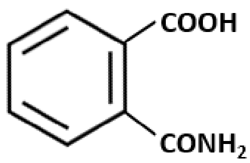
3. CH_3CH_2CHO

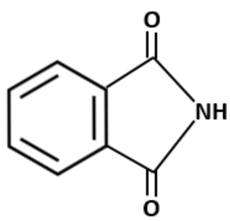
4. CH_3CHO

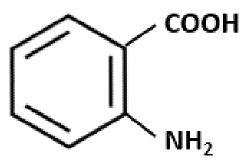
33. 

The product of the above mentioned reaction is-

1. 

2. 

3. 

4. 

34. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as-

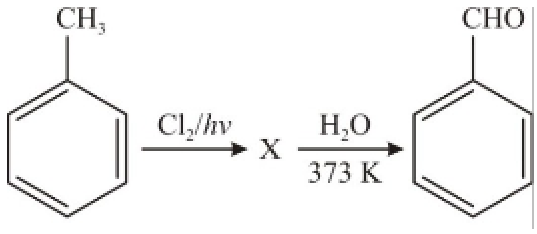
1. Cannizzaro's reaction

2. Cross Cannizzaro's reaction

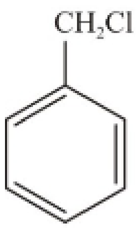
3. Cross aldol condensation

4. Aldol condensation

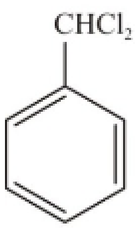
35.



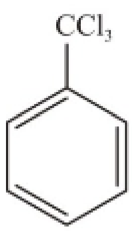
The 'X' in the above mentioned reaction is-



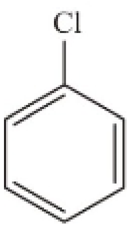
1.



2.

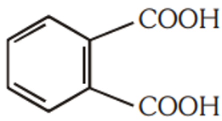


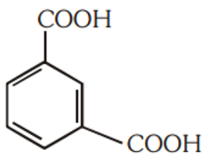
3.

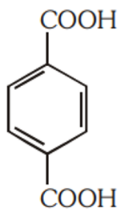


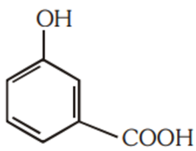
4.

36. An acid that forms an Anhydride (X)on heating and Acid imide (Y) on strong heating with ammonia is

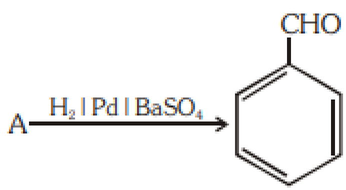
(1) 

(2) 

(3) 

(4) 

37.



The reactant 'A' in the above mentioned reaction is-

1. Benzoyl chloride

2. Toluene

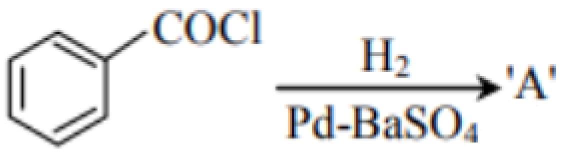
3. Acetophenone

4. Benzoic acid

38. A yellow precipitate with iodine and alkali is given by -

1. Methyl acetate
2. Acetamide
3. 2-Hydroxypropane
4. Acetophenone

39. Consider the following reaction :



The product 'A' is -

1. C_6H_5OH
2. $C_6H_5COCH_3$
3. C_6H_5Cl
4. C_6H_5CHO

40. Match the compounds given in List -I with their characteristic reactions given in List -II. Select the correct option.

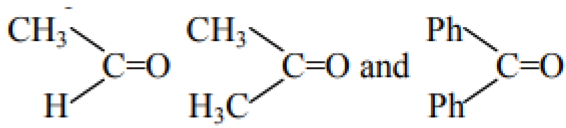
List – I
Compounds
(a) $CH_3CH_2CH_2CH_2NH_2$
(b) $CH_3C\equiv CH$
(c) $CH_3CH_2COOCH_3$
(d) $CH_3CH(OH)CH_3$

List – II
Reactions
(i) alkaline hydrolysis
(ii) with KOH (alcohol) and $CHCl_3$ produces bad smell
(iii) gives white ppt. with ammoniacal $AgNO_3$
(iv) with Lucas' reagent cloudiness appears after 5 minutes

Options :

	(a)	(b)	(c)	(d)
(1)	(iii)	(ii)	(i)	(iv)
(2)	(ii)	(iii)	(i)	(iv)
(3)	(iv)	(ii)	(iii)	(i)
(4)	(ii)	(i)	(iv)	(iii)

41. The order of reactivity of phenyl magnesium bromide (PhMgBr) with the following compounds :



I II III

1. I > II > III
2. III > II > I
3. II > I > III
4. I > III > II

42. Ethyl benzoate can be prepared from benzoic acid by using :

1. Ethyl alcohol
2. Ethyl alcohol and dry HCl
3. Ethyl chloride
4. Sodium ethoxide

43. RCHO and NH_2NH_2 react with each other in an acidic medium. The product obtained is-

1. $RCON_3$
2. RCH=NH
3. RCH_2NH_2
4. $RCH{=}NNH_2$

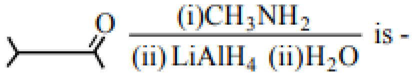
44. Reduction by $LiAlH_4$ of hydrolysed product of an ester gives :

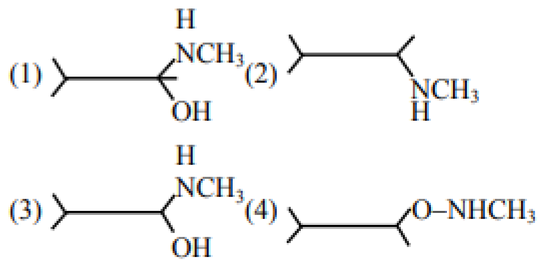
1. Two alcohols
2. Two aldehyde
3. One acid and one alcohol
4. Two acids

45. The following compound that does not give iodoform test is-

1. 3-Pentanone
2. 2-Pentanone
3. Ethanol
4. Ethanal

46. The major organic product formed from the following reaction

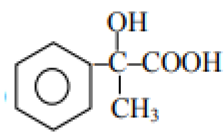


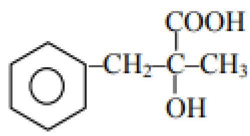


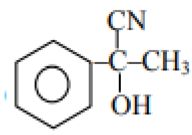
47. In a set of reactions acetic acid yielded a product D

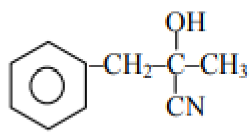
$$CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow[\text{Anhy.}AlCl_3]{\text{Benzene}} B \xrightarrow{HCN} C \xrightarrow{H_2O} D$$

The structure of D would be -

1. 

2. 

3. 

4. 

48. Ethylbenzene is obtained from phenyl methyl ketone by using-

1. Zn–Hg+HCl

2. $LiAlH_4$

3. $KMnO_4$

4. None of the above

49. Acetaldehyde reacts with semicarbazide product will be :

1. $CH_3CH = NHNH_2$

2. $CH_3CH = NCONHNH_2$

3. $CH_3CH = NNH - CO - NH_2$

4. $CH_3 - \overset{\overset{\LARGE O}{||}}{C} - NH - CONH_2$

50. Cyanohydrin of the following compound on hydrolysis gives an optically active product

1. HCHO

2. CH_3CHO

3. CH_3COCH_3

4. All of the above

51. Which one of the following can be oxidized to the corresponding carbonyl compound?

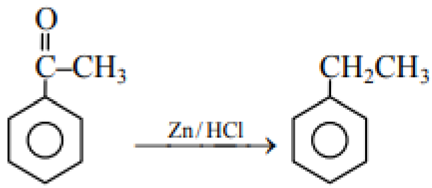
1. o-Nitrophenol

2. Aniline

3. 2-Methyl-2-hydroxypropane

4. 2-Hydroxy propane

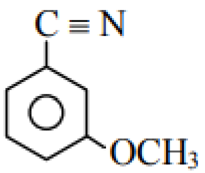
52. Clemmensen reduction reaction is :

1. 

2. $C_6H_5 - COCH_3 + NH_2NH_2 \xrightarrow{C_2H_5O\,Na} C_6H_5CH_2CH_3$

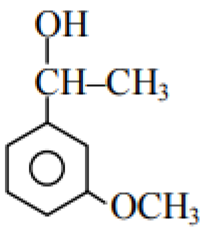
3. $CH_3COCH_3 + 4HI \xrightarrow{Red.\ P} CH_3CH_2CH_3$

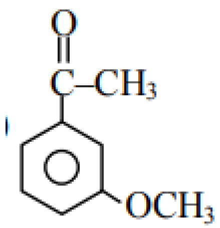
4. All of the above

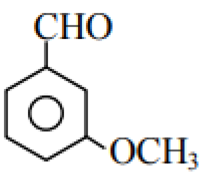
53. 

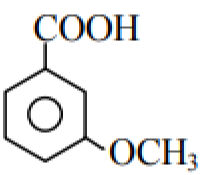
$+ CH_3MgBr \xrightarrow{H_3O^{\oplus}} P$

The product P is-

1. 

2. 

3. 

4. 

54. In the following reaction product, 'P' is-

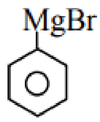
$$R - \underset{\underset{O}{||}}{C} - Cl \xrightarrow[Pd-BaSO_4]{H_2} P$$

1. RCH_2OH

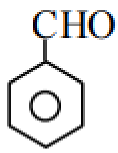
2. $RCOOH$

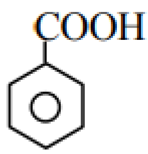
3. $RCHO$

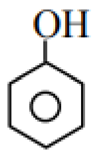
4. RCH_3

55.  $\xrightarrow[(ii) H_3O^{\oplus}]{(i)\ CO_2} P$

Product 'P' in the above reaction is : -

1. 

2. 

3. 

4. $C_6H_5 - \overset{\overset{O}{||}}{C} - C_6H_5$

56.

$$CH_3CHO + HCN \rightarrow CH_3CH\left(OH\right)CN \xrightarrow{H.OH} CH_3CH\Big($$

In the above reaction, an asymmetric centre is generated. The acid obtained in the final product would be:

1. 100 % R-isomer

2. 100% S-isomer

3. 50% R + 50% S-isomer

4. 20% R + 80% S-isomer

57. In a set of the given reactions, acetic acid yielded a product C.

$$CH_3\,COOH + PCl_5 \rightarrow A \xrightarrow[\text{Anh. } AlCl_3]{C_6H_6} B \xrightarrow[\text{ether}]{C_2H_5\,MgBr} \text{'C'},$$

Product C would be

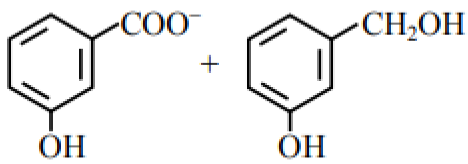
1. $CH_3CH(OH)C_2H_5$

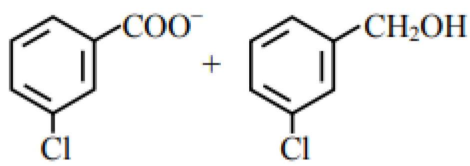
2. $CH_3COC_6H_5$

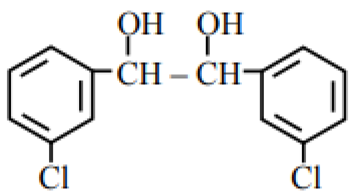
3. $CH_3CH(OH)C_6H_5$

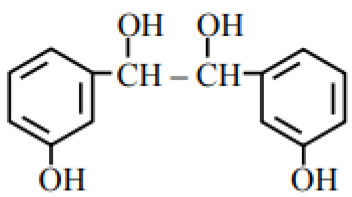
4. $CH_3-\overset{\overset{C_2H_5}{|}}{C}(OH)C_6H_5$

58. When m-chlorobenzaldehyde is treated with 50% KOH solution, the product(s) obtained is (are)

1. 

2. 

3. 

4. 

59. A and B in the following reactions are :

$$R-\underset{\underset{O}{\|}}{C}-R' \xrightarrow{HCN/KCN} A \xrightarrow{B} R-\underset{\underset{R'}{/}}{C}\begin{matrix} OH \\ CH_2NH_2 \end{matrix}$$

1. $A = RR'C\begin{matrix} OH \\ COOH \end{matrix}$, $B = NH_3$

2. $A = RR'C\begin{matrix} CN \\ OH \end{matrix}$, $B = H_3O^{\oplus}$

3. $A = RR'CH_2CN$, $B = NaOH$

4. $A = RR'C\begin{matrix} CN \\ OH \end{matrix}$, $B = LiAlH_4$

60.

$$CH_3\,CH_2\,COO^-\,Na^+ \xrightarrow[\text{Heat}]{NaOH,\,+\,?} CH_3\,CH_3 + Na_2\,CO_3$$

Consider the above reaction and identify the missing reagent/chemical.

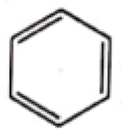
1. CaO

2. DIBAL-H

3. B_2H_6

4. Red Phosphorus

61. Match List-I with List-II.

List-I	List-II
(a)  $\xrightarrow[\text{Anhyd. AlCl}_3/\text{CuCl}]{\text{CO, HCl}}$	(i) Hell-Volhard-Zelinsky reaction
(b) $R-\overset{O}{\overset{\Vert}{C}}-CH_3 + NaOX \rightarrow$	(ii) Gattermann-Koch reaction
(c) $R-CH_2-OH + R'COOH \xrightarrow{\text{Conc. } H_2SO_4}$	(iii) Haloform reaction
(d) $R-CH_2COOH \xrightarrow[\text{(ii) } H_2O]{\text{(i) } X_2/\text{Red P}}$	(iv) Esterification

Choose the correct answer from the options given below.

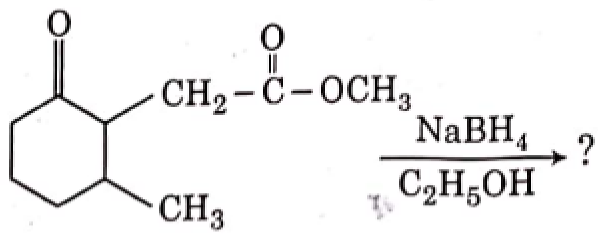
1. (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

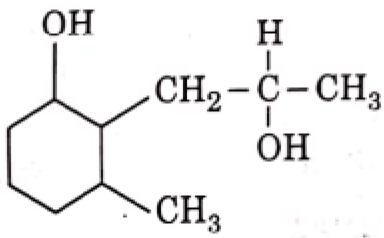
2. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

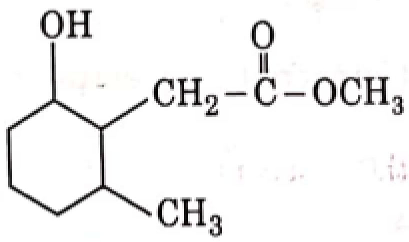
3. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

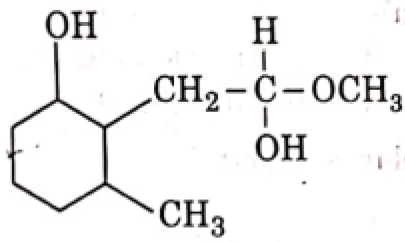
4. (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

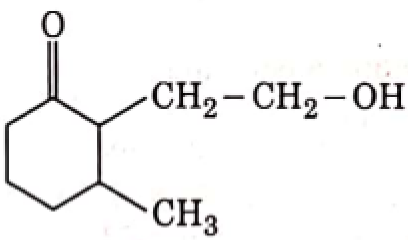
62. The product formed in the following chemical reaction is :



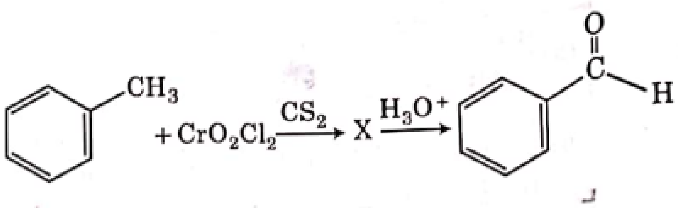
1. 

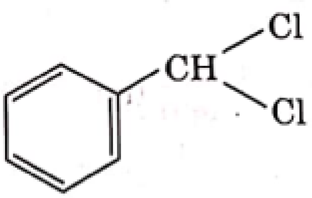
2. 

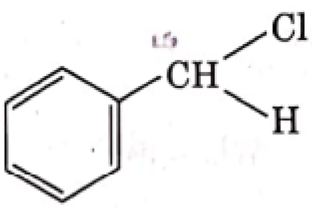
3. 

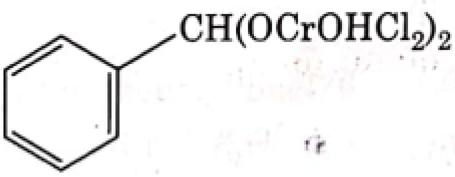
4. 

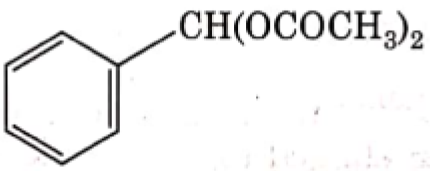
63. The intermediate compound 'X' in the following chemical reaction is :



1. 

2. 

3. 

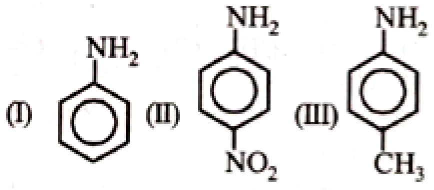
4. 

AMINES

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Amines - Preparation & Properties	20
Diazonium Salts: Preparation, Properties & Uses	8
Identification of Primary, Secondary & Tertiary Amines	5
Urea & Nitro Compound	3

1. The correct increasing order of basic strength for the following compounds is:



1. III<I<II

2. III<II<I

3. II<I<III

4. II<III<I

2. Which of the following reactions is appropriate for converting acetamide to methanamine?

1. Hoffmann hypobromamide reaction

2. Stephens reaction

3. Gabriels phthalimide synthesis

4. Carbylamine reaction

3. Nitration of aniline in strong acidic medium also gives m-nitroaniline because -

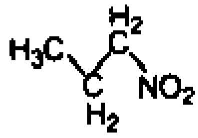
1. In spite of substituents nitro group always goes to only m-position

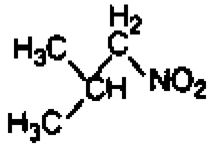
2. In electrophilic substitution reactions amino group is meta directive

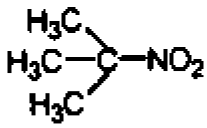
3. In absence of substituents nitro group always goes to only m-position

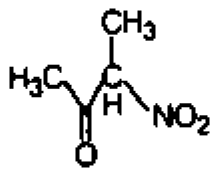
4. In acidic (strong) medium aniline is present as anilinium ion

4. A nitro-compounds among the following that does not react with nitrous acid is--

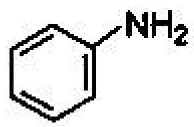
1. 

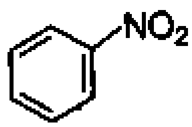
2. 

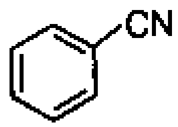
3. 

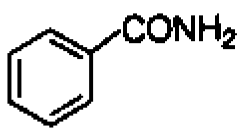
4. 

5. A nitrogen-containing aromatic compound A reacts with Sn/HCl, followed by HNO_2 to give an unstable compound B. B, on treatment with phenol, forms a beautiful colored compound C with the molecular formula $C_{12}H_{10}N_2O$. The structure of compound A is -

1. 

2. 

3. 

4. 

6.
The correct statement regarding the basicity of arylamines is -

1. Arylamines are generally more basic than alkylamines because the nitrogen lone-pair electrons are not delocalized by interaction with the aromatic ring π-electron system

2. Arylamines are generally more basic than alkylamines because of aryl group +I effect

3. Arylamines are generally more basic than alkylamines because the nitrogen atom in arylamines is sp-hybridized

4. Arylamines are generally less basic than alkylamines because the nitrogen lone-pair electrons are delocalized by interaction with the aromatic ring π-electron system.

7. The number of structural isomers possible from the molecular formula C_3H_9N is

1. 4

2. 5

3. 2

4. 3

8. Aniline cannot be prepared by -

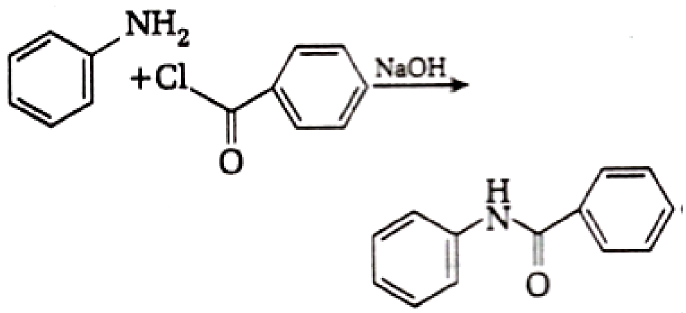
1. Hydrolysis of phenyl isocyanide with an acidic solution

2. Degradation of benzamide with bromine in alkaline Solution

3. Reduction of nitrobenzene with H_2/Pd in ethanol

4. Potassium salt of phthalimide treated with chlorobenzene followed by the hydrolysis aqueous NaOH solution

9. The following reaction is known as -

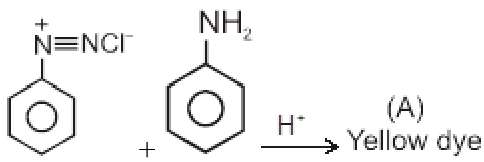


1. Friedel-Crafts reaction

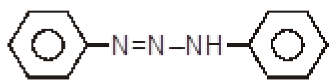
2. Perkins reaction

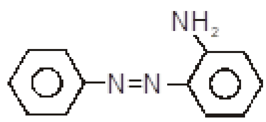
3. Acetylation reaction

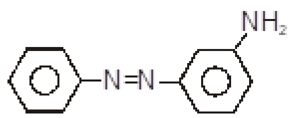
4. Schotten-Baumann reaction

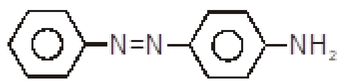
10.


The product (A) in the above mentioned reaction is :

1. 

2. 

3. 

4. 

11. The most stable diazonium salt among the following is -

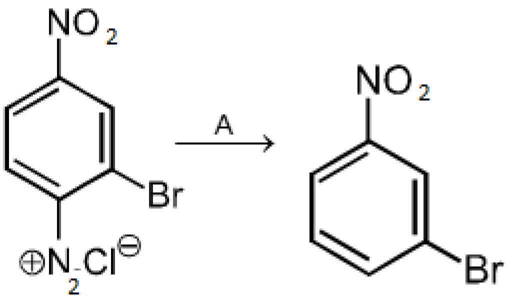
1. $CH_3\,N_2^+X^-$

2. $C_6H_5N_2^+X^-$

3. $CH_3\,CH_2\,N_2^+X^-$

4. $C_6H_5\,CH_2\,N_2^+X^-$

12.



A in the above reaction, is:

1. Cu_2Cl_2

2. H_3PO_2 and H_2O

3. H^+ / H_2O

4. $HgSO_4$ / H_2SO_4

13.
Nitrobenzene on reaction with conc. HNO_3 /H_2SO_4 at 80 – 100 ºC forms -

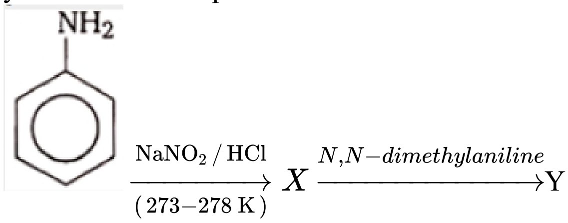
1. 1, 3– Dinitrobenzene

2. 1, 4– Dinitrobenzene

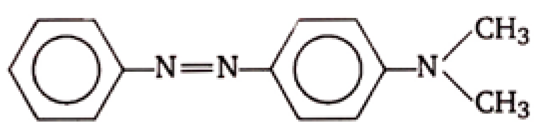
3. 1, 2, 4– Trinitrobenzene

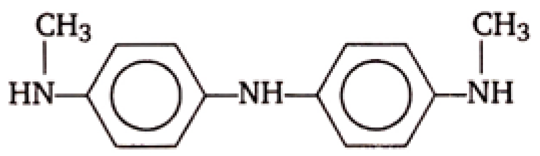
4. 1, 2–Dinitrobenzene

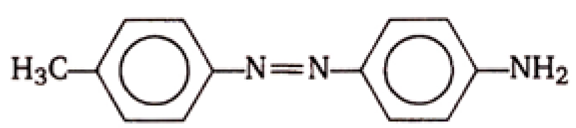
14. Aniline gives a set of the following reactions that yielded a colored product 'Y'.

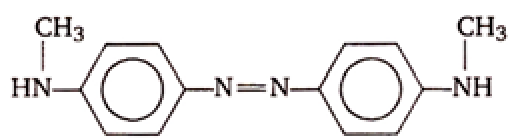


The structure of 'Y' is -

1. 

2. 

3. 

4. 

15. The reagent used to convert acetamide into methyl amine is -

1. NaOH-Br_2

2. Soda lime

3. Hot conc. H_2SO_4

4. PCl_5

16. The incorrect statment among the following about the primary amine is -

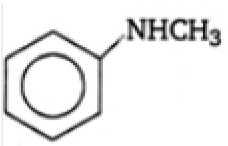
1. Alkyl amines are stronger bases than aryl amines

2. Alkyl amines react with, nitrous acid to produce alcohols

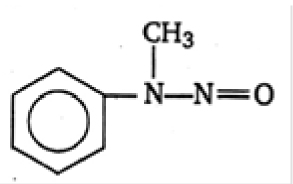
3. Aryl amines react with nitrous acid to produce phenols

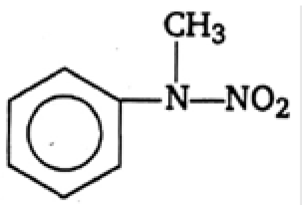
4. Alkyl amines are stronger bases than ammonia

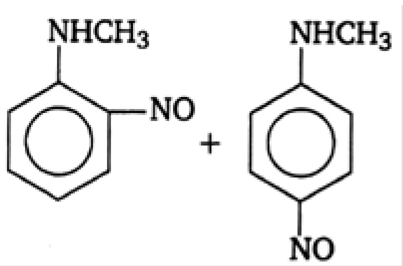
17.

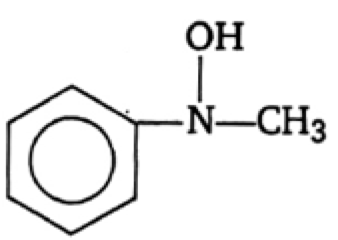

$+ NaNO_2 + HCl \rightarrow$ Product

The product formed in the above mentioned reaction is -

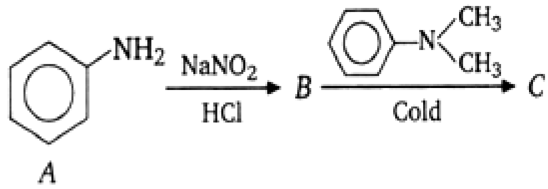
1. 

2. 

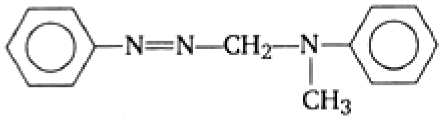
3. 

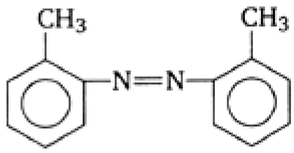
4. 

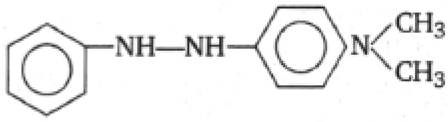
18.

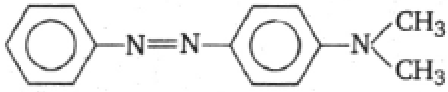


The structure of C in the above mentioned reaction is -

1. 

2. 

3. 

4. 

19. Which one of the following on reduction with lithium aluminium hydride yield a secondary amine?

1. Nitroethane

2. Methylisocyanide

3. Acetamide

4. Methyl cyanide

20. In a set of reactions propanoic acid yielded a compound *D*.

$$CH_3\,CH_2\,COOH \xrightarrow{SOCl_2} B \xrightarrow{NH_3} C \xrightarrow[Br_2]{KOH} D$$

The structure of *D* would be :

1. $CH_3CH_2CH_2NH_2$

2. $CH_3CH_2CONH_2$

3. $CH_3CH_2NHCH_3$

4. $CH_3CH_2NH_2$

21. More basic than aniline among the following compounds is -

1. Diphenylamine

2. Triphenylamine

3. p-nitroaniline

4. Benzylamine

22. The correct order of the basic strength of methyl substituted amines in aqueous solution is:

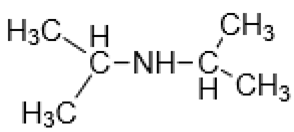
1. $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$

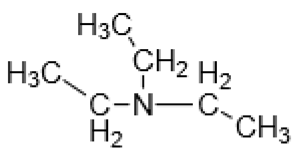
2. $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

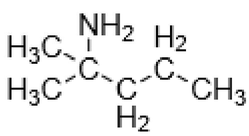
3. $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$

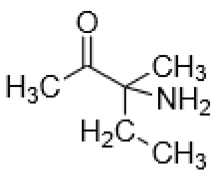
4. $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2$

23. The amine that reacts with Hinsberg's reagent to give an alkali insoluble product is:-

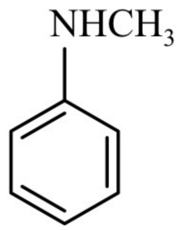
1. 

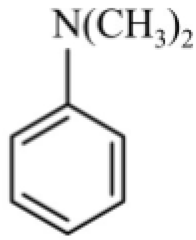
2. 

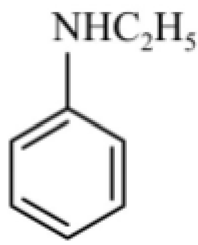
3. 

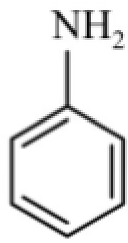
4. 

24. An amine that gives the carbyl amine test is -

1. 

2. 

3. 

4. 

25. Reaction of propanamide with ethanolic sodium hydroxide and bromine will give -

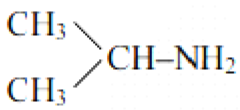
1. Ethylamine

2. Methylamine

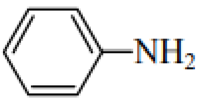
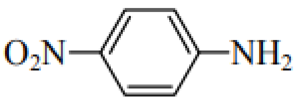
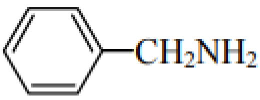
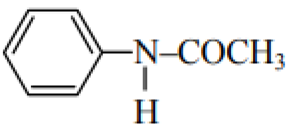
3. Propylamine

4. Aniline

26. An organic compound (C_3H_9N) (A), when treated with nitrous acid, gave an alcohol and N_2 gas was evolved. (A) on warming with $CHCl_3$ and caustic potash gave (C) which on reduction gave isopropylmethylamine. The structure of (A) is

1. $CH_3CH_2-NH-CH_3$
2. $CH_3-\underset{\displaystyle CH_3}{\underset{|}{N}}-CH_3$
3. $CH_3CH_2CH_2-NH_2$
4. 

27. Which of the following compounds is most basic ?

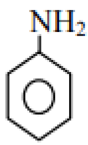
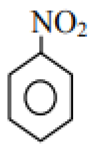
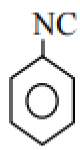
1. 
2. 
3. 
4. 

28. An organic compound 'A' on treatment with NH_3 gives 'B', which on heating gives 'C'. 'C' when treated with Br_2 in the presence of KOH produces ethylamine. Compound 'A' is -

1. CH_3CH_2COOH
2. CH_3COOH
3. $CH_3CH_2CH_2COOH$
4. $CH_3-\underset{\displaystyle CH_3}{\underset{|}{C}}\ HCOOH$

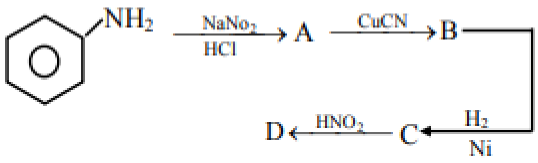
29.
$$A \xrightarrow[\text{(अपचयन)}]{\text{reduction}} B \xrightarrow{CHCl_3/KOH} C \xrightarrow[\text{(अपचयन)}]{\text{reduction}} D$$

If D is N-methyl aniline than A is:

1. 
2. 
3. CH_3NH_2
4. 

30. Aniline reacts with Br_2 water, $NaNO_2/HCl$ gives respectively :
1. p-Bromoaniline; p-Chloroaniline
2. 2,4,6-Tribromoaniline; p-Chloroaniline
3. 2,4,6-Tribromoaniline; Benzenediazoniumchloride
4. p-Bromoaniline; Benzenediazoniumchloride

31. Aniline in a set of reactions yielded a product D



The structure of the product D would be -

1. $C_6H_5\ CH_2\ OH$

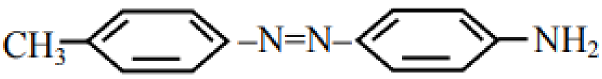
2. $C_6H_5\ CH_2\ NH_2$

3. $C_6H_5\ NHOH$

4. $C_6H_5\ NHCH_2\ CH_3$

32. Aniline when diazotized in cold and then treated with dimethyl aniline gives a coloured product. Its structure would be :-

1.



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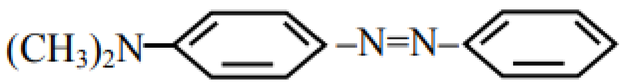

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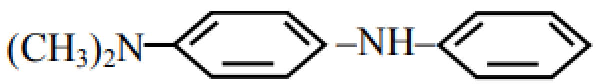

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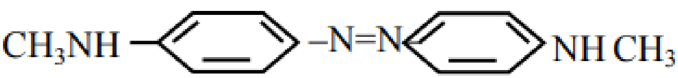
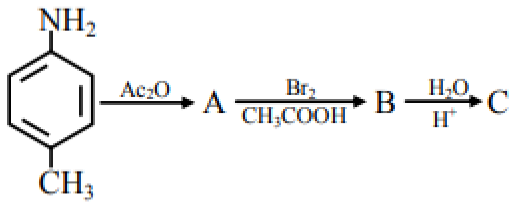


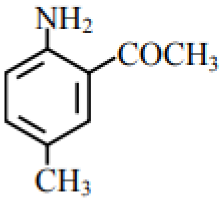
33. The reaction which gives isocyanide is :

1. Reimer Tiemann reaction.
2. Carbylamine reaction.
3. Hoffmann bromamide reaction.
4. None of the above.

34. The final product C, obtained in this reaction, would be :



1.



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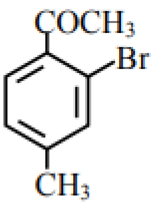

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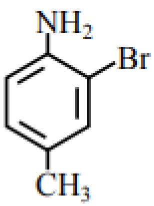

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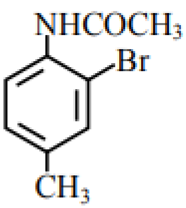
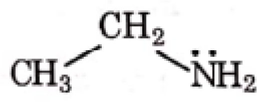
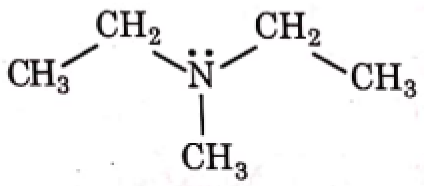
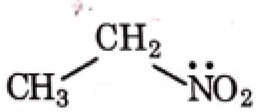


35. Identify the compound that will react with Hinsberg's reagent to give a solid which dissolves in alkali.

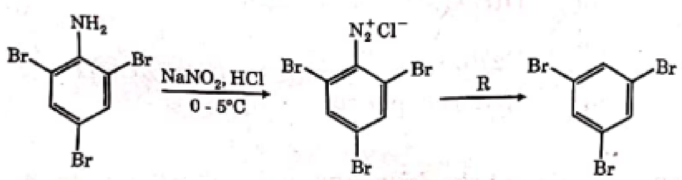
1. 

2. 

3. 

4. 

36. The reagent 'R' in the given sequence of a chemical reaction is :



1. HI

2. CuCN/KCN

3. H_2O

4. CH_3CH_2OH

Biomolecules

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Vitamins, Hormones & Enzymes	14
α - Amino Acids, Peptide Bond, Proteins & Structure	11
Polysaccharides & their Importance	7
DNA ,RNA & Metal Ions	6
Carbohydrates - Classification & D-L configuration	6
Denaturation of Proteins & Chemical Properties	1

1. Which one of the following compounds show the presence of intramolecular hydrogen bond?
1. H_2O_2
2. HCN
3. Cellulose
4. Concentrated acetic acid

2. In humans, the main oxygen carrier in the blood is -
1. Hemocyanin
2. Proteins
3. Hemoglobin
4. Both microorganisms and haemoglobin.

3. The difference between amylose and amylopectin is :
1. Amylopectin have $1 \rightarrow 4\ \alpha$ - linkage and $1 \rightarrow 6\ \alpha$ - linkage.
2. Amylose have $1 \rightarrow 4\ \alpha$- linkage and $1 \rightarrow 6\ \beta$ - linkage.
3. Amylopectin have $1 \rightarrow 4\ \alpha$ - linkage and $1 \rightarrow 6\ \beta$ - linkage.
4. Amylose is made up of glucose and galactose.

4. The central dogma of molecular genetics states that the genetic information flows from
1. amino acid - proteins - DNA
2. DNA - carbohydrates - proteins
3. DNA - RNA - proteins
4. DNA - RNA - Carbohydrates

5. Which of the following statements is not correct?
1. Ovalbumin is a simple food reserve in egg white
2. Blood protiens thrombin and fibrinogen are involved in blood clotting
3. Denaturation makes the protiens more active.
4. Insulin maintains sugar level in the blood of a human body.

6.
A compounds that can form a zwitterion is -

1. Aniline
2. Acetanilide
3. Benzoic acid
4. Glycine

7.
Amino acids are linked together in protein by :

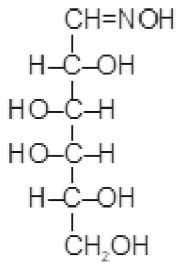
1. β-glycosidic bond.
2. Peptide bond.
3. Dative bond.
4. α-glycosidic bond.

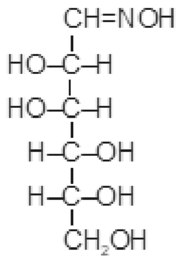
8.
The correct statement regarding RNA and DNA, respectively is
1. The sugar component in RNA is ribose and the sugar component in DNA is 2'-deoxyribose
2. The sugar component in RNA is arabinose and the sugar component in DNA is ribose
3. The sugar component in RNA is 2'-deoxyribose and the sugar component in DNA is arabinose
4. The sugar component in RNA is arabinose and the sugar component in DNA is 2’-deoxyribose

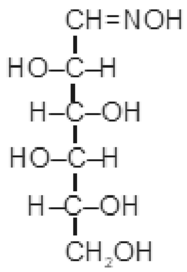
9.
A non-reducing sugar among the following is -

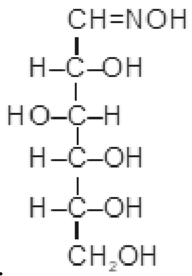
1. Lactose
2. Glucose
3. Sucrose
4. Maltose

10. D(+) glucose yield an oxime with hydroxyl amine . The structure of the oxime would be:

1. 

2. 

3. 

4. 

11. The disease caused by deficiency of vitamin B_1 is:
1. Convulsions
2. Beri-beri
3. Cheilosis
4. Sterility

12. One of the following sets having monosaccharide forms sucrose is -
(1) α–D–galactopyranose and α–D–glucopyranose
(2) α–D–glucopyranose and β–D–fructofuranose
(3) β–D–galactopyranose and α–D–fructofuranose
(4) α–D–galactopyranose and β–D–fructopyranose

13. The segment of DNA, that acts as the instrumental manual for the synthesis of the protein is -
1. Nucleotide
2. Ribose
3. Gene
4. Nucleoside

14. Which of the following hormones contains iodine?
1. Insuline
2. Testosterone
3. Adernaline
4. Thyroxine

15.
An amine that acts as hormone is -
1. Thyroxine
2. Oxypurin
3. Insulin
4. Progesterone

16.
In DNA, the complementary bases are :
1. Adenine and thymine; guanine and cytosine
2. Adenine and thymine; guanine and uracil
3. Adenine and guanine, thymine and cytosine
4. Uracil and adenine; cytosine and guanine

17. Which one of the following vitamins is water-soluble?
1. Vitamin-B
2. Vitamin-E
3. Vitamin-K
4. Vitamin-A

18. RNA and DNA are chiral molecules, their chirality is due to :
1. L- sugar component
2. Chiral bases
3. chiral phosphate exter unit
4. D- sugar component

19. During the process of digestion, the proteins present in food materials are hydrolysed to amino acids.
The two enzymes involved in the process
Proteins $\xrightarrow{\text{Enzyme (A)}}$ Polypeptides $\xrightarrow{\text{Enzyme (B)}}$ Amino acids, are respectively :
1. Amylase and maltase
2. Diastase and lipase
3. Pepsin and trypsin
4. Invertase and zymase

20. Which one of the following is a peptide hormone?
1. Glucagon
2. Testosterone
3. Thyroxin
4. Adernaline

21. Enzymes that utilize ATP in phosphate transfer require an alkaline earth metal (M) as the cofactor.
M is:
1. Sr
2. Be
3. Mg
4. Ca

22. The non-essential amino acid among the following is :
1. Lysine
2. Valine
3. Leucine
4. Alanine

23. Which structure(s) of proteins remains(s) intact during denaturation process?
1. Both secondary and tertiary structures

2. Primary structure only
3. Secondary structure only
4. Tertiary structure only

24. Sucrose on hydrolysis gives :
1. α-D-Glucose + β-D-Glucose
2. α-D-Glucose + β-D-Fructose
3. α-D-Fructose + β-D-Fructose
4. β-D-Glucose + α-D-Fructose

25. The following metal ions activates many enzymes participates in the oxidation of glucose to produce ATP and with Na is responsible for the transmission of nerve signals
1. Copper
2. Calcium
3. Potassium
4. Iron

26. Which of the following is a basic amino acid?
1. Alanine
2. Tyrosine
3. Lysine
4. Serine

27. The reaction of concentrated sulphuric acid with carbohydrates ($C_{12}H_{22}O_{11}$) is an example of
(1) Dehydration
(2) Oxidation
(3) Reduction
(4) Sulphonation

28. Deficiency of which vitamin causes osteomalacia ?
(1) Vitamin A
(2) Vitamin D
(3) Vitamin K
(4) Vitamin E

29. Fructose reduces Tollen's reagent due to -
1. Primary alcoholic group
2. Secondary alcoholic group
3. Enolisation of fructose followed by conversion to aldehyde by base
4. Asymmetric carbon

30. Which of the following is not a fat soluble vitamin ?
1. Vitamin A
2. Vitamin B complex
3. Vitamin D
4. Vitamin E

31. Which of the statements about "Denaturation" given below are correct?
Statements
(a) Denaturation of proteins causes loss of secondary and tertiary structures of the
protein.
(b) Denaturation leads to the conversion of double strand of DNA into a single strand.
(c) Denaturation affects primary structure which gets distorted.
Options :
1. (a), (b) and (c)
2. (b) and (c)
3. (a) and (c)
4. (a) and (b)

32. α-D-glucose and β-D-glucose are :
1. Epimers
2. Anomers
3. Functional isomers
4. Chain isomers

33. The base found in DNA but not in RNA :
1. Thymine
2. Adenine
3. Guanine
4. Cytosine

34. Sucrose on hydrolysis gives :

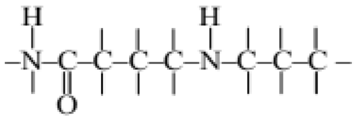
1. L(+) Glucose + D(+) Fructose
2. L(–) Glucose + L(–) Fructose
3. D(+) Glucose + D(–) Fructose
4. D(+) Glucose + L(–) Fructose

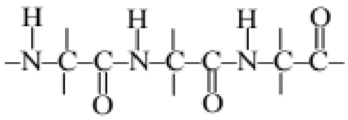
35. The compound that does not reduce Fehling solution is :

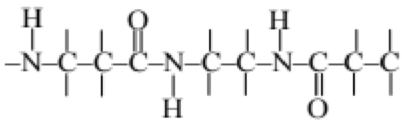
1. Glucose
2. Fructose
3. Sucrose
4. Maltose

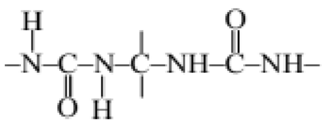
36. The hormone that helps in the conversion of glucose to glycogen is :-
(1) Bile acids
(2) Adrenaline
(3) insulin
(4) Cortisone

37. The structure that represents the peptide chain is :-

1. 

2. 

3. 

4. 

38. The helical structure of a protein is stabilized by:-
1. Hydrogen bonds
2. Ether bonds
3. Peptide bonds
4. Dipeptide bonds

39. The enzyme which hydrolyses triglycerides to fatty acids and glycerol is called :-
(1) Lipase
(2) Zymase
(3) Pepsin
(4) Maltase

40. Enzymes are made up of : -
(1) Edible proteins.
(2) Proteins with specific structure.
(3) Nitrogen containing carbohydrates.
(4) Carbohydrates.

41. Which is not a true statement: -
(1) α-carbon of α-amino acid is asymmetric except glycine.
(2) Some protein of human body are found in L-form
(3) Human body can synthesize all proteins they need
(4) At pH = 7 both amino and carboxylic groups exist in ionized form

42. Among the following reducing sugar is : -
(1) Galactose
(2) Gluconic acid
(3) β-methyl galactoside
(4) Sucrose

43. Compound that gives positive Fehling solution test is :
1. Sucrose
2. Glucose
3. Fats
4. Protein

44. Which is the correct statement among the following?
1. Starch is a polymer of α-glucose
2. Amylose is a component of cellulose
3. Proteins are composed of only one type of amino acid
4. In the cyclic structure of fructose, there are four carbons and one oxygen atom

45. The RBC deficiency is deficiency disease of:
1. Vitamin B_1
2. Vitamin B_1
3. Vitamin B_{12}
4. Vitamin B_6

Fill OMR Sheet*

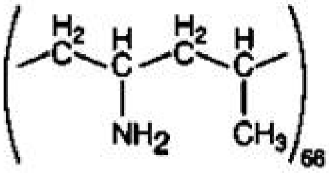
*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.

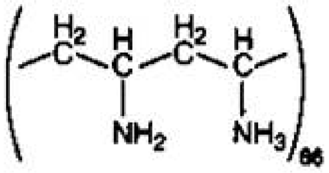
Polymers

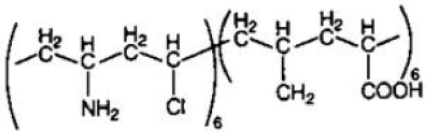
(Expected Questions in NEET 2022: 1)

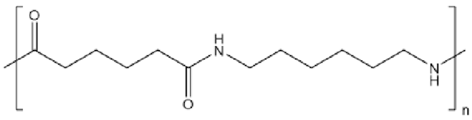
Subtopic Name	Number of Questions
Polymers: Natural & Synthetic, Biodegradable & Non-Biodegradable	18
Classification - Methods of Polymerization & Copolymerization	12
Application of Polymers	1

1. The correct structure of Nylon - 6, 6 polymer is:

1. 

2. 

3. 

4. 

2. Incorrect statement regarding cross-linked or network polymers is:
1. They contain covalent bonds between various linear polymer chains.
2. They are formed from bi and tri functional monomers.
3. Examples are bakelite and melamine.
4. They contain strong covalent bonds in same polymer chain.

3.
Natural rubber has -

1. All trans-configuration
2. Alternate cis - and trans-configuration
3. Random cis - and trans-configuration
4. All cis-configuration

4. Caprolactam is used for the manufacture of :
1. Nylon - 6
2. Teflon
3. Terylene
4. Nylon - 6, 6

5.

Biodegradable polymer that can be prepared from glycine and aminocaproic acid is -

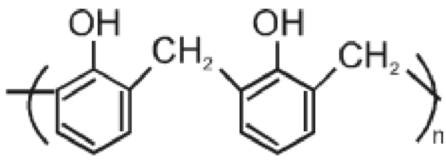
1. Nylon 2-nylon 6
2. PHBV
3. Buna-N
4. Nylon-6, 6

6.
The example of a thermosetting polymer among the following options is :

1. $\left(-CH_2 - \underset{\displaystyle Cl}{\underset{|}{C}} = CH - CH_2 - \right)_n$

2. $\left(CH_2 - \underset{\displaystyle Cl}{\underset{|}{CH}} - \right)_n$

3. $\left(-\overset{\displaystyle H}{\overset{|}{N}} - (CH_2)_6 - \overset{\displaystyle H}{\overset{|}{N}} - \overset{\displaystyle O}{\overset{||}{C}}(CH_2)_4 - \overset{\displaystyle O}{\overset{||}{C}} - \right)_n$

4. 

7. Which of the following organic compounds polymerizes to form the polyester Dacron?
1. Propylene and para $HO-(C_6H_4)-OH$
2. Benzolic acid and ethanol
3. Terepthalic acid and ethylene glycol
4. Benzoic acid and para $HO-(C_6H_4)-OH$

8.
Which is the monomer of Neoprene in the following?
1. $CH_2 = \underset{\displaystyle CH_3}{\underset{|}{C}} - CH = CH_2$
2. $CH_2 = \underset{\displaystyle Cl}{\underset{|}{C}} - CH = CH_2$
3. $CH_2 = CH - C \equiv H$
4. $CH_2 = CH - CH = CH_2$

9.
Nylon is an example of :

1. Polysaccharide
2. Polyamide
3. Polythene
4. Polyester

10. Which one of the following is not a condensation polymer?
1. Melamine
2. Glyptal
3. Dacron
4. Neoprene

11.
The polymer that can be classified as polyster polymer is :

1. Bakelite
2. Melamine
3. Nylon-66
4. Terylene

12.
The structure of neoprene polymer is:

1. $\left(-CH_2 - \underset{\mathrm{Cl}}{\underset{|}{C}} = CH - CH_2 - \right)_n$

2. $\left(CH_2 - \overset{\mathrm{CN}}{\overset{|}{CH}} - \right)_n$

3. $\left(-CH_2 - \overset{\mathrm{Cl}}{\overset{|}{CH}} - \right)_n$

4. $\left(-\underset{C_6H_5}{\underset{|}{CH}} - CH_2 - \right)_n$

13. Structures of some common polymers are given. The incorrect match is:

1. Teflon
$(-CF_2 - CF_2 -)_n$

2. Neoprene
$\left(-CH_2 - \underset{\mathrm{Cl}}{\underset{|}{C}} = CH - CH_2 - CH_2 - \right)_n$

3. Terylene


4. Nylon 66
$[-NH\,(CH_2)_6\,NHCO\,(CH_2)_4 - CO-]_n$

14. The straight chain polymer is formed by -
1. Hydrolysis of CH_3SiCl_3 followed by condensation polymerization.
2. Hydrolysis of $(CH_3)_3SiCl$ followed by condensation polymerization.
3. Hydrolysis of $(CH_3)_4Si$ by addition polymerisation.
4. Hydrolysis of $(CH_3)_2SiCl_2$ followed by condensation polymerization.

15.
Which one of the following statements is not true?
1. in vulcanisation, the formation of sulphur bridges between different chains make rubber harder and stronger
2. Natural rubber has the trans-configuration at every double bond
3. Buna-S is a copolymer of butadiene and styrene
4. Natural rubber is a 1,4-polymer of isoprene

16. Which one of the following polymers is prepared by condensation polymerization?
1. Nylon-66
2. Teflon
3. Rubber
4. Styrene

17. $[NH(CH_2)_6NHCO(CH_2)_4CO]_n$ is a :
1. Co-polymer
2. Addition polymer
3. Thermo-setting polymer
4. Homopolymer

18. The biodegradable polymer is:
1. Buna-S
2. Nylon-6, 6
3. Nylon 2-nylon 6
4. Nylon-6

19. The polymer that is used as a substitute for wool in making commercial fibres is -
1. Melamine
2. Nylon-6, 6
3. Polyacrylonitrile
4. Buna-N

20. Natural polymer among the following options is:
1. Poly(Butadiene-styrene)
2. Polybutadiene
3. Poly(Butadiene-acrylonitrile)
4. Cis-1,4-polyisoprene

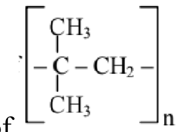
21. The correct statement regarding Bakelite is :
(1) It is a cross linked polymer.
(2) It is an addition polymer.
(3) It is a branched chain polymer.
(4) It is a linear polymer.

22. The set of monomer that forms a biodegradable polymer is:
1. $H_2N - CH_2 - COOH$ and $H_2N - (CH_2)_5 - COOH$
2. $HO - CH_2 - CH_2 - OH$ and $\mathrm{HOOC - C_6H_4 - COOH}$
3. $\mathrm{C_6H_5 - CH = CH_2}$ and $\mathrm{CH_2 = CH - CH = CH_2}$
4. $CH_2 = CH - CN$ and $CH_2 = CH - CH = CH_2$

23. $CF_2 = CF_2$ is monomer of :
1. Teflon
2. Orlon
3. Polythene
4. Nylon-6

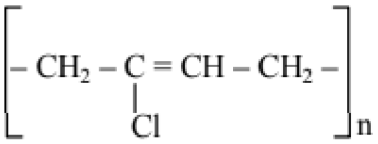
24. Monomer of natural rubber is :
1.
$$\begin{array}{l} CH_3 - C = CH = CH_3 \\ \qquad\quad | \\ \qquad\ CH_3 \end{array}$$
2. $CH_3 - CH = CH - CH_3$
3.
$$\begin{array}{l} CH_2 = C - CH = CH_2 \\ \qquad\quad | \\ \qquad\ CH_3 \end{array}$$
4.
$$\begin{array}{l} CH_2 = C - C = CH_2 \\ \qquad\quad |\quad\ \ | \\ \qquad\ CH_3\ CH_3 \end{array}$$

25. Which one of the following is a chain growth polymer :-
(1) Nucleic acid
(2) Polystyrene
(3) protein
(4) Starch

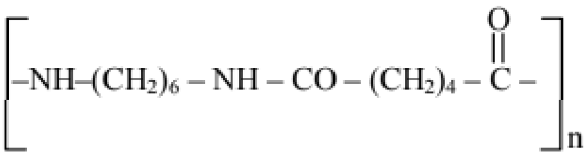
26. The monomer of  is : -
1. 2-methyl propene
2. Styrene
3. Propylene
4. Ethene

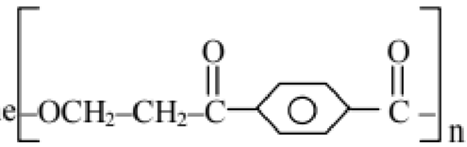
27. Cellulose is polymer of : -
(1) Glucose
(2) Fructose
(3) Ribose
(4) Sucrose

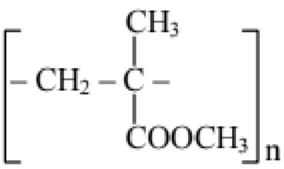
28. Incorrect match among the following is :

(1) Neoprene 

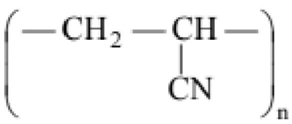
(2) Nylon-66

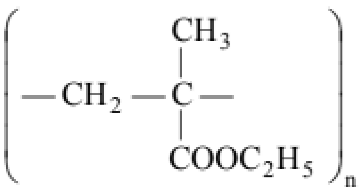


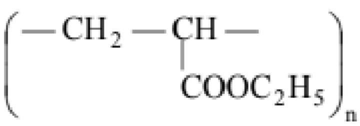
(3) Terylene 

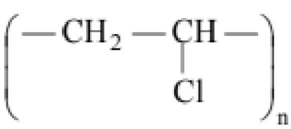
(4) PMMA 

29. Acrolein is hard, and a high melting point material. The structure of acrilan among the following is-

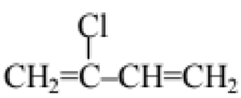
1. 

2. 

3. 

4. 

30. Among the following, the monomers give the polymer neoprene on polymerization is-

1. $CH_2 = CHCl$
2. $CCl_2 = CCl_2$
3. 
4. $CF_2 = CF_2$

31. Which one of the following polymers are prepared by addition polymerization?

1. Novolac
2. Dacron
3. Teflon
4. Nylon-66

Fill OMR Sheet*

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Chemistry in Everyday Life

(Expected Questions in NEET 2022: 1)

Subtopic Name	Number of Questions
Classification of Medicines	12
Soaps & Detergents, Dyes & Propellant	3
Food - Preservatives, Artificial Sweeteners & Antioxidants	2

1. Mixture of chloroxylenol and terpineol acts as:
1. Antiseptic
2. Antipyretic
3. Antibiotic
4. Analgesic

2.
Which of the following is an analgesic?
1. Penicillin
2. Streptomycin
3. Chloromycetin
4. Novalgin

3.
Bithional is generally added to the soaps as an additive to function as a/an
1. softener
2. dryer
3. buffering agent
4. antiseptic

4. Artificial sweetner which is stable under cold conditions only is:
1. Saccharine
2. Sucralose
3. Aspartame
4. Alitame

5.
Antiseptics and disinfectants either kill or prevent growth of microrganisms. Identify which of the following statements is not true :
1. Chlorine and Iodine are used as strong disinfectants.
2. Dilute solutions of Boric acid and Hydrogen Peroxide are strong antiseptics.
3. Disinfectants harm the living tissues.
4. A 0.2% solution of phenol is an antiseptic while 1% solution acts as a disinfectant.

6.
A compound among the following that can be used as an antihistamine is :
1. Diphenylhydramine
2. Norethindrone
3. Omeprazole
4. Chloramphenicol

7. A compound among the following can be used as tranquilizer is :
1. Promethazine
2. Valium
3. Naproxen
4. Mifepristone

8.
Which one of the following is employed as a tranquilizer?
1. Equanil
2. Naproxen
3. Tetracycline
4. Chlorpheninamine

9. The human body does not produce :
1. DNA
2. Vitamins
3. Hormones
4. Enzymes

10. Among the following, the narrow-spectrum antibiotic is:
1. chloramphenicol
2. penicillin G
3. ampicillin
4. amoxicillin

11. The artificial sweetener stable at cooking temperature and does not provide calories is-
1. Saccharin

2. Aspartame
3. Sucralose
4. Alitame

12. Which of the following is a cationic detergent?
1. Sodium stearate
2. Cetyl trimethyl ammonium bromide
3. Sodium dodecylbenzene sulphonate
4. Sodium lauryl sulfate

13. Which of the following is not true about chloramphenicol ?
(1) It inhibits the growth of only grampositive bacteria.
(2) It is a broad spectrum antibiotic.
(3) It is not bactericidal.
(4) It is bacteriostatic.

14. Chloramphenicol is an :
1. antihistaminic
2. antiseptic and disinfectant
3. antibiotic-broad spectrum
4. antifertility drug

15. Aspirin can be prepared by the reaction of acetyl chloride with :
1. Benzoic acid
2. Phenol
3. p-Hydroxy benzoic acid
4. o-Hydroxy benzoic acid

16. Which of the following forms cationic micelles above certain concentration :-
(1) sodium acetate
(2) Urea
(3) Cetyl trimethylammonium chloride
(4) Sodium dodecyl sulphonate

17. **Statement I:** Aspirin and Paracetamol belong to the class of narcotic analgesics.
Statement II: Morphine and Heroin are non-narcotic analgesics.
1. Statement I is correct but Statement II is false.
2. Statement I is incorrect but Statement II is true.
3. Both Statement I and Statement II are true.
4. Both Statement I and Statement II are false.

Fill OMR Sheet*

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