SEM I

Paper / Subject Code: 81108 / Chemistry : Paper I

FyBsc - Semester I 29/11/2018

CHE I

[3 Hours] [Marks: 100]

Oct '18

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of log-table/non programmable calculator is allowed.
4. Answers for the same question as for as possible should be written together.

1. (A) Select the correct option and complete the following sentences. **(Attempt any twelve)** 12

i) A system which exchange only energy with the surrounding but not the matter is called _____.
   a) Open system b) Closed system c) Isolated system

ii) _____ is not a state function.
   a) Concentration b) Internal energy c) Enthalpy

iii) The molar heat capacity at constant volume, Cv = _____.
   a) $\left[\frac{\delta U}{\delta T}\right]_V$
   b) $\left[\frac{\delta H}{\delta T}\right]_V$
   c) $\left[\frac{\delta S}{\delta T}\right]_V$

iv) The enthalpy of combustion of a substance is _____.
   a) always positive b) always negative c) always equal to zero

v) 0.1 N solution means _____.
   a) decinormal solution b) decanormal solution c) seminormal solution

vi) Solutions are examples of _____.
   a) compounds b) homogeneous mixture c) heterogeneous mixture

vii) The shell with n = 2, l = 1 is _____.
   a) 3 p b) 2 p c) 3 d

viii) The charge of the alpha particles is _____.
   a) positive b) negative c) neutral

ix) Louis de-Broglie's relation is _____.
   a) $\lambda = h/p$ b) $\lambda = p/h$ c) $h = p\times\lambda$

x) In second period, there are _____ elements.
   a) 6 b) 7 c) 8

xi) All VII A group elements are called _____ elements.
   a) normal b) respective c) inert

xii) Greater the charge on nucleus of an atom _____ will be the attraction between nucleus and outer most electrons.
   a) greater b) lesser c) moderate

xiii) In methanol, oxygen is _____ hybridized.
   a) sp^3 b) sp^2 c) Sp

xiv) The carbanion is _____ species.
a) Electron rich b) Electron deficient c) Neutral

xv) Ethanamide has _____ carbon.
a) One b) Two c) Three

xvi) Unit of dipole moment is_____ .
a) Debyes b) Pascal c) Newton/meter

xvii) The carbanion has _____ shape
a) pyramidal b) planar c) tetrahedral

xviii) Alkaline hydrolysis of alkyl halide is an _____ reaction.
a) elimination b) addition c) substitution

B) State whether the following sentences are **true** or **false**. **(Attempt any three)** 03

i) The properties which depend on the amount of a matter are called extensive properties.
ii) A solution which contain 1 mole of solute dissolved in 1000 cm^3 of water is designated by 1N.
iii) Electron enters in shells in the order of decreasing energy.
iv) The horizontal rows of long form of periodic table are called groups.
v) Phenol is more acidic than acetic acid.
vi) Sigma bonds are stronger than pi-bonds.

C) Match the following **(attempt any five)** 05

1)	Enthalpy	a)	R-CO-X
2)	1µg/L	b)	H^+
3)	Number of electrons in p – orbital	c)	U + PV
4)	Bond length between Cl-Cl in chlorine molecule	d)	parts per billion
5)	Acid halide	e)	6
6)	Electrophile	f)	19.8 x 10^{-2} nm
		g)	9.9 x 10^{-2} nm
		h)	R - X

2. Attempt **any four** of the following

A) Explain the concept of heat and work in thermodynamics along with it's sign conventions. 05

B) i) Distinguish between endothermic and exothermic reactions. 03
ii) Explain the term path function 02

C) Calculate change in internal energy and change in enthalpy of a system when 96 g of oxygen is heated from 0^0C to 95^0C. 05
[Given: Cv = 20.92 JK^{-1} mol^{-1}, Cp = 29.29$Jk^{-1}mol^{-1}$, 0 =16]

D) Derive Kirchhoff's equation. Give it's applications. 05

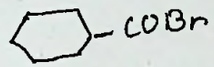
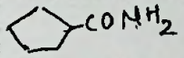
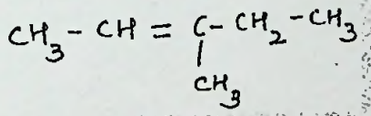
E) Define equivalent weight. Explain equivalent weight with respect to redox reactions. 05

F) In 250 cm^3 of 0.12 N of H_2SO_4, what is the weight of H_2SO_4? (Mol.wt 98) 05

3. Attempt any **Four** of the following.

A) Give Slater rules for shielding constant. 05
B) Define the terms shells, subshells and orbitals. 05
C) Discuss the limitations of Bohr's atomic model. 05
D) Discuss electronegativity of elements determined by Alfred and Rochow method 05
E) Explain the periodic table with reference to f blocks elements. 05
F) What is ionization enthalpy? 05

4. A) Write IUPAC name of the following compounds. 05

1) 
2) 
3) $CH_3-CH_2-CH_2-NH_2$
4) $CH_3-CH_2-CO-OCH_2-CH_3$
5) 

B) Explain sp^2 hybridization of oxygen with suitable example. Draw orbital picture of dimethyl ether. 05

C) What are carbocations? Discuss the structure and shape of carbocation. 05

D) What are free radicals? Explain stability of benzyl radical on the basis of resonance. 05

E) i) Explain sp^2- hybridization of carbon with suitable example. 03
ii) Alcohols are weak acids as compared to carboxylic acids, Explain. 02

F) i) Draw the structure of the following compounds. 03
1) 2 – methyl pentanoic acid.
2) 2 –Butyne.
3) Ethyl cyclobutane carboxylate.
ii) Indicate type of hybridization of C and O atoms in formaldehyde. 02

5. Attempt **any four** of the following.

A) State first law of thermodynamics in any three forms. Give any two limitations of it. 05

B) Define Molarity. Calculate the molarity of the solution when 9.8 g of $K_2Cr_2O_7$ is dissolved in 100 cm^3 of water. 05

C) Explain the distribution curve for radial wave function of 1s and 2s orbital. 05

D) What is effective nuclear change, explain in brief 05

E) Discuss stability of carbanion on the basis of inductive effect and 's' character. 05

F) i) Discuss orbital structure of Ethyne. 03
ii) Give one example each of addition and eliminations reactions. 02

CHE II

FyBsc – Semester – I

04/12/2018

[Time: Three Hours] [Marks: 100]

Please check whether you have got the right question paper

NB: 1.All questions are compulsory.
2. Answers to the same questions must be written together.
3. Figures to the right indicate full marks.
4. The use of log table/ non programmable calculator is allowed.

Q 1 (A) Select the correct option and complete the following statements **(Any twelve)** (12)

i) The unit of rate constant of a second order reaction is expressed as _____.
a) mole litre sec^{-1}
b) mole $litre^{-1}$ sec^{-1}
c) $mole^{-1}$ litre sec^{-1}

ii) Rate of reaction is defined as _____.
a) decrease in the concentration of a reactant
b) increase in the concentration of a product
c) change in the concentration of any one of the reactants or products per unit time.

iii) The rate constant of a reaction changes when _____.
a) pressure is changed
b) concentration of reactants changed
c) temperature is changed

iv) The rise of a liquid in a capillary tube is due to _____.
a) viscosity b) surface tension c) osmosis

v) With the increasing molar mass of a liquid, the viscosity____.
a) decreases b) increases c) no effect

vi) Which of the following expressions regarding the unit of coefficient of viscosity is not correct?
a) dyne cm^2 sec^{-1} b) dyne cm^{-2} sec c) Nm^{-2} sec

vii) The general electronic configuration of valence shell of group 17 elements is _____.
a) $ns^2 np^6$ b) $ns^2 np^5$ c) $ns^2 np^4$

viii) In the oxy acid of $HClO_4$ oxidation state of Cl is _____.
a) +1 b) +5 c) +7

ix) The order of electro negativity with respect to 's' character of hybrid orbital is _____.
a) $sp > sp^2 > sp^3$ b) $sp < sp^2 < sp^3$ c) $sp = sp^2 = sp^3$

x) Buck minister fullerene is allotrope of _____.
a) carbon b) sulphur c) silicon

xi) Which are the diagonal pair _____
a) Lithium –Aluminum b) Oxygen-Chlorine
c) Boron-Magnesium

xii) Chemical formula of caustic soda is _____.
a) Na_2CO_3 b) $Ca(OH)_2$ c) NaOH

xiii) The most stable conformer of n-butane is _____.
a) Synperiplanar b) antiperiplanar c) synclinal

xiv) _____ cannot be separated by physical methods like fractional distillation or fractional crystallisation.
a) Diastereoisomers b) Enantiomers c) Racemic form

xv) Racemic mixture is optically inactive due to _____.
a) Internal compensation b) external compensation
c) absence of chiral centre

xvi) _____ is the instrument used to measure optical activity.
a) Colorimeter b) Polarimeter c) Spectrophotometer

xvii) In the Fisher projection formulae the horizontal lines represent bonds that_____.
a) project above the plane of the paper
b) project behind the plane of the paper
c) are in the plane of the paper

xviii) In _____projection formulae the molecule is projected such that the central C- C bond is at angle to the plane of paper.
a) Newman b) Saw horse c) Fisher

(B) State whether the following statements are True or False (3)
(Any Three)

i) The order of a reaction can only be a positive integer.

ii) The angle of incidence and angle of refraction is characteristic of the liquid.

iii) Haemoglobin has more affinity for CO than for O_2 .

iv) The energy trapping phenomenon by infrared active molecules or gases in the atmosphere is known as green house effect.

v) If the high priority groups are on the same side of double bond it is a 'Z' isomer.

vi) For given molecule configuration does not specify the exact three dimensional arrangement of atoms.

(C) Match the following columns **(Any Five)** (5)

Column A		Column B	
(i)	Pseudo unimolecular reaction	(a)	R and S nomenclature
(ii)	Nematic liquid crystals	(b)	D and L nomenclature
(iii)	P_4 molecule	(c)	Acid catalysed hydrolysis of methyl acetate
(iv)	Lime water	(d)	p- methoxycinnamic acid
(v)	Absolute configuration	(e)	white phosphorous
(vi)	Relative configuration	(f)	CO_2
		(g)	red phosphorous
		(h)	SO_2

Q. 2 Attempt any Four of the following

(A) Define half life time of a reaction. Derive the expression for half life time of a first order and second order reaction. (5)

(B) A second order reaction of equal concentration required 750 seconds to undergo 40% completion. How much time will it be required for it to undergo 90% completion? (5)

(C) Explain the graphical method for the determination of order of a reaction. (5)

(D) What is Viscosity of liquid? Explain its determination using a Ostwald's viscometer? (5)

(E) Calculate the number of drops formed by an organic liquid having density 0.854×10^3 kg m^{-3} and surface tension 0.051 N , m^{-1} , if water forms 25 drops with the same stalagmometer. Given the density of water 0.998×10^3 kg m^{-3} and its surface tension 0.0728 Nm^{-1}. (5)

(F) Define polarizability.Explain with a Schematic diagram how Abbe's refractometer is used for measuring refractive index of any liquid. (5)

Q. 3 **Attempt any Four of the following**

(A) Explain the behaviour of beryllium which differs from other elements of Group 2. (5)

(B) Define the term allotropy. Discuss allotropic forms of group 16 elements. (5)

(C) Name the different types of oxides formed by alkaline earth metals. Explain preparation and uses of any one type. (5)

(D) With reference to calcium carbonate compound give, (5)

i) Method of preparation (any one)
ii) Properties (any two)
iii) Uses (any two)

(E) Discuss pollution of the atmosphere by sulphur dioxide with respect to: (5)

i) Sources of emission
ii) Techniques employed to control the emission

(F) Write a note on photochemical smog. (5)

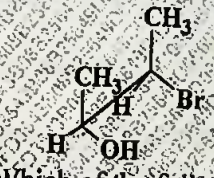
Q. 4 **Attempt any Four of the following**

(A) What is conformation? Draw the conformations of ethane? Explain their relative stabilities. (5)

(B) Explain briefly 'enantiomers'. (5)

(C) Convert the following Sawhorse projection formulae to Newman projection formulae. (5)

a)



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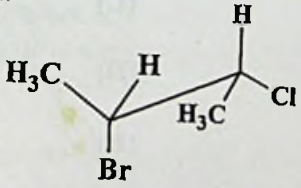
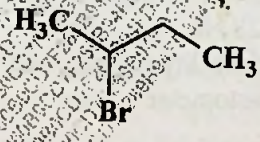


(D) i) Which of the following compounds have stereogenic centre (3)

a)



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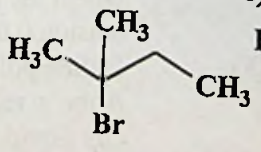

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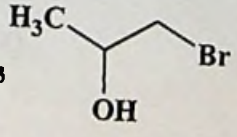
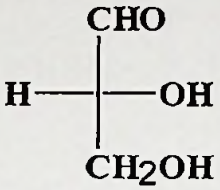
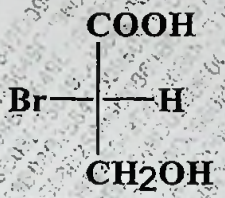


ii) Assign 'D' or 'L' configuration to the following compounds. **(2)**

a)



b)

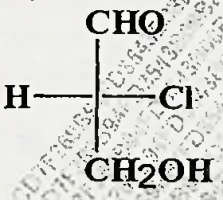


(E) i) Explain the terms : **(3)**
a) Configuration b) Asymmetric carbon c) Diastereoisomers

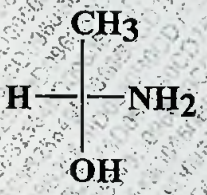
ii) What is racemic mixture? **(2)**

(F) i) Assign 'R' and 'S' descriptors to the following molecules by mentioning the priority of substituent's. **(4)**

a)



b)



ii) What is meant by erythro isomer? Explain with an example. **(1)**

Q 5 **Attempt any Four of the following**

(A) From the following data, show that the decomposition of H_2O_2 is first order reaction. **(5)**

Time (min)	0	5	10	20	30
$KMnO_4$ (cm^3)	46.1	37.1	29.8	19.3	12.4

(B) What are liquid crystals? Discuss the applications of liquid crystals. **(5)**

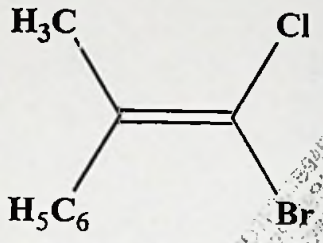
(C) Define metallic character. **(5)**
How does metallic character vary for group 13 elements.

(D) Discus the types of carbides of alkali and alkaline earth metals and any two uses of carbides. **(5)**

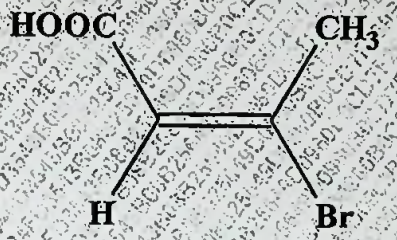
(E) i) Explain the meso form with suitable example. (3)

ii) Assign Z-E descriptors to the following compounds (2)

a)

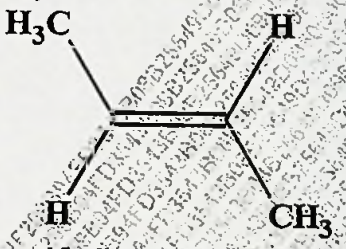


b)

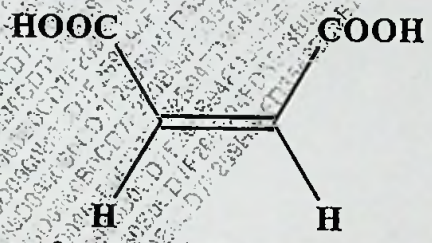


(F) i) Identify cis and trans isomer (2)

a)

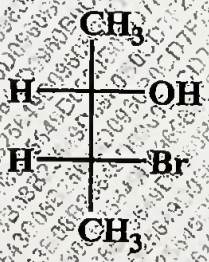


b)

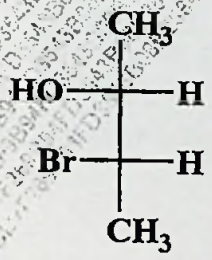


ii) Identify the pairs of diastereoisomers from the following (3)

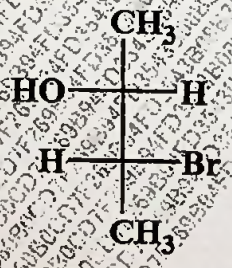
a)



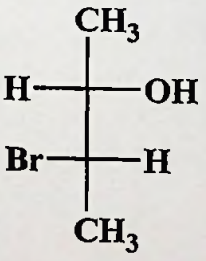
b)



c)



d)



FyBsc – Semester I
03/12/2018

PHY-I

[Time: Three Hours] [Marks:100]

N. B.: (1) All questions are compulsory.
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(3) Draw neat diagrams wherever necessary.
(5) Symbols have usual meaning unless otherwise stated.
(5) Use of non-programmable calculator is allowed.

Q.1. A) Select the correct alternative 12

(i) Impulse is product of _____
a. Force & mass
b. Mass & acceleration
c. Force & time
d. Force & displacement

(ii) Poisson's ratio is a ratio of_____
a. lateral strain and longitudinal strain
b. Shear Stress and Shear Strain
c. Volume Stress and Volume strain
d. None of the above

(iii) If the focal length of Huygen's Eyepiece is 18cm then focal length of field lens is _____ .
a. 12cm
b. 24cm
c. 36cm
d. 72cm

(iv) A ray of light reflected at the boundary of a rarer to denser medium undergoes a phase change of _____ degrees.
a. 30
b. 180
c. 90
d. 45

(v) First law of thermodynamics is statement of_____?
a. Conservation of momentum
b. Conservation of energy
c. Conservation of Angular Momentum
d. Conservation of Mass

(vi) Change in internal energy in a thermodynamic process depends_____
a. Only on initial and final temperature
b. Upon path taken
c. Is always positive
d. Is always negative

B) Answer in one sentence 3

(i) What is turbulent flow?
(ii) State the two types of the defects in a lens.
(iii) What is critical pressure?

C) Fill in the blanks 5

(i) In equation of continuity product of mass and velocity is _____
(ii) Along the axis of the pipe velocity of the fluid is _____
(iii) The radius of the n th dark ring is directly proportional to the _____ of the natural numbers in the reflected system.
(iv) A single lens cannot form an image free from _____ aberration.

PHY-I

FyBsc – Semester I
03/12/2018

[Time: Three Hours] [Marks:100]

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(v) Isotherm is P-V diagram at constant _____

Q. 2 A) **Attempt ANY ONE** 8

(i) Derive an expression for the moment of couple required to twist one end of the cylinder when other end is fixed for hollow cylinder

(ii) For a homogeneous isotropic material find the relation between young's modulus Y bulk modulus K and Poisson's ratio σ.

B) **Attempt ANY ONE** 8

(i) Derive Poiseuille's equation for liquid flowing in narrow tube. State the assumptions made.

(ii) a) As an application of Bernoulli's theorem, write a note on Venturimeter

b) On the basis of Bernoulli's theorem, explain the upward lift to aero plane

C) **Attempt ANY ONE** 4

(i) Young's modulus of a steel wire is 2.032×10^{11} N/m² & its modulus of rigidity is 0.7×10^{11} N/m² find its Poisson's ratio.

(ii) In Atwood's machine, a string passing over frictionless, massless pulley has 10 kg block tied to one end and 12 kg block tied to the other. Find the acceleration and tension in the string.

Q. 3 A) **Attempt ANY ONE** 8

(i) Derive the expression for optical path difference between two rays in the case of interference due to reflected light in the thin films.

(ii) Describe Newton's rings experiment and explain with necessary theory the formation of Newton's rings.

B) **Attempt ANY ONE** 8

(i) Derive an expression for the equivalent focal length for a system having two thin lenses separated by a finite distance.

(ii) What is chromatic aberration? Derive the expression for the axial chromatic aberration.

C) **Attempt ANY ONE** 4

(i) In the wedge shaped film of refractive index 1.57, fringe spacing is 1mm and wavelength of light used is $5893 AU$. Calculate the angle of wedge of film.

(ii) Two convex lenses of focal lengths 10 cm and 20 cm are placed 5cm apart in air .Find the equivalent focal power of lens and its positions of principal points.

Q. 4 A) **Attempt ANY ONE** 8

(i) With the corrections to pressure and volume, arrive at Van der Waals equation.

(ii) Show that for adiabatic process, $PV^{\gamma} = constant$.
A gas occupies 1000 cc of volume at 4 atm pressure. It expands adiabatically to 1190 cc and the resulting pressure is 3 atm. Calculate γ.

B) **Attempt ANY ONE** 8

(i) Show that for isothermal process work done, W is

$$W = RT \times 2.303 \log_{10} \frac{P_1}{P_2}$$

A perfect gas at room temperature having volume of $4m^3$ and initial pressure of 2 atm undergoes isothermal expansion to a volume of $5\ m^3$. Calculate the work done by the gas.

(ii) Show that for perfect gas, $C_P - C_V = R$

C) **Attempt ANY ONE** 4

(i) A quantity of air at 30^0C and at atmospheric pressure is suddenly compressed to half of its original volume. Find the final temperature and pressure of the gas. ($\gamma = 1.4$)

(ii) An adiabatic container of volume V has an adiabatic partition making to compartments of volume V_1 and V_2. These two compartments have an ideal gas of moles n_1 and n_2 at temperatures T_1 and T_2, pressure P_1 and P_2. If the partition is removed, what are the equilibrium temperature and pressure of the composite system?

Q. 5 **Attempt ANY FOUR** 20

(i) Write short note on stream line flow and turbulent flow

(ii) Write short note on limiting value of Poisson's ratio.

(iii) Write a short note on Ramsden's eyepiece.

(iv) State the various methods of reducing spherical aberration.

(v) State and explain zeroth law of thermodynamics.

(vi) Explain how the work done in a thermodynamic process is a path dependent function.

_____

F.Y.B.Sc – Semester-I

04/12/2018

PHY-II

[Time: Three Hours] [Marks: 100]

N. B.: (1) All questions are **compulsory.**
(2) **Figures** to the **right** indicate **full** marks.
(3) Draw **neat** diagrams wherever **necessary.**
(5) Symbols have usual meaning unless otherwise stated.
(5) Use of **non-programmable** calculator is allowed.

Q.1. A) Select the correct alternative 12

(i) 10 g of radioactive material of half-life 15 years is kept in store for 20 years. The disintegrated material is _____

a. 9.5 g b. 3.96 g
c. 6.04 g d. 4.03 g

(ii) The sodium nucleus $_{11}Na^{23}$ contains _____

a. 11 electrons b. 12 protons
c. 23 protons d. 12 neutrons

(iii) The minimum energy required for pair production is _____

a. 0.511keV b. 1.022 MeV
c. 0.511MeV d. 5.11keV

(iv) The average energy needed to ionize gas (eg. air) is of the order of a few _____

a. keV b. MeV
c. tens of eV d. hundreds of eV

(v) Wavelength of matter waves is _____

a. $\lambda = \frac{p}{hc}$ b. $\lambda = \frac{pc}{h}$
c. $\lambda = \frac{p}{h}$ d. $\lambda = h/p$

(vi) In Compton effect, the wavelength of the scattered ray is always _____ that of the incident ray.

a. greater than b. less than
c. greater than or equal to d. less than or equal to

B) Answer in one sentence 3

(i) What are isotones?

(ii) Define nuclear fusion.

(iii) How can we control the penetration power of X-rays?

C) Fill in the blanks 5

(i) A radioactive nucleus $_{92}X^{235}$ decays to $_{91}Y^{231}$. Radiations emitted are _____

(ii) Half-life of ^{210}Bi is 5 days. If we start with 50,000 atom of this isotope, the number of atoms left over after 10 days will be _____

(iii) If the Q value of a nuclear reaction is positive then the reaction is termed as _____

(iv) A nuclear reaction in which the projectile picks up a nucleon from the target is termed as _____ reaction.

(v) The gain in energy of a photon that falls in a gravitational field is manifested as increase in _____

Q. 2 A) **Attempt ANY ONE** 8

(i) On the basis of Rutherford's alpha scattering experiment, how will you estimate the size of the nucleus?

(ii) State the law of successive disintegration of radioactive substance. Explain transient equilibrium.

B) **Attempt ANY ONE** 8

(i) Define and explain binding of a nucleus. Sketch the graph of binding energy per nucleon against mass number. Explain its characteristic features.

(ii) State and explain law of radioactive decay. Hence obtain the expression for half-life period.

C) **Attempt ANY ONE** 4

(i) Find the distance of closest approach, when alpha particles of energy 5.48 MeV are bombarded on ^{79}Au.

(ii) In natural carbon the abundance of ^{14}C is 1.3×10^{-12} and 5730 years is its half-life time. Calculate the number of disintegration/hour in 1 gram of natural carbon.

Q. 3 A) **Attempt ANY ONE** 8

(i) Using the concept of compound nucleus formation, derive an expression for the threshold energy of a nuclear reaction.

(ii) Explain the construction and working of a GM counter.

B) **Attempt ANY ONE** 8

(i) Derive an expression for Geiger rule i.e. $V_0^3 = CR$ where V_0 is initial velocity of the emitted particle and R is the range of the particle and C is a constant for the particular medium in which the range is defined.

(ii) Derive an expression for the nuclear disintegration energy i.e. balance of mass and energy in a nuclear reaction (Q-value)

C) **Attempt ANY ONE** 4

(i) Calculate the Q value for the reaction: $Pb^{210}(Fe^{54}, Fe^{56})Pb^{208}$
Given: The masses of Pb^{208}= 207.976641 amu,
Fe^{56}= 55.934939 amu, Fe^{54}= 53.939612 amu,
Pb^{210}=209.984178 amu, 1 amu = 931.5 MeV

(ii) A neutron beam is incident on a stationary target of F^{19}atoms. The reaction $F^{19}(n,p)O^{19}$has a Q-value of -3.9 MeV. Calculate the lowest neutron energy that will make this reaction possible. Assume the masses of nuclei are equal to their mass numbers expressed in "amu". Given: 1 amu=931.5 MeV

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Q. 4 A) **Attempt ANY ONE** 8

(i) Describe Laue's experiment on X-ray diffraction.

(ii) What is Compton effect? Write the experimental determination of the Compton shift.

B) **Attempt ANY ONE** 8

(i) Give the elementary proof of Heisenberg's Uncertainty Principle.

(ii) Describe continuous and characteristic X-ray Spectra.

C) **Attempt ANY ONE** 4

(i) A bullet of mass 20 gm is moving with a speed of 350 m/s, measured with accuracy of 0.05%. Calculate the uncertainty in the location of the bullet.

(ii) X-ray tube emits X-rays with minimum wavelength 0.1 A°. What is the operating voltage of the tube?

Q. 5 **Attempt ANY FOUR** 20

(i) The number of first daughter element is given by; $N_2 = \frac{\lambda_1 N_0}{\lambda_2 - \lambda_1}\left[e^{-\lambda_1 t} - e^{\lambda_2 t}\right]$. Estimate the time ($t_m$) taken by second daughter to attend maximum.

(ii) Write a short note on nuclear charge and nuclear density.

(iii) Find the Q-value for the following reaction $N^{14}(\alpha, p)O^{17}$. The masses of the nuclei are given as mass of nitrogen = 14.00753 amu, mass of oxygen = 17.0045 amu, mass of alpha particle = 4.00387 amu and mass of proton is 1.00814 amu.
Given: 1 amu=931.5 MeV

(iv) Write short note on nuclear fission and nuclear fusion.

(v) Derive Bragg's equation for crystals.

(vi) In Compton scattering experiment, X-rays are scattered at angle 60° with respect to the incident beam. If the wavelength of scattered X-ray is 3.022 A°, calculate the wavelength of incident rays.

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MATHS I

F.Y.B.Sc - Semester - I
30/11/2018

(3 Hours) [Total Marks : 100]

N.B. 1. All questions are compulsory.
2. Figures to the right indicate full marks
3. Use of Calculator is not allowed.

Q.1 Choose correct alternative in each of the following: (20)

i. For a, b, x in $\mathbb{R}$ if $a + x = b + x$ then this means $a = b$

a) only if $x \neq 0$ b) cannot say

c) always d) none of the above

ii. If $S = \{ x \in \mathbb{R} : |x - 7| < 1 \}$ then

a) S is bounded b) S is only bounded above

c) S is only bounded below d) cannot say

iii. Which of the following sets is a neighbourhood of -1 with radius 1, N(-1,1) in $\mathbb{R}$?

a) (0,2) b) (-2,0)

c) [0,3] d) none of these

iv. The sequence (n^2) in $\mathbb{R}$ is

a) divergent b) convergent

c) bounded d) none of these

v. The sequence (x_n) where $x_n = \frac{1}{3^n}$, $\forall n \in \mathbb{N}$ is

a) monotonic increasing b) monotonic decreasing

c) Cannot say d) none of these

vi. Every constant sequence in $\mathbb{R}$ is

a) monotonic increasing b) divergent

c) bounded d) none of these

vii. The value of $\lim_{n\to\infty} (\frac{x}{2})^n$ for $0 < x < 1$ is

a) 1 b) 0

c) -1 d) none of these

viii. The value of $\lim_{x\to\infty} \frac{x^3}{3x^3+5}$

a) 1 b) 0

c) $\frac{1}{3}$ d) none of these

ix. If $f(x) = \frac{x^2-7x+12}{x-3}$ for $x \neq 3$ then $\lim_{x\to 3} f(x)$

a) does not exist b) -1

c) 1 d) none of these

x. The function $f(x) = x$, $x \in \mathbb{R}$ is

a) continuous everywhere b) continuous if $x > 0$

c) discontinuous everywhere d) none of these

Q.2 a) Attempt any ONE question from the following: (08)

i. Prove that any two distinct real numbers can be separated by disjoint neighborhoods in $\mathbb{R}$. Hence find disjoint neighborhoods of 2.33 and 2.333.

ii. Define infimum of a non-empty set.

Prove that a lower bound m of a non-empty set S is the infimum of S iff for all $\epsilon > 0\ \exists\ x \in S$ such that $m + \epsilon > x$.

b) Attempt any TWO questions from the following: (12)

i. Show that for any two real numbers a and b,

$$|a+b| = |a| + |b| \Leftrightarrow ab \geq 0$$

ii. Prove that for positive real numbers x and y,

(1) If $0 \leq x < y$, then $x^2 \leq xy < y^2$

(2) $x^2 + y^2 = 0 \Leftrightarrow x = 0$ and $y = 0$

iii. If A, B are bounded subsets of real numbers then prove that

$$\inf(A+B) = \inf A + \inf B$$

iv. Prove that for positive real numbers a, b and c,

$$\frac{a^2}{b^2} + \frac{b^2}{c^2} + \frac{c^2}{a^2} \geq \frac{b}{a} + \frac{c}{b} + \frac{a}{c}$$

Q.3 a) Attempt any ONE question from the following: (08)

i. Prove that a real sequence is convergent if and only if it is a Cauchy sequence.

ii. Prove that every monotone, bounded sequence of real numbers is convergent.

b) Attempt any TWO questions from the following: (12)

i. If $\lim_{n\to\infty} a_n = a$, $\lim_{n\to\infty} b_n = b$ and $\epsilon > 0$ is arbitrary, then prove that there exists $n_0 \in \mathbb{N}$ such that $|3a_n + 4b_n - 3a - 4b| < \epsilon\ \forall\ n \geq n_0$.

ii. Let $a_1 = \sqrt{2}$ and $a_{n+1} = \sqrt{2 + a_n}\ \forall\ n \in \mathbb{N}$. Prove that sequence (a_n) is increasing and bounded above by 2.

iii. Let (a_n) and (b_n) be two convergent sequences such that $\lim_{n\to\infty}(3a_n + 4b_n) = 10$ and $\lim_{n\to\infty}(a_n - 2b_n) = 11$. Then find $\lim_{n\to\infty} a_n$ and $\lim_{n\to\infty} b_n$.

iv. If (a_n) is a sequence of non-negative real numbers and $\lim_{n\to\infty} a_n = a$. Then prove that $a \geq 0$ and $\lim_{n\to\infty} \sqrt{a_n} = \sqrt{a}$.

Q.4 a) Attempt any ONE question from the following: (08)

i. *Let* $f, g : \mathbb{R} \to \mathbb{R}$ and $l, m \in \mathbb{R}$. If $\lim_{x\to a} f(x) = l$ and $\lim_{x\to a} g(x) = m$ then prove that $\lim_{x\to a}[f(x) - g(x)] = l - m$.

ii. Let $f : \mathbb{R} \to \mathbb{R}$ be a function and $p \in \mathbb{R}$. If $(f(x_n))$ converges to f(p) for any sequence (x_n) converging to p then prove that f is continuous at p.

b) Attempt any TWO questions from the following: (12)

i. Draw the graph of the function f where $f(x) = |x| + 3$ for $-3 \leq x \leq 3$.

ii. Show that $\lim_{x\to 3}(14 - 2x) = 8$ using $\epsilon - \delta$ definition.

iii. State and prove Sandwich theorem for limit of functions in $\mathbb{R}$.

iv. Let $f : \mathbb{R} \to \mathbb{R}$ be a function which is continuous at $p \in \mathbb{R}$. Then prove that there exists $\delta > 0$ and $M > 0$ such that $|f(x)| \leq M$, for all $x \in N(p, \delta)$.

Q.5 Attempt any FOUR questions from the following: (20)

a) Show that $x + \frac{1}{x} \geq 2$ for $x > 0$.

b) Let A and B be nonempty bounded subsets of $\mathbb{R}$ such that $A \subseteq B$. Prove that $\sup A \leq \sup B$.

c) Let $x_n = \cos\left(\frac{n\pi}{2}\right)$, $\forall\ n \in \mathbb{N}$. Show that (x_n) is not convergent by exhibiting two convergent subsequences of (x_n) converging to two different limits.

d) Show that $\lim_{n\to\infty} \frac{\sin n}{n^2} = 0$ using Sandwich theorem.

e) Let $f, g : \mathbb{R} \to \mathbb{R}$ be functions and $p \in \mathbb{R}$. If $\lim_{x\to p} f(x) = l$ and $\lim_{x\to p} g(x) = m$ and $f(x) \geq g(x)\ \forall\ x \in \mathbb{R}$ then show that $l \geq m$.

f) Find the value of b so that f becomes continuous at $\frac{\pi}{2}$ where $(x) = \begin{cases} -\sin x, & x < \frac{\pi}{2} \\ bx^2, & x \geq \frac{\pi}{2} \end{cases}$.

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MATHS -II

Paper / Subject Code: 81131 / Mathematics paper II

FyBsc - Semester I

05/12/2018

(3 Hours) [Total Marks : 100]

N.B.: 1. All questions are compulsory.
2. Figures to the right indicate full marks.

Q.1 Choose correct alternative in each of the following: (20)

i. What is the GCD of 88 and 143?
(a) 1 (b) 2
(c) 88 (d) None of these

ii. Let p be prime number such that $p \mid ab$, then
(a) $p = a$ or $p = b$ (b) $p = 1$ or $p = 2$
(c) $p \mid a$ or $p \mid b$ (d) None of these

iii. The coefficient of x^3y^7 in the expansion of $(x+y)^{10}$ is
(a) 240 (b) 100
(c) 21 (d) 120

iv. Function $f: X \to Y$ is invertible if and only if
(a) f is injective (b) f is bijective
(c) f is surjective (d) None of the above

v. If $A = \{1,2,3,4\}, B = \{a,b,c\}$. Which of the following is a function?
(a) $f_1 = \{(1,a),(2,a),(3,a)\}$ (b) $f_2 = \{(1,a),(2,b),(3,c),(4,a)\}$
(c) $f_3 = \{(1,a),(2,c),(3,b)\}$ (d) None of the above

vi. Which of the following binary operation on $\mathbb{Q}^* = \mathbb{Q}\backslash\{0\}$ is not commutative?
(a) $a * b = 4a - 5b$ (b) $a * b = \frac{ab}{5}$
(c) $a * b = a + b - 5$ (d) $a * b = a^2 + b^2$

vii. *The relation* $R = \{(1,1),(2,2),(3,3),(1,2)\}$ *in* $X = \{1,2,3,4\}$ *is*
(a) Reflexive (b) Transitive
(c) Symmetric (d) None of these

viii. If $f(x)$ and $g(x)$ are any two polynomials with $\deg(f(x)) = 8$ and $\deg(g(x)) = 6$ then $\deg(f(x) - g(x)) =$
(a) 2 (b) 14
(c) 8 (d) None of these

ix. What is the quotient when the polynomial $x^2 - 7x + 12$ is divided by the polynomial $(x-3)$?
(a) $(x-4)$ (b) $(x+4)$
(c) $(x+3)$ (d) None of these

x. For a cubic polynomial $x^3 + 10x^2 + 5x + 50$ with roots r_1, r_2, r_3 we have

(a) $r_1r_2 + r_2r_3 + r_1r_3 = -5$ (b) $r_1r_2r_3 = -50$

(c) $r_1r_2r_3 = 50$ (d) None of these

Q.2 a) Attempt any one question from the following: (08)

i. Show that the g.c.d. of any two non-zero integers exists and is unique.

ii. Let the integer $n > 1$, have the prime factorization

$$n = P_1^{e_1} \dots \dots P_r^{e_r}$$

then show that $\phi(n) = n\left(1-\frac{1}{p_1}\right)\left(1-\frac{1}{p_2}\right)\dots\left(1-\frac{1}{p_r}\right)$

where ϕ denotes Euler's phi function.

b) Attempt any TWO questions from the following: (12)

i. Prove that $18! \equiv -1 \, mod(437)$

ii. State and prove Euclid's Lemma.

iii. Find g.c.d. of $a = -1123$ *and* $b = 4567$ and express it in the form $ma + nb$

iv. Prove the following using second principle of induction –

If $A = \begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$, *show* $A^n = \begin{pmatrix} F_{n+1} & F_n \\ F_n & F_{n-1} \end{pmatrix} \forall n \geq 2$ where $F_1 = F_2 = 1$, $F_n = F_{n-1} + F_{n-2}$

Q.3 a) Attempt any ONE question from the following: (08)

i. Let $f : X \to Y$ be any function and A_1, A_2 be two non-empty subsets of X. Show that

a) $f(A_1 \cup A_2) = f(A_1) \cup f(A_2)$

b) $f(A_1 \cap A_2) \subset f(A_1) \cap f(A_2)$

ii. If $\sim$ is an equivalence relation on a non-empty set X, then prove following,

a) Each element of X belongs to some equivalence class of X.

b) Any two equivalence classes of X are either disjoint or identical.

c) Union of all equivalence classes is X.

b) Attempt any TWO questions from the following: (12)

i. Define composition of two functions. If $f, g : \mathbb{R} \to \mathbb{R}$ such that $f(x) = 2x^3 - 7$, $g(x) = 3x^2$, find $(g \circ f)(2)$ and $(f \circ g)(2)$.

ii. If $f : \mathbb{R} - \{-8\} \to \mathbb{R} - \{1\}$ such that $f(x) = \frac{x-5}{x+8}$, show that f is bijective and hence find the inverse of f.

iii. Let $S = \left\{\begin{bmatrix} a & a \\ a & a \end{bmatrix} : a \in \mathbb{R} - \{0\}\right\}$. Show that matrix multiplication is a binary operation on S and find the identity element of S and the inverse of an element in S under matrix multiplication.

iv. Construct residue classes of integer modulo 4 (that is $\mathbb{Z}_4$).

Q.4 a) Attempt any ONE question from the following: (08)

i. State Fundamental Theorem of Algebra and show that every non-constant polynomial in $\mathbb{R}[x]$ can be expressed as product of linear and quadratic polynomial in $\mathbb{R}[x]$.

ii. a) Prove that polynomial of degree n has at most n roots.

b) If $f(x) \in \mathbb{R}[x]$ and $\alpha \in \mathbb{C}$ is a root of $f(x)$, then prove that its conjugate $\bar{\alpha}$ is also a root of $f(x)$.

b) Attempt any TWO questions from the following: (12)

i. If r_1, r_2, r_3 are the roots of the polynomial $x^3 - 2x^2 + 4x - 5$, without calculating $r_1r_2r_3$ write the polynomial with roots $2r_1, 2r_2, 2r_3$.

ii. Find G.C.D. of $f(x) = x^4 - 4x^3 + 3x^2 + 4x - 4$ and $g(x) = x^3 - 3x^2 - x + 3$ in $\mathbb{R}[x]$

iii. Find all roots of $f(x) = x^3 - 2x^2 - 16x + 32$ given sum of two roots is zero.

iv. Find all the fourth roots of unity

Q.5 Attempt any FOUR questions from the following: (20)

a) If $(a, b) = 1$, prove that $(a + b, a^2 + b^2) = 1$ or 2.

b) Prove that $29^{25} \equiv 10 \, mod \, 11$.

c) Prove that the relation R in $\mathbb{Z}$ given by "$aRb \; iff \; a \equiv b(modn)$" where a, b $\in \mathbb{Z}$, n$\in$ N is an equivalence relation.

d) Give an example to show that the composition map g$\circ$f is bijective but the functions f and g need not be bijective.

e) Find quotient and the remainder when $f(x)$ is divided by $g(x)$ where $f(x) = x^5 - 3x^4 - 2x^2 + 4x + 2$ and $g(x) = x^2 + 2x + 2$

f) Find the multiplicity of each root of polynomial $f(x) = x^4 - 12x^3 + 46x^2 - 60x + 25$.

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200 | I

FyBSc - Semester - I

30/11/2018

[Time: Three Hours] **[Marks:100]**

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. All questions carry equal marks.
3. Draw neat and labelled diagrams wherever necessary.

Q. 1 A) Fill in the blanks by choosing the correct options given in the bracket. **(05)**

a) The Great Barrier reef is off the northeast coast of _____.
(America, Australia, Africa)

b) Guppies are _____.
(Oviparous, Ovoviviparous, Viviparous)

c) Silent valley National park is located in _____.
(Tamil Nadu, Kerala, Karnataka)

d) _____ has been recognized among the 100 leading Global Thinkers of 2014.
(Dr. Khorana, Dr. Kurien, Kiran Shaw)

e) "The Man who made the Elephant Dance", is an autobiography of _____.
(Dr. Salim Ali, Dr. Khorana, Dr. Kurien)

Q. 1 B) Match the column I and column II and rewrite **(05)**

I	II
a) Noctiluca	i) Alytes
b) Midwife Toad	ii) Gujarat
c) Gir	iii) Winter sleep
d) Hibernation	iv) Surimi
e) Gadre	v) Bioluminiscence

Q. 1 C) State whether **True** or **False.** **(05)**

a) Tilapia is not a mouth brooder.
b) Fat stored in the hump of camel helps it survive without food and water.
c) IUCN helps government prepare natural biodiversity policies.
d) DHARA was established by Dr. Kurien.
e) Ranthambore national park is located in MP.

Q. 1 D) Answer in one sentence only. **(05)**

a) Define bioluminescence
b) Give full form of CBD
c) Define hotspot
d) Name two value added products
e) What is cryopreservation?

Q. 2 A) Explain the types of migration in birds. **(10)**

OR

A) What is mimicry? Explain with examples.

B) Write short notes on **any two.** **(10)**

a) Parental care in Midwife Toad.
b) Pearl formation in Mollusca.
c) Enumerate the uses of biohiminiscence
d) Formation of corals.

Q. 3 A) Explain biodiversity and add a note on biodiversity hotspot in India. **(10)**

OR

A) Enumerate and explain threats to biodiversity. **(10)**

B) Write short notes on **any two**

a) National Parks
b) Direct use values of biodiversity
c) Deforestation
d) CITES

Q. 4 Answer **any two** of the following. **(20)**

a) Give an account on white Revolution
b) Describe the role of Anna Hazare in water conservation
c) Discuss the contribution of Dr. Salim Ali in the field of ornithology
d) Describe the work and achievements of Dr. Khorana

Q. 5 Write short notes on **any four** **(20)**

a) Echolocation in cetaceans
b) Adaptations of camel to desert condition
c) National Biodiversity Action Plans
d) Man-Wildlife Conflict
e) Project-Hemalkasa
f) Gadre Fisheries

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Paper / Subject Code: 81120 / Zoology : Paper I

Zool I

FyBSc - Semester - I

03/12/2018

Q. P. Code :30019

[Time: Three Hours]

[Marks: 100]

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. All questions carry equal marks.
3. Draw neat labelled diagrams wherever necessary.

Q.1 **A.** Fill in the blanks by choosing the correct option given in the bracket. **05**

a) Efforts by Dr. Varghese Kurien led to information of _____.
(NBA, AMUL, WWF)

b) In midwife toad the _____ carries eggs on its back.
(Male, Female, both male and female)

c) _____ has two rows of long eye lashes to protect from the hot sun.
(Lizard, Phrynosoma, Camel)

d) Green Revolution was master minded by _____.
(Dr. Varghese Kurien, Dr. Hargobind Khorana, Dr. M S. Swaminathan)

e) Insitu conservation of forest is achieved by the co-operation of _____.
(BNHS, IUCN, CBD)

Q.1 **B.** Match the columns I and II and rewrite. **05**

I	II
a) Darwin's frog	i) Dr. Salim Ali
b) Penicillium	ii) Rhinoderma
c) Pinctada	iii) Australia
d) Barrier reef	iv) Antibiotics
e) Fall of a sparrow	v) Gulf of Kutch

Q.1 **C.** State whether **True** of **False**. **05**

a) UNED is a programme to resolve problems of threatened species and habitat.
b) Malabar giant squirrel is endemic to Western Ghats.
c) Lok Biradari Prakalp project was undertaken by Anna Hajare.
d) Pearl is formed by the secretion of mantle tissue.
e) Man with a billion litre idea was of Baba Amte.

Q.1 **D.** Answer in **one** sentence only. **05**

a) Define Echolocation
b) Define Latitudinal migration
c) Give full form of CITES
d) Who was the Milk man of India?
e) Define Ovoviviparity

Q.2 **A.** Describe various types of migration. **10**

OR

A How does camel adapt to desert environment?

Q.2 **B.** Write short notes on **any two.** **10**

a) Pearl formation in Mollusca
b) Mechanism of bioluminiscence
c) Parental care in Tilapia
d) Formation of coral reefs

Q. P. Code :30019

Q.3 **A.** Explain the threats to biodiversity. **10**

OR

A Enumerate direct and indirect values of biodiversity.

Q.3 **B.** Write short notes on **any two.** **10**

a) Specific biodiversity
b) In-situ conservation strategies
c) Indo-Burma hot spot
d) Pollution a cause for loss of habitat

Q.4 Answer **any two** of the following. **20**

a) Describe Amul White Revolution
b) Give an account on the contribution made by Dr. Salim Ali in the field of ornithology.
c) Explain the project 'Anandwan'.
d) Describe the establishment of Biocon.

Q.5 Write short note on **any four.** **20**

a) Batesian mimicry
b) Noctiluca and angler fish
c) Man-wildlife conflict
d) Animal Translocation and Zoological garden
e) Gadre Marine Export Products
f) National Biodiversity Action Plan

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Zool - I

Paper / Subject Code: 81120 / Zoology : Paper I

FyBSc - Semester - I

03/12/2018

Q. P. Code :30019

[Time: Three Hours] [Marks: 100]

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. All questions carry equal marks.
3. Draw neat labelled diagrams wherever necessary.

Q.1 **A.** Fill in the blanks by choosing the correct option given in the bracket. **05**

a) Efforts by Dr. Varghese Kurien led to information of _____.
(NBA, AMUL, WWF)

b) In midwife toad the _____ carries eggs on its back.
(Male, Female, both male and female)

c) _____ has two rows of long eye lashes to protect from the hot sun.
(Lizard, Phrynosoma, Camel)

d) Green Revolution was master minded by _____.
(Dr. Varghese Kurien, Dr. Hargobind Khorana, Dr. M S. Swaminathan)

e) Insitu conservation of forest is achieved by the co-operation of _____.
(BNHS, IUCN, CBD)

Q.1 **B.** Match the columns I and II and rewrite. **05**

I	II
a) Darwin's frog	i) Dr. Salim Ali
b) Penicillium	ii) Rhinoderma
c) Pinctada	iii) Australia
d) Barrier reef	iv) Antibiotics
e) Fall of a sparrow	v) Gulf of Kutch

Q.1 **C.** State whether **True** of **False**. **05**

a) UNED is a programme to resolve problems of threatened species and habitat.
b) Malabar giant squirrel is endemic to Western Ghats.
c) Lok Biradari Prakalp project was undertaken by Anna Hajare.
d) Pearl is formed by the secretion of mantle tissue.
e) Man with a billion litre idea was of Baba Amte.

Q.1 **D.** Answer in one sentence only. **05**

a) Define Echolocation
b) Define Latitudinal migration
c) Give full form of CITES
d) Who was the Milk man of India?
e) Define Ovoviviparity

Q.2 **A.** Describe various types of migration. **10**

OR

A How does camel adapt to desert environment?

Q.2 **B.** Write short notes on **any two.** **10**

a) Pearl formation in Mollusca
b) Mechanism of bioluminiscence
c) Parental care in Tilapia
d) Formation of coral reefs

Q. P. Code :30019

Q.3 A. Explain the threats to biodiversity. 10

OR

A Enumerate direct and indirect values of biodiversity.

Q.3 B. Write short notes on **any two.** 10

a) Specific biodiversity
b) In-situ conservation strategies
c) Indo-Burma hot spot
d) Pollution a cause for loss of habitat

Q.4 Answer **any two** of the following. 20

a) Describe Amul White Revolution
b) Give an account on the contribution made by Dr. Salim Ali in the field of ornithology.
c) Explain the project 'Anandwan'.
d) Describe the establishment of Biocon.

Q.5 Write short note on **any four.** 20

a) Batesian mimicry
b) Noctiluca and angler fish
c) Man-wildlife conflict
d) Animal Translocation and Zoological garden
e) Gadre Marine Export Products
f) National Biodiversity Action Plan

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Paper / Subject Code: 81136 / Zoology : Paper II

Zool - II

FyBsc - Semester - I

05/12/2018

[Time: 3 Hours] [Marks:100]

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. All questions carry equal marks.
3. Draw neat labeled diagrams wherever necessary.

Q.1 A) Fill in the blanks by choosing option given in the bracket. (05)

a) In insulin hormone the length of chain 'B' is of _____amino acids. (21 / 30 / 40)

b) _____are black symbols on white background with red bordered rhombus. (Pictogram /Hisotgram /Pie diagram)

c) Dolly was created by _____. (John B. Gurdon / Ian Wilmut / T J Pradhan)

d) _____are Cryoprotective proteins that protect living organisms in number of ways. (RFLP / AFP / GFP)

e) _____is not a type of chromatography. (Paper / absorption / Partition)

B) Match the Columns **I** and **II** and rewrite (05)

I	II
a) Mikhail Tswett	i) Biotechnology
b) Volume	ii) Kilometer
c) Karl Ereky	iii) Microscope
d) Length	iv) Mililiter
e) Resolving power	v) Chromatography

c) State whether **True** or **False**. (05)

a) Solution is a homogenous mixture.

b) Combined glass electrode is used to measure colour intensity of a solution.

c) Transgenic Salmon over produce growth hormone.

d) DNA fingerprinting is based on the use of minisatellite.

e) In a simple microscope light from a source passes through a concave lens to get an enlarged image of an object.

D) Answer in one sentence. (05)

a) What are aerosols?

b) Give the full form of OECD.

c) Define *invivo* gene therapy.

d) Give the full form of SCID.

e) Principle of centrifugation.

Q.2 A) What is mode? How do you calculate Mode for ungrouped and grouped data? (10)

OR

A) Explain Good Laboratory Practices.

Q.2 Explain the following **any two** (10)

a) Physical hazards in laboratory.
b) Median for ungrouped data with example.
c) Pie diagram.
d) Probability sampling.

Q.3 A) Explain the scope of Biotechnology? (10)

OR

A) Explain the technique of DNA fingerprinting?

Q.3 Explain the following **any two** (10)

a) *Ex-vivo* gene therapy.
b) GFP.
c) DNA microinjection.
d) Industrial application of Biotechnology.

Q.4 Answer the following **any two** (20)

a) Explain in detail principle, construction and application of Dissecting microscope?
b) Explain the principle and types of electrophoresis.
c) Explain the principle and application of pH meter?
d) Explain the principle and application of spectroscopy?

Q.5 Write short notes on **any four** (20)

a) Explosive and flammable chemicals.
b) Normality.
c) Ethical issues of cloned animals.
d) Human Genome Project.
e) Particle properties of light.
f) Thin layer chromatography.

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Zool - II

Paper / Subject Code: 81136 / Zoology : Paper II

FYBSc - Semester - I

07/12/2018

Q. P. Code :30061

[Time: Three Hours] [Marks:100]

Please check whether you have got the right question paper.

N.B:
1. **All questions are compulsory.**
2. **All questions carry equal marks.**
3. **Draw a neat and labelled diagrams wherever necessary.**

Q.1 A) Fill in the blanks by choosing correct option given in the brackets. **05**

a. Liquids with flash point less than 37.8°C are called as _____(flammable, combustible, corrosive)
b. _____is a genetically improved variety of fish produced by the central institute of freshwater Aquaculture.(jayanti rohu, vaijayanti rohu, damayanti rohu)
c. Separation of charged molecules through inert, porous material by applying electric charge is called as _____(chromatography, spectroscopy, electrophoresis)
d. Zero kelvin corresponds to a temperature of _____on a Celsius scale. (173.16°, 273.16°, 274.16°)
e. In the dairy industry cheese is produced by adding a recombinant renin called_____. (cathepsin, chymosin, trypsin)

Q.1 B) Match the column I with II and rewrite. **05**

	I		II
a)	Oxidizing agent	i)	*Saccharomyces cerevisiae*
b)	Dolly	ii)	Adsorption chromatography
c)	Alcohol fermentation	iii)	Sodium
d)	TLC	iv)	Ian Wilmut
e)	Explosive	v)	Permanganates

Q.1 C) State whether **True or False.** **05**

a) Any finite or infinite collection of all possible objects under study is called sample.
b) 1 mL volume corresponds to 0.001L.
c) Dr. T.J. Pandian produced viable hybrid fishes using chemically and thermally induced polyploidy.
d) When transmission is 100% then absorbance should be zero.
e) Magnifying power of dissecting microscope 100X.

Q.1 D) Answer in **one sentence** **05**

a) Define pH.
b) What is a resolving power?
c) Define oxidizing agents.
d) Define molality.
e) Who is known as the father of gene therapy?

Q. P. Code :30061

Q.2 A) What is a frequency distribution table? Explain the steps involved in its preparation. **10**

OR

A) What is a median? Explain the calculation of median for ungrouped and grouped data.

B) Write note on **any two** of the following: **10**

a) Good laboratory practices.
b) Percentage concentrations.
c) Pie diagram.
d) Simple random and systematic sampling methods.

Q.3 A) Describe the production of recombinant insulin. **10**

OR

A) Describe SCID and its treatment.

B) Write notes on **any two** from the following: **10**

a) *In-vivo* gene therapy.
b) Achievements of biotechnology in medicine.
c) Transgenesis using nuclear transplant method.
d) Green fluorescent protein.

Q.4 Answer **any two** from the following: **20**

a) Describe the construction and applications of dissecting microscope.
b) Explain the principle and applications of pH meter.
c) Explain the principle and applications of spectrometry.
d) Explain the principle of centrifugation and write note on ultra-centrifugation.

Q.5 Write short notes on **any four** of the following: **20**

a) Corrosive chemicals.
b) Molarity.
c) Achievements of biotechnology in animal husbandry.
d) DNA finger printing technique.
e) Paper chromatography.
f) Agarose gel electrophoresis.

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BOT-I

Paper / Subject Code: 81107 / Botany: Paper I

FyBsc - Semester I
30/11/2018

[Time: Three Hours] [Marks. 100]

Please check whether you have got the right question paper.

N.B: i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Draw neat and labeled diagrams whenever necessary**

Q.1 A. Choose the **correct option** from the following: **10**

a) The chloroplast in *Spirogyra* is _____ shaped.
i) disc ii) cup iii) spiral iv) star

b) _____ is not the type of conjugation in *Spirogyra.*
i) Looping ii) Lateral iii) Reticulate iv) Scalariform

c) Chlorophyta contains _____ as main pigments.
i) Chlorophyll a & b ii) Chlorophyll a & c iii) Chlorophyll b & d
iv) Chlorophyll b & c

d) *Nostoc* reproduces by _____ methods.
i) vegetative and asexual ii) vegetative and sexual
iii) vegetative, sexual and asexual iv) sexual and asexual

e) Fruiting body of *Aspergillus* is called _____.
i) Apothecium ii) Cleistothecium iii) Perithecium iv) Epithecium

f) Mass of white, cottony threads of fungi are called _____.
i) mycelium ii) columella iii) sporangium iv) conidium

g) *Rhizopus* belongs to order _____.
i) Mucorales ii) Aspergillales iii) Erysiphales iv) Pucciniales

h) The aquatic species of *Riccia* is _____.
i) *Riccia discolor* ii) *Riccia fluitans* iii) *Riccia himalayensis* iv) *Riccia alba*

i) _____ represents the main plant body of *Riccia.*
i) Sporophyte ii) Gametophyte iii) Sporophyte on Gametophyte
iv) None of the above

j) *Riccia* reproduces vegetatively by _____.
i) fragmentation ii) tuber formation iii) persistent apices iv) all of the above

B. Answer the following in **one sentence**: **10**

a) What is coenobium ?
b) What is coenocytic mycelium ?
c) Define haustoria.
d) Why bryophytes are called amphibians of plants kingdom ?
e) State the functions of heterocyst.

Q 2 Answer **any two** from the following : **20**

a) Describe vegetative cell structure of *Spirogyra*. Add a note on its systematic position.
b) Write a detailed note on range of thallus in chlorophyta.
c) Explain reproduction in *Nostoc*.
d) Write an account on alternation of generations in chlorophyta.

Q.3 Answer **any two** from the following: **20**

a) Give the beneficial aspects of fungi.
b) Describe the modes of nutrition in fungi.
c) Explain asexual reproduction of *Aspergillus* in detail.
d) Discuss sexual reproduction in *Rhizopus*.

Q.4 Answer **any two** from the following: **20**

a) Describe the structure of sex organs in *Riccia*.
b) Write a detailed account on general characters of Hepaticae.
c) Give the systematic position and describe the external morphology of *Riccia*.
d) Describe V.S. of thallus of *Riccia*.

Q.5 Write short notes on **(any four)**: **20**

a) Algae as biofertilizers
b) Alginates
c) Thallus structure of *Rhizopus*
d) Systematic position of *Aspergillus*
e) Fertilization in *Riccia*
f) Types of rhizoids in *Riccia*

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BOT II

Paper / Subject Code: 81123 / Botany: Paper II

FyBSc – Semester – I
05/12/2018

[Time: Three Hours] [Marks. 100]

Please check whether you have got the right question paper.

N.B: i) **All questions are compulsory**
ii) **Figures to the right indicate full marks**
iii) **Draw neat and labeled diagrams whenever necessary**

Q.1.(A) Choose the correct option from the following and rewrite the sentence 10

a. Pectin a polysaccharide constituting the middle lamella of plant cell wall is present in the form of _____.
i) Sodium pectate ii) Calcium pectate iii) Potassium pectate iv) Zinc pectate

b. The dark reaction of the photosynthesis takes place in_____.
i) grana of chloroplast ii) stroma of chloroplast
iii) membrane of mitochondrion iv) lysosomes

c. The plant cell walls are interrupted by cytoplasmic connections between the adjacent cells. These connections are called as _____.
i) fibrous lamina ii) plasmodesmata
iii) equatorial connections iv) axial connections

d. The term Ecology was coined by _____.
i) E. P. Odum ii) Lindeman iii) Earnst Haeckel iv) Tansley

e. _____ecosystem is the largest ecosystem on the earth.
i) Forest ii) Aquatic iii) Grassland iv) Desert

f. _____ forest shows very high rainfall.
i) Tropical rain ii) Tropical deciduous
iii) Tropical evergreen iv) Montane coniferous

g. _____ is a possible abbreviation for a genotype.
i) BC ii) Pp iii) Ty iv) fg

h. A cross between two individuals with one pair of contrasting characters is called _____.
i) monohybrid ratio ii) monohybrid cross iii) dihybrid ratio iv) dihybrid cross

i. Whenever a gene at one locus on a chromosome influences the expression of another gene at a different locus, the 1st gene is said to be _____.
i) hypostatic ii) epistatic iii) dominant iv) recessive

j. In duplicate dominant epistasis, the Mendel's dihybrid ratio of 9:3:3:1 is changed to_____.
i) 9: 3: 4 ii) 15 : 1 iii) 9: 7 iv) 9 : 2 : 5

Q.1. B Answer the following in one sentence 10

a. What is eukaryotic cell?
b. Enlist the components of secondary cell wall.
c. Give types of terrestrial ecosystem.
d. State first law of thermodynamics.
e. What is test cross?

Q.2. Answer any two of following. 20

a. Describe the ultra-structure of cell wall. Add a note on its functions.
b. Give the ultra-structure and functions of endoplasmic reticulum.
c. Explain the fluid mosaic model of plasma membrane.
d. With the help of a neat and labelled diagram, describe the structure of a typical eukaryotic plant cell.

Q.3. Answer any two of following. 20

a. Explain energy flow in an ecosystem with the help of 'Y' shaped energy flow model.
b. Define ecosystem and give an account of its different components.
c. What are pyramids? Explain different types of pyramids with the help of diagrams.
d. Give an account of marine ecosystem.

Q.4. Answer any two of following. 20

a. Define Epistasis? Explain duplicate recessive epistasis by giving a suitable example.
b. What are multiple alleles? Explain the same with reference to inheritance of blood groups in man.
c. Explain dihybrid ratio with an example. Add a note on the law of Independent assortment of characters.
d. The comb shape in fowl is governed by two genes R and P. When the two dominant alleles of both genes in homozygous or heterozygous form are together the comb shape is walnut (RP- walnut), when the R locus is dominant (R-pp) the comb shape is rose, when the P locus is dominant (rr P-) the comb shape is Pea. When both loci are homozygous recessive (rrpp) the comb shape is single. Give the phenotype and genotype of the progeny of the following crosses. Also give the phenotype of the parents.

a) RrPp X rrPp **b) Rrpp X rrPp**

Q.5. Write short notes on any four 20

a. Lipids in plasma membrane
b. Greater membrane Model
c. Wetlands
d. Terrestrial ecosystem
e. Monohybrid ratio
f. Mendel's seven characters of pea plant

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Paper / Subject Code: 80901 / Foundation Course-I

FYBA/BSC/Bcom - Semester -I

28/11/2018

(2 ½ hours) Total marks: 75

N. B (1) All questions are compulsory

(2) All questions have internal choice

(3) Figures to the right indicate full marks

Q1. A. Choose the correct alternative: (Any eight) (08)

1. The Eightfold path was given by _____.
   (Jesus Christ, Buddha, Mahavira)
2. Among the states, _____ has the highest literacy rate.
   (Kerala, Maharashtra, Haryana)
3. _____ is the main reason of female foeticide.
   (Preference for male child, Unemployment, Globalisation)
4. _____is a form of social violence against women.
   (Eve teasing, Abduction, Dowry harassment)
5. Belgaum border dispute between the States of Karnataka and Maharashtra is an example of _____ (Regionalism, linguism, Casteism)
6. .....arises out of religious fundamentalism.
   (Communalism, Nationalism, Racism)
7. Caste system is a form of _____stratification.
   (Political, economic, social)
8. The_____ specifies the power of parliament to amend the Constitution and the procedure of it.
   (Article 368, Article 344, Article 246)
9. _____ functions at the village level.
   (Zilla Parishad, Panchayat Samiti, Gram Panchayat)
10. 73rd Amendment of the Indian Constitution is related to_____.
    (Parliamentary system, independent judiciary, Panchayati Raj)

Q1. B. State whether the following statements are 'True' or 'False': (any seven) (07)

1. Demography is a study of population.
2. Unemployment rate is very high in rural areas as compared to urban areas.
3. After cataract, glaucoma is the second most common cause of blindness.
4. National Institute for Mentally Handicapped is located at Secunderabad.
5. Caste system has created an egalitarian society.
6. Political justice is meaningless without economic justice.
7. Regional conflicts do not damage the integrity and unity of the nation.
8. Financial emergency can be declared under Article 360 of the Indian Constitution.
9. Municipal Commissioner is appointed by the State Government.
10. Participation of women in politics in India is very heartening.

Q2.A. Examine the factors responsible for declining gender-ratio in India. (15)

OR

Q2. B. State the causes and types of physical disabilities.

Q3. A. Define communalism. Explain the factors responsible for the growth of communalism in India. (15)

OR

Q3. B. Discuss the inequalities caused by the caste system.

Q4. A. Describe the fundamental duties of the citizens of India. (15)

OR

Q4. B. Explain the features of the Indian Constitution.

Q5. A. Analyze the features and functions of the political parties in India. (15)

OR

Q5. B Write short notes on the following: (any three)

1. Linguistic diversity
2. Communal harmony
3. Characteristics of rural India
4. Role of women in politics
5. 74th amendment to the Indian Constitution

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