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Reproduction in Organisms

All organisms do other physiological processes like they do reproduction as important physiological process, in which an organism gives birth to offspring similar to itself. The offspring grow, mature and then produce new offspring. Thus there is a cycle of birth, growth and death. Reproduction enables the retention continuity of the species, from generation to generation. The genetic variation is created and inherited during reproduction.

There is a large diversity in the biological world and each organism has evolved its own mechanism to multiply and produce offspring. The organism's habitat, its internal physiology and several other factors are collectively responsible for how it reproduces. There are two types of reproduction in organisms.

(1) Asexual reproduction and (2) Sexual reproduction.

Asexual reproduction: From a single parents, without formation of gametes offspring are formed so it is called asexual reproduction. Mitosis and amitosis like cellular reproduction involved in it.

Sexual Reproduction: When two opposite sex parents. involved and form male and female gametes so it is called sexual reproduction. Meiosis and mitosis like cellular divisions take place in it.

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- (1) Physiological activities, means
- (A) Physiological process in living organisms. (B) Chemical reaction in living organism
(C) Physical reaction in living organism (D) complex of physical, chemical and biological processes in living organisms.
- (2) Which physiological process is important for the formation of offsprings ?
- (A) Copulation (B) Digestion
(C) Nutrition (D) Assimilation
- (3) When young ones can reproduce ?
- (A) by obtaining nutrition (B) by growth
(C) by attaining maturity (D) by nutrition, growth and maturity
- (4) Which is correct sequence for living ?
- (A) Birth, death, growth, maturity (B) Birth, growth, maturity. death
(C) Death, maturity, Birth, Growth (D) Growth, maturity, Birth, growth
- (5) What is the definition of continuity of life ?
- (A) observing variation from one generation to next.
(B) continuous similarity and some variation from one generation to next.
(C) Similarities from one generation to next
(D) None
- (6) What is reason for genetic variation ?
- (A) Preservation of discontinuous characters (B) Preservation of continuous characters
(C) Some characters preseved by reproduction (D) Preservation of inherieance.
- (7) On the basis of which factors reproduction method is determined
- (A) Habitat, other factors (B) Internal physiological processes of livings.
(C) Habitat, physiological interactions, other factors (D) only effective factors.

- (8) Which is proper sentence for the Asexual reproduction ?
 (A) offsprings obtained from one parent. (B) gamete formation occurs
 (C) offsprings obtained from single parent without gamete formation. (D) Meiosis
- (9) What is proper for sexual reproduction ?
 (A) Two different parents are essential
 (B) Forms two similar gametes
 (C) Offsprings are exact copy.
 (D) Two different parents forms two different gametes, mostly similar offspring obtained.
- (10) When is meiosis occur in sexual reproduction ?
 (A) At the time of parent cells (B) At the time of gamete formation
 (C) At the time of offspring formation (D) At the time of somatic cells formation

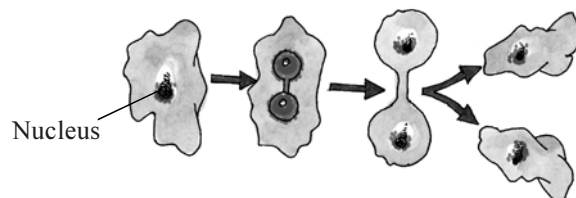
Answers : (1-D), (2-A), (3-D), (4-B), (5-D), (6-C), (7-C), (8-C), (9-D), (10-B)

Asexual reproduction : In asexual reproduction a single, parent is involved and is capable of producing offspring. As a result the offsprings that are produced are not only identical but also exact copies of their parent. Asexual reproduction is common among single-celled organisms and in plants and animals with relatively simple organizations. It is also seen in multicellular organisms.

Asexual reproduction in Animals : In animals asexual reproduction methods have seen as simply Fission, sporulation, Budding, Fragmentation.

(1) Fission : This method is observed commonly in protists and monerans types of organism groups. Three phases of fission. In it first of all division of nucleus occurs, than division or distribution of cytoplasm and finally two identical size of individual daughter cells are formed. This type of fission process is like mitosis. From the single maternal or paternal cell two identical daughter cells are formed so that process is called binaryfission. It occurs in three ways : (1) Simple binaryfission (2) Transverse binaryfission and (3) Longitudinal binary fission.

Simple binary fission : When the cytoplasmic division passes through any directions the fission is called simple binary fission. e.g. Amoeba. In that first nucleus become elongated or cylindrical, groove formed in cell membrane then division of cytoplasm occur in any direction.



Transverse Binary Fission : It is the plane of ctoplasmic division coincides with the transverse axis of the individual, the fission is termed transverse binary fission. eg. Paramecium and planaria. Their phases are : (1) macronucleus becomes cylindrical (2) Groove formation occur in macronucleus (3) Oral groove disintegrate (4) Amitotic division occurs of macronucleus (5) Formation of new oral groove (6) Formation of new vacuoles (7) Origin of internal groove in plasmamembrane (8) Division occurs in cytoplasm (9) Formation of two individual daughter cells.

Longitudinal binary fission : In euglena and vorticella, the plane of cytoploymic division coincides with the longitudinal axis of the individual. This kind of fission is designated as longitudinal binary fission. Phases of that type of binary fission are as. follows : (1) Elongation of cylindrical nucleus takes place (2) organisation occur in nucleus, ie nucleus groove (3) Formation of longitudinal groove in plasmamembrane. (4) Division occurs in cytoplasm (5) Formation of two individual daughter animals.

Longitudinal binary fission in Euglena : In binary fission only mitotic division take place. (cell division = cellular reproduction for the unicelluler organism.) Resultant progenies are genetically identical with the parental generation, ie from the single parent originated offsprings are identical genetically, which are considered as genetical clones of parents.

Multiple Fission : In this type of fission, dominancy of cell division is amitotic division. The nucleus divides several times by amitotic nuclear division. Thus large numbers of nucleus are formed. Cytoplosm does

not divide during this period. Then cytoplasm collects around each nucleus. Thus, within one maternal cell, innumerable unicellular and uninucleate offspring are formed. In course of time they live as independent unicellular organisms. This method of reproduction is called multiple fission. Multiple fission is observed in Amoeba and paramoecium.

- (11) What is sequence of development for asexual reproduction in animals ?
- (A) Fragmentation, Budding, sporulation, fission
 - (B) Buddingm sporulation fission fragmentation
 - (C) Sporulation, Budding, fragmentation, fission
 - (D) Fission, Sporulation, Budding, fragmentation,
- (12) What is the sequence of development for fission stages ?
- (A) Division of nucleus - Division of cytoplasm - 2 daughter cells
 - (B) Division of cytoplasm - Division of nucleus - 2 daughter cells
 - (C) Division of nucleus - 2 daughter cells - Division of cytoplasm
 - (D) Division of nucleus - 2 daughter nuclei - 2 daughter cells
- (13) Simple cell division, in which two daughter cells formed is called, it is which type of cell division ?
- (A) Binary fission, mitosis
 - (B) Binary fission, Amitosis
 - (C) Binary fission, meiosis
 - (D) Binary fission, cellulardivision
- (14) Which sentence is proper for eukaryotic unicellular irregular shaped protozoans ?
- (A) Division of cytoplasm in mid-longitudinal axis
 - (B) Division of cytoplasm transversely
 - (C) Division of cytoplasm, longitudinally
 - (D) Division is irregular.
- (15) Select proper option for development stage of cell division for eukaryotic, unicellular irregularly shaped protozoans.
- (A) Nucleus tubular enlarges - nuclear ridge formed - nucleus divided into two - Internal projection in plasmamembrane - cytoplasm divides.
 - (B) Internal projection formed in plasma membrane - cytoplasm divides - nucleus tubular - Nuclear ridge formed - nucleus divided into two.
 - (C) Internal projections formed in plasmamembrane - nucleus divided - nuclear ridge forms - nucleus tubular - nucleus divided into two
 - (D) Nuclear ridge formed - nucleus tubular - nucleus division - Internal projections in plasma membrane - cytoplasm divided.
- (16) In lower form of eukaryotic regular shaped protozoan and platyhelminthes at the time of binary fission, division of cytoplasm is at axis
- (A) Mid longitudinal
 - (B) Transverse
 - (C) longitudinal
 - (D) A and C
- (17) Which option is proper for nuclear divisional stages in transverse binary fission ?
- (A) micronuclei become tubular → internal groove in micronuclei → two daughter nuclei formed.

- (B) Macro nuclei become tubular → internal groove in macro nuclei → two daughter nuclei formed.
- (C) Internal groove in micronuclei → micronuclei tubular → two daughter nuclei formed.
- (D) Internal groove in micronuclei → micronuclei tubular → two daughter nuclei formed.
- (18) Which option is proper for lower form, regular shape eukaryotic protozoans and platyhelminthes for developmental sequence in division of cellular matrix ?
- (A) Disappearance of oral groove → New oral groove formed → Internal groove develop in plasma membrane → New contractile vacuoles formed - division of cytoplasm.
- (B) New oral grooves formed → internal groove develop in plasma membrane → oral groove disappears → new contractive vacuole formed → division of cytoplasm.
- (C) Disappearance of oral groove → new oral grooves formed → new contractile vacuoles formed - internal groove develop in plasma membrane → division of cytoplasm
- (D) Disappearance of oral groove → new oral groove develops → internal groove develop in plasma membrane → Division of cytoplasm - new contractile vacuoles formed.
- (19) Which two earlier stages are found in paramoecium and planaria, in which transverse division give rise to two daughter cells
- (A) Division of nucleus → Divison of cytoplasm
- (B) Internal groove in meganucleus → internal groove in plasma membrane
- (C) Internal groove in plasma membrane division of cytoplasm.
- (D) New oral grooves formed, new contractile vacuoles formed.
- (20) Select option in which Euglena divides longitudinally to form two daughter cells
- (A) Nucleus become tubular → nuclear groove formed longitudinarly groove in plasma membrane - division of cytoplasm
- (B) Nuclear groove formed → Nucleus become tubular - longitudinal groove in plasma membrane division of cytoplasm.
- (C) Division of cytoplasm → longitadinal groove in plasma membrane - nuclear groove formed -nucleus become tubular.
- (D) Longitadinal groove in plasmd membrane - division of cytoplasm - nucleus tubular - nuclear groove formed
- (21) Which option is proper for genetic similarity ?
- (A) Similarity in number of genes (B) Similarity in shape
- (C) Similarity in physiology (D) genetic, morphological, physiological similarities.
- (22) In which division processes, Amitosis is main ?
- (A) Simple division, transverse binary division (B) Simple division, longitudinal binary division
- (C) Simple division, multiple fission (D) Transverse binary fission, mltiple fission
- (23) In multiple fission which process occurs frequently and which do not occur ?
- (A) Amitosis, division of cytoplasm (B) Mitosis Division of cytoplasm
- (C) Mitosis, Division of cytoplasm (D) Amitosis, division of nucleus.
- (24) In multiple fission, during amitosis which substage observed frequently ?
- (A) G₁ (Gap - 1) (B) G₂ (Gap - 2)
- (C) S = DNA replication (D) all of above
- (25) offsprings formed as a result of multiple fission from one maternal cell is
- (A) innumerable, coenocytic (B) innumerable, uninucleated
- (C) innumerable, unicellular, uninucleated (D) innumerable, coenocytic.

(26) Which organisms show multiple fission ?

(A) plasmodium, planaria, Amoeba

(B) Plasmodium, Amoeba, paramoecium

(C) Plasmodium, Euglena, paramoecium

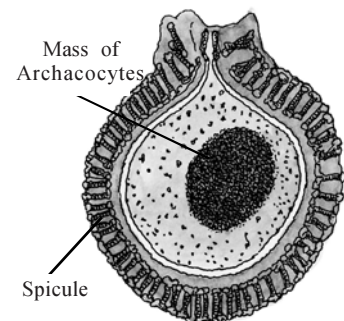
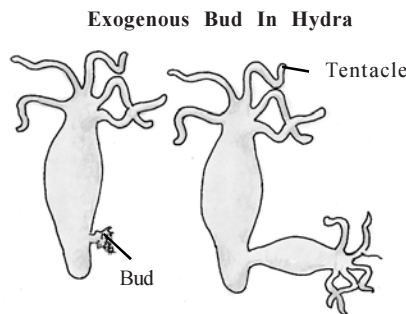
(D) Plasmodium, Euglena, Vorticella.

Answers : (11-D), (12-A), (13-A), (14-D), (15-A), (16-B), (17-B), (18-C), (19-C), (20-A), (21-D), (22D), (23-A), (24-C), (25-C), (26-B)

(1) Sporulation : Sporulation occurs during unfavorable conditions. In lower animals to maintain for continuation of life. Amoeba is irregular in shape, uninucleated protist organisms Amoeba withdraw their pseudopodia and become round in shape and form spore like structure, They create a hard protective three layered cyst around themselves, this process is called encystations. When Conditions become favorable, the nucleus in amoeba undergoes multiple divisions and a large number of amoeba are formed. These are called pseudopodiospores. This process is called Sporulation. When the cyst ruptures all new Amoebae are released. In plasmodium this proces occurs at a specific stage in its life cycle.

(2) Budding : In this method, first of all, cells of some part of the body of the animal repeatedly undergo mitotic divisions and the raised regions of cell masses, called bud are formed. From such a bud a young animal develops. It separates from the parent body and lives as an independent animal.

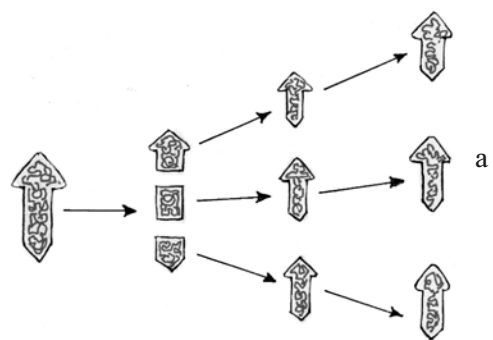
If such a bud is produced on the outer surface of the body it is called exogenous budding. In **Hydra**, exogenous budding is observed.



Internal bud in Spongilla

In Fresh water sponge eg. **spongilla** and marine sponge eg. **Sycon** specialized cell masses are produced surrounds the inside of the body. An envelope surrounds this cell mass. Such structures are called internal buds or gemmules. Each gemmule gives rise to a new animal. This is called endogenous budding.

(3) Fragmentation : In this method of asexual reproduction, the body becomes fragmented into several distinct parts. Each part develops the remaining body parts and becomes complete animal. This capacity is known as regeneration. Fragmentation is observed as regeneration capacity. E.g. lower platyhelminthus - Planaria, coelenterata - Hydra, Animal of ehinodermata - Starfish.



Regeneration in Planaria

(27) Which option is proper for Amoeba ?

(A) It is irregular, unicellular, coenocytic pseudopodial, protozoa.

(B) It is irregular, unicellular, uninucleated pseudopodial protozoa.

(C) It is irregular coenocytic, uninucleated pseudopodial protozoa.

(D) It is irregular, unicellular, uninucleated, protozoa without pseudopodia.

- (28) Irregular, unicellular, uninucleated, protozoa shows sporulation in which condition ?
 (A) Favourable (B) Normal
 (C) Unfavourable (D) specific.
- (29) In unfavourable situation, how is round structure formed in amoeba like organisms ?
 (A) Showing morphological changes
 (B) Spreading of plasmamembrane in periphery
 (C) Due to atmospheric pressure - effect.
 (D) Pseudopodia contracts and spore formation occurs.
- (30) How is cellular capsule ?
 (A) Three layered, strong. (B) Three layered, strong, permeable membrane
 (C) Three layered (D) Three layered, strong, impermeable
- (31) What is encapsulation ?
 (A) Three layered, strong, impermeable capsule formation surrounding round structure of spores
 (B) Formation of two layered, strong, impermeable capsule surrounding round structure of spores
 (C) Formation of three layered smooth, impermeable capsule surrounding round structure of spores.
 (D) Formation of capsule, which is three layered smooth, semipermeable surrounding round spores.
- (32) Pseudopodiospores possess which structures ?
 (A) Nucleus (B) Nucleus + cytoplasm + Plasma membrane
 (C) Cytoplasm + nucleus (D) Nucleus + cytoplasmic organelles
- (33) Which option is proper for formation of exogenous bud ?
 (A) Any organ of parent body divides frequently mitotically to form bud.
 (B) All organs of parent body frequently divides mitotically to form bud.
 (C) Any organ of parent body frequently divides mitotically as a result bud forms as an outgrowth
 (D) Any organ of parent body frequently divides amitotically, bud forms as an outgrowth.
- (34) In which animal group and which type of animal exogenous bud formation is common ?
 (A) Coelenterata polygonal shape (B) Coelenterata, tubular
 (C) Coelenterata, round (D) Coelenterata, Multicellular
- (35) What are gemmules or endogenous buds ?
 (A) Bud which is formed outside the parent body
 (B) Bud which is developed longitudinally on parent body.
 (C) Bud which is developed transversally on parent body.
 (D) Specific cell groups encircle to form bud on parent body
- (36) What is fragmentation ?
 (A) Parent body breaks into smaller, larger parts, and required parts regenerate to form complete organism.
 (B) Parent body longitudinally divides in equal parts, required parts regenerate and complete organism is formed.
 (C) Parent body transversely divides into equal parts, required parts regenerate to form complete animal.
 (D) Parent body alternately divides longitudinally and transversely, remaining parts regenerated to form complete organism.

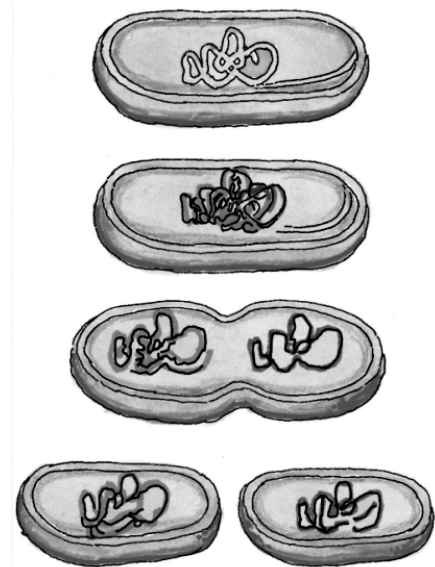
- (37) What is regeneration ?
 (A) Complete organism develops from fragmented segment or organ
 (B) Complete organism develops from any cell.
 (C) Complete organism develops from any tissue
 (D) Complete organism develops from any system.
- (38) What is called totipotency ?
 (A) Complete organism develops from any broken part or organ
 (B) Complete organism develops from any differentiated cell.
 (C) Complete organism develops from any tissue.
 (D) Complete organism develops from any system.
- (39) Which organisms shows asexual reproduction by fragmentation ?
 (A) Lizard, crocodile, bird (B) Anaconda, crocodile, calotes
 (C) Cockroach, Locust, housefly (D) Hydra, planaria, starfish
- (40) Complete totipotency is observed in which animal group ?
 (A) Platyhelminthes, housefly (B) Annelida, Arthropoda
 (C) Coelenterata, Mollusca (D) Porifera, coelenterata

Answers : (27-B), (28-C), (29-D), (30-D), (31-A), (32-C), (33-C), (34-B), (35-D), (36-A), (37-A), (38-B), (39-D), (40-D)

-Asexual Reproduction in plants :

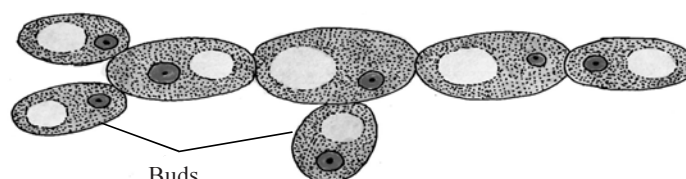
The common mode of asexual reproduction in plants is like fission, Budding, fragmentation, spore formation.

- (1) **Fission** : This method is simplest method of asexual reproduction. In which unicellular maternal cell divides by the mitosis Two daughter cells are formed. Each eventually grow into an independent mature organism. This simple fission process has stages as follows. (1) Enlargment area of nucleus (cylindrical) (2) formation of nucleus groove (3) Formation of two daughter nuclei (4) Inversion of plasmamembrane by the formation of internal groove. (5) Distribution of cytoplasm. (6) Two independent daughter cells are formed. This simple fission method commonly found in lower level plant groups eg. monera (Bacteria = Schizophyta), Algae Fungi, Bacteria/schizophyta are prokaryotic, while Algae and fungi are eukaryotic.



Fission in Bacteria

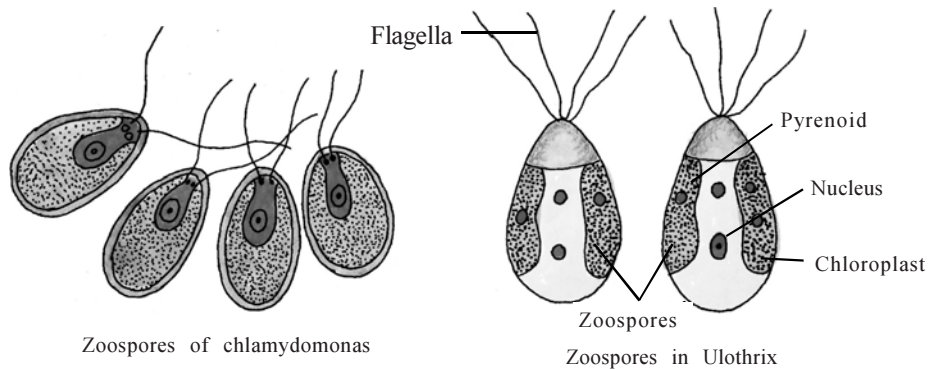
- (2) **Budding** : In plants amitotic divisions are responsible for asexual reproduction by this method. In that adventitious branches or buds like structures are formed which are attached to parent body. Finally bud forms new organism



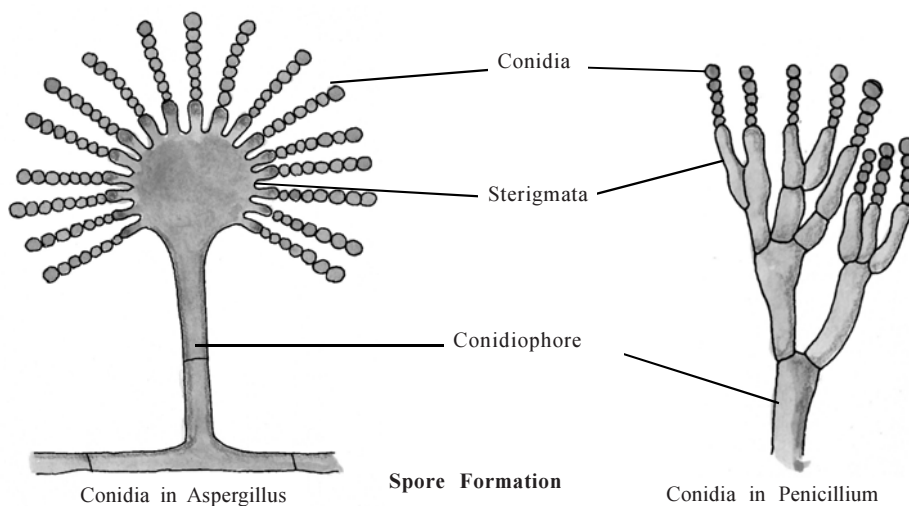
Buds in Yeast

independently. Some algae produce adventitious branches eg. **Dictyota, Fucus** by the amitotic divisions. **Protosiphon** algae produce bud. Even yeast like fungi by amitotic division produce bud.

- (3) **Fragmentation** : In plant this type of asexual reproduction break up into small segments due to mechanical pressure and each segment is capable of growing into a new mycelium or organism. In some algae e.g **ulothrix, oedogonium, spirogyra** and **zygnema** froms smaller or bigger segments of the vegetative thallus due to mechanical pressure. While **mucor, Rhizophus, saprolegnia** like fungus hyphae break up into small segment due to mechanical pressure. Each segment is capable of growing into a new mycelium.
- (4) **Spore formation** : In plants in this method of asexual reproduction various types of spores are formed. Spores mainly are two types (1) Zoospores (2) Conidiospores.



Ciliated motile spores called zoospores are produced by algae and fungi which swim in water for some time with the help of their flagella and then directly develop into new independent individuals. e.g **Ulothrix, chlamydomonas, oedogonium**.



Non flegellated and non-motile spores/conidia of various kinds are most common among terrestrial fungi. Such spores are light, dry and provided with a tough coat, and are well adapted for dispersal by wind e.g. **Penicillium, Aspergillus**.

True spores are always borne by sporophyte. Thus the sporophyte mass reproduces asexually by spores. Similarly ferns (**Nephrolepis**) bear spores and reproduce asexually by them. These plants are

homosporous (bear only one kind of spores) while in selaginella (a pteridophyte) and gymnosperms they are heterosporous (bears two types of spores).

- (41) Select proper option to understand evolutionary sequence for asexual reproduction method in plants
(A) Fission, Bud formation, fragmentation, spore formation
(B) Fission, fragmentation, sporeformation, Bud formation
(C) Bud formation, spore formation, fragmentation, fission
(D) Fission, spore formation, Bud formation, fragmentation
- (42) In which plants fission process takes place ?
(A) Unicellular, prokaryotic cell (B) Multicellular, Eukaryotic cell
(C) Unicellular / Multicellular, prokaryotic cell (D) Unicellular / multicellular, prokaryotic / Eukaryotic cell
- (43) Which option is proper in plants for development sequence of nuclear division during fission ?
(A) Nuclear region increases - nuclear ridge formed - two daughter nuclei formed.
(B) Nuclear region increases - two daughter nuclei formed - nuclear groove is formed.
(C) Two daughter nuclei formed - nuclear groove formed - nuclear region enlarges
(D) Two daughter nuclei formed - nuclear region enlarges - nuclear groove formed.
- (44) Which option is proper for development sequence of cytoplasmic division ?
(A) Invagination of plasma membrane forms internal ridge - Equal distribution of cytoplasm - Two daughter cells are formed
(B) Invagination of plasma membrane forms internal ridge - two daughter cells formed - equal distribution of cytoplasm.
(C) Equal distribution of cytoplasm - internal groove formed by invagination of plasma membrane - Two daughter cells are formed
(D) Two daughter cells formed - equal distribution of cytoplasm - Internal groove formed by invagination of plasma membrane.
- (45) In plants during fission, invagination of plasma membrane and internal groove formation occur during which stage ?
(A) Increase in nuclear region (B) Formation of nuclear region
(C) Two daughter nuclei formed (D) Equal distribution of cytoplasm occurs.
- (46) In which plant group fission process occurs ?
(A) Algae lichen, Fungi (B) Monera Bryophyta, Pteridophyta
(C) Monera, algae, fungi (D) Pteridophyta, Gymnosperm, Angiosperm
- (47) Which type of cellular structure shown by lower plants, shows fission process ?
(A) Unicellular (B) Multicellular
(C) Acellular (D) Unicellular / multi cellular
- (48) Which structure forms by repeated amitosis in parent thallus ?
(A) Adventitious branches (B) Buds
(C) Adventitious branches or buds (D) Adventitious branches and buds.
- (49) Which algae develops adventitious branches during bud formation ?
(A) Dictyota, Fucus (B) Dictyota, Protosiphon
(C) Fucus, Yeast (D) Fucus, Protosiphon

- (50) Which algae and fungi sequentially forms bud by fission ?
 (A) Dictyota and fucus (B) Dictyota and protosiphon
 (C) Fucus and yeast (D) Protosiphon and yeast.
- (51) Which plant organ experiences mechanical stress during fragmentation ?
 (A) Vegetative thallus (B) Vegetative cells
 (C) Spores (D) Reproductive cells
- (52) Which group of algae shows asexual reproduction by fragmentation ?
 (A) Ulothrix, oedogonium, spirogyra, zygnuma
 (B) Ulothrix, oedogonium penicillium, Aspergillus
 (C) Ulothrix, oedogonium, spirogyra, dictyota
 (D) Ulothrix, oedogonium, spirogyra, fucus.
- (53) Which fungi show asexual reproduction by fragmentation ?
 (A) Mucor, Rhizopus, saprolegnia (B) Mucor, yeast, penicillium
 (C) Mucor, yeast, Aspergillus (D) Mucor, penicillium, Aspergillus
- (54) In spore formation which are main type of spores ?
 (A) Round spores, oval spores (B) Motile spores, non motile spores
 (C) Motile spores, Round spores (D) Non-motile spores, oval spores
- (55) What is peculiarity of motile spore ?
 (A) Flagellated (B) Without flagella
 (C) Anuclear (D) Flagellated with locomotory capacity
- (56) In which algae motile spores are formed ?
 (A) Ulothrix, Chlamydomonas, oedogonium (B) Chlamydomonds, Ulothrix, Dictyota.
 (C) Ulothrix, Chlamydomonas, Fucus (D) Ulothrix, Chlamydomonas, Protosiphon
- (57) Non motile spore, conidia have which peculiarity based on structure ?
 (A) Light and dry
 (B) Without flagellum with strong envelop
 (C) Pollination by wind
 (D) Innumerable, light, dry, non-flagellated, wind pollinated
- (58) Which are known examples of terrestrial fungi which produces conidia ?
 (A) Penicillium, Aspergillus (B) Penicillium, oodogonium
 (C) Penicillium, Aspergillus (D) Penicillium, ulothrix
- (59) When are true spores formed in plants which have alternate gametophytic and sporophytic life cycle?
 (A) Sporophytic stage (B) Gametophytic stage
 (C) Megasporangiam. (D) Gametes.
- (60) Which are isogametes and heterogametes sequentially ?
 (A) Same type of gametes - similar morphological physiological and genetically are isogametes.
 Disimilar morphological physiological and genetically are heterogametes.
 (B) Isogametes - genetically similar but physiological and morphologically different.
 Heterogametes - genetically different but morphological and physiological similar
 (C) Isogametes - morphological, physiological similarity, genetic difference.
 (D) None of above.

- (61) Select proper option for classifying nephrolepis, selaginella, cycus, maize and bean for isogametic or Heterogametic
- (A) Isogametic - Nephrolepis, selaginella Heterogametic - cycus, maize, Bean
 (B) Isogametic - Nephrolepis, cycus Heterogametic - selaginella, maize, Bean
 (C) Isogametic - Nephrolepis Heterogametic - selaginella, cycus, maize Bean.
 (D) Isogametic - Nephrolepis, cycus, maize, Bean. Heterogametic - Selaginella.
- (62) Which is proper option for development sequence for conidia ?
- (A) Conidiophore - Sterigmata - Conidia
 (B) Sterigmata - Conidia - Conidiophore
 (C) Conidia - Sterigmata - Conidiophore
 (D) Conidia - Conidiophore - Sterigmata

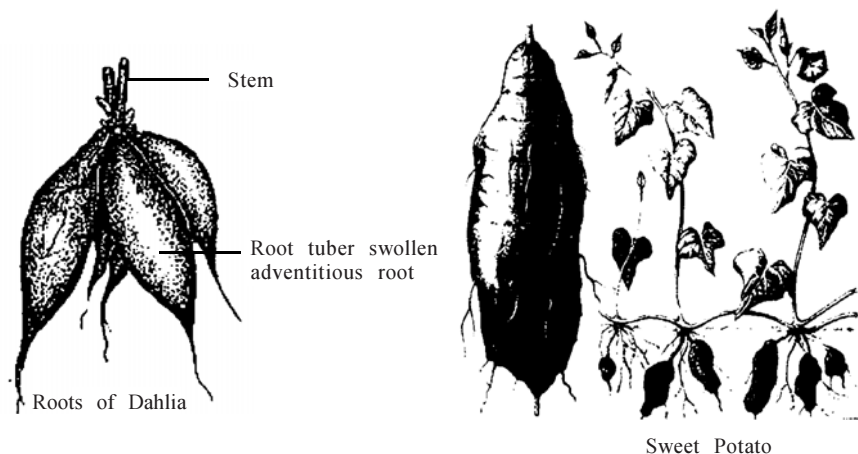
Answers : (41-A), (42-D), (43-A), (44-A), (45-B), (46-C), (47-D), (48-C), (49-A), (50-D), (51-A), (52-A), (53- A), (54-B), (55-D), (56-A), (57-D), (58-A), (59-A), (60-A), (61-C), (62-A)

(1) Vegetative propagation / vegetative reproduction :

Vegetative organs of plant asexual reproduction occur so it is vegetative propagation. It is one type of asexual reproduction for Animals and lower level organisms. Vegetative propagation - vegetative reproduction takes place by various vegetative organs by natural ways. Even vegetative propagation by artificial means can be induced. i.e. vegetative reproduction is divided in two main methods (1) Natural method and (2) Artificial method.

- (2) **Natural methods of vegetative propagation :** In natural methods of propagation, the development of a new plant from some organ of the mother plant under suitable environmental conditions is very common. In this method root, stem, leaf, floral bud are such reproductive organs.

Vegetative Reproduction by root : Sweet potato like plant vegetative reproduction by adventitious root for food storage occurs. Thus adventitious root becomes fleshy. This type of food storage occurs in adventitious root of root base middle part and root apex. Food storage is less in root apex and root base but middle part of the root food storage is more. This type of root store food in the form of starch and sucrose molecules. So it called simple tuberous root. This type of adventitious root in Asparagus and Dahlia also store food in cluster form. Such roots are called fasciculated tuberous root. They too involve in vegetative propagation.



Vegetative Reproduction by Root

Vegetative reproduction by stem : Ginger, Turmeric like plants store food in underground stem. Such prostrate underground stem possesses nodes, internodes, scaly leaves, axillary buds and terminal bud. This type of food storing underground stem is called rhizome; by which new daughter plants are formed. while in Amorphophallus food storage occur in only one internode of underground stem so it is called Corm by which vegetative reproduction occur. In patato food storage occur in scaly leaf of apical bud of underground stem which is called tuber stem. Which produce meristem vegetative bud, it is called 'eye'. by it vegetative propagation can occur. In an onion food storage occur in leaf base of scaly leaf stem is underground, disc like and pointwise, flatten so apical and axillary buds growth would be stunted,

it is called simple tunicated bulb. By this simple tunicatedbulb vegetative reproduction can occur.

Vegetative propagation by leaf : In Bryophyllum like plants vegetative propagation by leaf. Leaf margins of leaf of this plant vegetative meristem buds can occur. which make the contact with ground /soil and form daughter plant by vegetative reproduction. This types of buds are known as adventitious buds. Thus in bryophyllum vegetative propagation occurred by adventitious buds.



Vegetative Reproduction by Leaf in Bryophyllum

Vegetative Reproduction by Buds : Agave has

longest inflorescence in the plantkingdom, even in oxalis food storage occurs in floral buds. Such food storing floral buds becomes fleshy and weight increses, which fall in the ground and in favourable condition new daughter plant develops by vegetative propagation. Thus, in Agave, oxalis vegetative propagation occur by floral bud and converted into floral bulbil. Same in Dioscorea like plant food storage occur in axillary bud. so it becomes fleshy, heavy, which falls on ground and produce new daughter plant in favourable conditions. So, in Dioscorea vegetative reproduction occur in axillary bud and converted into axillary bulbil.

Other specific methods like natural methods are also available for vegetative propagation. These modifications are of subaerial stems. A part of the stem is underground and the remaining part is above the ground. In Grass, oxalis and Hydrocotyl, thin long, branches develops. They possess internodes and run parallel to the ground. The nodes which come in contact with ground develop new plants. This modification is called runner. In aquatic plants like pistia, marsilea from the node of stem branch is formed for vegetative propagation which is called offset.

while in mint branch of stem partially underground and partially aerial which do vegetative propagation by suckers. While in fern or nephrolepis and strawberry branch of underground -stem grows away from the ground level and take curve and then enter into soil and develops new plant, such branch is called stolon. Hence in fern (nephrolepis) and strawberry vegetatives propoagation occur by stolon.

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- (63) What is vegetative reproduction ?
- (A) Asexual reproduction by vegetative organs of plants
 - (B) Asexual reproduction by reproductive organs of plants
 - (C) Asexual Reproduction by plant organs such as fruits, seeds
 - (D) Asexual reproduction by flower, microspores megaspores of plants.

- (64) In which organisms asexual reproduction is very prominent ?
 (A) Lower organism and animals. (B) Lower category plants and animals
 (C) Lower category prokaryotic organism and animals. (D) Lower category Eukaryota and animals.
- (65) Which plant organ participate in vegetative reproduction ?
 (A) Root, stem, leaf (B) Root, stem, leaf, floral bud
 (C) Root, stem, leaf, flower (D) Root, stem, leaf, flower.
- (66) Which vegetative organ of sweet potato transforms into for vegetative reproduction
 (A) Adventitious root, simple tuberous root. (B) Primary root - simple tuberous root
 (C) Adventitious root - simple repeated structure (D) Primary root - composite, covered root.
- (67) What is called modified structure of underground stem for storage of food in ginger or turmeric and Amorphophallus ?
 (A) Rhizome, tuberous stem (B) Rhizome, simple tunicated bulb.
 (C) Rhizome, simple tuberous (D) Rhizome, corm.
- (68) Which modified structure formed by food storage in underground part of potato and onion ?
 (A) Rhizome, Tuberous stem (B) Tuberous stem, Rhizome
 (C) Tuberous stem, simple, tunicated bulb (D) Tuberous stem, compound tunicated bulb.
- (69) Ginger, Amorphophallus potato and onion , food is stored in which part of the plant sequentially ?
 (A) Rhizome, Nodes and internodes of rhizome, scaly leaf of apical bud of under ground stem, base of scaly leaf
 (B) Rhizome, Nodes of rhizome, scaly leaf of axillary bud of rhizome, Base of scaly leaf
 (C) Rhizome, Nodes and internodes of rhizome, scaly leaf of apical bud of rhizome, scaly leaf apex.
 (D) Base of rhizome, nodes of rhizome, scaly leaf of apical bud of rhizome, scaly leaf base.
- (70) Which option is proper for vegetative reproduction in Bryophyllum ?
 (A) Axillary buds at the leaf margin - vegetative reproduction - adventitious buds.
 (B) At the leaf margin vegetative, meristematic buds - food storage - vegetative reproduction - adventitious buds.
 (C) Buds on lamina - vegetative reproduction - Adventitious buds.
 (D) Buds at leafbase - vegetative reproduction - adventitious buds/
- (71) Bulbils are
 (A) Only do vegetative reproduction (B) Climbing and vegetative reproduction
 (C) Food storage and vegetative reproduction (D) Support and vegetative reproduction
- (72) Which is proper modified structure for vegetative reproduction for hydrocotyl, Eicchornia, Mint and Nephrolepis respectively ?
 (A) Runner, offset, sucker, stolon (B) Offset, Sucker, Stolon, Runner
 (C) Stolon, offset, Runner (D) Stolon, Offset, Runner
- (73) What is main difference in Runner and stolon for vegetative reproduction ?
 (A) Branch develops parallel to soilsurface, branch develops in the soil

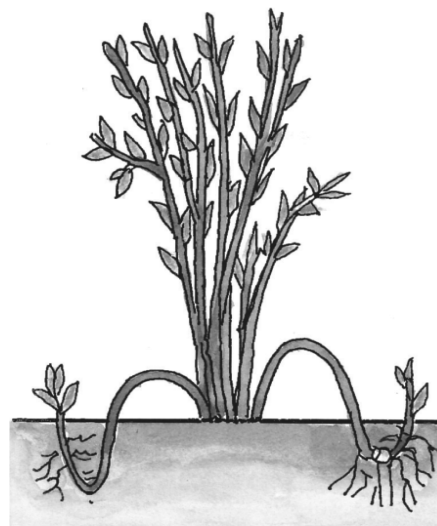
- (B) Branch of underground stem develop parallel to soil surface, Branch of underground stem develops above soil-surface again come in contact with soil.
- (C) Branch of underground stem remains in semi soil sub aerial and parallel to underground stem
- (D) No Difference.

Answers : (63-A), (64-A), (65-C), (66-A), (67-D), (68-C), (69-A), (70-B), (71-C) , (72-A), (73-B)

Artificial methods of vegetative Reproduction : Methods are developed for artificial vegetative propagation in which some part of the plant organ is utilized for obtaining a new complete plant. Amongst them the most common methods are. Cutting, Layering and Grafting.

- (1) **Cutting Method :** By the root and stem this type of artificial method induce as a vegetative reproduction. Cut the pieces of root and are planted in moist soil, development of adventitious roots, is artificially induced. New plants are developed in this way in **lemon** and **tamarind**.

Proper sizes of stem pieces are obtained and are planted in moist soil to develop into new plants. (xylem in contact with the soil surface). From the underground parts of stem, adventitious roots develop and buds on the aerial parts of stems sprout. The plant, so developed is called 'cutting'. Later, there cutting are transplanted in proper places. eg. **Rose, sugarcane, croton, china-rose** and **chrysanthemum** plants.



Layering

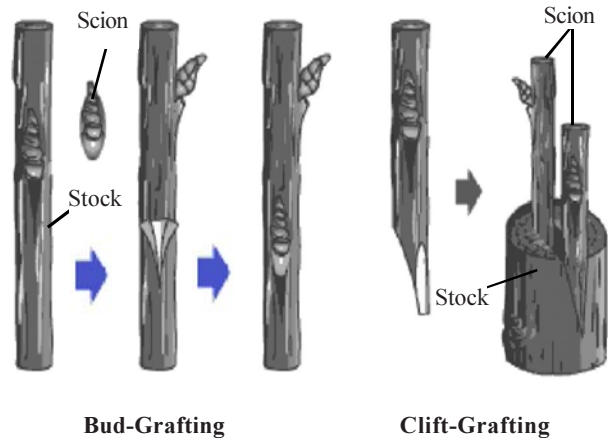
- (2) **Layering Method :** The lower branches of the plant are bent and pressed under the soil in such a way that the tip of the branch remains outside the soil and middle portion is buried inside the soil. When adventitious roots develop from this buried region of plant stem; this branch is cut and separated from the parent plant. Thus, a new plant is obtained. This method is employed in the cultivation of **Rose, lemon, Grape Hibiscus** and **Jasmine**.

- (3) **Grafting method :** Grafting is practiced in plants which do not root easily, or have a weak root system. In this method a union is established between two plant of the same or different kinds. Such a union is established between tissues of the two plants. This process can be induced more successfully amongst those plants which possess meristematic tissue (Dicots)

The main supporting plant or which plant cannot develop root system easily or which plant has weak root system, is called stock plant. The plant which is being grafted on it is called scion. A plant possessing higher and desirable characters is selected as 'scion' various methods of grafting scion are practiced. Grafting may be of different types, named budgrafting, side grafting, tongue grafting wedge grafting / cleft grafting and crown grafting depending on the methods of uniting the two parts. **mango, Apple, pear, citrus, Guava, litchi** and many other fruit - yielding plants are thus obtained and maintained.

Significance of vegetative Reproduction :

- (1) Vegetative reproduction is an ideal method of reproduction in plants in which it is desirable to maintain the same characteristic in the offspring which are present in the parents.
- (2) Plants showing reduced power of sexual reproduction, long dormant period of seed or poor viability can also be multiplied easily through this method.
- (3) Vegetative reproduction also helps in removing common infections from the parent plant.
- (4) In the plants raised through grafting, it is even possible to bring together the desired characters from plants. even best species are cultured by this method.



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- (74) Which plant tissue is kept in contact with soil during cutting ?
 (A) Parenchyma (B) Phloem (C) Xylem (D) Conductive tissue.
 - (75) When is cutting become ready ?
 (A) When Root system develops (B) Adventition root system, Buds and leaf lets develop.
 (C) When Buds develop (D) When leaf-lets develop.
 - (76) In which plants cutting is done by root parts ?
 (A) Lemon and Tamarind (B) Rose and sugarcane
 (C) Chrysanthemum and china rose (D) Croton, Rose
 - (77) Which plant group do not show vegetative reproduction by stem cutting ?
 (A) Lemon, Tamarind (B) Rose and sugarcane
 (C) Chrysanthemum, China Rose (D) Croton, Rose
 - (78) Why during cutting, xylem tissue, is kept in contact with soil, which type of force developed ?
 (A) Capillary force for ascent of sap (B) Capillary force for transpiration
 (C) Osmosis, Passive transport (D) Active transport, suction pressure
 - (79) In which plant group layering is done ?
 (A) Rose, Lemon, grapes (B) Hibiscus, Jasmine, Grape
 (C) Sugarcane, Chrysanthemum, Croton (D) Lemon, Tamarind sugar-cane
 - (80) Which option is proper for grafting ?
 (A) Between two different or same species of plants, artificial vegetative reproduction for obtaining desired characters.
 (B) Artificial vegetative reproduction between two similar species of plants to obtain undesired characters.
 (C) Artificial vegetative reproduction between two different species to remove disease causing factors.
 (D) Artificial vegetative reproduction between two similar species type plants to maintain hormonal balance.
 - (81) Which peculiarities considered in plants for grafting method ?
 (A) Stock possess developed root system, scion possess buds and leaflets and stock and scion has meristematic tissue

- (B) Stock possess meristematic tissue scion possess buds and leaflets. Both stock and scion has developed rootsystem
- (C) Stock possess developed root system, scion has only meristematic tissue and stock and scion both has Buds and leaflets.
- (D) Stock and scion undifferentiated, both possess meristematic tissue.
- (82) Grafting method is beneficial for whom ?
- (A) Fruit production (B) Garden
- (C) Horticulture (D) Decoration
- (83) Which sentence is improper for importance of vegetative reproduction ?
- (A) Decreasing work efficiency of sexual reproduction is avoided by vegetative reproduction.
- (B) To remove prolonged dormancy of seed vegetative reproduction is beneficial.
- (C) Disease causing factors do not enter reproduction is beneficial.
- (D) To retain unwanted characters of parent plant, vegetative reproduction is useful.

Answers : (74-C), (75-B), (76-A), (77-A), (78-A), (79-A), (80-A), (81-A), (82-A), (83-D)

- **Sexual Reproduction** : Sexual reproduction involves formation of the male and female gametes, either by the same individual or by different individuals of the opposite sex. These gamete fuse to form the zygote which develops to form the new organism. It is complex and slow process as compared to asexual reproduction. Because of the fusion of male and female gametes, sexual reproduction results in offspring that are not identical to the parents or amongst themselves.

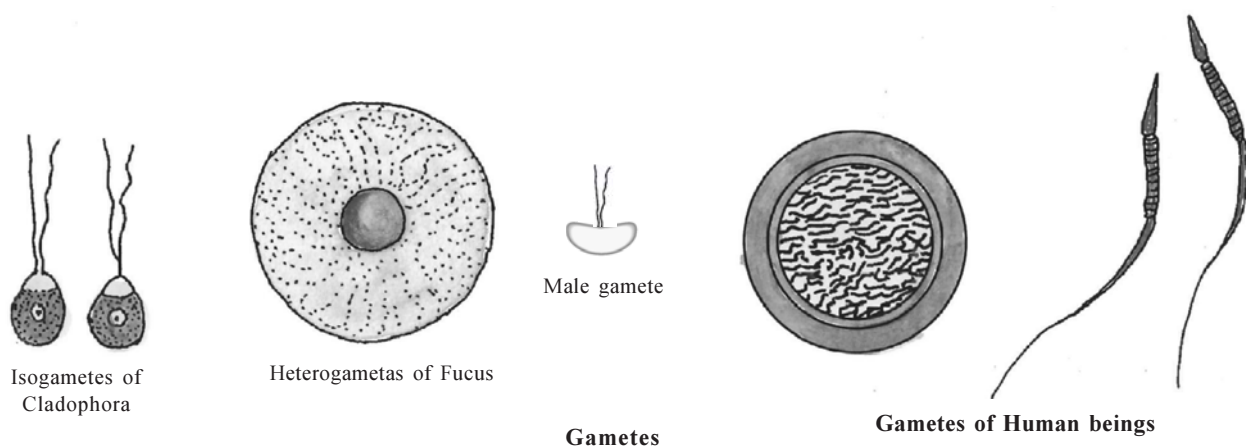
Though the plants, animals or fungi differ in external morphology, anatomy and physiology, yet their sexual mode of reproduction is similar in pattern. All organism reach a certain rate of growth and maturity in their life before they can reproduce sexually. This period is called the juvenile phase and in plants it is known as vegetative phase.

After attaining maturity, all asexually reproducing organisms show events and processes which have fundamental similarity, but the Structures associated with sexual reproduction are quite different. In all cases, the sexual reproduction is characterized by the fusion of the male and female gametes of the species. For convenience there sequential events may be grouped into three distinct stages namely, the (1) Pre-fertilization (2) Fertilization and the (3) post - fertilization events.

- Pre-fertilization Events : The pre-fertilization events of sexual reproduction are found prior to the fusion of gametes. The two main pre-fertilization events are (1) gametogenesis and (2) gamete transfer.

- (1) **Gametogenesis** : Gametogenesis is the process of formation of gametes. Generally gameter are of two types. i.e. male and female gametes. Gametes are haploid (n) cells. In some algae where two gametes are similar in appearance they are called isogametes or homogametes. It is morphologically and physiologically similar and usually motile and has flagellat e.g. clodophora, Ulothrix. However in a majority of sexually reproducing organisms the gametes produced are of two types. Morphologically and physiologically distinct types which are known as heterogametes or anisogametes. The male gametes are smaller and active whereas the female gametes are large and sluggish. In such cases the male gamete is called anthrozooid or sperm and the female gamete is called the egg or ovum.

(1) Isogametes of cladophora (2) Heterogametes of fucus (3) Gametes of Human beings.



Gametes are always haploids, but the parent body from which they arise may be either haploid or diploid. A haploid parent produces gametes by mitotic division. Several organisms belonging to **monera, fungi, Algae** and **Bryophyta** have haploid plant body but in majority of organisms belonging to **pteridophyta, Gymnosperms, Angiosperms** and **most of the animals**, the parental body is diploid. Here meiosis takes place to produce haploid gametes.

In diploid organisms the meiocytes (gamete mother cells) undergo meiosis. At the end of meiosis, only one set of chromosomes (n) gets incorporated in each gamete. Table showing diploid and haploid chromosome numbers of organisms.

Sr. No.	Name of Organisms	Chromosome in Meiocyte ($2n$)	Chromosome Number in Gamete (n)
1.	Apple	34	17
2.	Maize	20	10
3.	Onion	32	16
4.	Potato	48	24
5.	Rice	24	12
6.	Cat	38	19
7.	Dog	78	39
8.	Human beings	46	23
9.	House fly	12	06

(1) **Gamete Transfer** : After formation, the male and female gametes are brought together to facilitate fertilization. In a majority of organisms, male gamete is motile and the female gamete is stationary. There is a need for a medium through which the male gametes move. In Algae, Bryophytes and pteridophytes, water is the medium through which this gamete transfer takes place. A large number of the male gametes, however, fail to reach the female gametes. To compensate this loss of male gametes during transport, the number of male gametes produced is several thousand times the number of female gametes produced.

In Angiosperms pollen grains are the carrier of male gametes and ovule has the egg cell. Pollen grains are produced in anthers and are transferred to stigma, a phenomenon which is known as pollination. This

phenomenon requires the involvement of external agents such as insects, animals, wind and water. Pollen grains germinate on the stigma and the pollen tubes carrying the male gametes reach the ovule and discharge two male gametes near the egg cell.

- Fertilization : The fusion of two similar or dissimilar gametes is called syngamy and in its result diploid zygote is formed. This process is known as fertilization.

In majority of **algae, fishes and amphibians**, syngamy occurs in the external medium i.e. water (outside the body of the organism). This type of gametic fusion is called external fertilization. This happens in the bonyfishes and frogs where a large number of offspring are produced. A major disadvantage is that the offspring are extremely vulnerable to predators threatening their survival upto adulthood.

In plant groups (i.e. Fungi, Bryophytes, Pteridophytes) as well as Reptiles, Birds and Mammals, syngamy occurs inside the body of the organism, hence the process is called internal fertilization. In this process, male gametes are motile and have to reach and fuse with egg. This takes place inside the female body.

- **Post-fertilization Events** : The formation of zygote and the process of development of embryo (embryogenesis) are called post-fertilization events.

- (1) **Zygote** : Formation of zygote ($2n$) is common in all sexually reproducing organisms. In organism with external fertilization, zygote is formed in the external medium (water), whereas in those exhibiting internal fertilization, zygote is formed inside the body of organism. Further development of zygote depends on the type of life cycle the organism possesses and the environment to which it is exposed. In organisms, such as algae and Fungi, zygote develops a thick wall that is resistant to desiccation and damage commonly it undergoes a period of rest prior to germination.

Some unicellular protist animals (e.g. Paramecium) exhibit sexual reproduction by forming male and female gamete nuclei. Which they exchange through temporary cytoplasmic bridge, later the cytoplasmic bridge disappears and the gametes nuclei of one individual fuse with that of the other to form zygote nucleus. This mode of sexual reproduction is known as conjugation.

Zygote is the vital link that ensures continuity of species between organisms of one generation and the next.

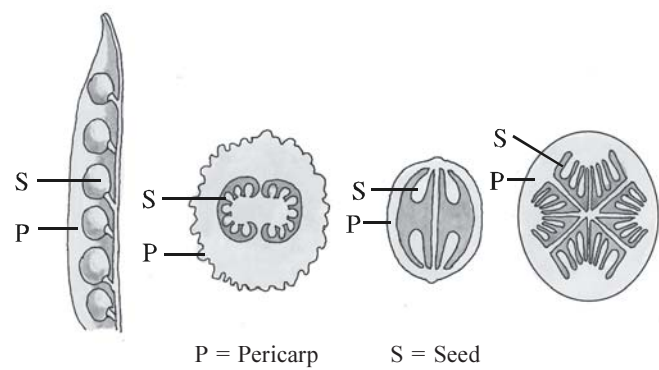
- (2) **Embryogenesis** : Embryogenesis is the process of development of embryo from the zygote. During embryogenesis, Zygote undergoes cell division (mitosis) and cell differentiation.

Cell division increases the number of cells in the developing embryos while cell differentiation helps group of cells to undergo certain modifications to form specialized tissues and organs to form an organism.

In animals, when the development of zygote takes place outside the body of the female parent, it is called oviparous, while when it develops inside then it is called viviparous.

In oviparous animals like Reptile and Birds, the fertilized eggs are covered by hard calcareous shell are laid in a safe place in the environment, after a period of incubation, young ones hatch out. On the other hand, in viviparous animals like Mammals including human beings the zygote develops into a young one inside the body of the female organism. After attaining a certain stage of growth, the young ones are delivered out of the body of the female parent. Because of proper embryonic care and protection, the chances of survival of young ones is greater in viviparous organisms.

In Angiosperms, the zygote is formed inside the ovule. After fertilization the sepals, petals and stamens of the flower fall off. The pistil however, remains attached to the plant. The zygote develops into the embryo and the ovules develop into the seed. The ovary develops into the fruit which develops a thick wall called pericarp that is protective in function. After dispersal seeds germinate under favourable conditions to produce new plants.



- (84) In between which organisms sexual reproduction occur ?
- Organisms of same species
 - Organisms of two different species.
 - Same species / different species organism
 - Two independent organisms.
- (85) How is zygote formed in sexual reproduction ?
- After formation of male and female gametes and their union.
 - Due to formation of male and female gametes
 - Distraction of male and female gametes
 - Union of male, female and somatic cells.
- (86) How is sexual reproduction compares to asexual reproduction ?
- | | |
|------------------------|-----------------------|
| (A) Simple and speedy | (B) Simple and slow |
| (C) Complex and speedy | (D) complete and slow |
- (87) Which type of offspring obtained at the end of sexual reproduction ?
- Similar to parent generation
 - Possess characteristics like parent generation.
 - Totally different than parent generation
 - None of above.
- (88) Plants, animals and fungi have difference in morphology, physiology but have similarity in
- | | |
|--------------------------|----------------|
| (A) Asexual reproduction | (B) Embryology |
| (C) Sexual reproduction | (D) Structure |
- (89) What is called juvenile phase ?
- After birth of organism upto growth, development and death time birth of organism
 - Time period, after birth of organism showing growth development and maturity
 - Time period, after birth of organism growth, development and obtaining aging.
 - Time period after birth of organism growth, development and production of offspring
- (90) Organism, who has obtain maturity, shows similarities and differences in
- Mature organisms show structurally similarity in sexual reproduction and difference in the structure produced during sexual reproduction.
 - Mature organisms, physiologically similar in asexual reproduction and similar in structures produced during sexual reproduction.
 - After attaining maturity, organisms do not show similar events and processes during sexual reproduction.

- (D) Organisms who has not obtained maturity, structurally show similarity in sexual reproduction and disimilarity in structure formed during sexual reproduction.
- (91) How is the structure of gametes ?
 (A) Haploid, unicellular, uninucleated (B) Haploid, unicellular, coenocytic
 (C) Diploid, unicellular, uninucleated. (D) Haploid, multicellular, uninucleated.
- (92) What are isogametes ?
 (A) Gametes which show difference in morphology, physiology, Flagellated and motile
 (B) Gametes which show similarity in physiology and morphology, flagellated and motile.
 (C) Gametes which show difference in physiology, morphology, unflagellated and nonmotile.
 (D) Gametes whaich show similarity in morphology and physiology, unflagellated and non-motile.
- (93) Which of the following algae is isogametic ?
 (A) Chlamydomonas, chlorella (B) Volvox chalamydomonas
 (C) Cladophora, ulothrix (D) Spirogyra, Anabaena
- (94) In 'aplanospore (Heterogametes), which type of difference is observed ?
 (A) Morphology and physiology (B) Working pattern and physiology
 (C) Embryology and anatomy (D) All of above
- (95) What is characteristics of male gametes ?
 (A) Large active, unicellular uninucleated.
 (B) Small active, unicellular, haploid, uninucleated.
 (C) Small, active, haploid, unicellular, uninucleatd.
 (D) Small, active, diploid, unicellular, coenocytic
- (96) What is peculiarity of female gamete ?
 (A) Haploid, unicellular, uninucleated, small, nonmotile.
 (B) Haploid, uninucleated, unicellular, large non-motile.
 (C) Diploid, uninucleated, unicellular, large, non motile
 (D) Haploid, unicellular, uninucleated, large, motile.
- (97) In pteridophyta, Gymnosperm and angiosperm, generally parent plant body is - type
 (A) n (B) 2n (C) 3n (D) 4n
- (98) Select true option based on number of chromosomes in gametes of cat, Dog, Man and housefly and in meiotic cell of Apple, maize, onion, potato and rice.
 (A) 17, 10, 24, 16, 12, 19, 39, 23, 06 (B) 34, 20, 32, 48, 24, 19, 39, 23, 06
 (C) 34, 20, 32, 48, 24, 38, 78, 46, 12 (D) 17, 10, 16, 24, 12, 38, 76, 46, 12
- (99) Why male gametes are more in number and female gametes less in number ?
 (A) To show fertilization process speedy
 (B) To show speedy transport of male gametes.
 (C) Gametes are destroyed fertilization to prove it.
 (D) Male gametes are wasted in transport of male gamete to support it.
- (100) By whom sequentially male gametes and female gametes are formed ?
 (A) Anther megasporophyll (B) Anther and carpel.
 (C) Pollen and ovule (D) Pollen sac and megasporophyll.

- (101) At the time of pollination, pollen grain is released and transferred to which place ?
 (A) It is released from Anther and transferred to carpel
 (B) Released from pollen and transferred to carpel.
 (C) Released from pollen sac and transferred to ovule
 (D) Released from pollen sac and transferred to stigma
- (102) Which option show proper sequence of living and non-living carriers for pollen grain ?
 (A) Wind, water, insects, animals
 (B) Insects, wind, Animals, water
 (C) Animals, wind, Insects, water
 (D) Animals, water, wind, insects.
- (103) By which gamete conjugation occur ?
 (A) Due to conjugation of two similar gamete
 (B) Conjugation of two dissimilar gametes
 (C) Two similar and dissimilar conjugation of gametes
 (D) None.
- (104) Which animal group show External fertilization ?
 (A) Algae, Fungi, arthropoda
 (B) Algae, Fish, Birds
 (C) Algae, Fish, Amphibia
 (D) Fungi, Fish, amphibians
- (105) Which animal group show External fertilization ?
 (A) Algae, Fungi, lichen
 (B) Algae, Fungi, Bryophyte
 (C) Algae, Bryophyta, pteridophyta
 (D) Pteridophyta, Gymnosperm, Angiosperm
- (106) Which animal group show internal fertilization ?
 (A) Fish, Amphibia, Reptilia,
 (B) Amphibia, Reptilian Birds
 (C) Reptilia, Birds, mammals
 (D) Mollusca, Echinodermata, Fish
- (107) In seed bearing plants which type of male gametes are seen ? How are they transported ?
 (A) non motile, pollen tube
 (B) Motile, Pollentube
 (C) Flagellated, pollen tube
 (D) Ciliated, pollentube
- (108) Which are proper sequential stages of sexual reproduction ?
 (A) Pre Fertilization, Fertilization, post Fertilization.
 (B) Fertilization, pre fertilization, post Fertilization
 (C) Post fertilization, fertilization, pre fertilization
 (D) Pre fertilization, post. fertilization, post fertilization
- (109) Which are stages of post fertilization ?
 (A) Gametogenesis, Embryogenesis
 (B) Transport of gametes, zygote formation
 (C) Zygote formation, Embryogenesis
 (D) Embryogenesis, Transport of gametes
- (110) Which sentence is improper for sexual reproduction by conjugation ?
 (A) Micronuclei is responsible for sexual reproduction in paramecium.
 (B) During conjugation, temporarily conjugation tube is formed, male and female gamete transfer take place through cytoplasmic bridge.
 (C) Eukaryota - porifera
 (D) Prokaryota - virus
- (111) Which sentence is improper for sexual reproduction in paramecium.
 (A) Micronuclei is responsible for sexual reproduction in paramecium.
 (B) During conjugation, temporarily conjugation tube is formed, male and female gamete transfer take place through cytoplasmic bridge.
 (C) After exchange of nucleus, cytoplasmic bridge disappear and conjugation tube disintegrates.
 (D) In paramecium, always transfer of two similar type nucleus through cytoplasmic bridge and conjugation tube occurs.

- (112) During embryogenesis, zygote passes through which processes and converted into multicellular form from unicellular form ?
 (A) Cell formation, cell enlargement (B) Mitosis, cell enlargement
 (C) Meiosis, cell differentiation (D) Mitosis, cell differentiation
- (113) What is called when zygotic development occurs inside female body and outside female body sequentially ?
 (A) Gamopary, oviparous (B) Oviparous, viviparous
 (C) Viviparous, oviparous (D) None.
- (114) Due to development of zygote, embryosac and wall of embryosac which structures formed sequentially ?
 (A) Seed, Fruit, seed coat (B) Seed, fruit, Fruit coat (Epicarp)
 (C) Fruit, seed, seed coat (D) Fruit seed, epicarp
- (115) Teacher wants to explain various stages of sexual reproduction in higher organism so which are points included in which sequence ?
 (A) Gametogenesis, Transfer of gametes, fertilization zygote formation, Embryogenesis
 (B) Gametogenesis, Transfer of gametes zygote formation, Embryogenesis, Fertilization
 (C) Gametogenesis, Embryogenesis, Transfer of gametes, zygote formation, fertilization
 (D) Transfer of gamete, zygote formation, gametogenesis, fertilization.

Answers : (84-C), (85-A), (86-D), (87-D), (88-C), (89-B), (90-A), (91-A), (92-B), (93-C), (94-D), (95-C), (96- B), (97-B), (98-B), (99-D), (100-C), (101-D), (102-A), (103-D), (104-C), (105-C), (106-C), (107-A), (108-A), (109-C), (110-B), (111-D), (112-D), (113-B), (114-B), (115-A)

- **A - Statement R - Reason A - R type questions Answer of following question, select from following option.**
 - (A) A and R both true, R is explanation of A
 - (B) A and R both true, R is not explanation of A
 - (C) A is true R is false
 - (D) A is false R is true.
- (116) Statement A : Gamete formation occur from independent, diploid or haploid parent, Gametes are always haploid.
 Reason R : Gamete formation occur from diploid by mitosis and meiosis process, where as in haploid parent show only meiosis
 (A) (B) (C) (D)
- (117) Statement A : Grafting method is important in plants where roots are not formed easily
 Reason R : In Jasmine and Hibiscus grafting method is important.
 (A) (B) (C) (D)
- (118) Statement A : Gametogenesis and transfer of gametes are main Prefertilization events.
 Reason R : Isogametes and heterogametes formed during gametogenesis
 (A) (B) (C) (D)
- (119) Statement A : Reptiles and Aves are oviparous
 Reason R : Zygote develops in the body of reptiles
 (A) (B) (C) (D)

- (120) Statement A : Vegetative reproduction is best for maintainance of desirable characters of parents into offspring.
Reason R : Vegetative reproduction removes infection of parent plant into offsprings.
(A) (B) (C) (D)
- (121) Statement A : True spores are formed by sporulation
Reason R : Nephrolepis plants have isogamete
(A) (B) (C) (D)
- (122) Statement A : Offsprings produced by sexual reproduction is copy of parent.
Reason R : Offsprings formed by asexual reproduction differs from parent.
(A) (B) (C) (D)
- (123) Statement A : Motile gametes fromed from ulothrix, develops as independent organism
Reason R : Bud formation by protosiphon is due to mitosis
(A) (B) (C) (D)
- (124) Statement A : In sexual reproduction of paramoecium exchange of gametes take place by cyto plasmic bridge.
Reason R : Majority of organism in sexual reproduction produces heterogametes.
(A) (B) (C) (D)
- (125) Statement A : Gametes of cladophora are similar, motile by morphology and physiology
Reason R : Majority of organism in sexual reproduction produces heterogametes.
(A) (B) (C) (D)
- (126) Statement A : In vorticella body of individual, cytoplasm divides longitudinally.
Reason R : New organism formed by longitudinal division in Euglena.
(A) (B) (C) (D)
- (127) Statement A : When condition become favourable in encysted hydra nucleus show multiple fission
Reason R : In spongilla cytoplasm divides transversely
(A) (B) (C) (D)
- (128) Statement A : Gamete formation take place by individual haploid or diploid parent, Gamete are always haploid.
Reason R : Gametes formation occurs in diploid parent by mitosis and meiosis, whereas in haploid parent only by meiosis
(A) (B) (C) (D)
- (129) Statement A : Gametes are always haploid.
Reason R : Gametes are always unicellular
(A) (B) (C) (D)

Answers : (116-C), (117-C), (118-A), (119-C), (120-A), (121-B), (122-D), (123-C), (124-C), (125-B), (126-A), (127-D), (128-C), (129-B)

(130) Column I	ColumnII	Column III	
(1) Maize	(p) 48	(a) 10	(A) : (1 - s - a), (2 - q - c), (3 - p - d), (4 - r - b)
(2) onion	(q) 32	(b) 12	(B) : (1 - p - a), (2 - q - b), (3 - r - c), (4 - s - d)
(3) Potate	(r) 24	(c) 16	(C) : (1 - r - a), (2 - q - b), (3 - s - c), (4 - p - d)
(4) Peddy	(s) 20	(d) 24	(D) : (1 - r - d), (2 - S - c), (3 - p - b), (4 - q - a)

- (131) **Column I** **Column II**
- | | | |
|-------------------|----------------------------|--|
| (1) Protosiphon | (p) non-flagellated spores | (A) : (1 - q), (2 - r), (3 - s), (4 - p) |
| (2) Sapro legnia | (q) Bud | (B) : (1 - r), (2 - s), (3 - p), (4 - q) |
| (3) Chlamydomonas | (r) Fragmentation | (C) : (1 - q), (2 - r), (3 - p), (4 - s) |
| (4) Aspergillus | (s) Motile spores. | (D) : (1 - s), (2 - p), (3 - q), (4 - r) |
- (132) **Column I (Stage)** **Column II (Phenomenon)**
- | | | |
|-------------------------|--|--|
| (1) Juvenile | (p) Formation of unicellular fertile cells | (A) : (1 - q), (2 - p), (3 - r), (4 - s) |
| (2) Gametogenesis | (q) period to reach reproductive stage | (B) : (1 - q), (2 - p), (3 - s), (4 - r) |
| (3) Transfer of gametes | (r) By fusion of haploid cells period of obtaining diploid stage | (C) : (1 - r), (2 - s), (3 - p), (4 - q) |
| (4) Fertilization | (s) Motile Foreign cells reach non-motile stage | (D) : (1 - s), (2 - r), (3 - q), (4 - p) |
- (133) **Column I (Stage)** **Column - II Phenomenon**
- | | | |
|--------------------------|------------------------------|--|
| (a) True spores | (w) Through spores | (A) : (a - y), (b - z), (c - x), (d - w) |
| (b) Nephrolepis | (x) Heterosporic plants | (B) : (a - x), (b - w), (c - z), (d - y) |
| (c) Selaginella | (y) Produced by sporogenesis | (C) : (a - x), (b - z), (c - y), (d - w) |
| (d) Asexual reproduction | (z) Isosporic plant | (D) : (a - w), (b - z), (c - x), (d - y) |
- (134) **Column - I** **Column - II**
- | | | |
|-----------------|---------------------------------------|--|
| (a) Mint | (w) Vegetative reproduction by sucker | (A) : (a - x), (b - w), (c - y), (d - z) |
| (b) Pistia | (x) Vegetative reproduction by runner | (B) : (a - y), (b - w), (c - z), (d - x) |
| (c) Hydrocotyl | (y) Vegetative reproduction by stolon | (C) : (a - w), (b - z), (c - x), (d - y) |
| (d) Nephrolepis | (z) Vegetative reproduction by offset | (D) : (a - x), (b - y), (c - w), (d - z) |
- (135) **Column - I** **Column - II**
- | | | |
|--------------------------|--|--|
| (a) Reptiles and mammals | (w) Post fertilization | (A) : (a - z), (b - x), (c - y), (d - w) |
| (b) Embryogenesis | (x) Development of body out side | (B) : (a - y), (b - w), (c - x), (d - z) |
| (c) Paramoecium | (y) Internal fertilization | (C) : (a - y), (b - w), (c - z), (d - x) |
| (d) Oviparous | (z) Sexual reproduction by conjugation | (D) : (a - w), (b - x), (c - z), (d - y) |
- (136) **Column - I** **Column - II**
- | | | |
|-------------------|----------------------|---|
| (1) Jasmine | (p) Suckers | (A) : (1 - u), (2 - t), (3 - s), (4 - q) (5 - p), (6 - r) |
| (2) Chrysanthemum | (q) Stolon | (B) : (1 - t), (2 - u), (3 - s), (4 - q) (5 - p), (6 - r) |
| (3) Bryophyllum | (r) Floral bud | (C) : (1 - t), (2 - u), (3 - s), (4 - p) (5 - q), (6 - r) |
| (4) Nephrolepis | (s) Adventitious bud | (D) : (1 - t), (2 - u), (3 - s), (4 - r) (5 - q), (6 - p) |
| (5) Mint | (t) Cutting | |
| (6) Oxalis | (u) Layering | |

(137) **Column - I**

Column - II

- | | | |
|-----------------|---|---|
| (P) Asparagus | (i) Vegetative propagation by floral bud | (A) : (P - i), (Q - ii), (R - iii), (S - iv) |
| (Q) Turmeric | (ii) Vegetative reproduction by leaf | (B) : (P - ii), (Q - iii), (R - iv), (S - i) |
| (R) Bryophyllum | (iii) Vegetative reproduction by rhizome. | (C) : ((P - iv), (Q - iii), (R - ii), (S - i) |
| (S) Agave | (iv) Vegetative reproduction by root | (D) : (P - iii), (Q - iv), (R - ii), (S - i) |

(138) **Column - I**

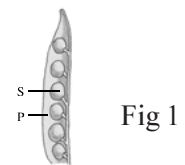
Column - II

- | | | |
|-------------------------|---------------------------------------|--|
| (a) Algae and Bryophyta | (w) Plant body is diploids | (A) : (a - z), (b - y), (c - x), (d - w) |
| (b) Pollengrain | (x) Transports ovule | (B) : (a - x), (b - z), (c - w), (d - y) |
| (c) Ovule | (y) Transports gametes | (C) : (a - y), (b - z), (c - x), (d - w) |
| (d) Pteridophytes | (z) Plant body is haploid angiosperms | (D) : (a - z), (b - w), (c - y), (d - x) |

Answers : (130-A), (131-A), (132-B), (133-A), (134-C), (135-C), (136-A), (137-C), (138-A)

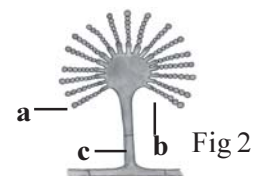
(139) What is indicated by S and P in the Fig 1

- | | |
|------------------------|-----------------------|
| (A) Pericarp and fruit | (B) Epicarp and seed |
| (C) Fruit and seed | (D) Seed and pericarp |



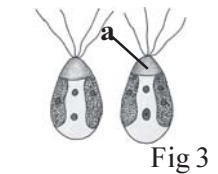
(140) What is indicated by 'a' in the given Fig 2

- | | |
|---------------|-----------------|
| (A) Nucleus | (B) Conidia |
| (C) Zoospores | (D) Chlorophyll |



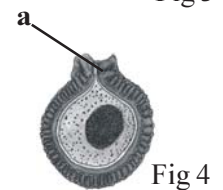
(141) What is indicated by 'a' in the Fig 3 ?

- | | |
|-----------------|--------------|
| (A) Chlorophyll | (B) Pyrenoid |
| (C) Tentacles | (D) Nucleus |



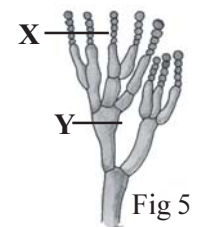
(142) What is indicated by 'a' part surrounded by spicules in Fig 4

- | | |
|--------------------|---------------|
| (A) Exogenous Bud | (B) Nucleus |
| (C) Endogenous Bud | (D) Cell body |



(143) In the given Fig 5 which is correct option for X and Y.

- | | |
|----------------------------------|--------------------------------|
| (A) X - Conidiophore Y - Conidia | (B) X - Sterigmata Y - Conidia |
| (C) X - Conidia, Y - Sterigmata | (D) X - mycellium, Y - Hyphae |



(144) Which is proper option for given Fig 6 ?

- | | |
|---------------------|--------------------|
| (A) Tongue grafting | (B) Cleft grafting |
| (C) Bud grafting | (D) Whip grafting |



(145) What is function of a in the given Fig 7 ?

- (A) Buds forms new organisms
- (B) Shows fission in Bacteria
- (C) Spore Formation
- (D) adventitious branch is formed.

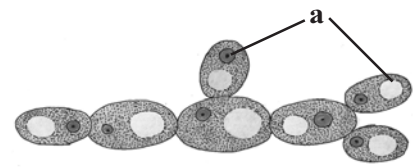


Fig 7

(146) Explain imp of b in the Fig 8.

- A Photo synthesis B Vegetative reproduction
- C Food storage D Climbing



Fig 8

(147) What is indicated in the given Fig 9 ?

- A Vegetative reproduction by root
- B Vegetative reproduction by stem
- C Vegetative reproduction by leaf
- D Vegetative reproduction by flower



Fig 9

Answers : (139-D), (140-D), (141-B), (142-C), (143-C), (144-B), (145-A), (146-B), (147-C)

● **Questions For NEET**

(148) Chara is monoecious plant.

- (A) Anther and carpel on the same plant
- (B) On the same plant male sporophyll on upper part and female sporophyll on lower part
- (C) On the same plant female sporophyll on upper part and male sporophyll on lower part
- (D) Both male and female sporophyll on the same plant.

(149) **Select false sentence from the following**

- (A) Heterogametes are different structurally functionally or behaviourly.
- (B) In Heterogametes female gamete is small and motile, female gamete is large and non-motile
- (C) Chlamydomonas shows isogametism and heterogametism. Fucus hetero gametism.
- (D) Iso gametes similar, structurally, functionally and behaviour point.

(150) Presence of which is required in grafting between stock and scion ?

- (A) Xylem (B) Phloem (C) Meristematic tissue (D) tissue.

(151) In monocot plant grafting is impossible because

- (A) Scattered vascular bundle (B) Lack of meristematic tissue
- (C) Colateral, open vascular bundle (D) Radial vascular bundle

(152) Before it is separated from maternal plant, root formation induced on the plant

- (A) Grafting (B) layering (C) Stolon (D) Rhizome

(153) If branch of one plant is taken as scion, which is sweet and stock on which it is grafted is juicy. So such plants by grafting gives which types of fruits ?

- (A) Sweet and fibrous (B) Sweet and juicy
- (C) Sour and juicy (D) Sour and fibrous

- (154) It stock has 58 chromosome and scion possess 30 chromosome, plant produced as a result has how many chromosome in root and egg cell ?
 (A) 30 and 29 (B) 15 and 58 (C) 58 and 15 (D) 29 and 30
- (155) Isogametic, non-flagellated gametes are seen ?
 (A) Spirogyra (B) Volvox (C) Fucus (D) Chlamydomonas
- (156) What is called method by which plants prepared in large number ?
 (A) Cutting (B) Organ formation (C) Micro propagation (D) Macro propagation.
- (157) What is called study of anther ?
 (A) Ethamology (B) Paleontology (C) Paleo-Botany (D) Omega - tatomy
- (158) In sporophytic stage of plants, where maturation is seen ?
 (A) Gemma (B) Primary structure (C) Sporophyll (D) Egg cell
- (159) During regeneration formation of one organ from another is called
- (A) Morphogenesis (B) Epimorphosis
 (C) Morpholaxis (D) Specialized cell growth
- (160) In mint, vegetative reproduction is by
- (A) Runner (B) Rhizome (C) Suckers (D) Stolon
- (161) What is similarity in vegetative ropreduction and apomixis ?
 (A) Both can be included in dicot plants.
 (B) Both passes through flowering stage
 (C) Both occur any time in the year
 (D) Both produces offspring similar to parent plant
- (162) If $2n$ female plant and $4n$ male plants are fertilized, what is poidy of endosperm ?
 (A) $4n$ (B) $3n$ (C) $2n$ (D) $5n$
- (163) For 100 zygote / 100 seed formation of wheat, necessary meiosis number is
- (A) 100 (B) 75 (C) 125 (D) 50

Answers : (148-C), (149-B), (150-C), (151-B), (152-B), (153-B), (154-C), (155-A), (156-C), (157-B), (158-C), (159-B), (160-C), (161-D), (162-A), (163-C)

