

Chapter 1 (THE LIVING WORLD)

Multiple Choice Questions

Single Correct Answer Type

Q1. As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics

- (a) Will decrease (b) Will increase**
(c) Remain same (d) May increase or decrease

Ans: (a) As we go higher from species to kingdom, the number of common characteristics goes on decreasing. Lower the taxa, more are the characteristics that the members within the taxon share. Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level.

Q2. Which of the following 'suffixes' used for units of classification in plants indicates a taxonomic category of family?

- (a) –Ales (b) –Onae (c) –Aceae (d) –Ae**

Ans: (c)

- (a) –Ales → Order (plant) .
(b) –Onae → Class (plant)
(c) –Aceae → Family (plant)
(d) –Ae → Phylum (plant)

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Q3. The term 'systematics' refers to

- (a) Identification and classification of plants and animals** •
(b) Nomenclature and identification of plants and animals
(c) Diversity of kinds of organisms and their relationship
(d) Study of habitats of organisms and their classification

Ans: (c) Human beings were, since long, not only interested in knowing more about different kinds of organisms and their diversities, but also the relationships among them. This branch of study was referred to as systematics. Systematics takes into account evolutionary relationships between organisms.

Q4. Genus represents .

- (a) An individual plant or animal**
(b) A collection of plants or animals
(c) Group of closely related species of plants or animals
(d) None of these

Ans: (c) Genus comprises a group of related species which has more characters in common in comparison to species of other genera.

Q5. The taxonomic unit 'Phylum' in the classification of animals is equivalent to which hierarchical level in classification of plants?

(a) Class (b) Order (c) Division (d) Family

Ans: (c) Classes comprising animals like fishes, amphibians, reptiles, birds along with mammals constitute the next higher category called Phylum. All these classes are included in the phylum chordata. In case of plants, classes with a few similar characters are assigned to a higher category called Division.

Q6. Botanical gardens and zoological parks have

**(a) Collection of endemic living species only
(b) Collection of exotic living species only
(c) Collection of endemic and exotic living species
(d) Collection of only local plants and animals**

Ans: (c) Botanical gardens and zoological parks have collection of endemic and exotic living species.

Q7. Taxonomic key is one of the taxonomic tools in the identification and classification of plants and animals. It is used in the preparation of

**(a) Monographs (b) Flora
(c) Both (a) and (b) (d) None of these**

Ans: (c) .

• Flora contains the actual account of habitat and distribution of plants

of a given area. These provide the index to the plant species found in a particular area. . .

• Manuals are useful in providing information for identification of names of species found in an area. Monographs contain information on any one taxon, i.e. any one genus or family at a particular time. They also help in correct identification.

Q8. All living organisms are linked to one another because

**(a) They have common genetic material of the same type
(b) They share common genetic material but to varying degrees
(c) All have common cellular organization**

Ans: (b) All living organisms—present, past and future are linked to one another by the sharing of the common genetic material, but to varying degrees.

Q9. Which of the following is a defining characteristic of living organisms?

- (a) Growth (b) Ability to make sound
(d) Reproduction (d) Response to external stimuli

Ans. (d) Response to external stimuli is a defining characteristic of living organisms.

Q10. Match the following and choose the correct option.

A.	Family	(i)	tuberosum
B.	Kingdom	(ii)	Polymoniales
C.	Order	(iii)	Solanaceae
D.	Species	(iv)	Plantae
E.	Genus	(v)	Solanaceae

Options:

- (a) D-(i), C-(ii), E-(iii), B-(iv), A-(v)
(b) E-(i), D-(ii), B-(iii), A-(iv), C-(v)
(c) D-C), E-(ii), B-(iii), A-(iv), C-(v)
(d) E-(i), C-(ii), B-(iii), A-(iv), D-(v)

Ans: (a)

D.	Species	(i)	tuberosum
C.	Order	(ii)	Polymoniales
E.	Genus	(iii)	Solanaceae
B.	Kingdom	(iv)	Plantae
A.	Family	(v)	Solanaceae

Very Short Answer Type Questions

Q1. Linnaeus is considered as Father of Taxonomy. Name two other botanists known for their contribution to the field of plant taxonomy.

Ans: Natural system of classification for flowering plants was given by George Bentham and Joseph Dalton Hooker, in three volume of Genera Plantarum.

Multiple Choice Questions

Single Correct Answer Type

Q1. All eukaryotic unicellular organisms belong to

(a) Monera (b) Protista (c) Fungi (d) Bacteria

Ans: (b) Monera—Kingdom of prokaryotes

• All eukaryotic unicellular organisms belong to protista.

Q2. The five kingdom classification was proposed by

(a) R.H. Whittaker . (b) C. Linnaeus

(c) A. Roxberg (d) Virchow

Ans: (a) This phylogenetic classification was proposed by R.H. Whittaker (1969). He create new kingdom 'Fungi'. The five kingdom classification are as follows: 1. Plantae, 2. Animalia, 3. Protista, 4. Monera and 5. Fungi.

Whittaker has used 5 criteria for the 5 kingdom classification and are as follows:

1. Reproduction,
2. Cell structure,
3. Phylogenetic relationships,
4. Mode of nutrition,
5. Thallus organisation

Q3. Organisms living in salty areas are called as

(a) Methanogens (b) Halophiles

(c) Heliophytes (d) Thermoacidophiles

Ans: (b)

• Halophiles: Bacteria living in extremely salty areas.

• Thermoacidophiles: Bacteria living in hot springs/deep sea water.

E.g.: Thermococcus

• Methanogens: Bacteria living in marshy areas and produce methane gas.

• Heliophytes: Sun loving plants

Q4. Naked cytoplasm, multinucleated and saprophytic are the characteristics of

(a) Monerans (b) Protists (c) Fungi (d) Slime moulds

Ans: (d) Slime moulds are saprophytic protists, without cell walls. The spores of slime moulds possess true walls. Thalloid multinucleate body of a slime mould is called plasmodium. Spores are dispersed by air currents.

E.g.: Acellular slime mould—Physarum, Cellular slime mould—Dictyostelium.

Q5. An association between roots of higher plants and fungi is called .

(a) Lichen (b) Fern (c) Mycorrhiza (d) BGA

Ans: (c) Lichens are symbiotic associations, i.e. mutually useful associations, between algae and fungi. This relationship is best known as helotism.

Q6. A dikaryon is formed when

(a) Meiosis is arrested

(b) The two haploid cells do not fuse immediately

(c) Cytoplasm does not fuse

(d) None of the above

Ans: (b) In some fungi the fusion of two haploid cells immediately results in diploid cells (2n). However, in other fungi (ascomycetes and basidiomycetes), an intervening dikaryotic stage ($n + n$, i.e. two nuclei per cell) occurs. Such a condition is called a dikaryon and the phase is called dikaryophase of fungus. A dikaryotic cell has two dissimilar haploid nuclei.

Q7. Contagium vivum fluidum was proposed by

(a) D. J. Ivanowsky (b) M. W. Beijerinck

(c) Stanley (d) Robert Hooke

Ans: (b) D.J. Ivanowsky (1892) discovered the virus and has recognised certain microbes as causal organism of the mosaic disease of tobacco. M.W. Beijerinck (1898) demonstrated that the extract of the infected plants of tobacco could cause infection in healthy plants and called the fluid as Contagium vivum fluidum (infectious living fluid). W. M. Stanley (1935) first time showed that viruses could be crystallised and crystals consist largely of proteins.

Q8. Association between mycobiont and phycobiont are found in

(a) Mycorrhiza (b) Root (c) Lichens (d) BGA

Ans. (c) Association between mycobiont and phycobiont are found in lichens.

Q9. Difference between virus and viroid is

(a) Absence of protein coat in viroid but present in virus

(b) Presence of low molecular weight RNA in virus but absent in viroid

(c) Both (a) and (b)

(d) None of the above

Ans: (a) Viroids are smaller than viruses and the cause of potato spindle tuber disease, chrysanthemum stunt disease. It was found to be a free RNA and lacked the protein coat that is found in viruses, hence the name viroid.

Q10. With respect to the fungal sexual cycle, choose the correct sequence of events.

(a) Karyogamy, plasmogamy and meiosis

(b) Meiosis, plasmogamy and karyogamy

(c) Plasmogamy, karyogamy and meiosis

(d) Meiosis, karyogamy and plasmogamy

Ans: (c) The sexual cycle involves the following three steps:

1. Fusion of protoplasts between two motile or non-motile gametes called

plasmogamy.

- Plasmogamy is fusion of two haploid cells without nuclear fusion.
- 2. Fusion of two nuclei is called karyogamy.
- 3. Meiosis in zygote resulting in haploid spores.

Q11. Viruses are non-cellular organisms but replicate themselves once they infect the host cell. To which of the following kingdom do viruses belong to?

(a) Monera (b) Protista (c) Fungi (d) None of these

Ans: (d) Viruses did not find a place in classification since they are not truly 'living' if we understand living as those organisms that have a cell structure. Viruses are neither prokaryotes nor eukaryotes. They are inert outside their specific host cell and cannot multiply of their own because they lack cellular machinery to use its genetic material. Viruses can only multiply in host or living cell.

Q12. Members of Phycomycetes are found in

(i) Aquatic habitats

(ii) On decaying wood

(iii) Moist and damp places

(iv) As obligate parasites on plants Choose from the following options.

(a) None of the above (b) (i) and (iv)

(c) (ii) and (iii) (d) All of the above

Ans: (d) Members of Phycomycetes are found in aquatic habitats, on decaying wood, moist and damp places and as obligate parasites on plants.

Very Short Answer Type Questions

Q1. What is the principle underlying the use of cyanobacteria in agricultural fields for crop improvement?

Ans: Cyanobacteria (BGA) are autotrophic microbes. Cyanobacteria are widely distributed in aquatic and terrestrial environments. Nostoc, Ariabaena and Oscillatoria are BGA that can fix atmospheric nitrogen. These organisms can fix atmospheric nitrogen in specialised cells called heterocysts, e.g., Nostoc and Anabaena. In paddy fields cyanobacteria serve as an important biofertiliser. BGA also add organic matter to the soil and increase its fertility.

Q2. Suppose you accidentally find an old preserved permanent slide without a label. In your effort to identify it, you place the slide under microscope and observe the following features:

a. Unicellular '

b. Well defined nucleus

c. Biflagellate—one flagellum lying longitudinally and the other transversely.

Chapter 3 (PLANT KINGDOM)

Multiple Choice Questions

Q1. Cyanobacteria are classified under

(a) Protista (b) Plantae (c) Monera (d) Algae

Ans: (c) Cyanobacteria are classified under Kingdom Monera.

• Protista— unicellular eukaryotes

• Plantae, all members of Kingdom Plantae are eukaryotic chloroplast 'chlorophyll containing organisms commonly called plants. These are autotrophic/holophytic.

Q2. Fusion of two motile gametes which are dissimilar in size is termed as

(a) Oogamy (b) Isogamy (c) Anisogamy (d) Zoogamy

Ans: (c) Fusion of two motile gametes which are dissimilar in size is termed as anisogamy.

Q3. Holdfast, stipe and frond constitute the plant body in case of

(a) Rhodophyceae (b) Chlorophyceae

(c) Phaeophyceae (d) All of the above

Ans: (c) The plant body of phaeophyceae is usually attached to the substratum by a holdfast, and has a stalk, the stipe and leaf like photosynthetic organ—the frond.

Q4. A plant shows thallus level of organization. It shows rhizoids and is haploid. It needs water to complete its life cycle because the male gametes are motile. It may belong to

(a) Pteridophytes (b) Gymnosperms

(c) Monocots (d) Bryophytes

Ans: (d) A plant shows thallus level of organization. It shows rhizoids and is haploid. It needs water to complete its life cycle because the male gametes are motile. It may belong to bryophytes.

Q5. A prothallus is ''

(a) A structure in pteridophytes formed before the thallus develops

(b) A sporophytic free living structure formed in pteridophytes

(c) A gametophyte free living structure formed in pteridophytes

(d) A primitive structure formed after fertilization in pteridophytes

Ans: (c) In pteridophytes, meiosis or R/D occurs at the time of spore formation. The spores germinate to give rise to inconspicuous, small but multicellular, free-living, mostly photosynthetic thalloid gametophytes called prothallus. Prothallus represents the gametophytic phase in pteridophytes.

Q6. Plants of this group are diploid and well adapted to extreme conditions. They grow bearing sporophylls in compact structures called cones. The group in reference is

- (a) Monocots (b) Dicots
(c) Pteridophytes (d) Gymnosperms**

Ans: (d) Plants of this group are diploid and well adapted to extreme conditions. They grow bearing sporophylls in compact structures called cones. The group in reference is gymnosperms.

Q7. The embryo sac of an Angiosperm is made up of

- (a) 8 cells (b) 7 cells and 8 nuclei
(c) 8 nuclei (d) 7 cells and 7 nuclei**

Ans: (b) The embryo sac of an Angiosperm is made up of 7 cells and 8 nuclei.

Q8. If the diploid number of a flowering plant is 36, what would be the chromosome number in its endosperm?

- (a) 36 (b) 18 (c) 54 (d) 72**

Ans: (c) Diploid number ($2n$) of a flowering plant is 36.
The chromosome number in its endosperm $3n = 54$.

Q9. Protonema is

- (a) Haploid and is found in mosses
(b) Diploid and is found in liverworts
(c) Diploid and is found in pteridophytes
(d) Haploid and is found in pteridophytes**

Ans: (a) The predominant stage of the life cycle of a moss is the gametophyte which consists of two stages. The first stage is the protonema stage (juvenile stage) and the second stage is the leafy stage. Moss protonema resembles to multicellular green algae in structure. Moss plant develops from protonema.

Q10. The giant Redwood tree (*Sequoia sempervirens*) is a/an .

- (a) Angiosperm (b) Free fern
(c) Pteridophyte (d) Gymnosperm**

Ans: (d) One of the gymnosperms, the giant redwood tree *Sequoia* is one of the tallest tree species.

Chapter 4 (ANIMAL KINGDOM)

Multiple Choice Questions

Q1. In some animal groups, the body is found divided into compartments with serial repetition of at least some organs. This characteristic feature is called

- (a) Segmentation (b) Metamerism
(c) Metagenesis (d) Metamorphosis**

Ans: (b) Metamerism: In some animals, the body is externally and internally divided into segments with a serial repetition of at least some organs. For example, in earthworm, the body shows this pattern called metameric segmentation and the phenomenon is known as metamerism or true segmentation. Metamerism is found in 3 animal phylums—Annelida, Arthropoda and Chordata.

Q2. Given below are the types of cells present in some animals. Which of the following cells can differentiate to perform different functions?

- (a) Choanocytes (b) Interstitial cells
(c) Gastrodermal cells (d) Nematocytes**

Ans: (b) Interstitial cells can differentiate to perform different functions. Choanocytes is the characteristics cells of porifera.

Gastrodermal cells and Nematocytes are found in Hydra.

Q3. Which one of the following sets of animals share a four chambered heart?

- (a) Amphibian, Reptiles, Birds (b) Crocodiles, Birds, Mammals
(c) Crocodiles, Lizards, Turtles (d) Lizards, Mammals, Birds**

Ans: (b) Crocodiles, Birds, Mammals are the set of animals that share a four chambered heart

- Amphibian—two chambered heart
- Reptiles and lizards—three chambered heart except crocodiles

Q4. Which of the following pairs of animals has non-glandular skin?

- (a) Snake and Frog (b) Chameleon and Turtle
(c) Frog and Pigeon (d) Crocodile and Tiger**

Ans: (b) Chameleon and Turtle has non-glandular skin.

Q5. Birds and mammals share one of the following characteristics as a common feature.

- (a) Pigmented skin (b) Pneumatic bones
(c) Viviparity (d) Warm blooded nature

Ans: (d) Birds and mammals both are warm blooded.

Q6. Which one of the following sets of animals belong to a single taxonomic group?

- (a) Cuttlefish, Jellyfish, Silverfish, Dogfish, Starfish
(b) Bat, Pigeon, Butterfly
(c) Monkey, Chimpanzee, Man
(d) Silkworm, Tapeworm, Earthworm

Ans: (c) Monkey, Chimpanzee and Man belong to a single taxonomic group mammalia (class).

Q7. Which one of the following statements is incorrect? ,

- (a) Mesoglea is present in between ectoderm and endoderm in Obelia
(b) Asterias exhibits radial symmetry
(c) Fasciola is a pseudocoelomate animal
(d) Taenia is a triploblastic animal

Ans: (c) Fasciola is an acoelomate animal.

Q8. Which one of the following statements is incorrect?

- (a) In cockroaches and prawns excretion of waste material occurs through Malpighian tubules.
(b) In ctenophore, locomotion is mediated by comb plates.
(c) In Fasciola flame cells take part in excretion.
(d) Earthworms are hermaphrodites and yet cross fertilization take place among them.

Ans: (a)

- In cockroaches excretion of waste material occurs through Malpighian tubules.
- In prawns excretion of waste material occurs through green glands or antennal glands.

Q9. Which one of the following is oviparous?

- (a) Platypus (b) Flying fox (Bat)
(c) Elephant (d) Whale

Ans: (a) Prototherians have evolved from reptiles. Mammary gland lacks nipples or teats. Corpus callosum is absent. Prototherians are oviparous/egg laying mammals. E.g.: Ornithorynchus (Duck-billed platypus) is monotreme mammal.

Q10. Which one of the following is not a poisonous snake?

Division of Labour		Animal	
A.	Organ level	(i)	Pheretima
B.	Cellular aggregate level	(ii)	Fasciola
C.	Tissue level	(iii)	Spongilla
D.	Organ system level	(iv)	Obelia

Choose the correct match showing division of labour with animal example.

- B-(i), C-(ii), D-(iii), A-(iv)
- B-(i), D-(ii), C-(iii), A-(iv)
- D-(i), A-(ii), B-(iii), C-(iv)
- A-(i), D-(ii), C-(iii), B-(iv)

Ans. (c)

A.	Organ level	(ii)	Fasciola
B.	Cellular aggregate level	(iii)	Spongilla
C.	Tissue level	(iv)	Obelia
D.	Organ system level	(i)	Pheretima

Q12. Body cavity is the cavity present between body wall and gut wall. In some animals the body cavity is not lined by mesoderm. Such animals are called (a) Acoelomate (b) Pseudocoelomate .

(c) Coelomate (d) Haemocoelomate

Ans: (b)

(i) Acoelomate: The animals in which the body cavity is absent are called acoelomates, e.g.: Porifers, Coelentrates, Ctenophores and Platyhelminthes. .

(ii) Pseudocoelomate: In some animals, the body cavity is not lined by mesoderm, instead, the mesoderm is present as scattered pouches in between the ectoderm and endoderm. Here body cavity is directly connected to archenteron. Such a body cavity is called pseudocoelom and the animals possessing them are called pseudocoelomates. E.g.: Aschelminthes (Ascaris). Pseudocoelom is derived from blastocoel.

(iii) Coelomate: The body cavity, which is lined by mesoderm (on both sides) is called coelom.

Q12. Body cavity is the cavity present between body wall and gut wall. In some animals the body cavity is not lined by mesoderm. Such animals are called (a) Acoelomate (b) Pseudocoelomate .

(c) Coelomate (d) Haemocoelomate

Ans: (b)

(i) Acoelomate: The animals in which the body cavity is absent are called acoelomates, e.g.: Porifers, Coelentrates, Ctenophores and Platyhelminthes. .

(ii) Pseudocoelomate: In some animals, the body cavity is not lined by mesoderm, instead, the mesoderm is present as scattered pouches in between the ectoderm and endoderm. Here body cavity is directly connected to archenteron. Such a body cavity is called pseudocoelom and the animals possessing them are called pseudocoelomates. E.g.: Aschelminthes (Ascaris). Pseudocoelom is derived from blastocoel.

(iii) Coelomate: The body cavity, which is lined by mesoderm (on both sides) is called coelom. Animals possessing coelom are called coelomates, or coelom is cavity between alimentary canal and body wall enclosed by mesoderm on both sides. E.g.: Annelids, Arthropods, Molluscs, Echinoderms, Hemichordates and Chordates.

Depending upon its origin, true coelom or eucoelom is of two types:

(a) Schizocoelous: The coelom is formed by splitting of mesoderm. E.g.: Annelida, Arthropods and Mollusca.

Note: The cavity filled with blood is called haemocoel. It is found in Arthropods (cockroach) and Molluscs (Pila).

(b) Enterocoelom: The coelom develops as an outgrowth of the enteron or embryonic gut. E.g.: Deuterostomia (Echinodermata and Chordata). Echinodermata is an enterocoelomate invertebrate.

Q13. Match the column A with column B and choose the correct option.

Column A		Column B	
A.	Porifera	(i)	Canal system
B.	Aschelminthes	(ii)	Water-vascular system
C.	Annelida	(iii)	Muscular Pharynx
D.	Arthropoda	(iv)	Jointed appendages
E.	Echinodermata	(v)	Metamers

- A-(ii), B-(iii), C-(v), D-(iv), E-(i)
- A-(ii), B-(v), C-(iii), D-(iv), E-(i)
- A-(i), B-(iii), C-(v), D-(iv), E-(ii)

- A–(ii), B–(iii), C–(v), D–(iv), E–(i)
- A–(ii), B–(v), C–(iii), D–(iv), E–(i)
- A–(i), B–(iii), C–(v), D–(iv), E–(ii)
- A–(i), B–(v), C–(iii), D–(iv), E–(ii)

Ans: (c)

A.	Porifera	(i)	Canal system
B.	Aschelminthes	(iii)	Muscular Pharynx
C.	Annelida	(v)	Metamers
D.	Arthropoda	(iv)	Jointed appendages
E.	Echinodermata	(ii)	Water-vascular system

Very Short Answer Type Questions

Q1. Identify the phylum in which adults exhibit radial symmetry and larva exhibit bilateral symmetry.

Ans: In phylum echinodermata, adults show radial symmetry whereas larva show bilateral symmetry.

Q2. What is the importance of pneumatic' bones and air sacs in Aves?

Ans: Pneumatic bones in Aves keep the body light and thus help in flight. Air sacs help in respiration and buoyancy.

Q3. What is metagenesis? Mention an example which exhibits this phenomenon.

Ans: Alteration of generation is known as metagenesis. Obelia exhibits this phenomenon.

Q4. What is the role of feathers?

Ans: Feathers keep the body light and thus help in flight.

Q5. Which group of chordates possess sucking and circular mouth without jaws?

Ans: Cyclostomes have a sucking and circular mouth without jaws.

Q6. Give one example each for an animal possessing placoid scales and that with cycloid scales

Chapter 5 (MORPHOLOGY OF FLOWERING PLANTS)

Multiple Choice Questions

Q1. Rearrange the following zones choose the correct option as seen in the root in vertical section and choose the correct option

- (A) Root hair zone
- (B) Zone of meristems
- (C) Root cap zone
- (D) Zone of Maturation
- (E) Zone of elongation

- (a) C, B, E, A, D
- (b) A,B,C,D,E
- (c) D, E, A, C, B
- (d) E, D, C, B, A

Ans: (a) (C) Root cap zone, (B) Zone of meristems, (E) Zone of elongation, (A) Root hair zone, (D) Zone of maturation

Q2. In an inflorescence where flowers are borne laterally in an acropetal succession, the position of the youngest floral bud shall be

- (a) Proximal (b) Distal (c) Intercalary (d) Anywhere**

Ans: (b) In racemose type of inflorescences the main axis continues to grow, the flowers are borne laterally in an acropetal succession, i.e. youngest flower is present at apex and oldest flower is present at the base. In racemose, inflorescence the growth of floral axis is unlimited or indefinite.

In cymose type of inflorescence the main axis terminates in a flower, hence is limited in growth. The flowers are borne in a basipetal. order, i.e. youngest flower is present at the base and oldest flower is present at the apex. In cymose inflorescence oldest flower remains in center and youngest towards the periphery. This type of arrangement is called centrifugal.

Q3. The mature seeds of plants such as gram and peas, possess no endosperm, because

- (a) These plants are not angiosperms**
- (b) There is no double fertilization in them**
- (c) Endosperm is not formed in them**
- (d) Endosperm gets used up by the developing embryo during seed development.**

Ans: (d) The mature seeds of plants such as gram and peas, possess no endosperm, because endosperm gets used up by the developing embryo during seed development.

Q4. Roots developed from parts of the plant other than radicle are called

- (a) Tap roots (b) Fibrous roots
(c) Adventitious roots (d) Nodular roots

Ans: (c) Roots developed from parts of the plant other than radicle are called adventitious roots.

Q5. Venation is a term used to describe the pattern of arrangement of

- (a) Floral organs (b) Flowers in inflorescence
(c) Veins and veinlets in a lamina (d) All of them

Ans: (c) Venation is a term used to describe the pattern of arrangement of veins and veinlets in a lamina.

Q6. Endosperm, a product of double fertilization in angiosperms is absent in the seeds of

- (a) Coconut (b) Orchids (c) Maize (d) Castor

Ans: (b) Endosperm, a product of double fertilization in angiosperms is absent in the seeds of orchids. .

Q7. Many pulses of daily use belong to one of the families below (tick the correct answer). –

- (a) Solanaceae (b) Fabaceae (c) Liliaceae (d) Poaceae

Ans: (b) Many pulses of daily use belong to one of the family fabaceae. Solanaceae (potato family)

Liliaceae (lily family)

Poaceae (cereal or grass family). .

Q8. The placenta is attached to the developing seed near the

- (a) Testa (b) Hilum (c) Micropyle (d) Chalaza

Ans: (b) The placenta is attached to the developing seed near the hilum.

Q9. Which of the following plants is used to extract the blue dye?

- (a) Trifolium (b) Indigofera (c) Lupin (d) Cassia

Ans: (b) Blue dye is obtained from Indigofera tinctoria which belongs to family fabaceae.

Q10. Match the followings and choose the correct option.

Group A		Group B	
A.	Aleurone layer	(i)	Without fertilization
B.	Parthenocarpic fruit	(ii)	Nutrition
C.	Ovule	(iii)	Double fertilization

D.	Endosperm	(iv)	Seed
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Options:

- A-(i), B-(ii), C-(iii), D-(iv)
- A-(ii), B-(i), C-(iv), D-(iii)
- A-(iv), B-(ii), C-(i), D-(iii)
- A-(ii), B-(iv), C-(i), D-(iii)

Ans. (b)

A.	Aleurone layer	(ii)	Nutrition
B.	Parthenocarpic fruit	(i)	Without fertilization
C.	Ovule	(iv)	Seed
D.	Endosperm	(iii)	Double fertilization

Very Short Answer Type Questions

Q1. Roots obtain oxygen from air in the soil for respiration. In the absence or deficiency of O₂, root growth is restricted or completely stopped. How do the plants growing in marshlands or swamps obtain their O₂ required for root respiration?

Ans: In some plants such as Rhizophora and Sonneratia (mangrove plant) growing in swampy areas near river mouths (saline marshy soil or halophytes), many roots come out of the ground and grow vertically upwards (negatively geotropic: against gravitational force). Such roots, called pneumatophores or breathing roots or respiratory roots, help to get oxygen for respiration.

Q2. Write floral formula for a flower which, is bisexual; actinoflorphic; sepals five, twisted aestivation, petals five; valvate aestivation; stamens six; ovary tricarpellary, syncarpous, superior, trilocular with axile placentation.

Ans. $\oplus \text{ } \overset{\text{♂}}{\text{Q}} \text{ } \text{K}_5 \text{ } \text{C}_5 \text{ } \text{A}_6 \text{ } \underline{\text{U}}_{(3)}$

Q3. In Opuntia the stem is modified into a flattened green structure to perform the function of leaves (i.e. photosynthesis). Cite some other examples of modifications of plant parts for

Q3. In *Opuntia* the stem is modified into a flattened green structure to perform the function of leaves (i.e., photosynthesis). Cite some other examples of modifications of plant parts for the purpose of photosynthesis.

Ans: Some plants of arid regions modify their stems into flattened (*Opuntia*), or fleshy cylindrical (*Euphorbia*) structures. These modified stems of indefinite growth are called phylloclades. They contain chlorophyll and carry out photosynthesis.

Q4. In swampy areas like the Sunderbans in West Bengal, plants bear special kind of roots called _____.

Ans: Pneumatophores

Q5. In aquatic plants like *Pistia* and *Eichhornia*, leaves and roots are found near

Ans: Node

Q6. Reticulate and parallel venation are characteristic of _____ and _____ respectively.

Ans: Dicotyledons and monocotyledons

Q7. Which parts in ginger and onion are edible?

Ans: Ginger: rhizome and onion: fleshy leaves

Q8. In epigynous flower, ovary is situated below the _____.

Ans: Calyx, corolla and androecium.

Q9. Add the missing floral organs of the given floral formula of Fabaceae.

Ans. $Br \oplus K_5 \text{ _____ } A_{(9)}, \dots$
 $Br \oplus \overset{\curvearrowright}{\underset{\curvearrowleft}{Q}} K_5 C_{1+2+(2)} A_{1+(9)} \underline{G}_1$

Short Answer Type Questions

Q1. Give two examples of roots that develop from different parts of the angiospermic plant other than the radicle.

Ans: The roots that arise from parts of plant other than radicle are called adventitious roots.
Pneumatophores—for respiration
Stilt roots—for support
Prop roots—for support

Q2. The essential functions of roots are anchorage and absorption of water and minerals in the terrestrial plant. What functions are associated with the roots of aquatic plants? How

Multiple Choice Questions

Q1. A transverse section of stem is stained first with safranin and then with fast green following the usual schedule of double staining for the preparation of a permanent slide. What would be the colour of the stained xylem and phloem?

- (a) Red and green (b) Green and red
(c) Orange and yellow (d) Purple and orange

Ans: (a) A transverse section of stem is stained first with safranin and then with fast green following the usual schedule of double staining for the preparation of a permanent slide. Red and green colour of the stained xylem and phloem appear.

Q2. Match the following and choose the correct option from below.

A.	Meristem	(i)	Photosynthesis, storage
B.	Parenchyma	(ii)	Mechanical support
C.	Collenchyma	(iii)	Actively dividing cells
D.	Sclerenchyma	(iv)	Stomata
E.	Epidermal tissue	(v)	Sclereids

Options:

- (a) A-(i), B-(iii), C-(v), D-(ii), E-(iv)
(b) A-(iii), B-(i), C-(ii), D-(v), E-(iv)
(c) A-(ii), B-(iv), C-(v), D-(i), E-(iii)
(d) A-(v), B-(iv), C-(iii), D-(ii), E-(i)

Ans:

A.	Meristem	(iii)	Actively dividing cells
B.	Parenchyma	(i)	Photosynthesis, storage
C.	Collenchyma	(ii)	Mechanical support
D.	Sclerenchyma	(v)	Sclereids
E.	Epidermal tissue	(iv)	Stomata

- (b) A-(iii), B-(i), C-(ii), D-(v), E-(iv)
 (c) A-(ii), B-(iv), C-(v), D-(i), E-(iii)
 (d) A-(v), B-(iv), C-(iii), D-(ii), E-(i)

Ans:

A.	Meristem	(iii)	Actively dividing cells
B.	Parenchyma	(i)	Photosynthesis, storage
C.	Collenchyma	(ii)	Mechanical support
D.	Sclerenchyma	(v)	Sclereids
E.	Epidermal tissue	(iv)	Stomata

Q3. Match the following and choose the correct option from below.

A.	Cuticle	(i)	Guard cells
B.	Bulliform cells	(ii)	Single layer
C.	Stomata	(iii)	Waxy layer
D.	Epidermis	(iv)	Empty colourless cell

Options:

- (a) A-(iii), B-(iv), C-(i), D-(ii)
 (b) A-(i), B-(ii), C-(iii), D-(iv)
 (c) A-(iii), B-(ii), C-(iv), D-(i)
 (d) A-(iii), B-(ii), C-(i), D-(iv)

Ans. (a)

Ans. (a)

A.	Cuticle	(iii)	Waxy layer
B.	Bulliform cells	(iv)	Empty colourless cell
C.	Stomata	(i)	Guard cells
D.	Epidermis	(ii)	Single layer

Q4. Identify the simple tissue from among the following.

(a) Parenchyma (b) Xylem (c) Epidermis (d) Phloem

Ans: (a) A simple tissue is made of only one type of cells so the origin of simple tissue is homogenous. Parenchyma, collenchyma and sclerenchyma comes under simple tissue.

Q5. Cells of this tissue are living and show angular wall thickening. They also provide

(a) Pericycle (b) Endodermis (c) Epidermis (d) Stele

Ans: (c) The outermost (piliferous) layer is epidermis (epiblema) or rhizodermis.

Q7. A conjoint and open vascular bundle will be observed in the transverse section of

(a) Monocot root (b) Monocot stem (c) Dicot root (d) Dicot stem

Ans: (d) Each vascular bundle is conjoint, collateral, open, and with endarch in protoxylem dicot stem.

Q8. Interfascicular cambium and cork cambium are formed due to

(a) Cell division (b) Cell differentiation

(c) Cell dedifferentiation (d) Redifferentiation

Ans: (c) Interfascicular cambium and cork cambium are formed due to cell dedifferentiation.

Q9. Phellogen and phellem respectively denote

(a) Cork and cork cambium (b) Cork cambium and cork

(c) Secondary cortex and cork (d) Cork and secondary cortex

Ans: (b) Phellogen and phellem respectively denote cork cambium and cork.

Q10. In which of the following pairs of parts of a flowering plants is epidermis absent?

(a) Root tip and shoot tip (b) Shoot bud and floral bud

(c) Ovule and seed (d) Petiole and pedicel

Ans: (a) In root tip and shoot tip, epidermis is absent.

Q11. How many shoot apical meristems are likely to be present in a twig of a plant possessing, 4 branches and 26 leaves?

(a) 26 (b) 1 (c) 5 (d) 30 (e) 4

Ans: (c) Five shoot apical meristems are likely to be present in a twig of a plant possessing 4 branches and 26 leaves.

Q12. A piece of wood having no vessels (trachea) must be belonging to

(a) Teak (b) Mango (c) Pine (d) Palm

Ans: (c) The presence of vessels is a characteristic feature of angiosperms.

Q13. A plant tissue, when stained, showed the presence of hemicellulose and pectin in cell wall of its cells. The tissue represents

(a) Collenchyma (b) Sclerenchyma (c) Xylem (d) Meristem

Ans: (a) A plant tissue, when stained, showed the presence of hemicellulose and pectin in cell wall of its cells. The tissue represents collenchyma.

Q14. In conifers fibres are likely to be absent in

(a) Secondary phloem (b) Secondary xylem

(c) Primary phloem (d) Leaves

Ans: (b) In conifers fibres are likely to be absent in secondary xylem.

Q15. When we peel the skin of a potato tuber, we remove

Q15. When we peel the skin of a potato tuber, we remove

- (a) Periderm (b) Epidermis (c) Cuticle (d) Sapwood**

Ans: (a) When we peel the skin of a potato tuber, we remove periderm.

Q16. A vesselless piece of stem possessing prominent sieve tubes would belong to

- (a) Pinus (b) Eucalyptus
(c) Grass (d) Trochodendron**

Ans: (d) A vesselless piece of stem possessing prominent sieve tubes would belong to Trochodendron.

Q17. Which one of the following cell types always divides by anticlinal cell division?

- (a) Fusiform initial cells (b) Root cap
(c) Protoderm (d) Phellogen**

Ans: (c) Protoderm cell always divides by anticlinal cell division.

Q18. What is the fate of primary xylem in a dicot root showing extensive secondary growth?

- (a) It is retained in the centre of the axis.
(b) It gets crushed.
(c) May or may not get crushed.
(d) It gets surrounded by primary phloem.**

Ans: (a) The fate of primary xylem in a dicot root showing extensive secondary growth because it is retained in the centre of the axis.

Very Short Answer Type Questions

Q1. Product of photosynthesis is transported from the leaves to various parts of the plants and stored in some cell before being utilised. What are the cells/ tissues that store them?

Ans: Parenchyma –

Q2. Protoxylem is the first formed xylem. If the protoxylem lies next to phloem what kind of arrangement of xylem would you call it?

Ans: Exarch

Q3. What is the function of phloem parenchyma?

Ans: The phloem parenchyma stores food material and other substances like resins, latex and mucilage.

Q4. What is present on the surface of the leaves which helps the plant prevent loss of water but is absent in roots?

Ans: Cuticle is present on the surface of the leaves which helps the plant prevent loss of water but is absent in roots.

mucilage.

Q4. What is present on the surface of the leaves which helps the plant prevent loss of water but is absent in roots?

Ans: Cuticle is present on the surface of the leaves which helps the plant prevent loss of water but is absent in roots.

Q5. What is the epidermal cell modification in plants which prevents water loss?

Ans: In grasses, certain adaxial epidermal cells along the veins modify themselves into large, empty, colourless cells. These are called bulliform cells or motor cells. Bulliform cells help in folding and unfolding of grass leaves.

When the bulliform cells in the leaves have absorbed water and are turgid, the leaf surface is exposed. When they are flaccid due to water stress, they make the leaves curl inwards (inrolling) to minimise water loss (transpiration).

Q6. What part of the plant would show the following?

a. Radial vascular bundle

b. Polyarch xylem

c. Well developed pith

Ans: a. Radial vascular bundle: Root

b. Polyarch xylem: Monocot root

c. Well developed pith: Dicot stem and monocot root

Q7. What are the cells that make the leaves curl in plants during water stress?

Ans: Bulliform/motor cells

Q8. What constitutes the cambial ring?

Ans: Interfascicular cambium + intrafascicular cambium .

Q9. Give one basic functional difference between phellogen and phelloderm.

Ans. Phellogen is a couple of layers thick. It is made of narrow, thin-walled and nearly rectangular cells. Phellogen cuts off cells on both sides. The outer cells differentiate into cork or phellem while the inner cells differentiate into secondary cortex or phelloderm.

Chapter 7 (STRUCTURAL ORGANISATION IN ANIMALS)

Multiple Choice Questions

Q1. Which one of the following types of cell is involved in making of the inner walls of large blood vessels?

- (a) Cuboidal epithelium
- (b) Columnar epithelium
- (c) Squamous epithelium
- (d) Stratified epithelium

Ans: (c) The squamous epithelium (pavement epithelium) is made up of a single thin layer of flattened cells with irregular boundaries. They are found in the walls of blood vessels and air sacs of lungs and are involved in a function like forming a diffusion boundary.

Q2. To which one of the following categories does adipose tissue belong?

- (a) Epithelial
- (b) Connective
- (c) Muscular
- (d) Neural

Ans: (b) Loose connective tissue has cells and fibres loosely arranged in a semi-fluid ground substance, for example, areolar tissue present beneath the skin. Adipose tissue is a type of loose connective tissue located mainly beneath the skin.

Q3. Which of the following is not a connective tissue?

- (a) Bone
- (b) Cartilage
- (c) Blood
- (d) Muscles

Ans: (d) Cartilage, bones and blood are various types of specialised connective tissues.

Q4. The clitellum is a distinct part in the body of earthworm, it is found in

- (a) Segments 13-14-15
- (b) Segments 14-15-16
- (c) Segments 12-13-14
- (d) Segments 15-16-17

Ans: (b) The clitellum, a prominent circular band of glandular nature is found from 14th-16th segments. It secretes mucus and albumin, which helps in the formation of cocoon.

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Ans: (b) The clitellum, a prominent circular band of glandular nature is found from 14th-16th segments. It secretes mucus and albumin, which helps in the formation of cocoon.

Q5. Setae help in locomotion in earthworm but are not uniformly present in all the segments.

They are present in

- (a) 1st segment
- (b) Last segment
- (c) Clitellar segment
- (d) 20th-22nd segment

Ans: (d) Setae help in locomotion in earthworm, it is present in all the segments except 1st segment, last segment and clitellar segment.

Q6. Which one of the following statements is true for cockroach?

- (a) The number of ovarioles in each ovary are ten.
- (b) The larval stage is called caterpillar.
- (c) Anal styles are absent in females.
- (d) They are ureotelic.

Ans: (c) In cockroach, anal styles are absent in females.

Q7. Match the following and choose the correct option.

A.	Adipose tissue -	(i)	Nose
B.	Stratified epithelium	(ii)	Blood
C.	Hyaline cartilage	(iii)	Skin
D.	Fluid connective tissue	(iv)	Fat storage

- (a) A-(i), B-(ii), C-(iii), D-(iv)
- (b) A-(iv), B-(iii), C-(i), D-(ii)
- (c) A-(iii), B-(i), C-(iv), D-(ii)
- (d) A-(ii), B-(i), C-(iv), D-(iii)

Ans. (b)

A.	Adipose tissue	(iv)	Fat storage
B.	Stratified epithelium	(ii)	Skin
C.	Hyaline cartilage	(i)	Nose
D.	Fluid connective tissue	(iii)	Blood

Q8. Match the following and choose the correct answer.

A.	Hermaphrodite	(0)	Produces blood cells and haemoglobin
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Q8. Match the following and choose the correct answer.

A.	Hermaphrodite	(0	Produces blood cells and haemoglobin
----	---------------	----	--------------------------------------

3

B.	Direct development	(ii)	Testis and ovary in the same animal
G.	Chemoreceptor	(iii)	Larval form absent
D.	Blood gland in earthworm	(iv)	Sense of chemical substances

(a) A-(ii), B-(iii), C-(iv), D-(i)

(b) A-(iii), B-(ii), C-(iv), D-(i)

(c) A-(i), B-(iii), C-(ii), D-(iv)

(d) A-(ii), B-(iv), C-(iii), D-(i)

Ans: (a)

A.	Hermaphrodite	(ii)	Testis and ovary in the same animal
B.	Direct development	(iii)	Larval form absent
C.	Chemoreceptor	(iv)	Sense of chemical substances
D.	Blood gland in earthworm	(0	Produces blood cells and haemoglobin

Q9. Match the following with reference to cockroach and choose the correct option.

A.	Chellomere	(i)	Chain of developing eye
----	------------	-----	-------------------------

A.	Phallomere	(i)	Chain of developing ova
B.	Gonopore	(ii)	Bundles of sperm
C.	Spermatophore	(iii)	Opening of the ejaculatory duct
D.	Ovarioles	(iv)	The external genitalia

- (a) A-(ii), B-(iv), C-(ii), D-(i)
 (b) A-(iv), B-(iii), C-(ii), D-(i)
 (c) A-(iv), B-(ii), C-(iii), D-(i)
 (d) A-(ii), B-(iv), C-(iii), D-(i)

10. Match the followings and choose the correct answer.

A.	Touch	(i)	Nasal epithelium
B.	Smell	(ii)	Foramen magnum
C.	Cranial nerves	(iii)	Sensory papillae
D.	Medulla oblongata	(iv)	Peripheral nervous system

- (a) A-(iii), B-(i), C-(ii), D-(iv)
 (b) A-(ii), B-(i), C-(iv), D-(iii)
 (c) A-(ii), B-(iv), C-(ii), D-(i)
 (d) A-(iii), B-(i), C-(iv), D-(ii)

Ans: (d)

A.	Touch	(iii)	Sensory papillae
B.	Smell	(i)	Nasal epithelium
C.	Cranial nerves	(iv)	Peripheral nervous system
D.	Medulla oblongata	(ii)	Foramen magnum

Very Short Answer Type Questions

D.	Medulla oblongata	(ii)	Foramen magnum
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Very Short Answer Type Questions

Q1. State the number of segments in earthworm which are covered by a prominent dark band or clitellum.

Ans: 14th–16th segments.

Q2. Where are sclerites present in Cockroach?

Ans: In each segment of the body of cockroach, exoskeleton has hardened plates called sclerites.

Q3. How many times do nymphs moult to reach the adult form of cockroach?

Ans: The nymph grows by moulting about 13 times to reach the adult form.

Q4. Identify the sex of a frog in which sound producing vocal sacs are present.

Ans: Male frog

Q5. Name the process by which a tadpole develops into an adult frog.

Ans: By metamorphosis a tadpole develops into an adult frog.

Q6. What is the scientific term given to earthworm's body segments?

Ans: Metamers

Q7. A muscle fibre tapers at both ends and does not show striations. Name the muscle fibre.

Ans: Smooth muscle fibre

Q8. Name the different cell junctions found in tissues.

- Ans:** a. Tight Junctions
b. Adhering Junctions
c. Gap Junctions

Q9. Give two identifying features of an adult male frog.

- Ans:** a. Vocal Sacs
b. Thumb pads/copulatory pads in thumb

Q10. Which mouth part of cockroach is comparable to our tongue?

Ans: Hypopharynx

Q11. The digestive system of a frog is made of the following parts. Arrange them in an order beginning from mouth.

Mouth, oesophagus, buccal cavity, stomach, intestine, cloaca, rectum, cloacal aperture

Ans: Mouth, buccal cavity, oesophagus, stomach, intestine, rectum, cloaca and cloacal aperture.

Chapter 8 (CELL - THE UNIT OF LIFE)

Multiple Choice Questions

Q1. A common characteristic feature of plant sieve tube cells and most of mammalian erythrocytes is

- (a) Absence of mitochondria (b) Presence of cell wall
(c) Presence of haemoglobin (d) Absence of nucleus

Ans: (d) A common characteristic feature of plant sieve tube cells and most of mammalian erythrocytes is absence of nucleus.

Q2. Select one which is not true for ribosomes.

- (a) Made of two subunits (b) Form polysome
(c) May attach to mRNA (d) Have no role in protein synthesis

Ans: (d) Ribosomes is made of two subunits, form polysome and may attach to mRNA. Ribosomes are the site of protein synthesis.

Q3. Which one of these is not a eukaryote? .

- (a) Euglena (b) Anabaena (c) Spirogyra (d) Agaricus

Ans: (b) Anabaena is a cyanobacterium (prokaryote).

Q4. Which of the following dyes is not used for staining chromosomes?

- (a) Basic Fuchsin (b) Saffranin
(c) Methylene green (d) Carmine

Ans: (b) Saffranin stain is not used for staining chromosomes while Basic Fuchsin, Methylene green and Carmine are used for staining chromosomes.

Q5. Different cells have different sizes. Arrange the following cells in an ascending order of their size. Choose the correct option among the following:

- (i) Mycoplasma
(ii) Ostrich eggs
(iii) Human RBCs
(iv) Bacteria

- (a) (i), (iv), (iii), (ii) (b) (i), (iii), (iv), (ii)
(c) (ii), (i), (iii), (iv) (d) (iii), (ii), (i), (iv)

Q6. Which of the following features is common to prokaryotes and many eukaryotes?

- (a) Chromatin material present
- (b) Cell wall present
- (c) Nuclear membrane present
- (d) Membrane-bound subcellular organelles present

Ans: (b) Cell wall is present in all prokaryotes (except mycoplasma) and many eukaryotes (like plants and fungi).

Q7. Who proposed the fluid mosaic model of plasma membrane?

- (a) Camillo Golgi (b) Schleiden and Schwann
- (c) Singer and Nicolson (d) Robert Brown

Ans: (c) An improved model of the structure of cell membrane was proposed by S.J. Singer and G.L. Nicolson (1972) widely accepted as fluid mosaic model.

Q8. Which of the following statements is true for a secretory cell?

- (a) Golgi apparatus is absent.
- (b) Rough Endoplasmic reticulum (RER) is easily observed in the cell.
- (c) Only Smooth endoplasmic reticulum (SER) is present.
- (d) Secretory granules are formed in nucleus.

Ans: (b) RER is frequently observed in the cells actively involved in protein synthesis and secretion. RER is well developed in cells engaged in synthesis of secretory products.

Q9. What is a tonoplast?

- (a) Outer membrane of mitochondria
- (b) Inner membrane of chloroplast
- (c) Membrane boundary of the vacuole of plant cells
- (d) Cell membrane of a plant cell.

Ans: (c) The vacuole is the membrane-bound space found in the cytoplasm. The vacuole is bound by a single membrane called tonoplast.

Q10. Which of the following is not true for an eukaryotic cell?

- (a) Cell wall is made up of peptidoglycans
- (b) It has 80S type of ribosome present in the cytoplasm
- (c) Mitochondria contain circular DNA
- (d) Membrane bound organelles are present

Ans: (a) In bacteria (prokaryotes) cell wall is made up of peptidoglycan.

Q11. Which of the following statements is not true for plasma membrane?

- (a) It is present in both plant and animal cell.

(b) Lipid is present as bilayer in it.

answer.

- (a) Presence of two layers of membrane
- (b) Presence of ribosome
- (c) Presence of thylakoids
- (d) Presence of DNA

Ans: (c) Thylakoids are present in plastids but not in mitochondria. Both plastids and mitochondria are similar in presence of two layers of membrane, presence of ribosome and presence of DNA.

Q13. Which of the following is not a function of cytoskeleton in a cell?

- (a) Intracellular transport
- (b) Maintenance of cell shape and structure
- (c) Support of the organelle
- (d) Cell motility

Ans: (a) The cytoskeleton in a cell are involved in many functions such as mechanical support, motility, maintenance of the shape of the cell.

Q14. The stain used to visualise mitochondria is

- (a) Fast green
- (b) Saffranin
- (c) Aceto carmine
- (d) Janus green

Ans: (d) Janus green stain is used to visualise mitochondria.

Very Short Answer Type Questions

Q1. What is the significance of vacuole in a plant cell?

Ans: Vacuole in plant cells help in the storage, waste disposal and cell elongation and protection.

Q2. What does 'S' refer in a 70S and an 80S ribosome?

Ans: Svedberg's Unit or sedimentation coefficient.

Q3. Mention a single membrane bound organelle which is rich in hydrolytic enzymes.

Ans: Lysosome

Q4. What are gas vacuoles? State their functions. ,

Ans: Gas vacuoles are aggregates of hollow cylindrical structures called gas vesicles. They are located inside some bacteria. The inflation and deflation of the vesicles provides buoyancy, allowing the bacterium to float at a desired depth in the water.

Chapter 9 (BIOMOLECULES)

Multiple Choice Questions

Q1. It is said that elemental composition of living organisms and that of inanimate objects (like earth's crust) are similar in the sense that all the major elements are present in both. Then what would be the difference between these two groups? Choose a correct answer from the following.

- (a) Living organisms have more gold in them than inanimate objects
- (b) Living organisms have more water in their body than inanimate objects
- (c) Living organisms have more carbon, oxygen and hydrogen per unit mass than inanimate objects
- (d) Living organisms have more calcium in them than inanimate objects.

Ans: (c)

Element	% Weight of	
	Earth's Crust	Human Body
Hydrogen (H)	0.14	0.5
Carbon (C)	0.03	18.5
Oxygen(O)	46.6	65.0
Nitrogen (N)	very little	3.3
Sulphur (S)	0.03	0.3
Sodium (Na)	2.8	0.2
Calcium (Ca)	3.6	1.5
Magnesium (Mg)	2.1	0.1
Silicon (Si)	27.7	negligible

Q2. Many elements are found in living organisms either free or in the form of compounds. One of the following is not found in living organisms.

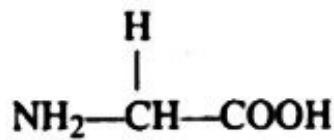
- (a) Silicon (b) Magnesium (c) Iron (d) Sodium

Ans: (a) See Answer 2.

Q3. Aminoacids, as the name suggests, have both an amino group and a carboxyl group in their structure. In addition, all naturally occurring aminoacids (those which are found in proteins) are called L-aminoacids. From this, can you guess from which compound can the simplest aminoacid be made?

- (a) Formic acid (b) Methane (c) Phenol acid (d) Glycine

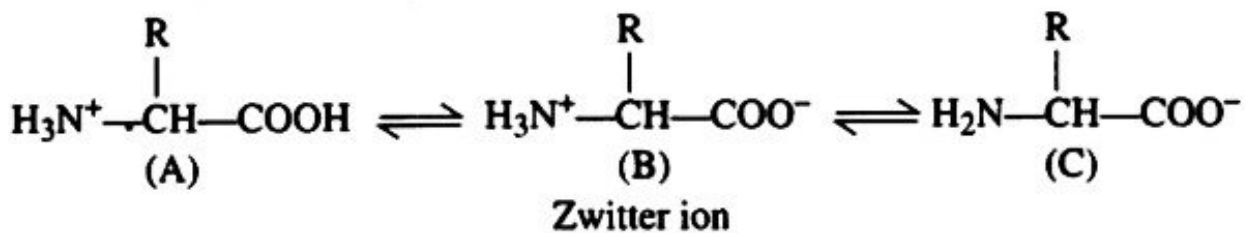
Ans: (d) Glycine is an amino acid (which have both an amino group and a carboxyl group in their structure).



Q4. Many organic substances are negatively charged, e.g., acetic acid, while others are positively charged e.g., ammonium ion. An amino acid under certain conditions would have both positive and negative charges simultaneously in the same molecule. Such a form of amino acid is called

- (a) Positively charged form (b) Negatively charged form
(c) Neutral form (d) Zwitterionic form**

Ans: (d) In aqueous solution, the carboxyl group can lose a proton and amino group can accept a proton, giving rise to a dipolar ion called Zwitter ion. Zwitter ion is neutral but contains both positive and negative charges.



Q5. Sugars are technically called carbohydrates, referring to the fact that their formulae are only multiple of C(H₂O). Hexoses therefore have six carbons, twelve hydrogens and six oxygen atoms. Glucose is a hexose. Choose from among the following another hexose.

- (a) Fructose (b) Erythrose (c) Ribulose (d) Ribose**

Ans: (a) Sugars are technically called carbohydrates, referring to the fact that their formulae are only multiple of C(H₂O). Hexoses therefore have six carbons, twelve hydrogens and six oxygen atoms. E.g., glucose and fructose.

Q6. When you take cells or tissue pieces and grind them with an acid in a mortar and pestle, all the small biomolecules dissolve in the acid. Proteins polysaccharides and nucleic acids are insoluble in mineral acid and get precipitated. The acid soluble compounds include

amino acids, nucleosides, small sugars etc. When one adds a phosphate group to a nucleoside one gets another acid soluble biomolecule called

- (a) Nitrogen base**
- (b) Adenine**
- (c) Sugar phosphate**
- (d) Nucleotide**

Ans: (d) Nucleotide = base + sugar + phosphate

Q7. When we homogenise any tissue in an acid, the acid soluble pool represents

- (a) Cytoplasm (b) Cell membrane**
- (c) Nucleus (d) Mitochondria**

Ans: (a) When we homogenise any tissue in an acid, the acid soluble pool represents cytoplasm.

Q8. The most abundant chemical in living organisms could be

- (a) Protein (b) Water (c) Sugar (d) Nucleic acid**

Ans: (b) Most abundant component of cell is water.

Component	% of the total Cellular Mass
Water	70-90
Proteins	10-15
Nucleic acids	5-7
Carbohydrates	3
Lipids	2
Ions	1

Q9. A homopolymer has only one type of building block called monomer repeated V number of times. A heteropolymer has more than one type of monomer. Proteins are heteropolymers usually made of amino acids. While a nucleic acid like DNA or RNA is made up of only 4 types of nucleotide monomers, proteins are made of

- (a) 20 types of monomers (b) 40 types of monomers**
- (c) 30 types of monomers (d) only one type of monomer**

Ans: (a) A homopolymer has only one type of building block called monomer repeated V number of times. A heteropolymer has more than one type of monomer. Proteins are heteropolymers usually made of amino acids. While a nucleic acid like DNA or RNA is made of only 4 types of nucleotide monomers, proteins are made of 20 types of monomers.

of only 4 types of nucleotide monomers, proteins are made of 20 types of monomers.

Q10. Proteins perform many physiological functions. For example, some proteins function as enzymes. One of the following represents an additional function that some proteins discharge

- (a) Antibiotics
- (b) Pigment conferring colour to skin
- (c) Pigment making colours of flowers
- (d) Hormones

Ans: (d) Proteins perform many physiological functions. For example, some proteins function as enzymes. Hormones represents an additional function that some proteins discharge (like

insulin).

Q11. Glycogen is a homopolymer made of

- (a) Glucose units (b) Galactose units
- (c) Ribose units (d) Amino acids

Ans: (a) Glycogen is a homopolymer made of glucose units.

Q12. The number of 'ends' in a glycogen molecule would be

- (a) Equal to the number of branches plus one
- (b) Equal to the number of branch points
- (c) One
- (d) Two, one on the left side and another on the right side

Ans: (d) In a polysaccharide chain (say glycogen), the right end is called the reducing end and the left end is called the non-reducing end.

Q13. The primary structure of a protein molecule has

- (a) Two ends (b) One end (c) Three ends (d) No ends

Ans: (a) The primary structure of a protein molecule has two ends.

A protein is imagined as a line, the left end represented by the first amino acid and the right end is represented by the last amino acid. The first amino acid is also called as N-terminal amino acid. The last amino acid is called the C-terminal amino acid.

Q14. Enzymes are biocatalysts. They catalyse biochemical reactions. In general they reduce activation energy of reactions. Many physico-chemical processes are enzyme mediated.'

Some examples of enzyme mediated reactions are given below. Tick the wrong entry.

- (a) Dissolving CO₂ in water
- (b) Unwinding the two strands of DNA
- (c) Hydrolysis of sucrose
- (d) Formation of peptide bond

Ans: (a) Dissolving CO₂ in water is a physical process.

Chapter 10 (CELL CYCLE AND CELL DIVISION)

Multiple Choice Questions

Q1. Meiosis in diploid organisms results in

- (a) Production of gametes**
- (b) Reduction in the number of chromosomes**
- (c) Introduction of variation**
- (d) All of the above**

Ans: (d) Meiosis in diploid organisms results in production of gametes, reduction in the number of chromosomes and introduction of variation.

Q2. At which stage of meiosis does the genetic constitution of gametes is finally decided? –

- (a) Metaphase-I**
- (b) Anaphase-II**
- (c) Metaphase-II**
- (d) Anaphase-I**

Ans: (d) At anaphase-I, stage of meiosis the genetic constitution of gametes is finally decided.

Q3. Meiosis occurs in organisms during

- (a) Sexual reproduction**
- (b) Vegetative reproduction**
- (c) Both sexual and vegetative reproduction**
- (d) None of these**

Ans: (a) Meiosis occurs in organisms during sexual reproduction. The production of offspring by sexual reproduction includes the fusion of two gametes, each with a complete haploid set of chromosomes. Gametes are produced through meiosis.

Q4. During anaphase-I of meiosis

- (a) Homologous chromosomes separate**
- (b) Non-homologous chromosomes separate**
- (c) Sister chromatids chromosomes separate**
- (d) Non Sister chromatids chromosomes separate**

Ans: (a) The homologous chromosomes separate, while sister chromatids remain associated at their centromeres. Separation of homologous chromosomes at anaphase is called disjunction.

Q5. Mitosis is characterised by

- (a) Reduction division**
- (b) Equal division**
- (c) Both reduction and equal division**
- (d) Pairing of homologous chromosomes**

Ans: (b) Mitosis is the most dramatic period of the cell cycle, involving a major reorganisation of virtually all components of the cell. Since the number of chromosomes in the parent and progeny cells is the same, it is also called as equational division.

Q6. A bivalent of meiosis-I consists of

- (a) Two chromatids and one centromere**
- (b) Two chromatids and two centromeres**
- (c) Four chromatids and two centromeres**
- (d) Four chromatids and four centromeres.**

Ans: (c) A bivalent of meiosis-I consists of four chromatids and two centromeres.

Q7. Cells which are not dividing are likely to be at

- (a) G₁**
- (b) G₂**
- (c) G₀**
- (d) S phase**

Ans: (c) These cells that do not divide further exit G₁ phase to enter an inactive stage is called quiescent stage (G₀) of the cell cycle. G₀ stage of cell denotes exit of cell from cell cycle. During G₀ stage of cell cycle, cell decides to undergo differentiation. Cells in G₀ stage remain metabolically active but no longer proliferate unless called on to do so depending on the requirement of the organism.

Q8. Which of the events listed below is not observed during mitosis?

- (a) Chromatin condensation**
- (b) Movement of centrioles to opposite poles**
- (c) Appearance of chromosomes with two chromatids joined together at the centromere**
- (d) Crossing over**

Ans: (d) Crossing over occurs in pachytene (it is a phase of meiosis-I). Crossing over is the exchange of genetic material (genes) between two homologous chromosomes. Crossing over is also an enzyme-mediated process and the enzyme involved is called recombinase. Crossing over leads to recombination of genetic material on the two chromosomes. Exchange of paternal and maternal chromosome material during pachytene is called crossing over.

Q9. Identify the wrong statement about meiosis.

- (a) Pairing of homologous chromosomes**

(b) Four haploid cells are formed

(c) At the end of meiosis number of chromosomes are reduced to half

(d) Two cycles of DNA replication occur.

Ans: (d) Meiosis involves two sequential cycles of nuclear and cell division called meiosis-I and meiosis-II but only a single cycle of DNA replication.

Q10. Select the correct statement about G1 phase.

(a) Cell is metabolically inactive

(b) DNA in the cell does not replicate

(c) It is not a phase of synthesis of macromolecules

(d) Cell stops growing.

Ans: (b) During G₁ phase the cell is metabolically active and continuously grows but does not replicate its DNA but proteins and RNA are synthesized.

Very Short Answer Type Questions

Q1. Between a prokaryote and an eukaryote, which cell has a shorter cell division time?

Ans: Prokaryotic cells has shorter cell division time than eukaryotic cells. A typical eukaryotic cell cycle is illustrated by human cells in culture. These cells divide once in approximately every 24 hours. In bacteria (E.coli) cell cycle is of 20 minutes.

Q2. Which of the phases of cell cycle is of longest duration?

Ans: Interphase

Q3. Name a stain commonly used to colour chromosomes.

Ans: Basic fuchsin, acetocarmine etc.

Q4. Which tissue of animals and plants exhibits meiosis?

Ans: Gohads (testes and ovary) in animals and sporangium in plants.

Q5. Given that the average duplication time of E.coli is 20 minutes, how much time will two E.coli cells take to become 32 cells?

Ans. $2 \xrightarrow{\text{I}} 4 \xrightarrow{\text{II}} 8 \xrightarrow{\text{III}} 16 \xrightarrow{\text{IV}} 32$

For formation of 32 cells, two E.coli cells takes 4 cycles. So total time will be $4 \times 20 = 80$ minutes

Q6. Which part of the human body should one use to demonstrate stages in mitosis?

Ans: Nail base or any somatic cell (diploid cell).

Q7. What attributes does a chromatid require to be classified as a chromosome?

Ans: Centromere