# CHAPTER 5

# MORPHOLOGY OF FLOWERING PLANTS

## MULTIPLE CHOICE QUESTIONS

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

   A. Root hair zone
   B. Zone of meristems
   C. Rootcap zone
   D. Zone of maturation
   E. Zone of elongation

Options:

   a. C, B, E, A, D
   b. A, B, C, D, E
   c. D, E, A, C, B
   d. E, D, C, B, A

2. 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. Any where

3. 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

4. Roots developed from parts of the plant other than radicle are called
   a. Taproots
   b. Fibrous roots
   c. Adventitious roots
   d. Nodular roots

5. Venation is a term used to describe the pattern of arrangment of
   a. Floral organs
   b. Flower in infloresence
   c. Veins and veinlets in a lamina
   d. All of them

6. Endosperm, a product of double fertilization in angiosperms is absent in the seeds of
   a. Gram
   b. Orchids
   c. Maize
   d. Castor

7. Many pulses of daily use belong to one of the families below (tick the correct answer)
   a. Solanaceae
   b. Fabaceae
   c. Liliaceae
   d. Poceae

8. The placenta is attached to the developing seed near the
   a. Testa
   b. Hilum
   c. Micropyle
   d. Chalaza

9. Which of the following plants is used to extract the blue dye?
   a. *Trifolium*
   b. *Indigofera*
   c. *Lupin*
   d. *Cassia*

10. Match the followings and choose 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 |

Options:

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

## VERY SHORT ANSWER TYPE QUESTIONS

1. Roots obtain oxygen from air in the soil for respiration. In the absence or deficiency of $O_2$, root growth is restricted or completely stopped. How do the plants growing in marshlands or swamps obtain their $O_2$ required for root respiration?
2. Write floral for mula for a flower which, is bisexual; actinomorphic; sepals five, twisted aestivation, petals five; valvate aestivation; stamens six; ovary tricarpellary, syncarpous, superior, trilocular with axile placentation.
3. 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.
4. In swampy areas like the Sunderbans in West Bengal, plants bear special kind of roots called _____.
5. In aquatic plants like *Pistia* and *Eichhornia*, leaves and roots are found near _____.
6. Reticulate and parallel venation are characteristic of _____ and _____ respectively.
7. Which parts in ginger and onion are edible?
8. In epigynous flower, ovary is situated below the _____.
9. Add the missing floral organs of the given floral formula of Fabaceae.

br ⊕ $K_5$ _____ $A_{(a)}\bar{G}_{(5)}$

10. Name the body part modified for food storage in the following

a. Carrot _____

b. *Colocasia* _____

c. Sweet potato _____

d. *Asparagus* _____

e. Radish _____

f. Potato _____

g. Dahlia _____

h. Turmeric _____

i. *Gladiolus* _____

j. Ginger _____

k. *Portulaca* _____

## SHORT ANSWER TYPE QUESTIONS

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

2. 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 are roots of aquatic plants and terrestrial plants different?

3. Draw diagrams of a typical monocot and dicot leaves to show their venation pattern.

4. A typical angiosperm flower consists of four floral parts. Give the names of the floral parts and their arrangements sequentially.

5. Given below are a few floral formulae of some well known plants. Draw floral diagrams from these formulae.

(i) $\oplus \male\!\!\female K_{(5)}, C_{(5)}, A_{(5)}, G_{(2)}$ (ii) $\Phi \male\!\!\female K_{(5)} C_{1+2+(2)} A_{(9)+1} G_{\underline{1}}$ (iii) $\oplus \male\!\!\female K_5 C_5 A_{5+5} G_{(5)}$

6. Reticulate venation is found in dicot leaves while in monocot leaves venation is of parallel type. Biology being a 'Science of exceptions', find out any exception to this generalization.

7. You have heard about several insectivorous plants that feed on insects. *Nepenthes* or the pitcher plant is one such example, which usually grows in shallow water or in marsh lands. What part of the plant is modified into a 'pitcher'? How does this modification help the plant for food even though it can photosynthesize like any other green plant?
8. Mango and coconut are 'drupe' type of fruits. In mango fleshy mesocarp is edible. What is the edible part of coconut? What does milk of tender coconut represent?
9. How can you differentiate between free central and axile placentation?
10. Tendrils are found in the following plants. Identify whether they are stem tendrils or leaf tendrils.
    a. Cucumber
    b. Peas
    c. Pumpkins
    d. Grapevine
    e. Watermelons
11. Why is maize grain usually called as a fruit and not a seed?
12. Tendrils of grapevines are homologous to the tendril of pumpkins but are analogous to that of pea. Justify the above statement.
13. Rhizome of ginger is like the roots of other plants that grows underground. Despite this fact ginger is a stem and not a root. Justify.
14. Differentiate between
    a. Bract and Bracteole
    b. Pulvinus and petiole
    c. Pedicel and peduncle
    d. Spike and spadix
    e. Stamen and staminoid
    f. Pollen and pollenium

## LONG ANSWER TYPE QUESTIONS

1. Distinguish between families Fabaceae, Solanaceae, Liliaceae on the basis of gynoecium characteristics (with figures), Also write economic importance of any one of the above family.
2. Describe various stem modifications associated with food storage, climbing and protection.

3. Stolon, offset and rhizome are different forms of stem modifications. How can these modified forms of stem be distinguished from each other?

4. The mode of arrangements of sepals or petals in a floral bud is known as aestivation. Draw the various types of aestivation possible for a typical pentamerous flower.

5. The arrangements of ovules within the ovary is known as placentation. What does the term placenta refer to? Name and draw various types of placentations in the flower as seen in T.S. or V.S..

6. Sunflower is not a flower. Explain.

7. How do you distinguish between hypogeal germination and epigeal germination? What is the role of cotyledon (s) and the endosperm in the germination of seeds?

8. Seeds of some plants germinate immediately after shedding from the plants while in other plants they require a period of rest before germination. The later phenomena is called as dormancy. Give the reasons for seed dormancy and some methods to break it.

# CHAPTER 6

# ANATOMY OF FLOWERING PLANTS

## MULTIPLE CHOICE QUESTIONS

1. 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

2. Match the followings 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 |

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

| | | | |
|---|---|---|---|
| A. | Cuticle | i. | guard cells |
| B. | Bulli form 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 |

4. Identify the tissue system from among the following
   a. Parenchyma
   b. Xylem
   c. Epidermis
   d. Phloem

5. Cells of this tissue are living and show angular wall thickning. They also provide mechanical support. The tissue is
   a. Xylem
   b. Sclerenchyma
   c. Collenchyma
   d. Epidermis

6. Epiblema of roots is equivalent to
   a. Pericycle
   b. Endodermis
   c. Epidermis
   d. Stele

7. 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

8. Interfascicular cambium and cork cambium are formed due to
   a. Cell division
   b. Cell differentiation
   c. Cell dedifferentiation
   d. Redifferentiation

9. 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

10. In which of the following pairs of parts of a flowering plant is epidermis absent?
    a. Root tip and shoot tip
    b. Shoot bud and floral bud
    c. Ovule and seed
    d. Petiole and pedicel

11. How many shoot apical meritsems 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

12. A piece of wood having no vessels (trachea) must be belong to
    a. Teak
    b. Mango
    c. Pine
    d. Palm

13. 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

14. Fibres are likely to be absent in
    a. Secondary phloem
    b. Secondary Xylem
    c. Primary phloem
    d. Leaves

15. When we peel the skin of a potato tuber, we remove
    a. Periderm
    b. Epidermis
    c. Cuticle
    d. Sapwood

16. A vesselless piece of stem possessing prominent sieve tubes would belong to
    a. *Pinus*
    b. *Eucalyptus*
    c. Grass
    d. *Trochodendron*

17. Which one of the following cell types always divides by anticlinal cell division?
    a. fusiform initial cells
    b, root cap
    c. protoderm
    d. phellogen

18. 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

## VERY SHORT ANSWER TYPE QUESTIONS

1. 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?
2. Protoxylem is the first formed xylem. If the protoxylem lies next to phloem what kind of arrangement of xylem would you call it?
3. What is the function of phloem parenchyma?
4. What is present on the surface of the leaves which helps the plant prevent loss of water but is absent in roots?
5. What is the epidermal cell modification in plants which prevents water loss?
6. What part of the plant would show the following:
    a. Radial vascular bundle
    b. Polyarch xylem
    c. Well developed pith
7. What are the cells that make the leaves curl in plants during water stress?

8. What constitutes the cambial ring?
9. Give one basic functional difference between phellogen and phelloderm.
10. Arrange the following in the sequence you would find them in a plant starting from the periphery – phellem, phellogen, phelloderm.
11. If one debarks a tree, what parts of the plant is being removed?
12. The cross-section of a plant material showed the following features when viewed under the microscope.
    a. The vascular bundles were radially arranged.
    b. Four xylem strands with exarch condition of protoxylem.

    To which organ should it be assigned?
13. What do hard wood and soft wood stand for?

## SHORT ANSWER TYPE QUESTIONS

1. While eating peach or pear it is usually seen that some stone like structures get entangled in the teeth, what are these stone like structures called?
2. What is the commercial source of cork? How is it formed in the plant?
3. Below is a list of plant fibres. From which part of the plant these are obtained
    a. Coir
    b. Hemp
    c. Cotton
    d. Jute
4. What are the characteristic differences found in the vascular tissue of gymnosperms and angiosperms?
5. Epidermal cells are often modified to perform specialized functions in plants. Name some of them and function they perform.
6. The lawn grass (*Cyandon dactylon*) needs to be mowed frequently to prevent its overgrowth. Which tissue is responsible for its rapid growth?
7. Plants require water for their survival. But when watered excessively, plants die. Discuss.
8. A transverse section of the trunk of a tree shows concentric rings which are known as growth rings. How are these rings formed? What is the significance of these rings?
9. Trunks of some of the aged tree species appear to be composed of several fused trunks. Is it a physiological or anatomical abnormality? Explain in detail.

10. What is the difference between lenticels and stomata?

11. Write the precise function of
    a. Sieve tube
    b. Interfasicular cambium
    c. Collenchyma
    d. Aerenchyma

12. The stomatal pore is guarded by two kidney shaped guard cells. Name the epidermal cells surrounding the guard cells. How does a guard cell differ from an epidermal cell? Use a diagram to illustrate your answer.

13. Point out the differences in the anatomy of, leaf of peepal (*Ficus religiosa*) and maize (*Zea mays*). Draw the diagrams and label the differences.

14. Palm is a monocotyledonous plant, yet it increases in girth. Why and how?

## LONG ANSWER TYPE QUESTIONS

1. The arrangement of ovules within the ovary is known as placentation. What does the term placenta refer to? Draw various types of placentations in the flower as seen in T.S. and V.S.

2. Deciduos plants shed their leaves during hot summer or in autumn. This process of shedding of leaves is called abscission. Apart from physiological changes what anatomical mechanism is involved in the abscission of leaves.

3. Is Pinus an evergreen tree? Comment.

4. Assume that a pencil box held in your hand, represents a plant cell. In how many possible planes can it be cut? Indicate these cuts with the help of line drawings.

5. Each of the following terms has some anatomical significance. What do these terms mean? Explain with the help of line diagrams.
    a. Plasmadesmoses / Plasmodesmata
    b. Middle lamella
    c. Secondary wall

6. Distinguish between the following:
    a. Exarch and endarch condition of protoxylem
    b. Stele and vascular bundle
    c. Protoxylem and metaxylem
    d. Interfasicular cambium and intrafasicular cambium
    e. Open and closed vascular bundles
    f. Stem hair and root hair

CHAPTER 7

# STRUCTURAL ORGANISATION IN ANIMALS

## MULTIPLE CHOICE QUESTIONS

1. 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

2. To which one of the following categories does adipose tissue belong?
   a. Epithelial
   b. Connective
   c. Muscular
   d. Neural

3. Which one of the following is not a connective tissue?
   a. Bone
   b. Cartilage
   c. Blood
   d. Muscles

4. 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

5. Setae help in locomotion in earthworm but not uniformly present in all the segments. Select among the following that represents setae.
   a. 1$^{st}$segment
   b. Last segment
   c. Clitellar segment
   d. 20th - 22nd segment

6. 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

7. Match the followings 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 |

Options:

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

8. Match the followings and choose the correct answer

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

Options:

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-i
d. A-ii, B-iv, C-iii, D-i

9. Match the following with reference to Cockroch and choose the correct option

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

Options:

a. A-iii, 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 |

Options:

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

## VERY SHORT ANSWER TYPE QUESTIONS

1. State the number of segments in earthworm which are covered by a prominent dark band or clitellum.
2. Where are sclerites present in Cockroach?
3. How many times do nymphs moult to reach the adult form of cockroach?
4. Identify the sex of a frog in which sound producing vocal sacs are present.
5. Name the process by which a tadpole donelops into an adult frog.
6. What is the scientific term given to earthworm's body segments?
7. A muscle fibre tapers at both ends and does not show striations. Name the muscle fibre.
8. Name the different cell junctions found in tissues.
9. Give two identifying features of an adult male frog.
10. Which mouth part of cockroach is comparable to our tongue?
11. The digestive system of 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
12. What is the difference between cutaneous and pulmonary respiration?
13. Special Venous connection between liver and intestine and between kidney and intestine is found in frog, what are they called?

## SHORT ANSWER TYPE QUESTIONS

1. Give the location of hepatic caeca in a Cockroach. What is their function?
2. Frogs are beneficial for mankind, justify the statement.
3. The body of sponges does not possess tissue level of organisation though it is made of thousands of cells. Comment.
4. Structural organisation in animals attains different levels as cell - organ - organ system. What is missing in this chain? Mention the significance of such an organisation.
5. Stratified epithelial cells have limited role in secretion. Justify their role in our skin.
6. How does a gap junction facilitate intercellular communication?
7. Why are blood, bone and cartilage called connective tissue?
8. Why are neurons called excitable cells? Mention special features of the membrane of the neuron?
9. Why earthworm is called the friend of farmer?
10. How do you distinguish between dorsal and ventral surface of the body of earthworm.
11. Correct the wrong statements among the following:
    a. In earthworm, a single male genital pore is present.
    b. Setae help in locomotion of earthworm.
    c. Muscular layer in the body wall of earthworm is made up of only circular muscles.
    d. Typhlosole is the part of intestine of earthworm.
12. Why nephridia in earthworm that are basically similar in structure classified into three types? Mention the names of each.
13. Common name of some animals are given in Column A, write their scientific name in Column B.

| | Column A | Column B |
|---|---|---|
| a. | Tiger | _____ |
| b. | Peacock | _____ |
| c. | Housefly | _____ |

14. Complete the following statement :
    a. In Cockroach grinding of food particle is performed by _____
    b. Malpighian tubules help in removal of _____
    c. Hind gut of Cockroach is differentiated into _____
    d. In Cockroach blood vessels open into spaces called _____

15. Mention special features of eye in Cockroach.

16. Frog is a poikilotherm, exhibits camouflage and undergoes aestivation and hibernation, how are all these beneficial to it?

17. Write the functions in brief in column B, appropriate to the structures given in column A.

| Column A | | Column B | |
|---|---|---|---|
| a. | Nictitating membrane | i. | _____ |
| b. | Tympanum | ii. | _____ |
| c. | Copulatory pad | iii. | _____ |

18. Write the appropriate type of tissues in column B according to the functions mentioned in column A.

| Column A | | Column B | |
|---|---|---|---|
| a. | Secretion and absorption | i. | _____ |
| b. | Protective covering | ii. | _____ |
| c. | Linking and supporting framework | iii. | _____ |

19. Using appropriate examples, differentiate between false and true body segmentation.

20. What is special about tissue present in the heart?

## LONG ANSWER TYPE QUESTIONS

1. Classify and describe epithelial tissue on the basis of structural modifications of cells.

2. Write down the common features of the connective tissue. On the basis of structure and function, differentiate between bones and cartilages.

3. Comment upon the gametic exchange in earthworm during mating.

4. Explain the digestive system of Cockroach with the help of a labelled sketch.

5. Draw a neat and well labelled diagram of male reproductive system of a frog.

## CHAPTER 11

# TRANSPORT IN PLANTS

### MULTIPLE CHOICE QUESTIONS

1. Which of the following statements does not apply to reverse osmosis?
   a. it is used for water purification.
   b. In this technique, pressure greater than osmotic pressure is applied to the system
   c. It is a passive process
   d. It is an active process

2. Which one of the following will not directly affect transpiration?
   a. temperature
   b. light
   c. wind speed
   d. chlorophyll content of leaves

3. The lower surface of leaf will have more number of stomata in a
   a. dorsiventral leaf
   b. isobilateral leaf
   c. both a and b
   d. none of the above

4. The form of sugar transported through phloem is
   a. glucose
   b. fructose
   c. sucrose
   d. ribose

5. The process of guttation takes place
   a. when the root pressure is high and the rate of transpiration is low.
   b. when the root pressure is low and the rate of transpiration is high
   c. when the root pressure equals the rate of transpiration
   d. when the root pressure as well as rate of transpiration are high.

6. Which of the following is an example of imbibition
   a. uptake of water by root hair
   b. exchange of gases in stomata
   c. swelling of seed when put in soil
   d. opening of stomata

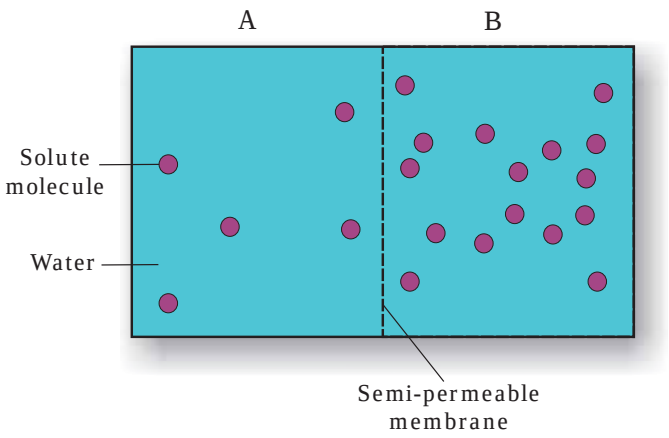
7. When a plant undergoes senescence, the nutrients may be
   a. exported
   b. withdrawn
   c. translocated
   d. None of the above

8. Water potential of pure water at standard temperature is equal to
   a. 10
   b. 20
   c. Zero
   d. None of the above

9. Choose the correct option mycorrhiza is a symbiotic association of fungus with root system which helps in
   A. Absorption of water
   B. Mineral nutrition
   C. Translocation
   D. Gaseous exchange

Options:
   a. Only A
   b. Only B
   c. both A and B
   d. both B and C

10. Based on the figure given below which of the following statements is not correct?



a. Movement of solvent molecules will take place from chamber A to B.
b. Movement of solute will take place from A to B.
c. Presence of a semipermeable is a pre-requisite for this process to occur.
d. The direction and rate of osmosis depends on both the pressure gradient and concentration gradient.

11. Match the followings and choose the correct option

| | | | |
|---|---|---|---|
| A. | leaves | i. | Anti-transpirant |
| B. | seed | ii. | Transpiration |
| C. | Roots | iii. | negative osmotic potential |
| D. | Aspirin | iv. | Imbibition |
| E. | Plasmolyzed cell | v. | Absorbtion |

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

11. Mark the mismatched pair.

| | | | |
|---|---|---|---|
| a. | Amyloplast | i. | store protein granule |
| b. | Elaioplast | ii. | store oils or fats |
| c. | Chloroplasts | iii. | contain chlorophyll pigments |
| d. | Chromoplasts | iv. | contain coloured pigments other than chlorophyll |
| e. | Leucoplast | v. | contains colourless pigments |

## VERY SHORT ANSWER TYPE QUESTIONS

1. Smaller, lipid soluble molecules diffuse faster through cell membrane, but the movement of hydrophilic substances are facilitated by certain transporters which are chemically _____.

2. In a passive transport across a membrane, when two protein molecules move in opposite direction and independent of each other, it is called as _____.

3. Osmosis is a special kind of diffusion, in which water diffuses across the cell membrane. The rate and direction of osmosis depends upon both _____.

4. A flowering plant is planted in an earthen pot and irrigated. Urea is added to make the plant grow faster, but after some time the plant dies. This may be due to _____ .

5. Absorption of water from soil by dry seeds increases the _____, thus helping seedlings to come out of soil

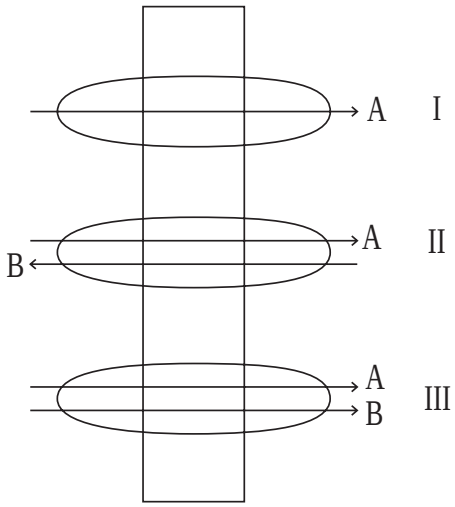
6. Water moves up against gravity and even for a tree of 20 m height, the tip receives water within two hours. The most important physiological phenomenon which is responsible for the upward movement of water is _____.

7. The plant cell cytoplasm is surrounded by both cell wall and cell membrane. The specificity of transport of substances are mostly across the cell membrane, because _____.

8. The $C_4$ plants are twice as efficient as $C_3$ plants in terms of fixing $CO_2$ but lose only _____ as much water as $C_3$ plants for the same amount of $CO_2$ fixed.

9. Movement of substances in xylem is unidirectional while in phloem it is bidirectional. Explain.

10. Identify the process occurring in I, II and III




11. Given below is a table. Fill in the gaps

| | Property | Simple diffusion | facilitated transport | Active Transport |
|---|---|---|---|---|
| i | Highly selective | _____ | Yes | _____ |
| ii | Uphill transport | _____ | _____ | Yes |
| iii | Requires ATP | _____ | _____ | _____ |

12. Define water potential and solute potential.

13. Why is solute potential always negative? Explain $y_w = y_s + y_p$

14. An onion peel was taken and
    a. Placed in salt solution for five minutes.
    b. After that it was placed in distilled water.

    When seen under the microscope what would be observed in a and b?

15. Differentiate between Apoplast and Symplast pathways of water movement. Which of these would need active transport?

16. How does most of the water moves within the root?

17. Give the location of casparian strip and explain its role in the water movement.

18. Differentiate between guttation and transpiration.

19. Transpiration is a necessary evil in plants. Explain.

20. Describe briefly the three physical properties of water which helps in ascent of water in xylem.

21. A gardener forgot to water a potted plant for a day during summer, what will happen to the plant? Do you think it is reversible? If yes, how?

22. Identify a type of molecular movement which is highly selective and requires special membrane proteins, but does not require energy.

24. Correct the statements
    a. Cells shrink in hypotonic solutions and swell in hypertonic solutions.
    b. Imbibition is a special type of diffusion when water is absorbed by living cells.
    c. Most of the water flow in the roots occurs via the symplast.

## SHORT ANSWER TYPE QUESTIONS

1. Minerals absorbed by the roots travel up the xylem. How do they reach the parts where they are needed most? Do all the parts of the plant get the same amount of the minerals?

2. If one wants to find minerals and in the form they are mobilised in the plant, how will an analysis of the exudate help?

3. From your knowledge of physiology can you think of some method of increasing the life of cut plants in a vase?

4. Do different species of plants growing in the same area show the same rate of transpiration at a particular time? Justify your answer.

5. Water is indispensable for life. What properties of water make it useful for all biological processes on the earth?

6. How is it that the intracellular levels of $K^+$ are higher than extracellular levels in animal cells?

7. Cut pieces of beetroot do not leave colour in cold water but do so in hot water. Explain.

8. In a girdled plant, when water is supplied to the leaves above the girdle, leaves may remain green for sometime then wilt and ultimately die. What does it indicate?

9. Various types of transport mechanisms are needed to fulfil the mineral requirements of a plant. Why are they not fulfilled by diffusion alone?

10. How can plants be grown under limited water supply without compromising on metabolic activities?

11. Will the ascent of sap be possible without the cohesion and adhesion of the water molecules? Explain.

12. Keep some freshly cut flowers in a solution of food colour. Wait for sometime for the dye to rise in the flower, when the stem of the flower is held up in light, coloured strands can be seen inside. Can this experiment demonstrate which tissue is conducting water up the stem?

13. When a freshly collected *Spirogyra* filament is kept in a 10% potassium nitrate solution, it is observed that the protoplasm shrinks in size:

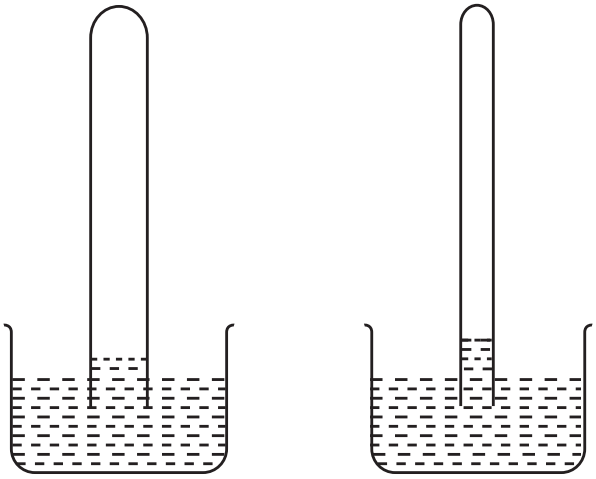
    a. What is this phenomenon called?
    b. What will happen if the filament is replaced in distilled water?

14. Sugar crystals do not dissolve easily in ice cold water. Explain.

15. Salt is applied to tennis lawns to kill weeds. How does salting tennis lawns help in killing of weeds without affecting the grass?

16. What is the chemical composition of xylem and phloem sap?

17. If you are provided with two tubes (A and B), where one is narrow and the other is relatively wider and if both are immersed in a beaker containing water as shown in the figure given on next page.




Why does B show higher water rise than A?

18. What are 'aquaporins'? How does presence of aquaporins affect osmosis?

19. ABA (Abscisic acid) is called a stress hormone.
    a. How does this hormone overcome stress conditions?
    b. From where does this hormone get released in leaves?

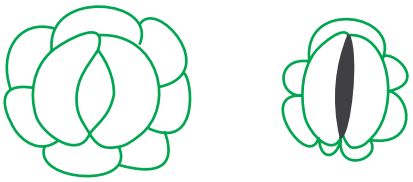
20. We know that plants are harmed by excess water. But plants survive under flooded condition. How are they able to manage excess water?

21. Differentiate between diffusion and translocation in plants.

22. How is facilitated diffusion different from diffusion?

23. Explain the mass flow hypothesis of transport in phloem.

24. Observe the diagram and answer the following;



(i) (ii)

a. Are these types of guard cells found in monocots or dicots?
b. Which of these shows a higher water content (i) or (ii)?
c. Which element plays an important role in the opening and closing of stomata?

25. Define Uniport, Symport and Antiport. Do they require energy?

## LONG ANSWER TYPE QUESTIONS

1. Minerals are present in the soil in sufficient amounts. Do plants need to adjust the types of solutes that reach the xylem? Which molecules help to adjust this? How do plants regulate the type and quantity of solutes that reach xylem?

2. Plants show temporary and permanent wilting. Differentiate between the two. Do any of them indicate the water status of the soil?

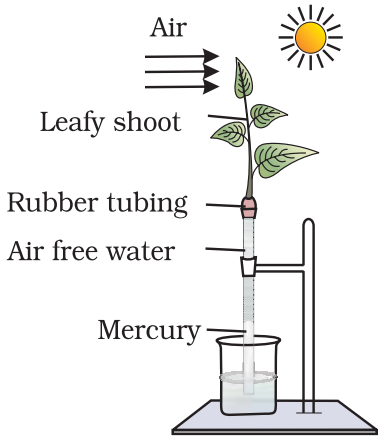
3. Which of these is a semipermeable membrane (S.P) and which is selectively permeable (S.L)
   a. Animal Bladder
   b. Plasmalemma
   c. Tonoplast
   d. Parchment membrane
   e. Egg membrane

4. Halophytes may show precell pressure very much higher than atmospheric pressure. Explain how this can happen?

5. The radio labelled carbon in carbon dioxide supplied to potato plants in an experiment was seen in the tuber eventually. Trace the movement of the labelled carbon dioxide.

6. Water molecule is very polar. Polar end of molecule attracts opposite charges on another water molecule (acts like magnet). How will you explain this property of water with reference to upward movement of water? Comment on the upward movement of water given the intermolecular hydrogen bonding in water.

7. Comment on the experimental setup




a. What does the setup demonstrate?

b. What will happen to the level of water if a blower is placed close to setup.

c. Will the mercury level fluctuate (go up / down) if phenyl mercuric acetate is sprayed on leaves?

CHAPTER 12

# MINERAL NUTRITION

## MULTIPLE CHOICE QUESTIONS

1. Which one of the following roles is not characteristic of an essential element?
   a. being a component of biomolecules
   b. changing the chemistry of soil
   c. being a structural component of energy related chemical compounds
   d. activation or inhibition of enzymes

2. Which one of the following statements can best explain the term critical concentration of an essential element?
   a. essential element concentration below which plant growth is retarded.
   b. essential element concentration below which plant growth becomes stunted.
   c. essential element concentration below which plant remains in the vegetative phase.
   d. none of the above

3. Deficiency symptoms of an element tend to appear first in young leaves. It indicates that the element is relatively immobile. Which one of the following elemental deficiency would show such symptoms?
   a. sulphur
   b. magnesium
   c. nitrogen
   d. potassium

4. Which one of the following symptoms is not due to manganese toxicity in plants?
   a. Calcium translocation in shoot apex is inhibited

b. Deficiency in both Iron and Nitrogen is induced

c. Appearance of brown spot surrounded by chlorotic veins

d. None of the above

5. Reaction carried out by $N_2$ fixing microbes include

a. $2NH_3 + 3O_2 \longrightarrow 2NO_2^- + 2H^+ + 2H_2O$ (i)

b. $2NO_2^- + O_2 \longrightarrow 2NO_3^-$ (ii)

Which of the following statements about these equations is not true

a. step (i) is carried out by *Nitrosomonas* or *Nitrococcus*

b. step (ii) is carried out by *Nitrobacter*

c. both steps (i) and (ii) can be called nitrification

d. bacteria carrying out these steps are usually photoautotrophs

6. With regard to the Biological Nitrogen Fixation by *Rhizobium* in association with soybean, which one of the following statement/ statements does not hold true.

a. Nitrogenase may require oxygen for its functioning.

b. Nitrogenase is MO- Fe protein

c. Leg-hemoglobin is a pink coloured pigment.

d. Nitrogenase helps to convert $N_2$ gas into two molecules of ammonia.

7. Match the element with its associated functions/roles and choose the correct option among given below

| | | | |
|---|---|---|---|
| A. | Boron | i. | splitting of $H_2O$ to liberate $O_2$ during photosynthesis |
| B. | Manganese | ii. | needed for synthesis of auxins |
| C. | Molybdenum | iii. | component of nitrogenase |
| D. | Zinc | iv. | Pollen germination |
| E. | Iron | v. | component of ferredoxin |

Options

a. A-i, B-ii, C-iii, D-iv, E-v

b. A-iv, B-i, C-iii, D-ii, E-v

c. A-iii, B-ii, C-iv, D-v, E-i

d. A-ii, B-iii, C-v, D-i, E-iv

8. Plants can be grown in (Tick the incorrect option)

a. soil with essential nutrients.

b. water with essential nutrients.

c. either water or soil with essential nutrients.

d. water or soil without essential nutrients.

## VERY SHORT ANSWER TYPE QUESTIONS

1. Name a plant, which accumulate silicon.
2. Mycorrohiza is a mutualistic association. How do the organisms involved in this association gain from each other?
3. Nitrogen fixation is shown by prokaryotes and not eukaryotes. Comment?
4. Carnivorous plants like *Nepenthes* and Venus fly trap have nutritional adaptations. Which nutrient do they especially obtain and from where?
5. Think of a plant which lacks chlorophyll. From where will it obtain nutrition? Give an example of such a type of plant.
6. Name an insectivorous angiosperm.
7. A farmer adds *Azotobacter* culture to soil before sowing maize. Which mineral element is being replenished?
8. What type of conditions are created by leghaemoglobin in the root nodule of a legume?
9. What is common to *Nepenthes*, *utricularia* and *Drosera* with regard to mode of nutrition?
10. Plants with zinc deficiency show reduced biosynthesis of _____.
11. Yellowish edges appear in leaves deficient in _____ .
12. Name the macronutrient which is a component of all organic compounds but is not obtained from soil.
13. Name one non-symbiotic nitrogen fixing prokaryote.
14. Rice fields produce an important green house gas. Name it.
15. Complete the equation for reductive amination

$$\text{\_\_\_\_?\_\_\_\_} + NH_4^+ + NADPH \xrightarrow{?} \text{glutamate} + H_2O + NADP$$

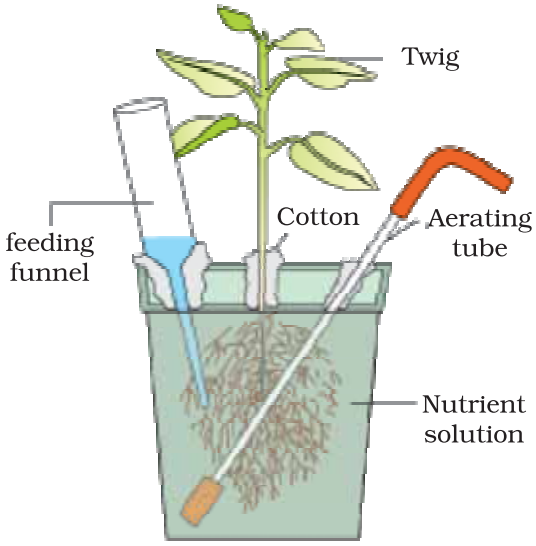
16. Excess of Mn in soil leads to defeciency of Ca, Mg and Fe. Justify.

## SHORT ANSWER TYPE QUESTIONS

1. How is sulphur important for plants? Name the aminoacids in which it is present.

2. How are organisms like *Pseudomonas* and *Thiobacillus* of great significance in nitrogen cycle?

3. Carefully observe the following figure




   a. Name the technique shown in the figure and the scientist who demonstrated this technique for the first time.
   b. Name atleast three plants for which this technique can be employed for their commercial production.
   c. What is the significance of aerating tube and feeding funnel in this setup?

4. Name the most crucial enzyme found in root nodules for $N_2$ fixation? Does it require a special pink coloured pigment for its functioning? Elaborate.

5. How are the terms 'critical concentration' and 'deficient' different from each other in terms of concentration of an essential element in plants? Can you find the values of 'critical concentration' and 'deficient' for minerals – Fe & Zn.

6. Carnivorous plants exhibit nutritional adaptation. Citing an example explain this fact.

7. A farmer adds / supplies Na, Ca, Mg and Fe regularly to his field and yet he observes that the plants show deficiency of Ca, Mg and Fe. Give a valid reason and suggest a way to help the farmer improve the growth of plants.

## LONG ANSWER TYPE QUESTIONS

1. It is observed that deficiency of a particular element showed its symptoms initially in older leaves and then in younger leaves.
   a. Does it indicate that the element is actively mobilized or relatively immobile?
   b. Name two elements which are highly mobile and two which are relatively immobile.
   c. How is the aspect of mobility of elements important to horticulture and agriculture?

2. We find that *Rhizobium* forms nodules on the roots of leguminous plants. Also *Frankia* another microbe forms nitrogen fixing nodules on the roots of non-leguminous plant *Alnus*.
   a. Can we artificially induce the property of nitrogen fixation in a plant – leguminous or non-leguminous?
   b. What kind of relationship is observed between mycorrihiza and pine trees?
   c. Is it necessary for a microbe to be in close association with a plant to provide mineral nutrition? Explain with the help of one example.

3. What are essential elements for plants? Give the criteria of essentiality? How are minerals classifieds depending upon the amount in which they are needed by the plants?

4. With the help of examples describe the classification of essential elements based on the function they perform.

5. We know that plants require nutrients. If we supply these in excess, will it be beneficial to the plants? If yes, how / If no, why?

6. Trace the events starting from the coming in contact of *Rhizobium* to a leguminous root till nodule formation. Add a note on importance of leg hemoglobin

7. Give the biochemical events occurring in the root nodule of a pulse plant. What is the end product? What is its fate?

8. Hydroponics have been shown to be a successful technique for growing of plants. Yet most of the crops are still grown on land. Why?

# CHAPTER 13

# PHOTOSYNTHESIS IN HIGHER PLANTS

## MULTIPLE CHOICE QUESTIONS

1. Which metal ion is a constituent of chlorophyll?
   a. Iron
   b. Copper
   c. Magnesium
   d. Zinc

2. Which pigment acts directly to convert light energy to chemical energy?
   a. Chlorophyll a
   b. Chlorophyll b
   c. Xanthophyll
   d. Carotenoid

3. Which range of wavelength (in nm) is called photosynthetically active radiation (PAR)?
   a. 100 - 390
   b. 390 - 430
   c. 400 - 700
   d. 760 – 100,00

4. Which light range is most effective in photosynthesis?
   a. Blue
   b. Green
   c. Red
   d. Violet

5. Chemosynthetic bacteria obtain energy from
   a. Sun
   b. Infra red rays
   c. Organic substances
   d. Inorganic chemicals

6. Energy required for ATP synthesis in PSII comes from
   a. Proton gradient
   b. Electron gradient
   c. Reduction of glucose
   d. Oxidation of glucose

7. During light reaction in photosynthesis the following are formed:
   a. ATP and sugar
   b. Hydrogen, $O_2$ and sugar
   c. ATP, hydrogen donor and $O_2$
   d. ATP, hydrogen and $O_2$ donor

8. Dark reaction in photosynthesis is called so because
   a. It can occur in dark also
   b. It does not depend on light energy
   c. It cannot occur during day light
   d. It occurs more rapidly at night

9. PEP is primary $CO_2$ acceptor in
   a. $C_4$ plants
   b. $C_3$ plants
   c. $C_2$ plants
   d. Both $C_3$ and $C_4$ plants

10. Splitting of water is associated with
   a. Photosystem I
   b. Lumen of thylakoid
   c. Both Photosystem I and II
   d. Inner surface of thylakoid membrane

11. The correct sequence of flow of electrons in the light reaction is
   a. PSII, plastoquinone, cytochromes, PSI, ferredoxin
   b. PSI, plastoquinone, cytochromes, PSII, ferredoxin
   c. PSI, ferredoxin, PSII,
   d. PSI, plastoquinone, cytochromes, PSII, ferredoxin

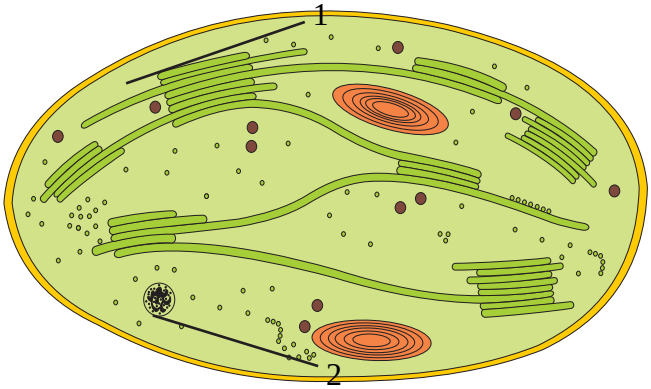
12. The enzyme that is not found in a C3 plant is
   a. RuBP Carboxylase
   b. PEP Carboxylase
   c. NADP reductase
   d. ATP synthase

13. The reaction that is responsible for the primary fixation of $CO_2$ is catalysed by
    a. RuBP carboxylase
    b. PEP carboxylase
    c. RuBP carboxylase and PEP carboxylase
    d. PGA synthase

14. When $CO_2$ is added to PEP, the first stable product synthesised is:
    a. Pyruvate
    b. Glyceraldehyde-3-phosphate
    c. Phosphoglycerate
    d. Oxaloacetate

## VERY SHORT ANSWER TYPE QUESTIONS

1. Examine the figure




    a. Is this structure present in animal cell or plant cell?
    b. Can these be passed on to the progeny? How?
    c. Name the metabolic processes taking place in the places marked (1) and (2).

2. $2H_2O \longrightarrow 2H^+ + O_2 + 4e^-$
   Based on the above equation, answer the following questions:
    a. Where does this reaction take place in plants?
    b. What is the significance of this reaction?

3. Cyanobacteria and some other photosynthetic bacteria don't have chloroplasts. How do they conduct photosynthesis?

4. a. NADP reductase enzyme is located on _____.
   b. Breakdown of proton gradient leads to release of _____.

5. Can girdling experiments be done in monocots? If yes, How? If no, why not?

6. $3CO_2$ + 9ATP + 6NADPH + Water $\longrightarrow$ glyceraldehyde 3 – phosphate + 9 ADP + 6 $NADP^+$ + 8 Pi

   Analyze the above reaction and answer the following questions:
   a. How many molecules of ATP & NADPH are required to fix one molecule of $CO_2$?
   b. Where in the chloroplast does this process occur?

7. Does moonlight support photosynthesis? Find out.

8. Some of these terms / chemicals are associated with the $C_4$ cycle. Explain.
   a. Hatch slack pathway
   b. Calvin cycle
   c. PEP carboxylase
   d. Bundle sheath cells

9. Where is NADP reductase enzyme located in the chloroplast? What is the role of this enzyme in proton gradient development?

10. ATPase enzyme consists of two parts. What are those parts? How are they arranged in the thylakoid membrane? Conformational change occur in which part of the enzyme?

11. Which products formed during the light reaction of photosynthesis are used to drive the dark reaction?

12. What is the basis for designating C3 and C4 pathways of photosynthesis?

## SHORT ANSWER TYPE QUESTIONS

1. Succulents are known to keep their stomata closed during the day to check transpiration. How do they meet their photosynthetic $CO_2$ requirements?

2. Chlorophyll 'a' is the primary pigment for light reaction. What are accessory pigments? What is their role in photosynthesis?

3. Do reactions of photosynthesis called, as 'Dark Reaction' need light? Explain.

4. How are photosynthesis and respiration related to each other?

5. If a green plant is kept in dark with proper ventilation, can this plant carry out photosynthesis? Can anything be given as supplement to maintain its growth or survival?

6. Photosynthetic organisms occur at different depths in the ocean. Do they receive qualitatively and quantitatively the same light? How do they adapt to carry out photosynthesis under these conditions?

7. In tropical rain forests, the canopy is thick and shorter plants growing below it, receive filtered light. How are they able to carry out photosynthesis ?

8. What conditions enable Rubis CO to function as an oxygenase? Explain the ensuing process.

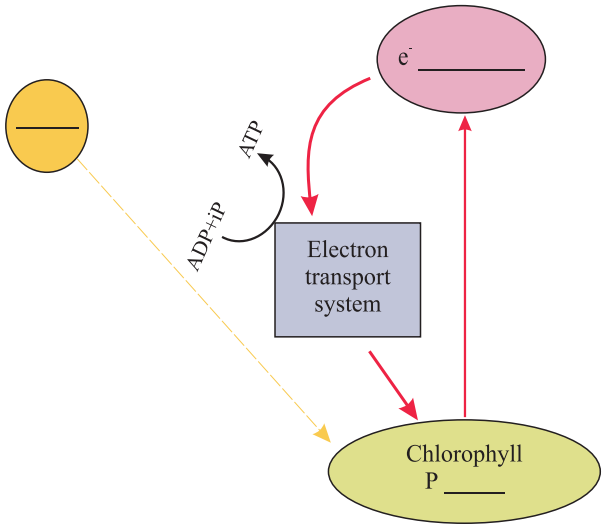
9. Why does the rate of photosynthesis decrease at higher temperatures?

10. Explain how during light reaction of photosynthesis, ATP synthesis is a chemiosmotic phenomenon.

11. Find out how Melvin Calvin worked out the complete biosynthetic pathway for synthesis of sugar.

12. Six turns of Calvin cycle are required to generate one mole of glucose. Explain.

13. Complete the flow chart for cyclic photophosphorylation of the photosystem-I



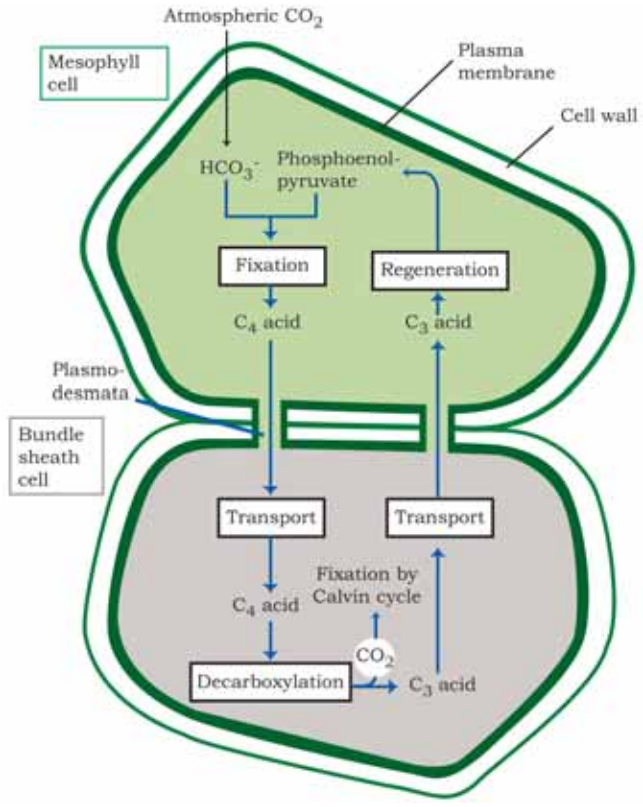

14. In what kind of plants do you come across 'Kranz' anatomy? To which conditions are those plants better adapted? How are these plants better adapted than the plants, which lack this anatomy?

15. A process is occurring throughout the day, in 'X' organism. Cells are participating in this process. During this process ATP, $CO_2$ and water are evolved. It is not a light dependent process.
    a. Name the process.
    b. Is it a catabolic or an anabolic process?
    c. What could be the raw material of this process?

16. Tomatoes, carrots and chillies are red in colour due to the presence of one pigment. Name the pigment. Is it a photosynthetic pigment?

17. Why do we believe chloroplast and mitochondria to be semi-autonomous organelle?

18. Observe the diagram and answer the following.




    a. Which group of plants exibits these two types of cells?
    b. What is the first product of $C_4$ cycle?
    c. Which enzyme is there in bundle sheath cells and mesophyll cells?

19. A cyclic process is occurring in C3 plant, which is light dependent, and needs $O_2$. This process doesn't produce energy rather it consumes energy.

    a. Can you name the given process?
    b. Is it essential for survival?
    c. What are the end products of this process?
    d. Where does it occur?

20. Suppose *Euphorbia* and Maize are grown in the tropical area.

    a. Which one of them do you think will be able to survive under such conditions?
    b. Which one of them is more efficient in terms of photosynthetic activity?
    c. What difference do you think are there in their leaf anatomy?

## LONG ANSWER TYPE QUESTIONS

1. Is it correct to say that photosynthesis occurs only in leaves of a plant? Besides leaves, what are the other parts that may be capable of carrying out photosynthesis? Justify.

2. The entire process of photosynthesis consists of a number of reactions. Where in the cell do each of these take place?

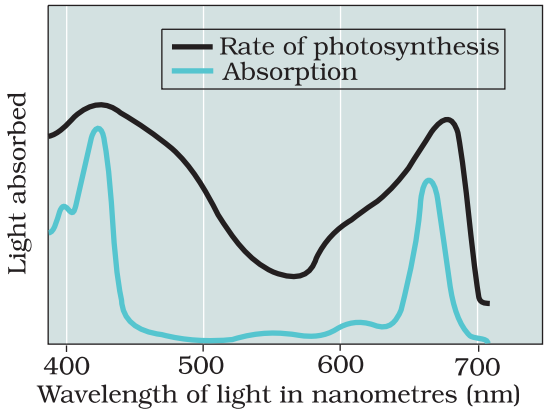
    a. Synthesis of ATP & NADPH _____
    b. Photolysis of water _____
    c. Fixation of $CO_2$ _____
    d. Synthesis of sugar molecule _____
    e. Synthesis of starch _____

3. Which property of the pigment is responsible for its ability to initiate the process of photosynthesis? Why is the rate of photosynthesis higher in the red and blue regions of the spectrum of light?

4. What can we conclude from the statement that the action and absorption spectrum of photosynthesis overlap? At which wavelength do they show peaks?

5. Under what conditions are C4 plants superior to C3?

6. In the figure given below, the black line (upper) indicates action spectrum for photosynthesis and the lighter line (lower) indicates the absorption spectrum of chlorophyll a, answer the followings:



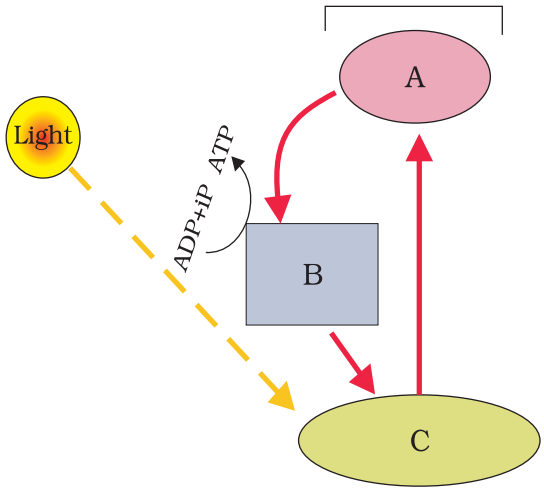

a. What does the action spectrum indicate? How can we plot an action spectrum? Explain with an example.

b. How can we derive an absorption spectrum for any substance?

c. If chlorophyll a is responsible for light reaction of photosynthesis, why do the action spectrum and absorption spectrum not overlap?

7. What are the important events and end products of the light reaction?

8. In the diagram shown below label A, B, C. What type of phosphorylation is possible in this?



9. Why is the RuBisCo enzyme more appropriately called RUBP Carboxylase-Oxygenase and what important role does it play in photosynthesis?

10. What special anatomical features are displayed by leaves of C4 plants? How do they provide advantage over the structure of C3 plants?

11. Name the two important enzymes of $C_3$ and $C_4$ pathway, respectively? What important role do they play in fixing $CO_2$?

12. Why is RuBisCo enzyme the most abundant enzyme in the world?

13. Why does not photorespiration take place in C4 plants?

# CHAPTER 16

# DIGESTION AND ABSORPTION

## MULTIPLE CHOICE QUESTIONS

1. Select what is not true of intestinal villi among followings
   a. They possess microvilli
   b. They increase the surface area
   c. They are supplied with capillaries and the lacteal vessels
   d. They only participate in digestion of fats

2. Hepato-pancreatic duct opens into the duodenum and carries
   a. Bile
   b. Pancreatic juice
   c. Both bile and pancreatic juice
   d. Saliva

3. One of the following is not a common disorder associated with digestive system
   a. Tetanus
   b. Diarrhoea
   c. Jaundice
   d. Dysentery

4. A gland not associated with the alimentary canal is
   a. Pancreas
   b. Adrenal
   c. Liver
   d. Salivary glands

5. Match the two columns and select the correct among options given

| | Column I | | Column II |
|---|---|---|---|
| A. | Biomacromolecules of food | i. | Alimentary canal and associated gland |
| B. | Human digestive system | ii. | Embedded in jawbones. |

| | | | |
|---|---|---|---|
| C. | Stomach | iii. | Outer wall of visceral organs |
| D. | Thecodont | iv. | Converted into simple substances |
| E. | Serosa | v. | J-shaped bag like structure |

Options:

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

6. Match the two columns and select the right one among options given

| Column I | | Column II | |
|---|---|---|---|
| A. | Duodenum | i. | A cartilaginous flap |
| B. | Epiglottis | ii. | Small blind sac |
| C. | Glottis | iii. | 'U' shaped structure emerging from the stomach |
| D. | Caecum | iv. | Opening of wind pipe |

Options

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

7. Match the enzyme with their respective substrate and choose the right one among options given

| | Column I | | Column II |
|---|---|---|---|
| A. | Lipase | i. | Dipeptides |
| B. | Nuclease | ii. | Fats |
| C. | Carboxypeptidase | iii. | Nucleic acids |
| D. | Dipeptidases | iv. | Proteins, peptones and proteoses. |

Options:

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

8. Dental formula in human beings is

a. $\frac{3\ 2\ 2\ 3}{3\ 2\ 2\ 3}$
b. $\frac{2\ 1\ 2\ 3}{2\ 1\ 2\ 3}$

c. 1 2 3 2
1 2 3 2
d. 2 2 3 3
2 2 3 3

9. Liver is the largest gland and is associated with various functions, choose one which is not correct
   a. Metabolism of carbohydrate
   b. Digestion of fat
   c. Formation of bile
   d. Secretion of hormone called gastric

10. Mark the right statement among the following
   a. Trypsinogen is an inactive enzyme
   b. Trypsinogen is secreted by intestinal mucosa
   c. Enterokinase is secreted by pancrease
   d. Bile contains trypsin

## VERY SHORT ANSWER TYPE QUESTIONS

1. The food mixes thoroughly with the acidic gastric juice of the stomach by the churning movements of its muscular wall. What do we call the food then?
2. Trypsinogen is an inactive enzyme of pancreatic juice. An enzyme, enterokinase, activates it. Which tissue/ cells secrete this enzyme?/ How is it activated?
3. In which part of alimentary canal does absorption of water, simple sugars and alcohol takes place?
4. Name the enzymes involved in the breakdown of nucleotides into sugars and bases?
5. Define digestion in one sentence.
6. What do we call the type of teeth attachment to jaw bones in which each tooth is embedded in a socket of jaws bones?
7. Stomach is located in upper left portion of the abdominal cavity and has three major parts. Name these three parts.
8. Does gall bladder make bile?
9. Correct the following statements by deleting one of entries (given in bold).

a. Goblet cells are located in the intestinal mucosal epithelium and secrete **chymotrypsin / mucus**.

b. Fats are broken down into di- and monoglycerides with the help of **amylase / lipases**.

c. Gastric glands of stomach mucosa have **oxyntic cell** / **chief cells** which secrete HCl.

d. Saliva contains enzymes that digest **starch** / **protein**.

## SHORT ANSWER TYPE QUESTIONS

1. What is pancreas? Mention the major secretions of pancreas that are helpful in digestion.
2. Name the part of the alimentary canal where major absorption of digested food takes place. What are the absorbed forms of different kinds of food materials?
3. List the organs of human alimentary canal and name the major digestive glands with their location.
4. What is the role of gall bladder? What may happen if it stops functioning or is removed?
5. Correct the statement given below by the right option shown in the bracket against them
   a. Absorption of amino acids and glycerol takes place in the. (small intestine / large intestine)
   b. The faeces in the rectum initiate a reflex causing an urge for its removal. (neural / hormonal)
   c. Skin and eyes turn yellow in infection. (liver / stomach)
   d. Rennin is a proteolytic enzyme found in gastric juice in (infants / adults).
   e. Pancreatic juice and bile are released through. (intestine-pancreatic / hepato- pancreatic duct)
   f. Dipeptides, disaccharides and glycerides are broken down into simple substances in region of small intestine. (jejunum / duodenum)
6. What are three major types of cells found in the gastric glands? Name their secretions.
7. How is the intestinal mucosa protected from the acidic food entering from stomach?
8. How are the activities of gastro-intestinal tract regulated?

9. Distinguish between constipation and indigestion. Mention their major causes.
10. Describe the enzymatic action on fats in the duodenum.

## LONG ANSWER TYPE QUESTIONS

1. A person had roti and dal for his lunch. Trace the changes in those during its passage through the alimentary canal.

2. What are the various enzymatic types of glandular secretions in our gut helping digestion of food? What is the nature of end products obtained after complete digestion of food?

3. Discuss mechanisms of absorption.

4. Discuss the role of hepato – pancreatic complex in digestion of carbohydrate, protein and fat components of food.

5. Explain the process of digestion in the buccal cavity with a note on the arrangement of teeth.

# Chapter 18

# Body Fluids and Circulation

## MULTIPLE CHOICE QUESTIONS

1. Mark, among the following a cell which does not exhibit phagocytotic activity
   a. Monocytes
   b. Neutrophil
   c. Basophil
   d. Macrophage

2. One of the common symptoms observed in people infected with Dengue fever is
   a. Significant decrease in RBC count
   b. Significant decrease in WBC count
   c. Significant decrease in platelets count
   d. Significant increase in platelets count

3. Which among the followings is correct during each cardiac cycle?
   a. The volume of blood pumped out by the Rt and Lt ventricles is same.
   b. The volume of blood pumped out by the Rt and Lt ventricles is different
   c. The volume of blood received by each atrium is different
   d. The volume of blood received by the aorta and pulmonary artery is different

4. Cardiac activity could be moderated by the autonomous neural system. Tick the correct answer:
   a. The parasympathetic system stimulates heart rate and stroke volume
   b. The sympathetic system stimulates heart rate and stroke volume
   c. The parasympathetic system decreases the heart rate but increase stroke volume
   d. The sympathetic system decreases the heart rate but increase stroke volume

5. Mark the pair of substances among the following which is essential for coagulation of blood.
   a. Heparin and calcium ions
   b. Calcium ions and platelet factors
   c. Oxalates and citrates
   d. Platelet factors and heparin

6. ECG depicts the depolarisation and repolarisation processes during the cardiac cycle. In the ECG of a normal healthy individual one of the following waves is not represented.
   a. Depolarisation of atria
   b. Repolarisation of atria
   c. Depolarisation of ventricles
   d. Repolarisation of ventricles

7. Which one of the following type of cells lack nucleus?
   a. RBC
   b. Neutrophils
   c. Eosinosphils
   d. Monocytes

8. Which one of the following blood cells is involved in antibody production.
   a. B-Lymphocytes
   b. T-Lymphocytes
   c. RBC
   d. Neutrophils

9. The cardiac impulse is initiated and conducted further upto ventricle. The correct sequence of conduction of impulse is

| | | | | |
|---|---|---|---|---|
| a. | S A Node | A V Node | Purkinje fiber | A V Bundle |
| b. | S A Node | Purkinje fiber | A V Node | A V Bundle |
| c. | S A Node | A V Node | A V Bundle | Purkinje fiber |
| d. | S A Node | Purkinje fiber | A V Bundle | A V Node |

10. The cells involved in inflammatory reactions are
   a. Basophils
   b. Neutrophils
   c. Eosinophils
   d. Lymphocytes

11. The second heart sound (dubb) is associated with the closure of
    a. Tricuspid valve
    b. Semilunar valves
    c. Bicuspid valve
    d. Tricuspid and bicuspid valves.

12. Which of the following correctly explains a phase/ event in cardiac cycle in a standard electrocardiogram?
    a. QRS complex indicates atrial contraction.
    b. QRS complex indicates ventricular contraction.
    c. Time between S and T represents atrial systole.
    d. P-wave indicates beginning of ventricular contraction.

13. Which of the following statements is incorrect?
    a. A person of 'O' blood group has anti 'A' and anti 'B' antibodies in his blood plasma.
    b. A person of 'B' blood group can't donate blood to a person of 'A' blood group.
    c. Blood group is designated on the basis of the presence of antibodies in the blood plasma.
    d. A person of AB blood group is universal recipient.

14. What would be the cardiac output of a person having 72 heart beats per minute and a stroke volume of 50 ml?
    a. 360 mL
    b. 3600 mL
    c. 7200 mL
    d. 5000 mL

15. Match the terms given under Column 'A' with their functions given under Column 'B' and select the answer from the options given below:

| | Column A | | Column B |
|---|---|---|---|
| A. | Lymphatic System | i. | Carries oxygenated blood |
| B. | Pulmonary vein | ii. | Immune Response |
| C. | Thrombocytes | iii. | To drain back the tissue fluid to the circulatory system |
| D. | Lymphocytes | iv. | Coagulation of blood |

Options:

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

16. Read the following statements and choose the correct option

Statement 1 : Atria receive blood from all parts of the body which subsequently flows to ventricles.

Statement 2 : Action potential generated at sino-atrial node passes from atria to ventricles.

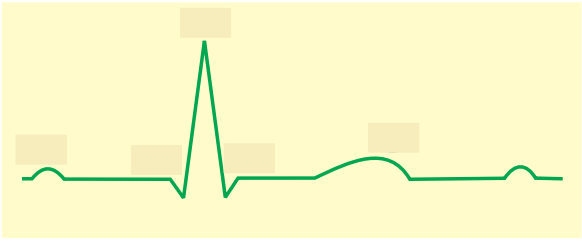
a. Action mentioned in Statement 1 is dependent on action mentioned in Statement 2
b. Action mentioned in Statement 2 is dependent on action mentioned in Statement 1
c. Action mentioned in Statements 1 and 2 are independent of each other.
d. Action mentioned in Statements 1 and 2 are synchronous.

## VERY SHORT ANSWER TYPE QUESTIONS

1. Name the blood component which is viscous and straw coloured fluid.

2. Complete the missing word in the statement given below:
   a. Plasma without _____ factors is called serum.
   b. _____ and monocytes are phagocytic cells.
   c. Eosinophils are associated with _____ reactions.
   d. _____ ions play a significant role in clotting.
   e. One can determine the heart beat rate by counting the number of _____ in an ECG.

3. Given below is the diagrammatic representation of a standard ECG. Label its different peaks.



4. Name the vascular connection that exists between the digestive tract and liver.

5. Given below are the abnormal conditions related to blood circulation. Name the disorders.
   a. Acute chest pain due to failure of $O_2$ supply to heart muscles
   b. Increased systolic pressure

6. Which coronary artery diseases is caused due to narrowing of the lumen of arteries?

7. Define the following terms and give their location?
   a. Purkinje fibre
   b. Bundle of His

8. State the functions of the following in blood
   a. Fibrinogen
   b. Globulin
   c. Neutrophils
   d. Lymphocytes

9. What physiological circumstances lead to erythroblastosis foetalis?

10. Explain the consequences of a situation in which blood does not coagulate.

11. What is the significance of time gap in the passage of action potential from sino-atrial node to the ventricle?

12. How will you interpret an electrocardiogram (ECG) in which time taken in QRS complex is higher.

## SHORT ANSWER TYPE QUESTIONS

1. The walls of ventricles are much thicker than atria. Explain.

2. Differentiate between
   a. Blood and Lymph
   b. Basophils and Eosinophils
   c. Tricuspid and bicuspid valve

3. Briefly describe the followings:
   a. Anaemia
   b. Angina Pectoris

c. Atherosclerosis
d. Hypertension
e. Heart failure
f. Erythroblastosis foetalis

4. Explain the advantage of the complete partition of ventricle among birds and mammals and hence leading to double circulation.

5. What is the significance of hepatic portal system in the circulatory system?

6. Explain the functional significance of lymphatic system?

7. Write the features that distinguish between the two
   a. Plasma and Serum
   b. Open and closed circulatory system
   c. Sino-atrial node and Atrio-ventricular node

8. Thrombocytes are essential for coagulation of blood. Comment.

9. Answer the following
   a. Name the major site where RBCs are formed.
   b. Which part of heart is responsible for initating and maintaining its rhythmic activity?
   c. What is specific in the heart of crocodiles among reptilians?

## LONG ANSWER TYPE QUESTIONS

1. Explain Rh-incompatibility in humans.
2. Describe the events in cardiac cycle. Explain “double circulation”.
3. Explain different types of blood groups and donor compatibility by making a table.
4. Write short note on the following
   a. Hypertension
   b. Coronary Artery Disease
5. In the diagrammatic presentation of heart given below, mark and label, SAN, AVN, AV bundles, bundle of His and Purkinje fibres.