

Meghalaya Board
Class XI
Bio-Botany
Sample Paper 1 – Solution

GROUP A

1. Sepals protect the flower in the bud stage.
2. It shows that carbon dioxide is necessary for photosynthesis
3. A leaf of silk cotton is palmately compound because the petiole bears leaflets at the tip of the petiole like the fingers of the palm.
4. It proves that chlorophyll is necessary for photosynthesis.
5. When the vascular bundle lacks cambium, it is referred to as closed.
6. Ubiquinol

GROUP – B

7. The mutually beneficial or symbiotic association of a fungus with the root of a higher plant is known as mycorrhiza.
The plant is immensely benefited from the association with the fungus. Fungal hyphae take part in the absorption of water, dissolving essential minerals present in the organic debris and handing over the same to plant, absorbing inorganic salts present in the soil and producing various growth promoting substances. The fungus in return is dependent on the higher plant for shelter and food.

Or

Gemmae are green, multicellular, asexual buds which develop in small receptacles called gemma cups located on the thallus.

Mature gemmae separate from their stalks and get dispersed by water and animals. On germination, each gemma gives rise to a new thallus.

8. The tracheids and vessels are collectively referred to as the tracheary elements.
 - (a) Tracheids: The tracheids are elongated dead cells with hard lignified walls, wide lumen and narrow end walls. The inner walls of tracheids have various types of thickenings for mechanical strength.
 - (b) Vessels: They are much elongated tubes which are closed at either end and are formed by the union of several short, wide and thickened cells called vessel elements or members.

Each cell of the vessel elements is lignified with a large cavity and devoid of protoplasm.

The end walls of vessel elements are transverse or oblique. They are often completely dissolved; the condition is called a simple perforation plate. In few cases, there are multiple perforation plates.

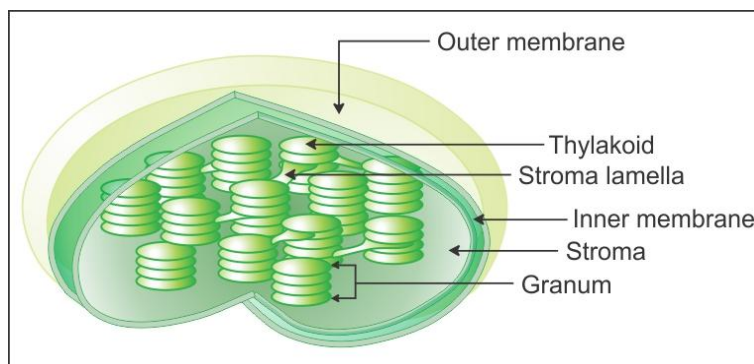
9. Ferns which produce two kinds of spores—microspores and megaspores—are called heterosporous ferns. Examples: Selaginella, Salvinia
10. Modifications of tap root for storage:
- Conical: The base of the root is broad and gradually tapers towards the apex. Example: Carrot
 - Fusiform: The fusiform fleshy root is like a spindle, i.e. thickest in the middle and narrow towards both base and apex. Example: Radish

GROUP - C

11. Double fertilisation is unique to angiosperms.

In this phenomenon, two male gametes are discharged by a pollen tube into the embryo sac of an ovule. One male gamete fuses with the female gamete to form a zygote. This fusion is called syngamy. A second male gamete fuses with the secondary nucleus to form the primary endosperm nucleus. This is called double fertilisation.

- 12.



Or

A photosystem is a group of pigments which are involved in photosynthesis. These pigment systems have a reaction centre to which light energy absorbed by the accessory pigments is passed. There are two photosystems—I and II. A chlorophyll a molecule acts as the reaction centre. It is called P700 in PS I and P680 in PS II.

13. The factors affecting the rate of diffusion:

- i. Temperature: The rate of diffusion increases with the increase in temperature because the kinetic energy of diffusing particles also increases with increasing temperature.
- ii. Density of diffusing substance: The rate of diffusion is inversely proportional to the square root of the density of the diffusing substance.
- iii. Medium in which diffusion occurs: The rate of diffusion decreases in a concentrated medium. Example: A gas diffuses more rapidly through vacuum than air.

GROUP - D

14.

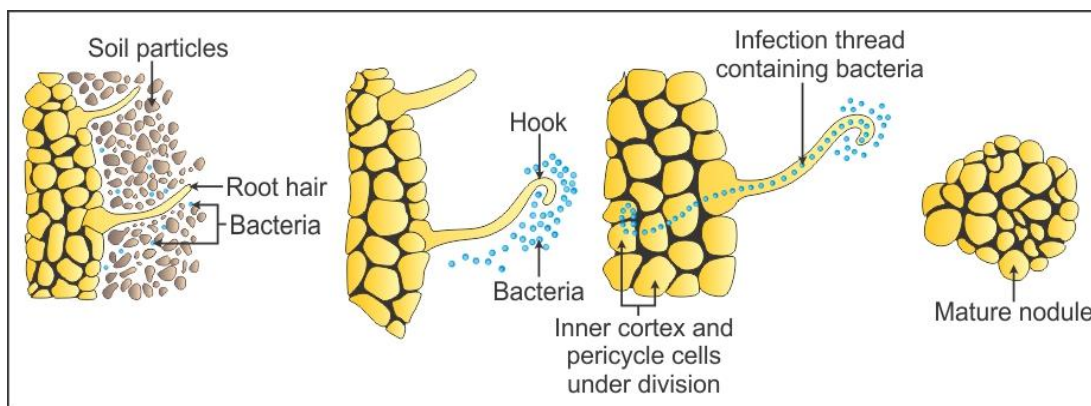
- (a) Auxin fails to cause growth of intact plants because the required amount of auxin is already present in such plants and they do not need an external supply of auxins.
- (b) Vitamins have no specific influence on the growth of plants. They are essential dietary factors needed by an organism in small amounts. They influence the growth and metabolism through direct nutritive effects.
- (c) Short-day plants need a long and uninterrupted dark period for flowering. Therefore, it is appropriate to call a short-day plant a long-night plant.
- (d) Plants belonging to halophytes and growing in marshy lands face a great difficulty in seed germination due to the presence of a high concentration of salt in water. These plants solve this problem by vivipary.
- (e) Gibberellins require the presence of meristematic cells to cause elongation growth. Therefore, they do not enhance the growth of isolated plant parts if meristematic cells are absent.

Or

- i. 1. Mesophyll cells 2. Mesophyll chloroplasts
Cells of bundle sheath 4. Bundle sheath chloroplasts
- ii. Kranz anatomy is shown in the given diagram. This anatomy occurs in the leaves of C_4 plants in which the bundle sheath cells are arranged in a wreath-like manner.
- iii. Structure and function of mesophyll chloroplasts: Mesophyll chloroplasts are granal and contain thylakoids which are stacked to form grana. These chloroplasts are involved in the light reaction with the evolution of molecular O_2 . CO_2 is fixed by phosphoenol pyruvic acid to form 4 carbon oxaloacetic acid. Structure and function of bundle sheath chloroplasts: These chloroplasts are agranal, i.e. grana are absent and the thylakoids are present only as stroma lamellae. The C_3 cycle occurs in bundle sheath chloroplasts in which CO_2 is fixed by RuBP catalysed by the enzyme RuBisCO (RuBisCO is present only in bundle sheath chloroplasts). CO_2 is made available by decarboxylation of 4 carbon organic acid (malic acid).

15. Steps in the development of root nodules:

- (a) The roots of legumes secrete flavonoids and betaines which attract Rhizobium bacteria.
- (b) The bacteria collect over the root hair and release Nod factors which cause curling of root hair.
- (c) The enzymes from the bacteria degrade the parts of root hair cell wall which produces a thread-like structure called the infection thread.
- (d) The bacteria multiply and invade the infection thread and finally reach up to the inner cortex where they enter the cells and divide to form a knob-like protuberance called root nodule.



16.

i.1. Root hair, 4. Endodermis

Function of parts 1 and 4:

(a)

1. Root hair: The root hair is unicellular elongations of epidermal cells. Each root hair is about 0.05–15 mm long and 10μ wide. It has a central vacuole filled with cell sap which determines the osmotic relations of the cell. Root hair are specialised for absorption of water.
4. Endodermis: It is the inner boundary of the cortex and is single layered. It is made of barrel-shaped cells which do not enclose intercellular spaces. Endodermis is called the starch sheath in stems. The major function of endodermis in roots is to prevent the loss of water and minerals.

ii. Pathway 2 – Symplast

In this pathway, water moves from cell to cell through the living cytoplasm and plasmodesmata.

Pathway 3 – Apoplast

In apoplast, movement of water takes place through non-living cell walls and intercellular spaces.