



MARCH -2025 (TS)

PREVIOUS PAPERS**IPE: MARCH-2025 (TS)**

Time : 3 Hours

JR.BOTANY

Max.Marks : 60

SECTION-A**I. Answer ALL the following VSAQ:****10 × 2 = 20**

1. What is flora?
2. Who proposed five kingdom classification? How many kingdoms of this classification contain eukaryotes?
3. Why is Mendel considered as the father of Genetics?
4. What is meant by parthenocarpic fruit? How is it useful?
5. What is the morphology of cup like structure in Cyathium? In which family it is found?
6. Name the type of pollination mechanism found in members of Fabaceae.
7. What are the vacuoles? State their functions.
8. Give one example for each of amino acids, sugars, nucleotides and fatty acids.
9. At what stage of cell cycle does DNA synthesis occur?
10. Define population and community.

SECTION-B**II. Answer any SIX of the following SAQs:****6 × 4 = 24**

11. Write the role of Fungi in our daily life.
12. What is heterospory? Briefly comment on its significance. Give two examples.
13. Distinguish between asexual and sexual reproduction.
Why is vegetative reproduction also considered as a type of asexual reproduction?
14. Describe the essential organs of Solanaceae.
15. Describe the structure and function of power houses of cell.
16. Mention the key features of meiosis.
17. What is the difference between lenticels and stomata?
18. List out the anatomical adaptations of hydrophytes.

SECTION-C**II. Answer any TWO of the following SAQs:****2 × 8 = 16**

19. Define root modification. Explain how root is modified to perform different functions.
20. Write a brief account on agents of pollination.
21. Describe the internal structure of a dicot Root.

IPE TS MARCH-2025

ANSWERS

SECTION-A

1. What is flora?

A: **Flora** is the actual account of habitat, distribution and systematic listing of plants of a given area.

2. Who proposed five kingdom classification? How many kingdoms of this classification contain eukaryotes?

A: 1) R.H. Whittaker proposed five kingdom classification.
2) Four kingdoms contain eukaryotes. They are Protista, Fungi, Plantae and Animalia

3. Why is Mendel considered as the father of Genetics?

A: 1) **Mendel** conducted hybridisation experiments on pea plants and also introduced the laws of inheritance in 1866.
2) After this a considerable progress was seen in Botany. So, he is declared as **Father of Genetics**.

4. What is meant by parthenocarpic fruit? How is it useful?

A: 1) When a fruit is formed without fertilization of ovary, it is called parthenocarpic fruit.
2) It is useful in the Juice industries for commercial production of seedless fruits. **Ex:** Banana.

5. What is the morphology of cup like structure in Cyathium? In which family it is found?

A: 1) In Cyathium, involucre of bracts unite to form a cup like structure.
2) It is found in the family Euphorbiaceae.

6. Name the type of pollination mechanism found in members of Fabaceae.

A: The pollination mechanism found in Fabaceae is **Piston mechanism**.

7. What are gas vacuoles? State their functions.

A: 1) **Gas vacuoles:** These are the aggregates of number of small hollow cylindrical vesicles found in the cytoplasm of the 'floating purple and green photosynthetic' bacteria.
2) **Functions:**

- They store reserve materials in prokaryotes.
- They help the bacteria to float on the surface of water.

8. Give one example for each of amino acids, sugars, nucleotides and fatty acids.

- A:**
- | | |
|----------------|---------------------------------------|
| 1) Amino acids | Ex: <u>G</u> lycine |
| 2) Sugars | Ex: <u>G</u> lucose |
| 3) Nucleotide | Ex: <u>A</u> denylic acid |
| 4) Fatty acids | Ex: <u>L</u> ecithin, Glycerol |
-

9. At what stage of cell cycle does DNA synthesis occur?

- A:** S-phase or Synthesis phase of interphase.
-

10. Define population and community.

- A:**
- 1) Population** is a group of similar individuals, belonging to same species found in an area.
 - 2) Community** is an assemblage of several populations belonging to different species occurring in an area.
- BABY BULLET

SECTION-B

11. Write the role of Fungi in our daily life.

A: Role of Fungi in our daily life:

I) Advantages of Fungi:

- 1) Yeast is the unicellular fungus. It is used in the commercial preparation of bread and beer.
- 2) The Antibiotic 'penicillin' is obtained from a fungus called **penicillium**.
- 3) Mushrooms (Agaricus), morels and truffles are the common edible fungi.

II) Disadvantages of Fungi:

- 1) Some fungi cause diseases in plants.
- 2) **Red rot disease** on sugar cane is due to **Collectotrichum**.
- 3) **Rust disease** on wheat is due to **Puccinia**.

12. What is heterospory? Briefly comment on its significance. Give two examples.

A: I) **Heterospory** : Production of **two kinds of spores** on the same plant is called **heterospory**.

Ex : Selaginella, Salvinia

II) Significance:

- 1) Two types of spores are seen
 - i) Microspores - germinate into male gametophyte
 - ii) Megaspores - germinate into female gametophyte.
- 2) Sex organ in male gametophyte is Antheridia. It gives antherozoids as male gametes.
- 3) Sex organ in female gametophyte is Archegonia. It produces egg as female gametes.
- 4) Fusion of Antherozoids to egg results zygote.
- 5) Development of zygote into young embryo takes place within the female gametophyte.
- 6) This event is precursor to the seed habit. This is considered as important step in evolution.

13. Distinguish between asexual and sexual reproduction. Why is vegetative reproduction also considered as a type of asexual reproduction?

A:	Asexual reproduction	Sexual reproduction
	1) It involves single parent only. 2) Gametes are not formed. 3) No gametic fusion. 4) No fertilization 5) Off springs are identical and same as parents.	1) It involves two parents. 2) Male and female gametes are formed. 3) Gametic fusion occurs. 4) Fertilization takes place. 5) Variations occur in sexual reproduction. So off springs are not identical to that of parents.

14. Describe the essential organs of Solanaceae.

A: 1) **Essential organs of Solanaceae are Androecium and Gynoecium:**

- 2) Androecium:** There are five epipetalous stamens, alternating with the petals. Anthers are ditheous, basifixed and introse.
- 3) Gynoecium:** The ovary is superior, bicarpellary and syncarpous. It is usually bilocular but occasionally unilocular. It is oblique in position and anterior carpel to the left is at an angle of 45° . There are numerous ovules arranged on axile placentation on swollen placenta.
- 4) The style is terminal and stigma is capitate.**

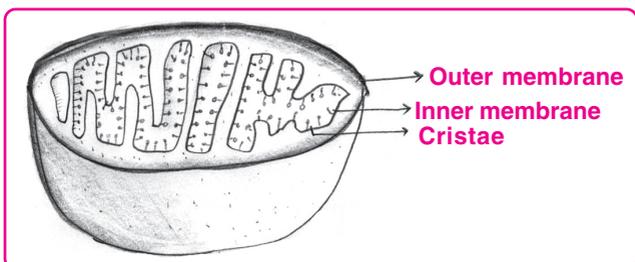
15. Describe the structure and function of power houses of cell.

A: I) **Structure:**

- 1) Mitochondria** are the **Power houses of cell.**
- These are double membrane bond structures.
- Typically, a mitochondria is sausage shaped or cylindrical shaped.
- The inner membrane divides its lumen into two compartments.
- The inner compartment is called matrix.
- The matrix contains SS circular DNA, 70S ribosomes and RNA.
- The outer membrane forms the continuous limiting boundary.
- The inner membrane forms a number of infoldings called cristae.
- They increase the surface area.

II) **Functions:**

- Sites of Aerobic respiration.
- Producers of cellular energy in the form of ATP. [Hence called Power houses of cell]



STRUCTURE OF MITOCHONDRIA

16. Mention the key features of meiosis.

A: Key features of Meiosis:

- 1) Meiosis involves two sequential cycles of nuclear and cell division called meiosis I and Meiosis II, but only a single cycle of DNA replication.
- 2) Meiosis I is initiated after the parental chromosomes have replicated to produce identical sister chromatids at the S-Phase.
- 3) Meiosis involves pairing of homologous chromosomes and recombination between them.
- 4) Four haploid cells are formed at the end of meiosis II. Meiotic events can be grouped under the following phases.

Meiosis I	Meiosis II
Prophase I	Prophase II
Metaphase I	Metaphase II
Anaphase I	Anaphase II
Telophase I	Telophase II

17. What is the difference between lenticels and stomata?

A:

Lenticels	Stomata
1) Lenticels are the aerating pores present on old stems and old aerial roots.	1) Stomata are present on leaves and young stems.
2) They contain closely arranged parenchymatous cells.	2) Each stomata is guarded by two guard cells which contain chloroplasts.
3) Lenticels are meant for the exchange of gases between the outer atmosphere and the internal tissues of woody organs.	3) Stomata help in transpiration and respiration of plants.
4) Opening and closing mechanisms are absent in lenticels.	4) Opening and closing mechanisms are present in stomata.
5) Lenticels do not conduct photosynthesis.	5) Guard cells conduct photosynthesis.

18. List out the anatomical adaptations of hydrophytes.

A: Anatomical adaptations of hydrophytes:

- 1) Cuticle is totally absent in the submerged parts of the plant.
- 2) It may be present in the form of a thin film on the surface of parts exposed to atmosphere.
- 3) The epidermis is composed of thin walled cells and it **performs absorption**.
- 4) The epidermal cells contain **chloroplasts and help in assimilation**.
- 5) Stomata are **totally absent** in submerged hydrophytes.
- 6) Gaseous exchange takes place directly through thin walled cells by **diffusion**.
- 7) In plants with floating leaves, the **leaves are epistomatous**.
- 8) All hydrophytes contain aerenchyma that helps in gaseous exchange and buoyancy.

SECTION-C

19. Define root modification. Explain how root is modified to perform different functions.

A: Root: The under ground part of the flowering plant is called root.

Roots are of two types: (i) Tap Roots (ii) Fibrous Roots

Root modification: Roots in some plants change their shape and structure to perform some additional functions other than absorption and conduction.

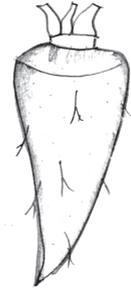
Such modification of roots is called Root Modification.

Types of Root modifications and their Functions:

1) Storage roots:

- i) Roots of some plants **store food material**.
- ii) Due to this, the roots become swollen.

Ex: Tap roots in carrot; Adventitious roots in sweet potato;
Fibrous roots in Asparagus.

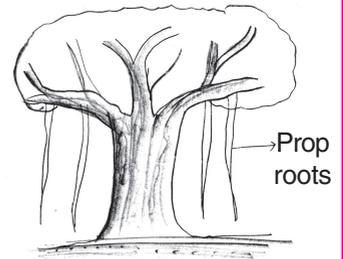


Carrot

2) Proproots :

- i) Roots of some trees arise from heavy branches.
- ii) They hang in air and enter into soil.
- iii) They give **pillar like support** to the heavy branches.

Ex: Banyan Tree

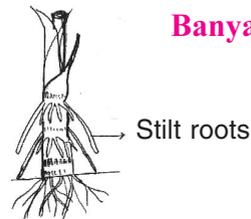


Banyan Tree

3) Stilt roots:

- i) Roots of some plants arise from the lower nodes of the stem.
- ii) They give **mechanical support** to the plant.

Ex: Sugarcane and maize

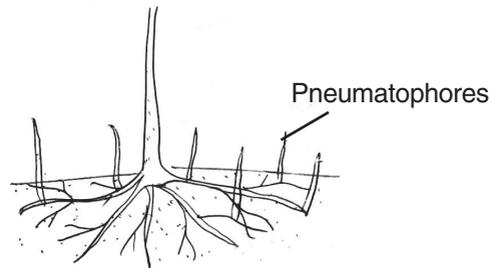


Sugarcane

4) Respiratory roots(Pneumatophores):

- i) Roots of some plants grow in swampy area.
- ii) They grow vertically upwards into the air.
- iii) Their openings on their surfaces help to **get oxygen for respiration**.

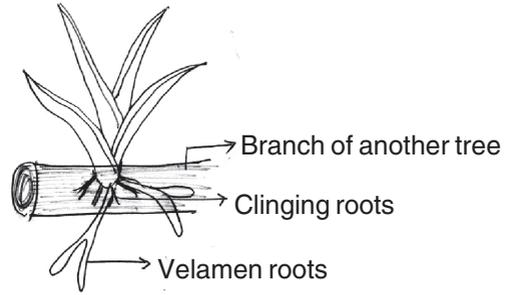
Ex: Avicennia and Rhizophora



5) Velamen roots:

- i) Roots of some plants are found on the branches of some other plants (epiphytes).
- ii) The function of these adventitious roots is to **absorb moisture from atmosphere.**

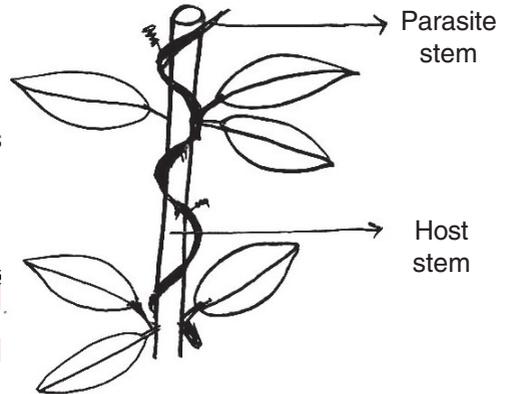
Ex: Vanda.

**6) Parasite roots(or) Haustorial roots :**

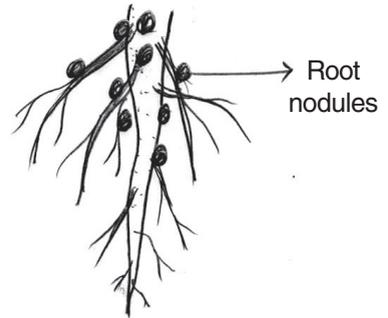
- i) The plants that depend upon some other plants for their **food and water** are called parasite plants.
- ii) They are two types.

a) **Complete parasites Ex: Cuscuta, Rafflesia**

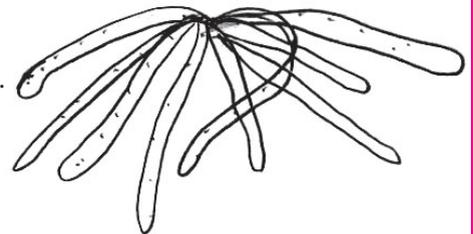
b) **Partial parasites: Ex: Viscum, Striga.**

**7) Nodular roots:**

- i) Roots having nodules are called nodular roots.
- ii) These are present in the members of Fabaceae.
- iii) Rhizobium bacteria live in the root nodules and they **fix atmospheric nitrogen.**
- iv) **Ex: Ground Nut**

**8) Photosynthetic roots:**

- i) Roots of some plants become chlorophyllous (green).
- ii) In these plants, normal, green leaves are reduced.



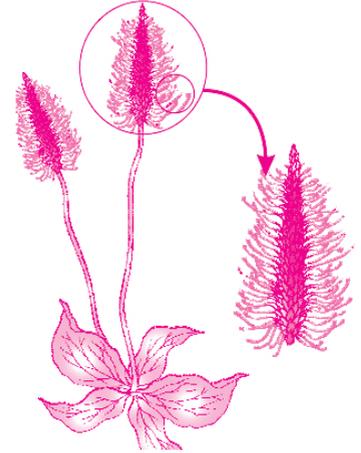
Taeniophyllum

20. Write a brief account on agents of pollination.

A: **Pollination** in plants occurs by two abiotic (wind and water) and one biotic (animals) agents.

1) Wind pollination: The pollination by wind is called **Anemophily**. Wind pollinated flowers produce large amount of pollen, the pollengrains are light and non sticky.

- The flowers possess well exposed stamens, so that the pollen is easily dispersed into wind current. Large feathery stigmas are present to trap the pollen easily. Numerous flowers are packed into an inflorescence.
- The bunch of silky hairs of corn cob are nothing but the stigmas and styles which hang in air to trap the pollengrains. Wind pollination is common in grasses.

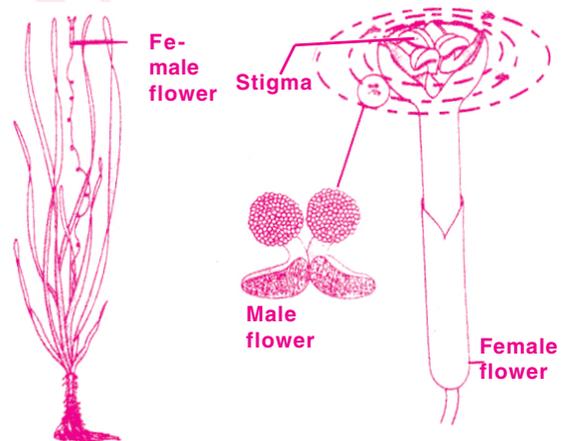


A wind pollinated plant showing compact inflorescence and well exposed stamens

2) Water pollination : Pollination by water is called **Hydrophily**. It is of two types.

a) Epiphydrophily: Pollination at the surface level of water is called epiphydrophily. **Ex:** Vallisneria.

- The female flowers reach the surface of water by its long stalk and the male flowers are released on the surface of water.
- They are carried by water current to reach the female flowers and the stigma to perform pollination.



Pollination by water in Vallisneria

b) Hypohydrophily: Pollination below the surface level of water is called hypohydrophily. Plants like zosteria and their flowers remain submerged in water. Pollen grains are long, ribbon like and are carried inside the water and reach the stigma to achieve pollination.

3) Zoophily: Pollination by the agency of animals is called zoophily. These flower may be with attractive colours, or they may produce nectar or fragrancy, pollengrains and may be sticky.

- Pollination by **insects** is called **entamophily**.
- Pollination by **birds** is called **ornithophily**.
- Pollination by **bats** is called **chiropterophily**.
- Pollination by **squirrels** is called **therophily**.
- Pollination by **snakes** is called **ophiophily**.

21. Describe the internal structure of a Dicot Root.

A: T.S of Dicot Root shows three main parts. They are I) Epidermis II) Cortex III) Stele

I) Epidermis:

- 1) It is the outermost layer
- 2) It is made up of single layered rectangular cells.
- 3) It contains root hairs. They help in absorption of water.
- 4) Cuticle and stomata are absent.
- 5) Epidermis is useful in the protection of inner tissue.

II) Cortex: The Region between epidermis and stele is called cortex. It has three subparts.

1) Exodermis:

- i) It is 2 to 3 layered thick suberised cells.
- ii) It prevents the exit of water from cortex.

2) Parenchyma (General Cortex):

- i) It is found below the hypodermis and is made up of thin walled parenchyma.
- ii) They enclose a number of glands.

3) Endodermis:

- i) It is the inner most layer of the cortex.
- ii) Cylindrical cells are tightly arranged.
- iii) Endodermis contains 'casparian thickenings' deposited with suberin in cell wall.

III) Stele: Stele is the central conducting cylinder.

It has three parts (1) Pericycle
(2) Vascular bundles (3) Medulla

1) Pericycle:

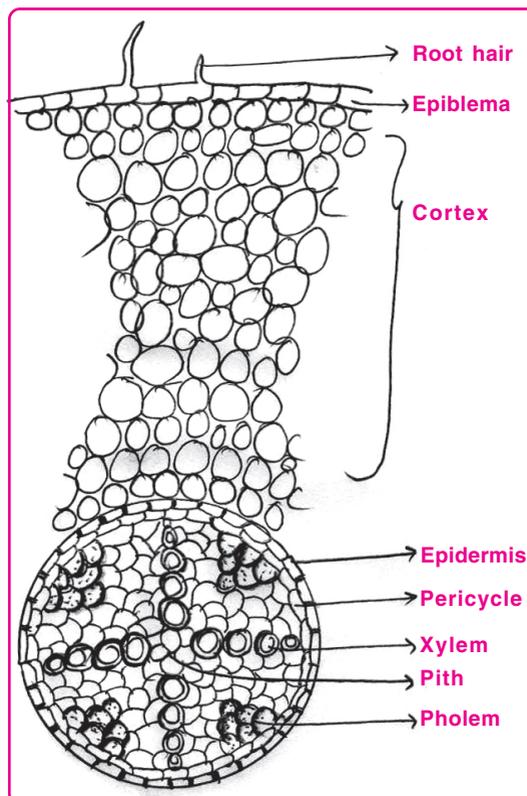
- i) Pericycle is with single layer of cells surrounding the stele.
- ii) * **Secondary growth is observed.**

2) Vascular bundles:

- i) Vascular bundles contain xylem and phloem on separate radii.
- ii) * Usually **4 xylem bundles alternate with 4 phloem bundles.**
- iii) * This condition is called '**Tetrach**'.
- iv) Xylem transports water. Phloem transports food.

3) Medulla (or) Pith :

- i) *Medulla is small (or) **absent.**
- ii) It helps in the storage of food and water.



TS OF DICOT ROOT