



MARCH -2024 (TS)

PREVIOUS PAPERS**IPE: MARCH-2024(TS)**

Time : 3 Hours

JR.BOTANY

Max.Marks : 60

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

1. Give the scientific name of Mango. Identify the generic name and specific epithet.
2. How are Viroids different from Viruses?
3. Who discovered the cell and what was the book written by him?
4. What is meant by pulvinus leaf base?
In members of which angiospermic family do you find them?
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 is the feature of a metacentric chromosome?
8. Give one example for each of amino acids, sugars, nucleotides and fatty acids.
9. An anther has 1200 pollen grains. How many pollen mother cells must have been there to produce them?
10. Define heliophytes and sciophytes. Name a plant from your locality that is either heliophyte or sciophyte.

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

11. Give a brief account of Dinoflagellates.
12. How would you distinguish monocots from dicots?
13. Distinguish between asexual and sexual reproduction. Why is vegetative reproduction also considered as a type of asexual reproduction?
14. Describe the essential floral parts of plants belonging to Liliaceae.
15. Differentiate between Rough Endoplasmic Reticulum (RER) and smooth Endoplasmic Reticulum (SER).
16. Explain prophase I of meiosis
17. State the location and function of different types of meristems.
18. Enumerate the morphological adaptations of xerophytes.

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

19. Explain how stem is modified variously to perform different functions.
20. With a neat, labelled diagram, describe the parts of a mature angiosperm embryo sac. Mention the role of synergids.
21. Describe the internal structure of a Monocot Root.

IPE TS MARCH-2024

ANSWERS

SECTION-A

1. Give the scientific name of Mango. Identify the generic name and specific epithet.

[TS Mar-17, 24]

- A:** 1) The scientific name of mango is **Mangifera indica**.
2) Its generic name is **Mangifera** and its specific epithet is **indica**.

2. How are 'Viroids' different from 'Viruses'? [AP M-16, 17,23 IPE M-14]

Viroids	Viruses
1) Viroids are infectious agents to plants	1) Viruses are infectious agents to all organisms
2) Protein coat is absent.	2) Protein coat is present.
3) Viroids contain nucleic acid only .	3) Viruses contain nucleic acid & protein coat .
4) Their nucleic acid consists of only RNA.	4) The nucleic acid may be RNA or DNA.

3. Who discovered the cell and what was the book written by him? [TS May -17]

- A:** 1) **Robert Hooke** discovered the cell. [TS M 24]
2) The book written by him is **Micro graphia**.

4. What is meant by pulvinus leaf base? In members of which angiospermic family do you find them? [AP M-17][TS M-20,24]

- A:** 1) The Pulvinous leaf base is a swollen leaf base .
2) It is seen in 'Leguminaceae' family.

5. What is the morphology of cup like structure in Cyathium? In which family it is found? [TSM-17,24][APM-15]

- 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. [Mar- 14]

A: The pollination mechanism found in Fabaceae is **Piston mechanism**. [TS M- 23,24]

7. What is the feature of a metacentric chromosome? [AP M-18][TS M-24]

A: Meta centric chromosome has middle centromere with two equal arms.

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

A: 1) Amino acids Ex: Glycine [AP May-19][TS M-16,23,24]

2) Sugars Ex: Glucose

3) Nucleotide Ex: Adenylic acid

4) Fatty acids Ex: Lecithin, Glycerol

9. An anther has 1200 pollen grains. How many pollen mother cells must have been there to produce them? [AP MAY-19][AP M-15,16,17,23][TS M-17,20,24]

A: 1) 300 pollen mother cells.

2) Reason: $\frac{1}{4}(1200) = 300$

10. Define heliophytes and sciophytes. Name a plant from your locality that is either heliophyte or sciophyte. [TS M-16,24]

A: 1) **Heliophytes**: Plants which grow in **direct sunlight** are called heliophytes.

Ex: Tridax, Grass plants.

2) **Sciophytes**: Plants which grow in shady places are called sciophytes.

Ex: Ferns, Mosses

SECTION-B**11. Give a brief account of Dinoflagellates.**

[AP M-17,19,23] [TS M-15,16,19,22]

A: 1) Dinoflagellates belong to **kingdom Protista.** [AP May-19]

- 2) They are a large group of **flagellate eukaryotes.**
- 3) Dinoflagellates are seen **mostly in marine water.**
- 4) **Ex:** Red Dino flagellates like Gonyaulax in Medeterranian sea.
- 5) They appear in **various colours depending upon their pigments.**
- 6) The outer surface of their **cell wall** has **stiff cellulose.**
- 7) They have two flagellae, **one lies longitudinally and the other lies transversely.**
- 8) The **flagellae** produces **spinning movements**, so these are called **whirling whips.**
- 9) The nucleus has **condensed chromosomes.**
- 10) Due to absence of histones, nucleus is called **mesokaryon.**
- 11) Marine dinoflagellates like Noctiluca show **bioluminescence.**
- 12) Toxins released by dinoflagellates may harm to animal cules.

12. How would you distinguish monocots from dicots?

[TS M -19,24]

A.

Monocots	Dicots
1) The seed has only one cotyledon.	1) The seed has two cotyledons.
2) Root system is fibrous type.	2) Root system is taproot system
3) Leaves have parallel venation.	3) Leaves show reticulate venation.
4) Leaves are isobilateral.	4) Leaves are dorsiventral
5) Sheathing leaf base is present.	5) Sheathing leaf base absent.
6) Secondary growth is absent.	6) Secondary growth is present.

13. Distinguish between asexual and sexual reproduction. Why is vegetative reproduction also considered as a type of asexual reproduction? [AP May-19][TS M-15,20,24]

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.

In vegetative reproduction, off springs are produced from a single parent. As it doesnot involve two parents, it is considered as a type of asexual reproduction

14. Describe the essential floral parts of plants belonging to Liliaceae.

[AP M-15,17,18,20] [TS M 23,24]

- A: 1) Essential floral parts of Liliaceae are **Androecium** and **Gynoecium**.
- 2) **Androecium:** Six stamens in two whorls (3 + 3); epiphyllous, ditheous anthers, basifixed, introrse and longitudinal dehiscence.
- 3) **Gynoecium:**Tricarpellary, Syncarpous, Trilocular superior ovary with many ovules on axile placentation.
- 4) Style is **terminal** and **stigma is trifold and capitate**.

15. Differentiate between Rough Endoplasmic Reticulum (RER) and smooth Endoplasmic Reticulum (SER).

[TSM-24][AP M-17]

A:	Rough Endoplasmic reticulum (RER)	Smooth Endoplasmic Reticulum (SER)
	1) The ER bearing ribosomes on their surface is called RER. 2) RER observed in cells actively involves in protein synthesis and secretion.	1) The ER which does not bear ribosomes on their surface is called SER. 2) SER is the site for synthesis of lipids and lipid like steroidal hormones in animal cells.

16. Explain prophase I of meiosis

[TS M -19,24][TS May-17]

A: The Prophase I of Meiosis I is longer and more complex when compared to prophase of mitosis. It is further sub divided into 5 phases based on the chromosomal behaviour

They are 1) Leptotene 2) Zygotene 3) Pachytene 4) Diplotene and 5) Diakinesis.

1) Leptotene: In this phase, the nucleus increases in size by absorbing water from the cytoplasm. The chromatin material organises into a constant number of chromosomes.

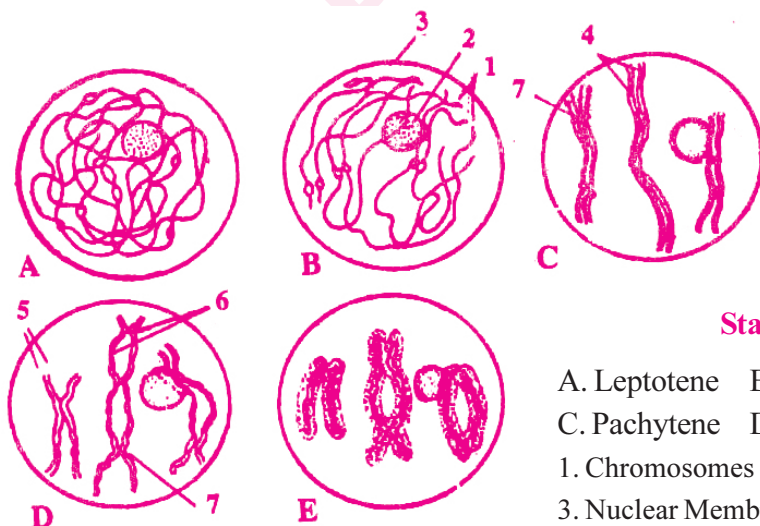
2) Zygotene: Here, the chromosomes become shorter and thicken. They approach each other and form pairs. This homologous pair is called bivalent and the process of pairing is called synapsis.

3) Pachytene: At this stage, the bivalent chromosomes are clearly visible as tetrads. This stage is characterised by the appearance of recombination nodules.

Crossing over is mediated by recombinase enzyme. Crossing over leads to recombination of genetic material.

4) Diplotene: Here, dissolution of synaptonemal complex occurs. The homologous chromosomes of bivalents separate from each other except at the sites of cross overs. Here, the x-shaped structures are called chiasmata.

5) Diakinesis: This is the final stage of prophase I of meiosis I. This is marked by terminalisation of chiasmata. By the end of diakinesis, the nucleolus disappears and the nuclear envelope also breaks down.



Stages of Meiosis

- A. Leptotene B. Zygotene
 C. Pachytene D. Diplotene E. Diakinesis
 1. Chromosomes 2. Nucleolus
 3. Nuclear Membrane
 4. Homologous Chromosomes
 5. Sister chromatids
 6. Non-sister chromatids 7. Chiasma

17. State the location and function of different types of meristems.[AP & TS M-17,16,15]**A:** Based on the function Meristems are two types.**[TS M-19, 23,24]****I) Primary Meristems:** These are formed at the primary growth of the plant.

They help in the formation of primary plant body.

II) Secondary Meristems: It is formed at the secondary growth of the plant.

It helps in the wide growth of the plant.

Based on the location, Meristems are three types.

They are 1. Apical 2. Intercalary 3. Lateral Meristems.

1) Apical meristems: These are present at the growing tips of roots, stems, branches etc.

They help in linear growth of the plant body. They appear early in the life of a plant and contribute to the formation of the primary plant body. So they are called primary meristems.

2) Intercalary meristems: These are found in between the permanent tissues. They are seen at the base of internodes and leaf bases of monocotyledons, particularly grasses. They are active for a short period and gradually change into permanent tissues. These are also primary meristems.**3) Lateral meristems:** They are present at the lateral sides of the plant body. The cells help to increase the thickness of the organs like stem and root. It helps in the secondary growth.**Ex:** Vascular cambium**18. Enumerate the morphological adaptations of xerophytes. [TS M-24][AP M-19,22]****A: Morphological adaptations of xerophytes:**

- 1) Here, the roots are long with extensive branching spread over wide areas.
- 2) Root hairs and root caps are very well developed.
- 3) Stems are stunted, woody, hard and covered with thick bark.
- 4) Stems are usually covered by hairs or waxy coatings.
- 5) Leaves are very much reduced, small and scale like.
- 6) Some times leaves are modified into spines to reduce the rate of transpiration.

SECTION-C

19. Explain how stem is modified variously to perform different functions.

[AP M-19,20,23][AP May-17,22][TS M-16, IPE-14]

A: Stem: The aerial part of the flowering plant is called stem.

Stem Modification: A **permanent structural change** in the stem to perform some special functions suitable to the environment is called stem modification. This is of three types.

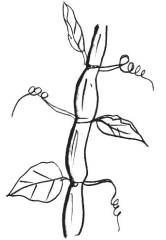
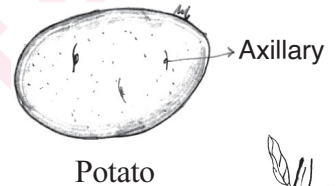
- I) Underground stem modification II) Aerial stem modification
III) Sub-aerial stem modification.

I) Underground stem modification:

- 1) In some plants, the stems grow into soil.
- 2) They can withstand unfavourable conditions and become Perennial plants.
- 3) They perform **vegetative propagation**. They store **food material**.

Examples of Underground stems :

- | | |
|----------------------|-------------------------|
| a) Rhizome of Ginger | b) Bulb of Onion |
| c) Corm of Colocasia | d) Stem tuber of Potato |



II) Aerial stem modification: This is of four types.

1) Stem tendrils:

- i) These are slender, spirally coiled structure.
- ii) They help in **climbing up**.

Ex: Axillary bud is modified into a tendril in **cucumber, watermelon**.

Terminal bud is modified into a tendril in **grape vines**.

2) Thorns:

- i) The buds of the stem which modify into woody, straight and pointed structures are called thorns.
- ii) They **protect** the plant from **grazing animals**.

Ex: **Bougainvillea, citrus**.

3) Phylloclades:

- i) In some xerophytes, the leaves are modified to reduce transpiration.
- ii) Their stems become green, flat and photosynthetic to perform **photosynthesis**.

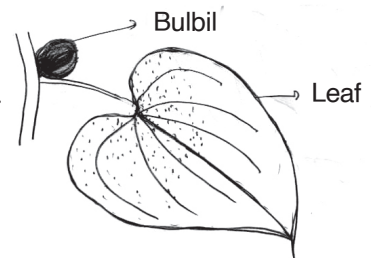
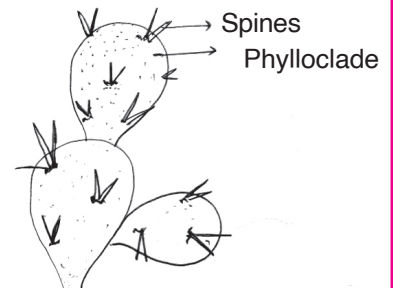
Ex: **Opuntia, Euphorbia, Casuarina**.

4) Bulbils:

- i) Some plants detach from the parent plant, and develop adventitious roots(buds) to store food.
- ii) Such buds are called bulbils.
- iii) This helps in **vegetative reproduction**.

Ex: **Floral buds (Agave),**

Vegetative buds (Dioscorea)



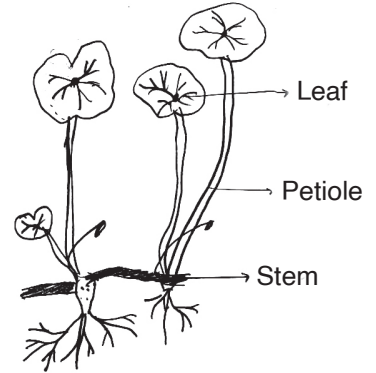
III) Sub-aerial stem modification:

Here the stems are partly aerial and partly underground. They help in vegetative propagation. They are four types.

1) Runner:

- i) In some plants, subaerial stems spread to new niches and **form new plants** when older parts die.
- ii) Such plants are called runners.

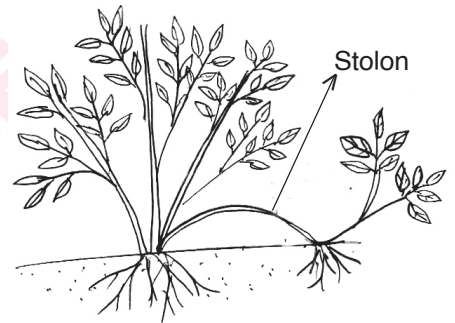
Ex: Strawberry, Oxalis.



2) Stolon:

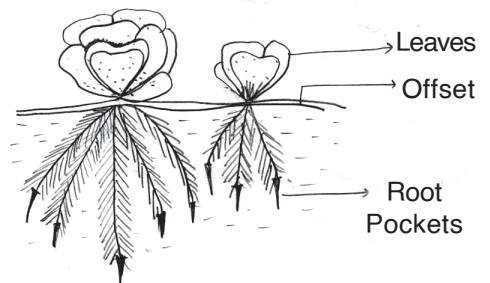
- i) In some plants, a slender lateral branch grows aerielly.
- ii) After some time, it arches downwards to touch the ground and **produce adventitious roots**.
- iii) Such branches are called stolons.
- iv) When detached from the parent plant they lead independent life.

Ex: Jasmine, Nerium, Mint plant



3) Offset:

- i) 'One internode length' of a lateral branch of aquatic plants is called 'offset'.
- ii) It bears a rosette of leaves at each node and a tuft of balancing roots.



Ex: Pistia and Eichhornia

4) Sucker:

- i) In some plants, a part of the stem lies in the underground.
- ii) Some lateral branches originate from the main stem.
- iii) They grow horizontally and then come out obliquely upwards giving rise to leafy shoots.
- iv) These branches are called suckers.

Ex: Banana, Chrysanthemum



20. With a neat, labelled diagram, describe the parts of a mature angiosperm embryo sac. Mention the role of synergids.

[TS 16,17,19,20,22,24][AP 16,17,19,23]

A: The **mature angiosperm** embryo sac has three parts.

- 1) Egg apparatus 2) Central cell 3) Antipodals

1) Egg apparatus:

- i) Three cells grouped together at the **Micropylar end** constitute the egg apparatus.
- ii) They are two synergids and one egg cell.
- iii) The synergids with special cellular thickenings at the micropylar end is called filiform apparatus.
- iv) The middle largest cell is called egg or oospore.

2) Central cell:

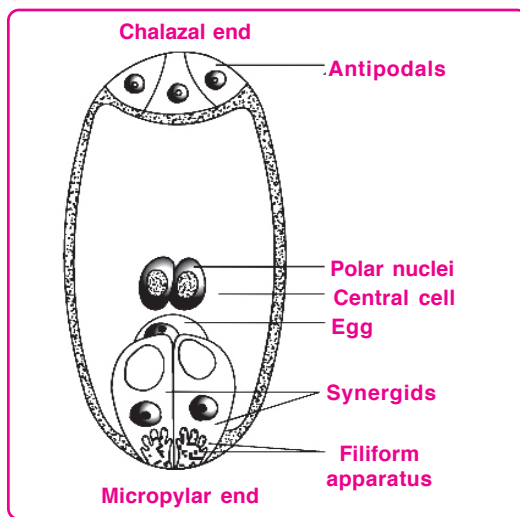
- i) It is the **Largest cell** of embryo sac.
- ii) It has 2 polar nuclei which fuse to form a single diploid secondary nucleus.

3) Antipodals:

- i) Three cells present at the **Chalazal end** of embryo sac are called antipodals.
- ii) These are smallest cells of embryo sac.
- iii) They degenerate before or after fertilisation.
- iv) They are considered as vegetative cells of embryo sac.

Role of Synergids:

- i) Absorption of nutrients from the nucellus into the embryo sac.
- ii) Nourishing female gametophyte nutrients.
- iii) Guiding the pollen tube into Egg cell.



MATURE EMBRYO SAC

21. Describe the internal structure of a Monocot Root. [APMAY-19][AP,TS May-17]

A. T.S of Monocot Root shows three main parts.

[AP M-20]

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:

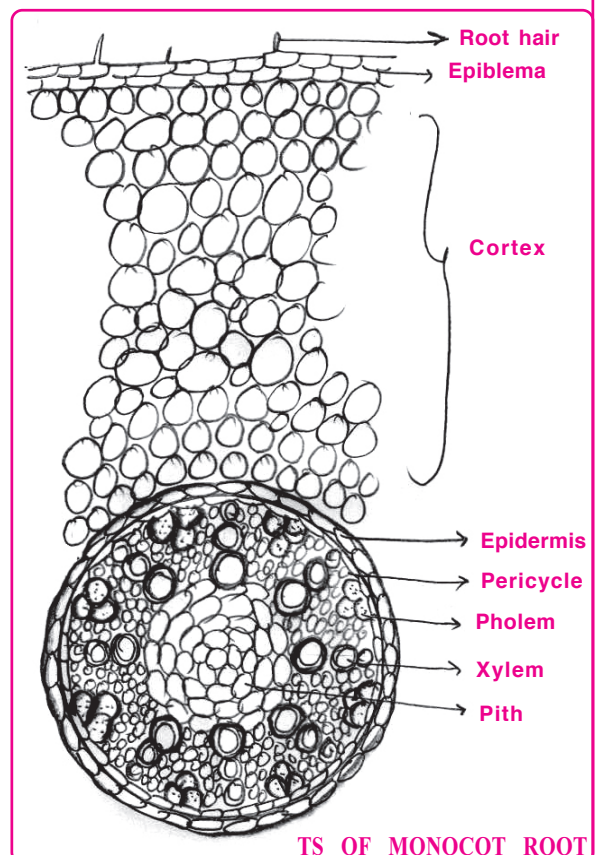
- i) Pericycle is with single layer of cells surrounding the stele.
- ii) Secondary growth is not observed.

2) Vascular bundles:

- i)* Vascular bundles contain **xylem and phloem on separate radii.**
- ii)* Number of bundles vary from **6 to 8.**
- iii)* It is called '**Polyarch**'.
- iv) Xylem transports water. Phloem transports food.

3) Medulla (or) Pith :

- i)* Medulla is well developed and is **made up of parenchyma.**
- ii) It helps in the storage of food and water.



TS OF MONOCOT ROOT