

Previous IPE
SOLVED PAPERS

MARCH -2020 (AP)

PREVIOUS PAPERS

IPE: MARCH-2020(AP)

Time : 3 Hours

JR.BOTANY

Max.Marks : 60

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

1. What is the basic unit of classification? Define it.
2. Give the main criteria used for classification by Whittaker.
3. Name the books written by Parasara and mention the important aspects discussed in those books.
4. Differentiate fibrous roots from adventitious roots.
5. Define placentation. What type of placentation is found in Dianthus?
6. Write the floral formula of solanum plant.
7. What is referred to as satellite chromosome?
8. Medicines are either man made (i.e., synthetic) or obtained from living organisms like plants, bacteria, animals etc. and hence the latter are called natural products. Sometimes natural products are chemically altered by man to reduce toxicity or side effects. Write against each of the following whether they were initially obtained as a natural product or as a synthetic chemical.
 - a. Penicillin_____
 - b. Sulfonamide_____
 - c. Vitamin C_____
 - d. Growth Hormone_____
9. If a tissue has at a given time 1024 cells. How many cycles of mitosis had the original parental single cell undergone?
10. Hydrophytes show reduced xylem. Why?

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

11. What are the characteristic features of Euglenoids?
12. Give a brief account of prothallus.
13. Define (a) Juvenile phase (b) Reproductive phase.
14. Describe the essential floral parts of plants belonging to Liliaceae.
15. What is Cytoskeleton? What functions is it involved in?
16. Though redundantly described as a resting phase, interphase does not really involve rest. Comment.
17. State the location and function of different types of meristems.
18. Write a brief account on classification of xerophytes.

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

19. Explain how stem is modified variously to perform different functions.
20. Draw the diagram of a microsporangium and label its wall layers. Write briefly about the wall layers.
21. Describe the internal structure of a Monocot Root.

IPE AP MARCH-2020

ANSWERS

SECTION-A

1. **What is the basic unit of classification? Define it.** [AP M -17,20,22][TS-20]

- A:**
- 1) Species is the basic unit of classification.
 - 2) Species is a group of individual organisms with fundamental similarities.

2. **Give the main criteria used for classification by Whittaker.** [AP M-20,22][TS M-15]

- A: Main criteria used for classification by Whittaker:** Cell structure, thallus organisation, mode of nutrition, reproduction and phylogenetic relations.

3. **Name the books written by Parasara and mention the important aspects discussed in those books.** [AP M-17,20]

- A: The books written by Parasara are:** "Krishiparasara" and "Vrikshayurveda".
- 1) Krishiparsara deals with agriculture and weeds.
 - 2) Vrikshayurvedam deals with the types of forests and characters of plants including medicinal plants.

4. **Differentiate fibrous roots from adventitious roots.** [AP M-20]

Fibrous roots	Adventitious roots
<p>1) The roots that originate from the base of stem are called fibrous roots.</p> <p>2) Ex: Monocots like Maize.</p>	<p>1) The roots which arise from parts of the plant other than the radicle are called adventitious roots.</p> <p>2) Ex: Velamen, Parasite roots, Ficus</p>

5. **Define placentation. What type of placentation is found in Dianthus?** [TS M-15,20]

- A: Placentation:** The mode of arrangement of ovules in a ovary is known as placentation.
- In Dianthus, the placentation is 'free central'.

6. Write the floral formula of solanum plant. [TS M -22][AP M-20]

A: Floral formula of Solanum plant: $\text{Br, Ebrl, } \oplus, \hat{\ominus}, \text{K}_{(5), \overset{\curvearrowright}{\text{C}}_{(5), \text{A}_5, \underline{\text{G}}_{(2)}}$

7. What is referred to as satellite chromosome? [APM-19,20][AP,TS May-17]

- A: 1) Some chromosomes contain a small segment called satellite which is separated from the main body of the chromosome by a secondary constriction.
- 2) Such chromosomes are called satellite chromosomes.

8. Medicines are either man made (i.e., synthetic) or obtained from living organisms like plants, bacteria, animals etc. and hence the latter are called natural products. Sometimes natural products are chemically altered by man to reduce toxicity or side effects. Write against each of the following whether they were initially obtained as a natural product or as a synthetic chemical. [AP M-20]

- a. Penicillin _____ b. Sulfonamide _____
- c. Vitamin C _____ d. Growth Hormone _____

- A: a) Penicilin→Natural product
 b) Sulfonamide→ Synthetic chemical
 c) Vitamin C→ Natural product
 d) Growth Hormone→Natural product

9. If a tissue has at a given time 1024 cells. How many cycles of mitosis had the original parental single cell undergone? [AP M-20,22][TS M-17]

- A: 1) 10 cycles of mitosis.
- 2) Reason: $2^{10}=1024$

10. Hydrophytes show reduced xylem. Why? [AP M-17,20,22][TS M-15,19]

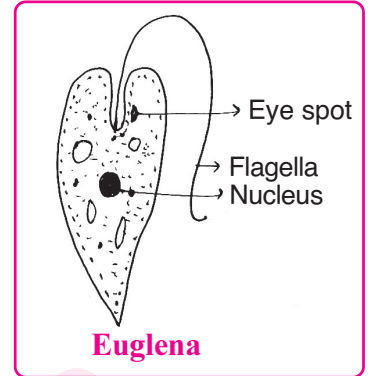
- A: 1)In hydrophytes, absorption of water takes place through all over the surface of the plant body.
- 2)All submerged organs are capable of absorbing water. So, their xylem is reduced.

SECTION-B

11. What are the characteristic features of Euglenoids?[TS M-17,20][AP M-16,17,20,22]

A: Characteristic features of Euglenoids:

- 1) Euglenoids belong to **kingdom Protista**.
- 2) They are a group of **unicellular flagellate eukaryotes**.
- 3) They are seen in **fresh stagnant water**.
- 4) **Ex:** Euglena.
- 5) Their body is covered by a **protein layer** called **pellicle**.
- 6) They have **two flagellae**, one is short and **other is long**.
- 7) The anterior part of their body consists of cytostome, cytopharynx and reservoir.
- 8) One eye spot (or stigma) is present on the membrane of the reservoir.
- 9) Reproduction in euglenoids is by **longitudinal binary fission** and **palmella stage is seen**.
- 10) They are **autotrophic**, but in the **absence of sunlight they are heterotrophic**.



12. Give a brief account of prothallus.

[AP M-20]

A: Prothallus:

- 1) The gametophytic plant body of pteridophytes is called prothallus.
- 2) The haploid spore germinates and gives rise to prothallus.
- 3) It is a heart shaped thallus like structure, green, dorsiventral with a notch.
- 4) The rhizoids produced on ventral surface are unicellular.
- 5) Prothallus grows on shady, damp and wet soil.
- 6) Male sex organs antheridia are produced on the lower part of prothallus.
- 7) Female sex organs archegonia are produced near the notch.
- 8) The antherozoids are ciliated, require water to reach the egg.
- 9) The zygote develops into an embryo, which develops into a diploid sporophyte with in the female gametophyte.

13. Define (a) Juvenile phase (b) Reproductive phase. [AP M-20]

A: a) **Juvenile Phase:** All organisms have to reach a certain stage of growth and maturity in their life before they can reproduce sexually. This stage is called juvenile phase or vegetative phase.

b) **Reproductive Phase:** The phase where the plants start producing flowers is called Reproductive Phase. This is the end of the Juvenile phase.

14. Describe the essential floral parts of plants belonging to Liliaceae. [AP M-15,17,18,20]

A: 1) Essential floral parts of Liliaceae are **Androecium** and **Gynoecium**.

2) **Androecium:** Six stamens in two whorls (3+3); epiphyllous, dithecous 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. What is Cytoskeleton? What functions is it involved in? [AP M-20]

A: 1) The network of filamentous proteinaceous structures in the cytoplasm is collectively called as cytoskeleton.

2) It has three components micro filaments, intermediate filaments and micro tubules.

3) The cytoskeleton is involved in mechanical support and in the maintenance of cell shape, cell motility, intra cellular transport and karyokinesis, signalling across the cell.

16. **Though redundantly described as a resting phase, interphase does not really involve rest. Comment.** [AP May-19,22][TS M-17,20,22][AP Mar-15,16,17,19,20]

A: Interphase: The state of cell cycle, at which, the nucleus is not in a state of division, is called Inter phase. It is the period of preparation for cell division. This stage occurs between two successive cell divisions.

The inter phase is called resting phase. But during this time, the cell prepares for division by undergoing both cell growth and DNA replication in an orderly manner. The inter phase is divided into 3 sub stages- G_1 phase, S phase and G_2 phase.

- 1) **G_1 phase:** This is the phase between mitosis phase and initiation of DNA replication. During G_1 phase the cell is **metabolically active** and it grows continuously; but **does not replicate its DNA.**

This G_1 phase includes

- Increase in the size of the cell.
- Synthesis of RNA and proteins.

- 2) **S Phase:** In this phase, **DNA replication takes place.** During this time the amount of DNA per cell doubles.

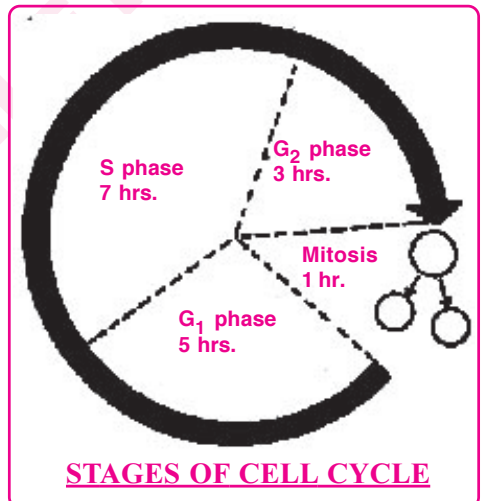
However, there is no increase in the chromosome number.

- 3) **G_2 phase:** During G_2 phase, the **synthesis of proteins and RNA continues.**

Various cell organelles are newly synthesized.

In view of the above 3 phases, we say interphase does not really involve rest.

☹ **Interphase is Restless Really**



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]

I) Primary Meristems: These are formed at the primary growth of the plant.

They help in the formation of primary plant body.

[AP M-19,20]

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. Write a brief account on classification of xerophytes.

[AP Mar -17,20][TS M-16,22]

A: Xerophytes: The plants which grow in habitats deficient of water supply are called xerophytes. They are classified into three categories.

1) **Ephemerals:**

i) These plants are annuals, mostly found in arid (dry) zones.

ii) They complete their life cycle within a very short period. **Ex:** Tribulus.

2) **Succulents:**

i) These plants absorb large quantities of water during rainy season.

ii) They store the water in different parts of the plant in the form of mucilage.

iii) As a result, the plant parts like the stem (**Ex:** Opuntia), leaf (**Ex:** Aloe), root (**Ex:** Asparagus) become succulent.

iv) The stored water is used during dry periods.

v) These are called '**drought avoiding plants**'.

3) **Non-Succulents:**

i) These are perennial plants which can withstand prolonged periods of drought.

Ex: Casuarina, Nerium.

ii) These are called '**true xerophytes**'.

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

[AP M-19,20][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.

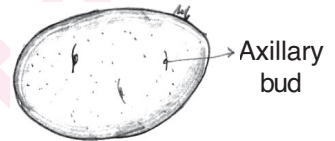
- I) Underground stem modification II) Aerial stem modification
 III) Sub-aerial stem modification.

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 |



Potato

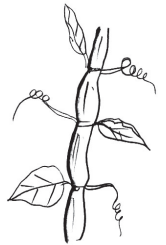
II) Aerial stem modification: This is of four types.

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**.

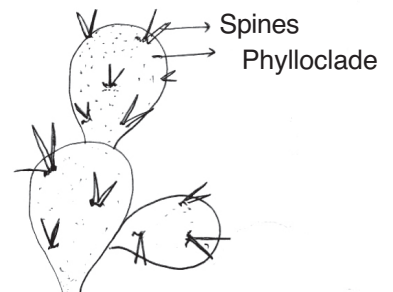
Ex: Bougainvillea, citrus.



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.

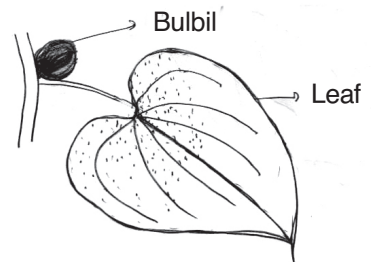


4) Bulbils:

- 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)



😊 Ginger, Onion, Potato, Thorns, Citrus are all **Stems**.
'Bulbil' sounds well.

III) Sub-aerial stem modification:

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

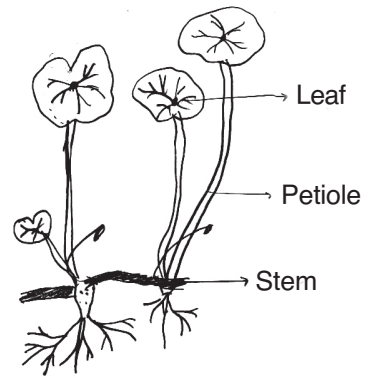
☺ **SECOND is Sure,
if FIRST is missed.**

ఈ రెండూ రెండే! దేనిని వదలొద్దు!

1) Runner:

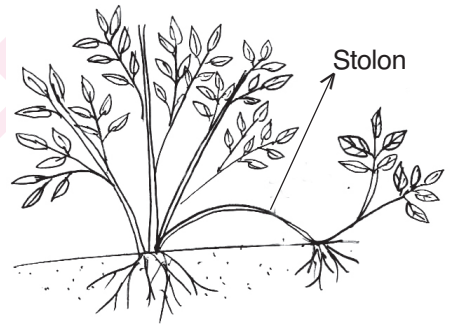
- i) In some plants, subaerial stems spread to new niches and **form new plants** when older parts die.
- ii) Such plants are called runners.

Ex: Strawberry, Oxalis.

**2) Stolon:**

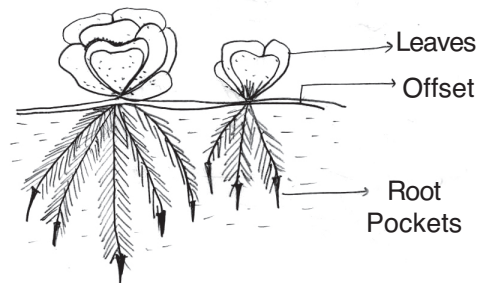
- i) In some plants, a slender lateral branch grows aeri ally.
- ii) After some time, it arches downwards to touch the ground and **produce adventitious roots**.
- iii) Such branches are called stolons.
- iv) When detached from the parent plant they lead independent life.

Ex: Jasmine, Nerium, Mint plant

**3) Offset:**

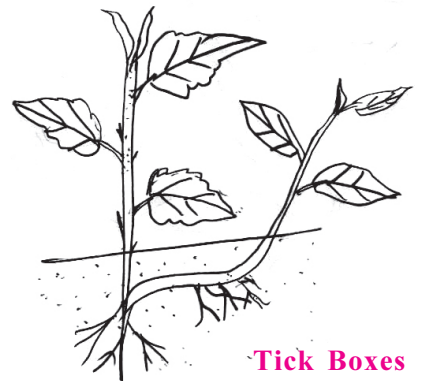
- i) 'One internode length' of a lateral branch of aquatic plants is called 'offset'.
- ii) It bears a rosette of leaves at each node and a tuft of balancing roots.

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



Tick Boxes

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20. Draw the diagram of a microsporangium and label its wall layers. Write briefly about the wall layers. [AP M-18, 20] [TS 18, 23]

A: Wall layers of Microsporangium are of 4 types:

They are 1) Epidermis 2) Endothecium 3) Middle layers 4) Tapetum

1) Epidermis: The outer, thick, protective layer of microsporangium is called epidermis.

The cells present between the two pollen sacs are thin walled and this region is called as stomium. This is useful for the dehiscence of pollen sacs.

2) Endothecium: It is below the epidermis and expands radially with fibrous thickenings.

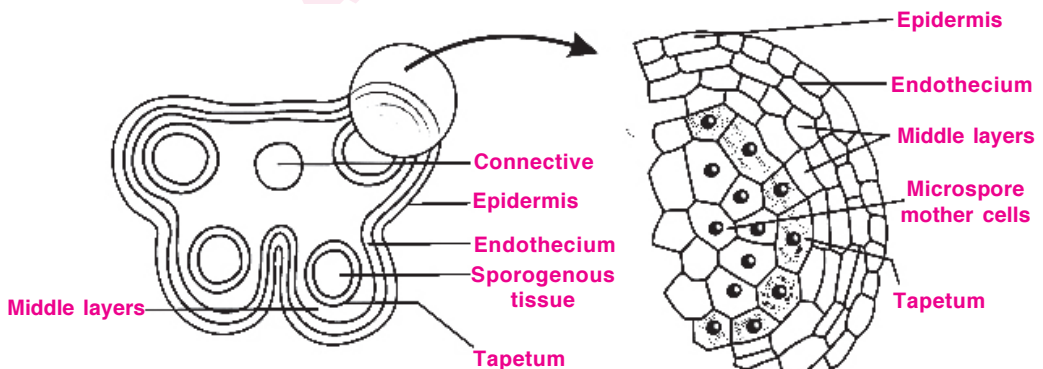
At maturity, these cells lose water and contract. They help in the dehiscence of pollen sacs.

3) Middle layers: Below the endothecium, 1 to 5 layers of thin walled cells form the middle layers. They help in the dehiscence of anther.

4) Tapetum: The inner most wall layer is the tapetum. It encircles the sporogenous tissue.

The cells are large, thin walled & multinucleate.

It **nourishes** the development of **pollen grains**.



a) Transverse section of Anther

b) Enlarged view of Microsporangium

MICROSPORANGIUM

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:

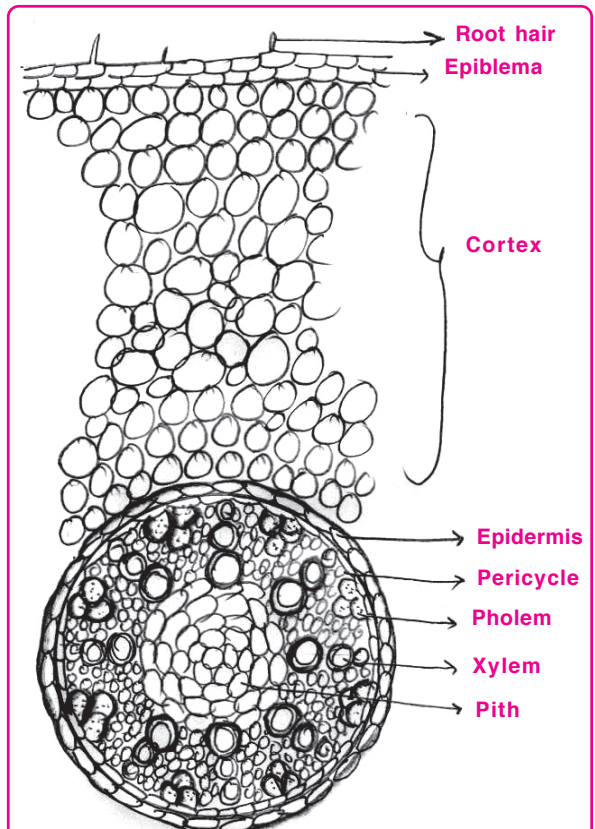
- i) Pericycle is with single layer of cells surrounding the stele.
- ii) Secondary growth is not observed.

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