



MARCH -2019 (AP)

PREVIOUS PAPERS**IPE: MARCH-2019(AP)**

Time : 3 Hours

JR.BOTANY

Max.Marks : 60

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

1. What does ICBN stand for?
2. What is the principle underlying the use of cyanobacteria in agricultural fields for crop improvement ?
3. Explain how the term Botany has emerged.
4. Which organ is modified to trap insects in insectivorous plants? Give two examples
5. Why certain fruits are called false fruits? Name two examples of plants having false fruits.
6. What is "Omega Taxonomy"
7. Match the following :
 - a) Cristae
 - b) Cisternae
 - c) Thylakoids
 - i) Flat membranous sacs in stroma
 - ii) Infoldings in mitochondria.
 - iii) Disc - shaped sacs in Golgi apparatus
8. What constituents of DNA are linked by glycosidic bond?
9. Which of the four chormatids of a bivalent at prophase – I of meiosis can involve in cross over?
10. Define population and community?

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

11. Give a brief account of Dinoflagelleues
12. Write a note on economic improtance of Algae and Bryophytes.
13. Give a brief account on the phases of the life cycle of an angiosperm plant.
14. Write a brief note on semi - technical description of a typical flowering plant.
15. What are nucleosomes? What are they made of ?
16. Thoug redundantly described as a resting phase, interphase does not really involve rest. Comment.
17. What is the diffrence between lenticels and stomata?
18. Enumerate the morphological adaptations 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. 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 dorsi-ventral leaf with the help of labelled diagram

IPE AP MARCH-2019

ANSWERS

SECTION-A

1. What does ICBN stand for?

[AP Mar, May-19]

A: ICBN stands for **I**nternational **C**ode for **B**otanical **N**omenclature.

2. What is the principle underlying the use of cyanobacteria in agricultural fields for crop improvement ?

[AP M-15,19]

A: 1. Cyano bacteria (like Nostoc and Anabaena) contain dinitrogenase enzyme.

It can fix **atmospheric nitrogen** in specialised cells called heterocysts.

2. They help in improving the **soil fertility**.

3. Explain how the term Botany has emerged.

[AP M-19]

A: The term Botany is derived from the Greek word Bouskein, which means cattle feed.

In course of time **Bouskein** gave rise to **Botane** and hence the term **Botany** is derived.

4. Which organ is modified to trap insects in insectivorous plants? Give two examples.

[APM-19][IPE Mar- 13]

A: In insectivorous plants, **leaves** are modified to trap the insects.

Ex: Nepenthes, Drosera, Dionaea.

5. Why certain fruits are called false fruits? Name two examples of plants having false fruits.

[AP M-19]

A: A fruit developing from fertilized ovary is called true fruit. Hence, any fruit which is developed from any part of the flower **other than the ovary** is called as **false fruit**.

Ex: Apple, Anacardium.

6. What is "Omega Taxonomy"? [AP M-15,19][TS M-20]

A: Omega Taxonomy is an advanced taxonomy which deals with Embryology, Cytology, Palynology, Phytochemistry, Serology etc., along with Morphology.

7. Match the following [AP MAR-19]

- | | |
|---------------|--|
| a) Cristae | i) Flat membranous sacs in stroma |
| b) Cisternae | ii) Infoldings in mitochondria |
| c) Thylakoids | iii) Disc-shaped sacs in Golgi apparatus |

A: a) ii b) iii c) i

8. What constituents of DNA are linked by glycosidic bond? [AP M-15,17,19]

A: 1) A Glycosidic bond is formed between two carbon atoms of two adjacent monosaccharides.
2) **Nitrogen base** is linked to sugar group laterally by glycosidic bond.

9. Which of the four chromatids of a bivalent at prophase-I of meiosis can involve in cross over? [AP M-19][TS M-16]

A: Non sister chromatids.

10. Define population and community. [TS Mar, May-17,20][AP M-15,17,19]

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.

SECTION-B

11. Give a brief account of Dinoflagellates. [AP M-17,19] [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. Write a note on economic importance of Algae and Bryophytes.

[AP M-19][TS M-16]

A: I) Economic importance of Algae:

- 1) Fixation of carbondioxide on Earth is mainly carried out by algae.
- 2) **Brown algae** produces **Algin**.
- 3) **Red algae** produces **carrageen**.
- 4) Agar Agar is obtained from Gelidium.
- 5) Chlorella and spirulina are used as food supplements by space travellers.

II) Economic importance of Bryophytes:

- 1) Mosses provide food for herbivorous mammals and birds.
- 2) Sphagnum provides peat, which is used as fuel.
- 3) They play significant role in plant succession.
- 4) They prevent soil erosion.
- 5) They are used as packing material for trans-shipment.

13. Give a brief account on the phases of the life cycle of an angiosperm plant.

A: The life cycle of angiospermic plant consists of two phases.

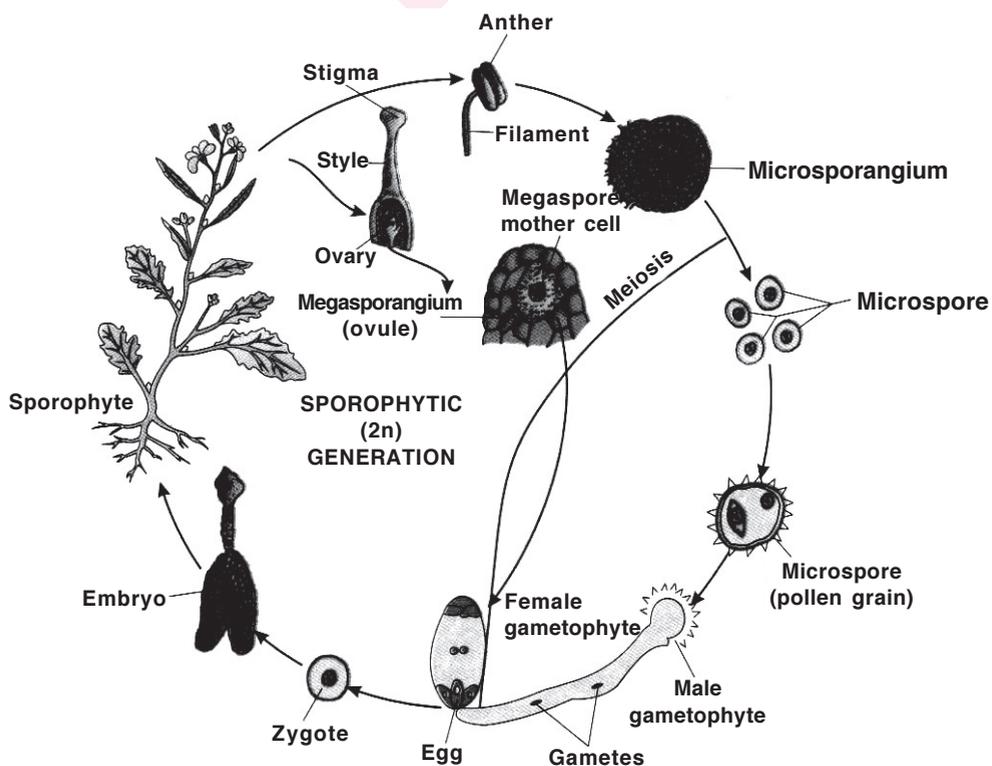
[APM-19]

A) Sporophytic phase:

- 1) It is diploid ($2n$).
- 2) It is the dominant phase of the life cycle.
- 3) It is developed from the zygote. Reproductive organs develop at this stage.

B) Gametophyte phase:

- 1) It is haploid (n).
- 2) It is derived from a spore which is a product of meiotic division of spore mother cell.
- 3) In angiosperms, microspore mother cells and megaspore mother cells are present.
- 4) The mega spore mother cells undergo reduction division and produces megaspores.
- 5) With the production of microspores & mega spores, the sporophytic generation comes to an end.
- 6) Micro and mega spores produce male and female gametophytes respectively.
- 7) Male and female gametes formed respectively from male and female gametophytes fuse to form a diploid zygote.
- 8) The zygote is the first cell of the sporophyte.
- 9) The zygote undergoes repeated mitotic divisions to produce an embryo ($2n$) in the seed.
- 10) The seed germinates and gives rise to a sporophytic plant body.



14. Write a brief note on semi technical description of a typical flowering plant.

[AP M-19]

- A:**
- 1) The description of a flowering plant begins with its habit, habitat, vegetative characters (root, stem, leaves) and then floral characters (inflorescence, flower and its parts) followed by its fruit.
 - 2) After describing various parts of a plant, a floral diagram and floral formula are presented.
 - 3) Floral diagram provides information about the number of parts of a flower and their arrangement.
 - 4) Floral formula represents various floral parts by means of symbols.

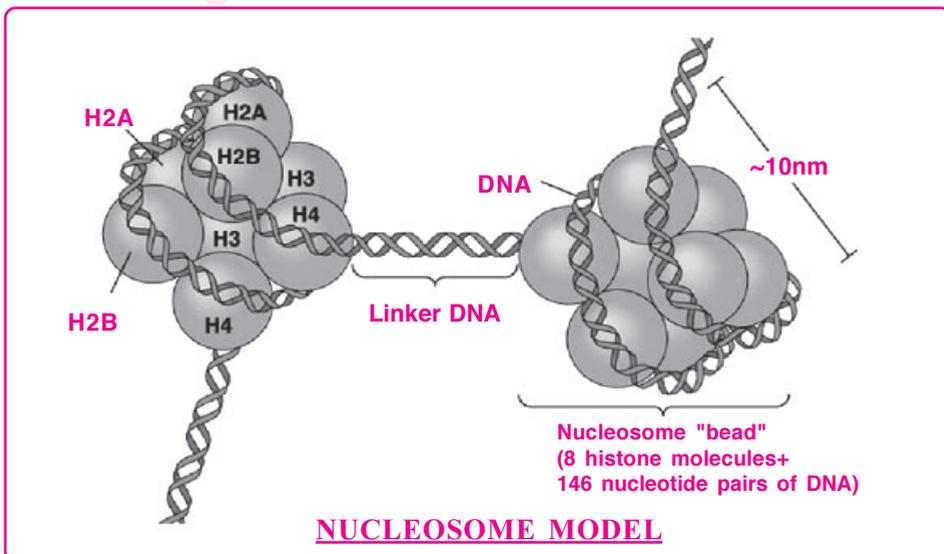
5) Notation of floral formula:

| | | |
|----------------------------------|---------------------------------|---|
| Br = bracteate | EBr = ebracteate | Epik = Epicalyx |
| Brl = Bracteolate | Ebrl = ebracteolate | () = Cohesion of floral parts in a whorl |
| ⊕ = actinomorphic | % = zygomorphic | \overline{CA} = Epipetalous stamens |
| ♂ = male, ♀ = female | ♂♀ = bisexual flower | \overline{PA} = Epiphyllous stamens |
| K = calyx, C = corolla | P = perianth, | A = androecium G = gynoecium |
| \underline{G} = superior ovary | \overline{G} = inferior ovary | G- = half superior ovary. |

15. What are nucleosomes? What are they made of? [AP,TS May-17][AP M-16,19]

[AP May-19]

- A:**
- 1) Nucleosome is a structural unit of eukaryotic chromosome, consisting of a length of DNA coiled around a core of histones.
 - 2) A typical nucleosome contains **200bp of DNA** double helix wrapped (Two turns) around a core of histone octamer through a linear histone protein - H₁.
 - 3) It has two copies of each of four types of histone proteins viz., H₂A, H₂B, H₃ and H₄.



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**.

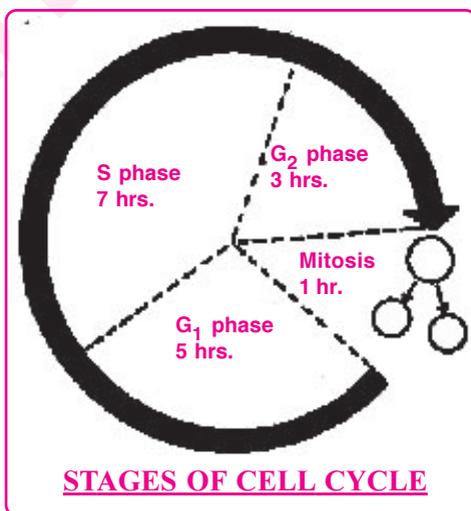
However, there is no increase in the chromosome number.

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. What is the difference between lenticels and stomata?

[AP, TS Mar, May-17]

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 donot conduct photosynthesis. | 5) Guard cells conduct photosynthesis. |

18. Enumerate the morphological adaptations of xerophytes.

[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][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.

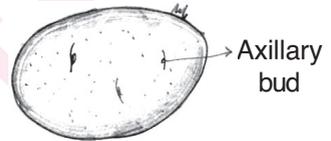
- I) Underground stem modification II) Aerial stem modification
 III) Sub-aerial stem modification.

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:**

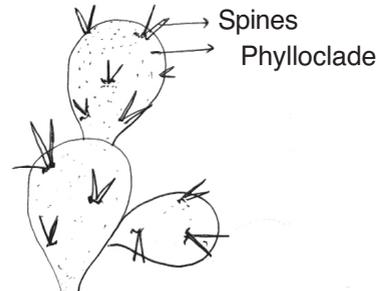
- i) These are slender, spirally coiled structure.
- ii) They help in **climbing up**.

Ex: Axillary bud is modified into a tendril in **cucumber, watermelon**.Terminal bud is modified into a tendril in **grape vines**.**2) Thorns:**

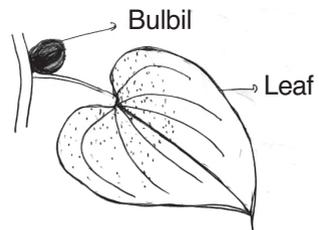
- i) The buds of the stem which modify into woody, straight and pointed structures are called thorns.
- ii) They **protect** the plant from **grazing animals**.

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.

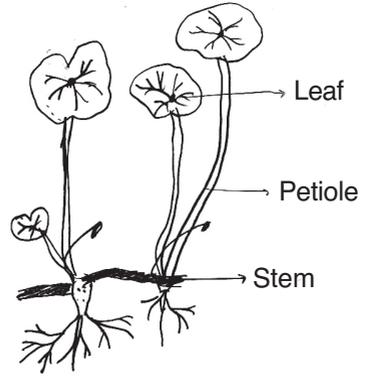
☺ **SECOND is Sure,**
if FIRST is missed.

ఈ రెండూ రెండే! దేనిని వదలొద్దు!

1) Runner:

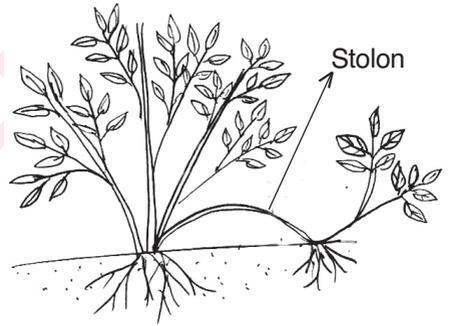
- i) In some plants, subaerial stems spread to new niches and **form new plants** when older parts die.
- ii) Such plants are called runners.

Ex: Strawberry, Oxalis.

**2) Stolon:**

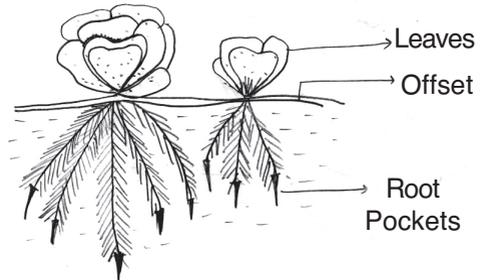
- i) In some plants, a slender lateral branch grows aerielly.
- ii) After some time, it arches downwards to touch the ground and **produce adventitious roots**.
- iii) Such branches are called stolons.
- iv) When detached from the parent plant they lead independent life.

Ex: Jasmine, Nerium, Mint plant

**3) Offset:**

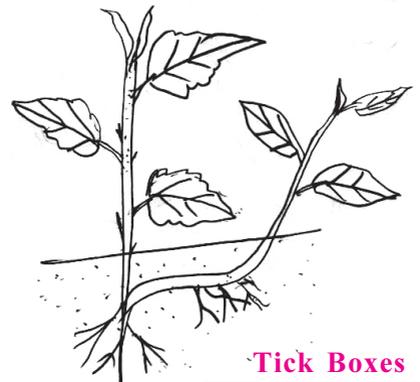
- i) 'One internode length' of a lateral branch of aquatic plants is called 'offset'.
- ii) It bears a rosette of leaves at each node and a tuft of balancing roots.

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



Tick Boxes

20. With a neat, labelled diagram, describe the parts of a mature angiosperm embryo sac. Mention the role of synergids. [TS 20,22][AP & TS M-16,17,19]

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:

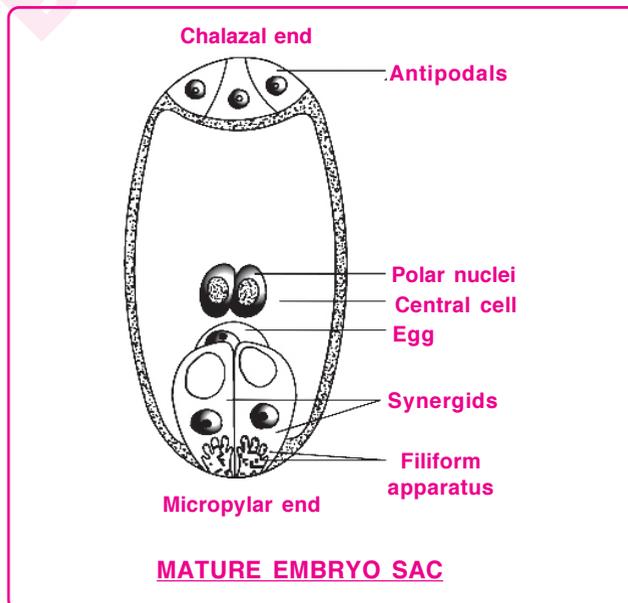
- i) It is the **largest cell** of embryo sac.
- ii) It has two polar nuclei which fuse to form a single diploid secondary nucleus.

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.



Tick

Boxes

21. Describe the internal structure of dorsiventral leaf with the help of labelled diagram.

A: T.S (Transverse Section) of dorsiventral leaf (dicot leaf) shows three main parts. [TS 17,20]
They are I) Epidermis II) Mesophyll III) Vascular bundles. [AP M-19]

I) Epidermis:

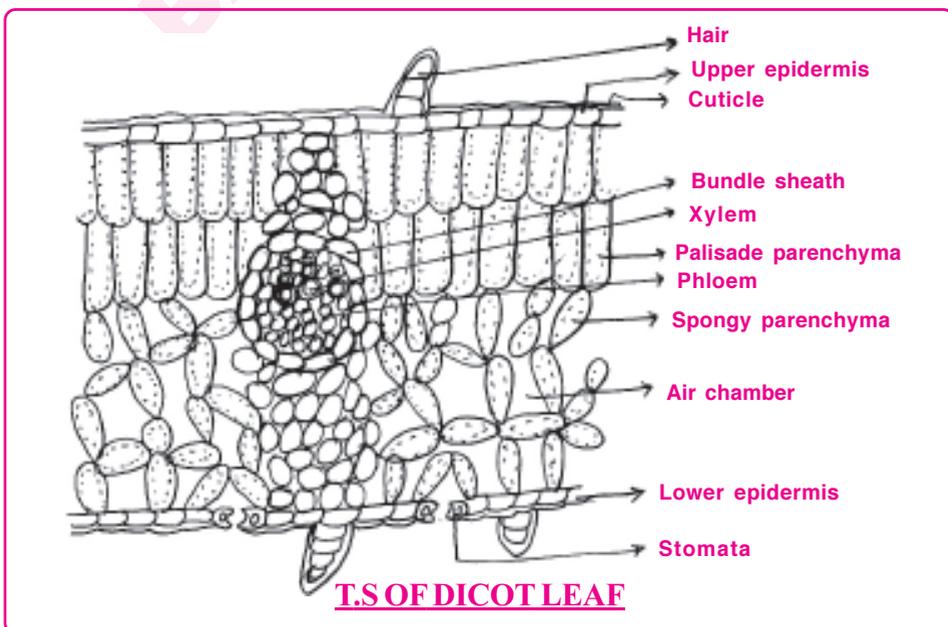
- 1) It consists of the upper surface and lower surface of the leaf.
- 2) It is made up of single layered, rectangular, compactly arranged cells.
- 3)* It contains epidermal hairs (trichomes).
- 4)* **Thick cuticle** is present in **upper surface** and **thin cuticle** in **lower surface**.
- 5)* Stomata are present mostly on lower epidermis. They help in transpiration.
- 6) Epidermis gives protection to the inner tissues and helps in gaseous exchange.

II) Mesophyll:

- 1) Mesophyll tissue is present between the upper and lower epidermis.
- 2)* It is divided into upper palisade parenchyma and lower spongy parenchyma.
- 3)* Palisade parenchyma consists of vertically, elongated cells arranged in two layers.
- 4)* Spongy parenchyma consists of loosely arranged oval shaped cells.
- 5) Mesophyll cells contain chloroplasts. They perform photosynthesis.
- 6) Mesophyll helps in the synthesis of food.

III) Vascular Bundles:

- 1)* Vascular bundles are present in the mid vein region of mesophyll tissue.
- 2) They are conjoint, collateral and closed.
- 3) Each vascular bundle is surrounded by a bundle sheath.
- 4) Xylem lies towards the upper epidermis and phloem lies towards the lower epidermis.
- 5) Vascular bundles help in supplying water, mineral salts and food material.



Tick

Boxes