



MARCH-2023 (TS)

PREVIOUS PAPERS

IPE: MARCH-2023(TS)

Time : 3 Hours

JR.BOTANY

Max.Marks : 60

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

1. Why is Mendel considered as the father of Genetics?
2. What is Palaeobotany? What is its use?
3. What does ICBN stand for?
4. Which organ is modified to trap insects in insectivorous plants? Give two examples.
5. Define mericarp. In which plant you find it?
6. Name the type of pollination mechanism found in members of Fabaceae.
7. What is referred to as satellite chromosome?
8. Give one example for each of amino acids, sugars, nucleotides and fatty acids.
9. Which tissue of animals and plants exhibits meiosis?
10. Define communities? Who classified plant communities into hydrophytes, mesophytes and xerophytes?

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

11. What is meant by identification and nomenclature? How is a key helpful in the identification and classification of an organism?
12. What are the characteristic features of Euglenoids?
13. 'Fertilisation is not an obligatory event for fruit production in certain plants'. Explain the statement.
14. Describe the essential floral parts of plants belonging to Liliaceae.
15. Describe the cell organelle which contains chlorophyll pigments.
16. Schematically represent primary, secondary and tertiary structures of a hypothetical polymer using protein, as an example.
17. State the location and function of different types of meristems.
18. What are hydrophytes? Briefly discuss the different kinds of hydrophytes with examples.

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

19. Define root modification. Explain how root is modified 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 T.S of a Dicot Stem.

IPE TS MARCH-2023

ANSWERS

SECTION-A

1. **Why is Mendel considered as the father of Genetics?** [TS M-17]

- 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**.

2. **What is Palaeobotany? What is its use?** [AP M-17,22][TS M-15,17,20]

- A:** 1) **Palaeobotany** is the study of **fossil plants**.
- 2) It helps in understanding the course of evolution in plants.

3. **What does ICBN stand for?** [AP Mar, May-19]

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

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

[AP M-19][TS Mar- 23]

- A:** In insectivorous plants, **leaves** are modified to trap the insects. **Ex:** *Nepenthes*, *Drosera*, *Dionea*.

5. **Define mericarp. In which plant you find it?** [TS M-16]

- A:** **Mericarp:** The one seeded bits of Schizocarpic fruits are called mericarps.

Ex: *Acacia*, *Castor*.

6. **Name the type of pollination mechanism found in members of Fabaceae.** [Mar- 14]

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

7. **What is referred to as satellite chromosome?** [AP M-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. Give one example for each of amino acids, sugars, nucleotides and fatty acids.

- A:** 1) Amino acids **Ex:** Glycine [IPE Mar- 13]
2) Sugars **Ex:** Glucose [AP May-19][TS M-16]
3) Nucleotide **Ex:** Adenylic acid
4) Fatty acids Ex: Lecithin, Glycerol
-

9. Which tissue of animals and plants exhibits meiosis? [AP M-16]

- A:** 1) In animals, Meiosis occurs in gamete producing cells.
2) In **Thallophyta**, meiosis occurs in **zygote**.
3) In **Bryophytes**, meiosis occurs in **spore mother cells**.
-

10. Define communities? Who classified plant communities into hydrophytes, mesophytes and xerophytes?

- A:** 1) **Community** is an **assemblage of several populations** belonging to different species occurring in an area.
2) '**Eugen Warming**' classified plant communities into hydrophytes, mesophytes and xerophytes.

SECTION-B

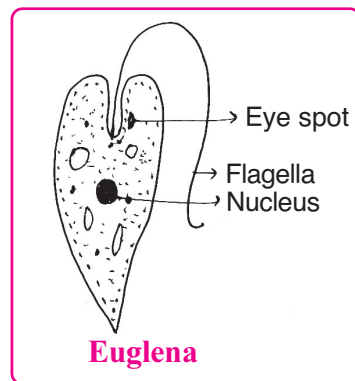
11. What is meant by identification and nomenclature? How is a key helpful in the identification and classification of an organism? [TS Mar-23]

- A:**
- **Identification:** The determination of a collected organism whether is entirely new or already known, is called Identification.
 - **Nomenclature:** Providing a universal scientific name to an identified organism is called Nomenclature.
- 1) Key is a taxonomical aid used for identification of plants and animals based on the similarities and dissimilarities.
 - 2) The keys based on the contrasting characters generally in a pair are called couplets.
 - 3) It represents the choice made between two opposite options. This results in acceptance of only one and rejection of the other.
 - 4) Each statement in the key is called a lead.
 - 5) In plants, identification can be done by directly comparing the characters with an authentic herbarium specimen or indirectly with the help of keys in flora.
 - 6) Separate taxonomic keys are required for each taxonomic category such as family, genus and species for identification purposes.

12. 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**.



13. 'Fertilisation is not an obligatory event for fruit production in certain plants'. Explain the statement. [TS MAR-23]

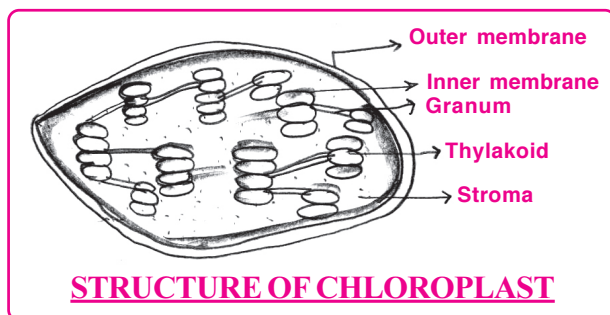
- A:**
- 1) Some times fruits are produced from a flower without fertilisation. This phenomenon is called parthenocarpy.
 - 2) Development of an embryo from an unfertilised egg is called parthenogenesis.
 - 3) So fertilisation is not an obligator event for fruit production. **Ex:** Banana, Guava, Pine apple.

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, 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. Describe the cell organelle which contains chlorophyll pigments. [TS M-16,22]

- A:**
- 1) The cell organelles which contain chlorophyll pigment are called chloroplasts.
 - 2) They are double membrane bound structures.
 - 3) The space limited by the inner membrane is called the stroma.
 - 4) Number of flattened membranous sacs called thyalkoids are present in stroma.
 - 5) Thylakoids are arranged in stacs like the piles of coins called grana.
 - 6) Flat membranous tubules called stroma lamellae connect the thylakoids of different grana.
 - 7) The membrane of the thylakoids encloses a space called lumen.
 - 8) The stroma of chloroplast contains enzymes required for the synthesis of carbohydrates and proteins.
 - 9) Chloroplasts also contain small, double stranded circular DNA molecules and ribosomes.
 - 10) **Function:** Chloroplasts perform photosynthesis.



16. Schematically represent primary, secondary and tertiary structures of a hypothetical polymer using protein, as an example. [AP M-22][TS M-23]

A: Primary Structure:

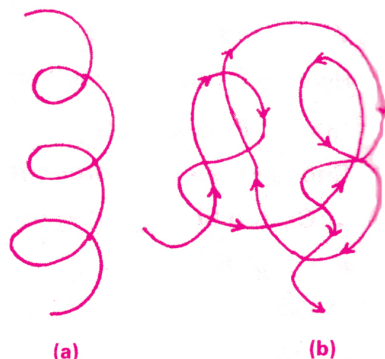
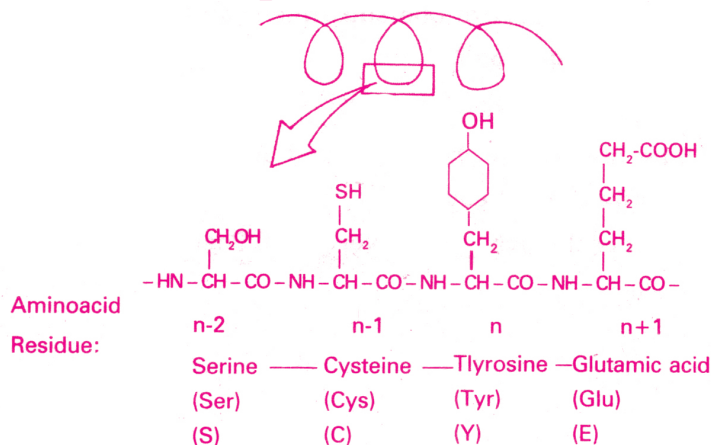
- 1) Proteins are heteropolymers containing string of amino acids.
- 2) Each amino acid has hydrogen, carboxyl group, amino group and a variable group.
- 3) When the carboxyl ($-\text{COOH}$) group of one amino acid reacts with the amino ($-\text{NH}_2$) group of next amino acid, peptide bonds are formed.
- 4) Many amino acids are joined by peptide bonds which held them together in a particular sequence and constitute the primary structure of proteins.
- 5) This structure does not make a protein functional.
- 6) It is the linear sequence of amino acids.

Secondary Structure:

- 1) A protein is imagined as a line, the left end is represented by first amino acid and the right end the last amino acid.
- 2) The first amino acid is also called as N- terminal amino acid.
- 3) The last amino acid is called C- terminal amino acid.
- 4) A protein thread does not exist as an extended rigid rod.
- 5) The thread is folded in the form of helix.
- 6) Thus a functional protein has 3-dimensional configuration.
- 7) Secondary protein has α -helices and β -sheaths held in place of amino acids.

Tertiary Structure:

- 1) The long protein chain is folded like a hollow wooden ball.
- 2) It gives rise to the tertiary structure. This gives us 3-dimensional view of a protein.
- 3) Tertiary structure is absolutely necessary for the many biological activities of proteins.



Primary structure of a portion of a hypothetical protein. a. A secondary structure and N and C refer to the two termini of every protein. b. A tertiary structure of proteins

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. What are hydrophytes? Briefly discuss the different kinds of hydrophytes with examples.

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

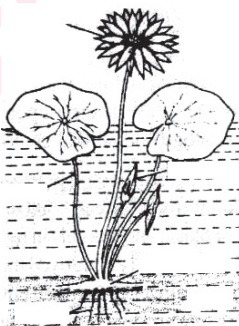
A: Hydrophytes: Plants that grow in water are called hydrophytes.

According to their mode of living in water, these are of five kinds.

- 1) **Free floating hydrophytes:** These plants have no contact with soil and thus float freely on water surface. **Ex:** Pistia, Lemna, Salvinia.
- 2) **Routed hydrophytes with floating leaves:** Roots of these plants are **fixed to the substratum**, but their **long petiolated leaves keep them floating on water surface**.
Ex: Nymphaea and Victoria regia.
- 3) **Submerged suspended hydrophytes:** These plants have **contact only with water**, being completely submerged and not rooted in the mud.
Ex: Hydrilla and Utricularia.
- 4) **Submerged rooted hydrophytes:** These plants are **completely submerged in water** and **attached to the substratum by their root system**. **Ex:** Vallisneria.
- 5) **Amphibious plants:** These plants live **partly in water and partly in air**.
Ex: Sagittaria, Typha and Limnophila.



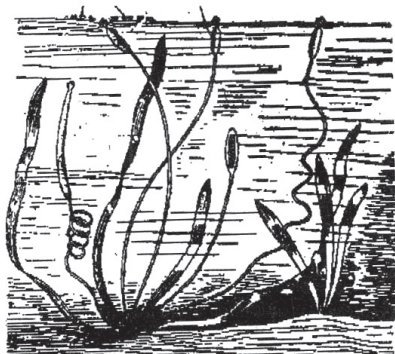
1) Pistia



2) Nymphaea



3) Hydrilla



4) Vallisneria



5) Limnophila

SECTION-C

19. Define root modification. Explain how root is modified to perform different functions.
[TS 20] [AP May-19][AP, TS M-15,17]

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.

😊 Wow! Your favourite **Carrot**, Banyan, **Sugar Cane**, Avicennia are all root modifications

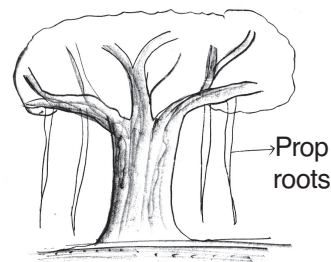


Carrot

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

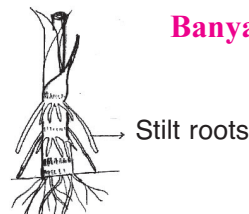


Banyan Tree

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

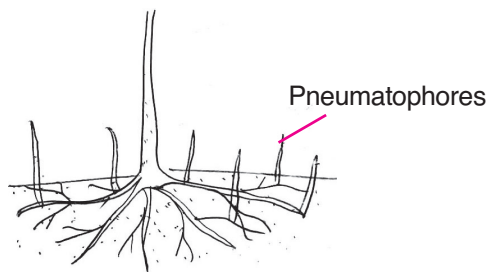


Sugarcane

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**.

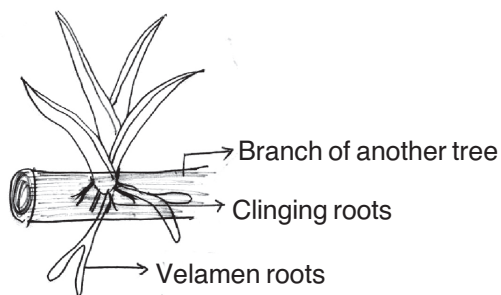
Ex: Avicennia and Rhizophora



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**.

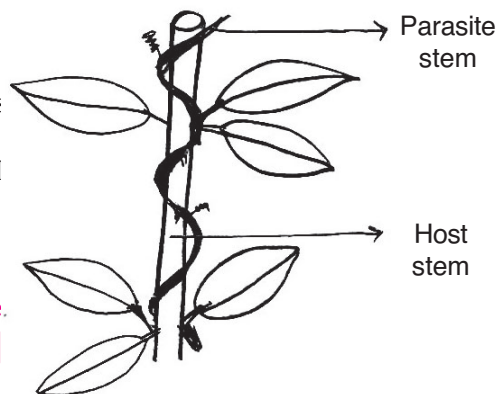
Ex: Vanda.

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

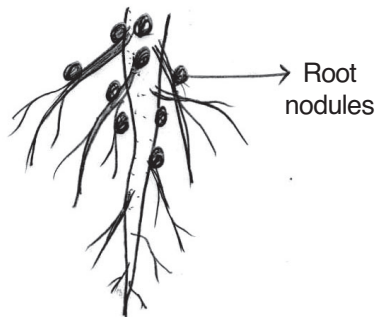
- i) The plants that depend upon some other plants for their **food and water** are called parasite plants.
- ii) They are two types.

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.
- iii) They perform **photosynthesis**.
- iv) **Ex: Taeniophyllum.**



Taeniophyllum

Tick Boxes

☐	☐	☐
--------------------------	--------------------------	--------------------------

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.

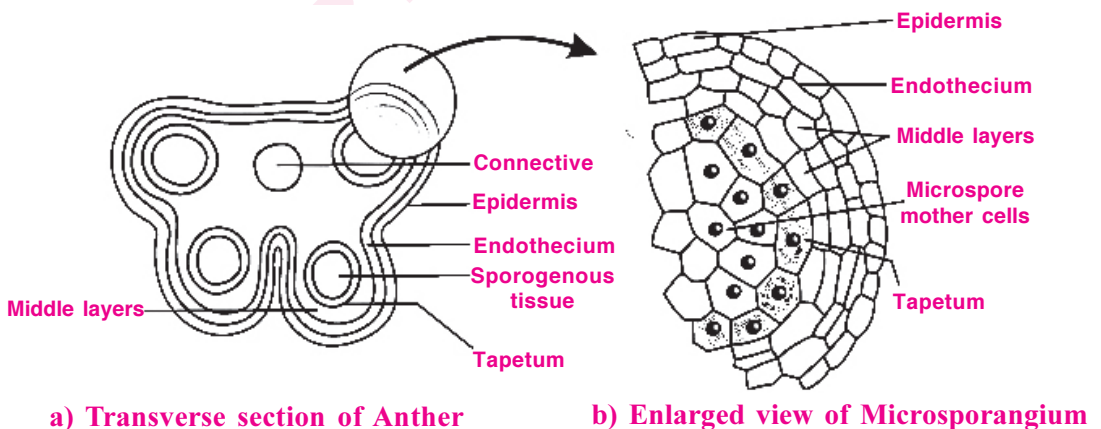
2) Endothecium: It is below the epidermis and expands radially with fibrous thickenings. At maturity, these cells lose water and contract. They help in the dehiscence of pollen sacs.

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**.



MICROSPORANGIUM

21. Describe the T.S of a Dicot Stem.**[TS M-15][AP M-17]****A:** T.S of young dicot stem 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 epidermal hairs(trichomes).
- 4)***Thin cuticle** is present.
- 5) Stomata helps in gaseous exchange.
- 6) Epidermis protects innermost tissues.

II) Cortex: The part between epidermis and stele is called cortex. It has three subzones**1)Hypodermis:**

- i) Hypodermis is present below the epidermis
- ii) It is made up of collenchyma.
- iii) It gives mechanical strength to the stem.

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) Inner most layer of cortex is called endodermis.
- ii) The cells are **barrel shaped**; tightly arranged without any intercellular spaces.
- iii) These cells contain starch grains. Hence, it is known as '**starch sheath**'.
- iv) The radial walls show **lens shaped thickenings called casparian bands**.

III) Stele: Stele is the **central conducting cylinder**.

It has four parts (1) pericycle (2) vascular bundles (3) medulla (4) Medullary rays.

1) Pericycle: Pericycle is with single layer of cells surrounding the stele.**2) Vascular bundles:**

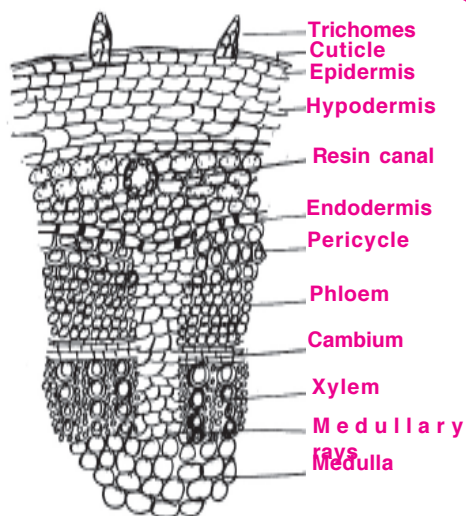
- i)***Few number (7-15)** of Vascular bundles are present in stele.
- ii)*Each vascular bundle is **wedge shaped, conjoint, collateral, open**.
- iii)*Each vascular bundle is enclosed by bundle sheath.
- iv)*In between the phloem and xylem, **cambium is present**.

3) Medulla(pith):

- i) **Medulla is the central part of stele**.
- ii) It helps in storage.

4) Medullary rays:

- i) The cells between vascular bundles look like rays radiating from the pith.
- ii) They help in lateral conduction of food.

**T.S OF DICOT STEM**