XI-STD - BIO-BOTANY & BOTANY
SPECIAL GUIDE

2024-2025
KRISHNAGIRI DISTRICT

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CHAPTER 1: LIVING WORLD

ONE MARKS:

1. An Intact Infective Virus Particle Which Is Non-Replicating Outside A host cell
   Virion
2. Who Proposed Five Kingdom Classification
   R.h.Whittaker
3. Which Bacteria Produce ''Earthy Odour" To Soil After Rain
   Streptomyces
4. Duodenal and Gastric Ulcers are caused by
   Helicobacter Pylori
5. 1 Nanometer = **10^{-9} meter**
6. In Which Year did Frederick Griffith Explain Genetic Modification in Bacteria
   1928
7. Father Of Indian Mycology
   E.J.Butler
8. Gram Staining of Bacteria was first developed by
   Christian Gram
9. Who Obtained Virus In Crystallised form from Infected tobacco Juice
   W.M.Stanley
10. Dolipore Septum is a characteristic feature of
    Basidiomycetes

TWO MARKS:

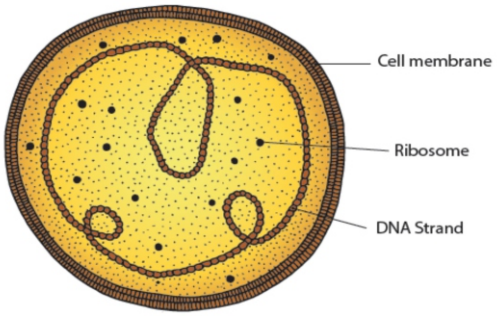
1. Define "Bacteriophage"

- Viruses infecting bacteria are called **Bacteriophages**.

2. What is Fimbriae or Pili?

- Pili or fimbriae are hair like appendages.
- It found on surface of cell wall of gram-negative bacteria.

3. Draw Diagram and Label the Parts of Structure of Mycoplasma.



4. Differentiate Homiomerous and Heteromerous Lichens.

- **Homiomerous**- Algal cells evenly distributed in the thallus.
- **Heteromerous**- a distinct layer of algae and fungi present.

5. What is Archaebacteria?

- Archaebacteria are primitive prokaryotes.

- They are adapted to thrive in extreme environments.
- Example: *Methanobacterium.*

6. What is Sterigmata?

- The basidiospores are borne on stalk like structures called **sterigmata**.

7. Define - Pileus.

- The upper convex surface of basidiocarp is called **pileus.**
- which is white or cream in colour.

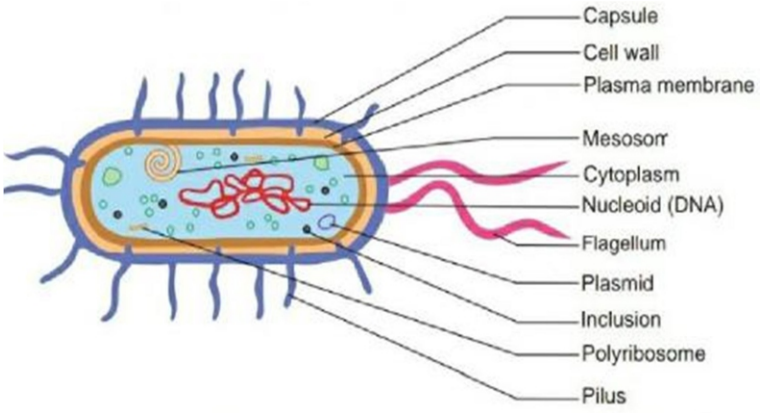
8. Draw diagram and label the parts of Agaricus Basidiocarp.

THREE MARKS:

1.Write the distinguishing features of monera.

- They are Prokaryotic.
- Mostly Unicellular, rarely multicellular.
- Motile or non-motile.
- Example: Archaebacteria

2. Draw a diagram and label the parts of ultra structure of a bacterial cell.



Ultrastructure of a bacterial cell

3. What is Deuteromycetes or imperfecti fungi?

- The fungi belonging to this group lack sexual reproduction and are called imperfect fungi.

4. Write the significance of Mycorrhizae.

- Helps to derive nutrition in *Monotropa*, a saprophytic angiosperm.

- Improves the availability of minerals and water to the plants.
- Provides drought resistance to the plants.
- Protects roots of higher plants from the attack of plant pathogens.

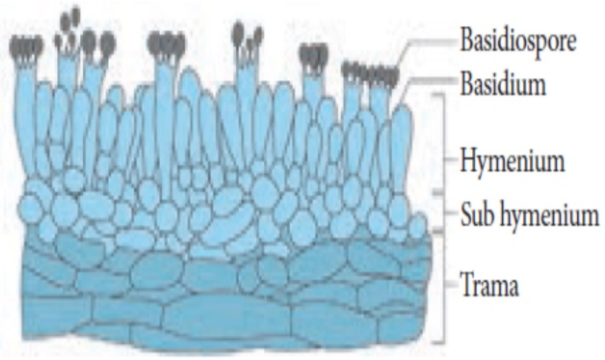
5. Why do farmers plant leguminous crops in crop rotation / mixed cropping?

- The leguminous plants have root nodules in their roots.
- They have nitrogen fixing bacteria like Rhizobium inside.
- It fix atmospheric nitrogen and increase soil fertility.

6. What is Paraphysis?

- The basidium is interspersed with sterile hyphae called paraphysis.

7. Draw diagram and label the parts of C.S of Agaricus gills.



8. What is hymenium?

- On both the sides of the gills a fertile layer called **hymenium** is present.

FIVE MARKS:

1. Write the living and non – living characteristics features of viruses.

Living Characters of viruses:

- Presence of nucleic acid and protein.
- Capable of mutation.
- Ability to multiply within living cells.
- Able to infect and cause diseases in living beings.
- Show irritability.
- Host –specific.

***Non-living Characters of viruses*:**

- Can be crystallized.
- Absence of metabolism.
- Inactive outside the host.
- Do not show functional autonomy.
- Energy producing enzyme system is absent.

2. Explain the Merits and Demerits of Five kingdom classification.

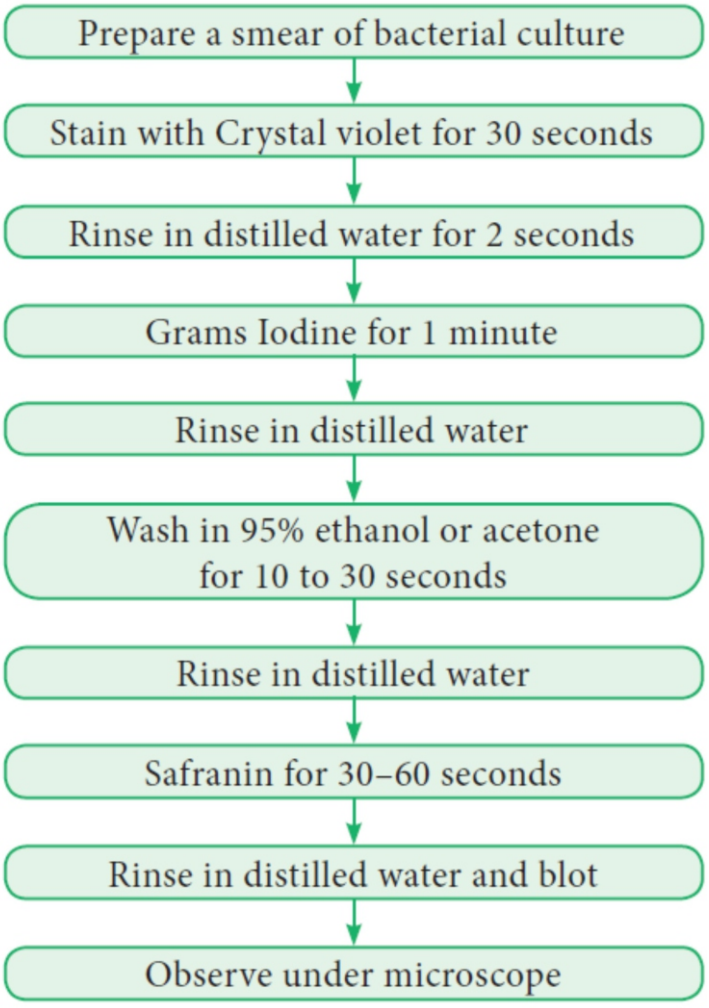
Merits

- The classification is based on the complexity of cell structure and organization of thallus.
- It is based on the mode of nutrition.
- Separation of fungi from plants.
- It shows the phylogeny of the organisms.

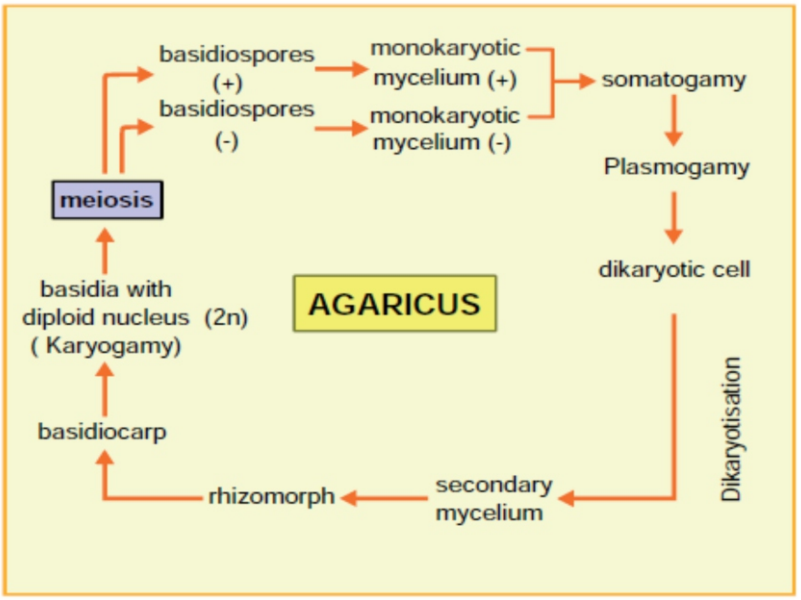
Demerits

- The Kingdom Monera and protista accommodate both autotrophic and heterotrophic organisms.
- cell wall lacking and cell wall bearing organisms thus making these two groups more heterogeneous.
- Viruses were not included in the system.

3. Write steps involved in Gram Staining in Bacteria.



4. Explain the Agaricus life cycle.



CHAPTER 2 : PLANT KINGDOM

ONE MARKS:

1. Which one is Amphibians of Plant Kingdom
   Bryophytes
2. Xylem is Star shaped in
   Actinostele
3. Vascular bundles are closed
   in **Monocot**
4. Vessels are found in Gymnosperm
   like **Gnetum**
5. Classified the gymnosperms into 3 classes and 31 families
   Sporne
6. The Oldest Recorded algae
   Grypania
7. The amber is produced by
   Pinites succinifera
8. Agar Agar obtained from
   Gelidiella
9. Father of Indian Phycology
   M.O. Parthasarathy
10. Father of Indian Bryology
    Shiv Ram Kashyap

TWO MARKS:

1. Name the three classes of Bryophytes?

i) Hepaticopsida ii) Anthocerotopsida iii) Bryopsida.

2.What is Plectostele? Give example.

- Xylem plates alternates with phloem plates.
- Ex : Lycopodium clavatum.

3.What method of reproduction occur in the following organism.

- a) Yeast – Budding b) Spirogyra –fragmentation

4. What is Amber?

- Amber is a plant secretion which is an efficient preservative that doesn't get degraded and hence can preserve remains of extinct life forms.
- The amber is produced by ***Pinites succinifera***, a Gymnosperm.

5.Do you agree with the statement "Bryophytes need water for fertilization. Justify your answer.

- Yes. I agree.
- The antheridia produces biflagellate antherozoids which swims in thin film of water and reach the archegonium and fuse with the egg to form diploid zygote.
- So, Water is essential for fertilization.

6. **What is Globule?**

- The male sex organ of Chara is called antheridium or globule.

7. **What is Gemmae.**

- The dorsal surface of Marchantia shows crescent shaped structures called gemma cups.
- which contain vegetative reproductive structures called gemmae.

9. **What is Resurrection plants give example**

- In few *Selaginella* species during dry season the entire plant body gets curled and become fresh, green when moisture is available.
- Due to this they are called **Resurrection plants**. Example *S. lepidophylla.*

THREE MARKS:

1. **What is Eustele?**

- The stele is split into distinct collateral vascular bundles around the pith. Example: Dicot stem.

2. Do you think shape of chloroplast is unique for algae. Justify your answer?

- Yes. I agree.
- Cup shaped - *Chlamydomonas*,
- Discoid - *Chara*,
- Girdle shaped -*Ulothrix*,
- Reticulate - *Oedogonium*,
- Spiral - *Spirogyra*,
- Stellate - *Zygnema*,
- Plate like - *Mougeoutia*.

3. **Define "Peat".**

- Dead thalli of *Sphagnum* gets accumulated and compressed, hardened to form peat.

4. Write types of wood found in Gymnosperm.

- **Manoxylic**- Porous, soft, more parenchyma with wide medullary ray eg.*Cycas*
- **Pycnoxylic**- compact with narrow medullary ray. eg.*Pinus*).

5. Mention two characters shared by gymnosperms and angiosperms.

- Presence of well organised plant body which is differentiated into roots, stem and leaves.
- Presence of cambium in gymnosperms as in dicotyledons.
- Both plant groups produce seeds. Pollen tube helps in the transfer of male nucleus in both.
- Presence of eustele.

6. What are elaters?

- Elaters are found in capsule of Marchantia Which helps in the dispersal of spores.

7. What is Nucule?

- The female sex organ of Chara is called Oogonium or nucule

8. Differentiate nodal and internodal cells of chara?

Nodal cells	Internodal cells
➢ The nodal cells are uninucleate.	➢ The intermodal cells are multi nucleate.
➢ They have few ellipsoidal chloroplasts.	➢ They have numerous discoidal chloroplasts.

FIVE MARKS:

1. Differentiate Gymnosperm and Angiosperms.

Table 2.5: Difference between Gymnosperms and Angiosperms

S.No	Gymnosperms	Angiosperms
1.	Vessels are absent [except Gnetales]	Vessels are present
2.	Phloem lacks companion cells	Companion cells are present
3.	Ovules are naked	Ovules are enclosed within the ovary
4.	Wind pollination only	Insects, wind, water, animals etc., act as pollinating agents
5.	Double fertilization is absent	Double fertilization is present
6.	Endosperm is haploid	Endosperm is triploid
7.	Fruit formation is absent	Fruit formation is present
8.	Flowers absent	Flowers present

2. Explain stele types with diagram.

I) Protostele: In protostele phloem surrounds xylem. This type includes Haplostele, Actinostele, Plectostele, and Mixed protostele.

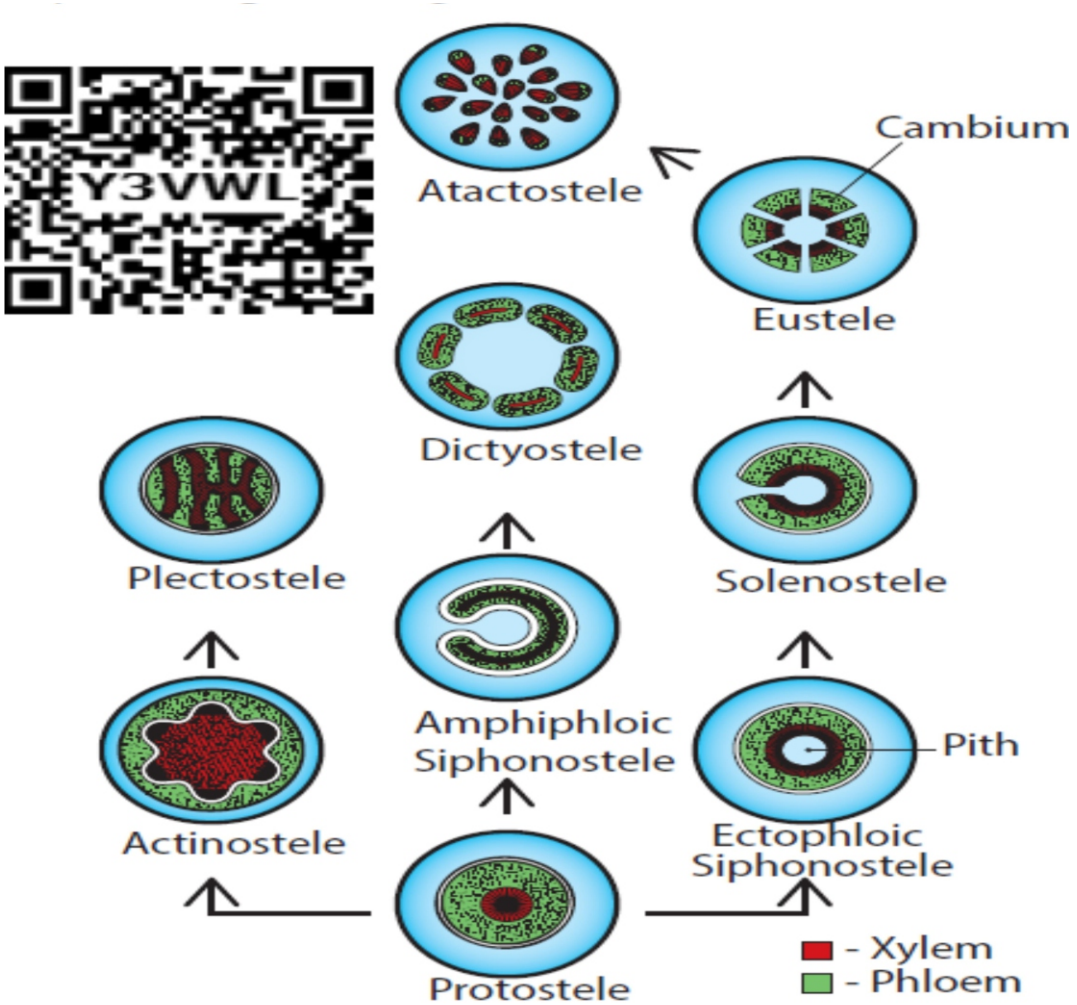
(i) **Haplostele**: Xylem surrounded by phloem is known as haplostele. Example: *Selaginella.*

(2) (ii) **Actinostele**: Star shaped xylem core is surrounded by phloem is known as actinostele. Example: *Lycopodium serratum.*

(3) (iii) **Plectostele**: Xylem plates alternates with phloem plates. Example: *Lycopodium clavatum.*

(4) (iv) **Mixed prototostele**: Xylem groups uniformly scattered in the phloem. Example: *Lycopodium cernuum*.

II) Siphonostele: In siphonostele xylem is surrounded by phloem with pith at the centre. It includes Ectophloic siphonostele, Amphiphloic siphonostele, Solenostele, Eustele, Atactostele and Polycylic stele.



(i) **Ectophloic siphonostele:** The phloem is restricted only on the external side of the xylem. Pith is in centre. Example: *Osmunda.*

(ii) Amphiphloic siphonostele: The phloem is present on both the sides of xylem. The pith is in the centre. Example: *Marsilea*.

III) Solenostele: The stele is perforated at a place or places corresponding the origin of the leaf trace.

(a) Ectophloic solenostele– Pith is in the centre and the xylem is surrounded by phloem Example *Osmunda*.

(b) Amphiphloic solenostele– Pith is in the centre and the phloem is present on both sides of the xylem. Example: *Adiantum pedatum*.

i). **Dictyostele**– The stele is separated into several vascular strands and each one is called meristele. Example: *Adiantum capillus-veneris*.

ii). **Eustele**: The stele is split into distinct collateral vascular bundles around the pith. Example: Dicot stem.

iii) **Atactostele**: The stele is split into distinct collateral vascular bundles and are scattered in the ground tissue. Example: Monocot stem.

IV) **Polycyclicstele:** The vascular tissues are present in the form of two or more concentric cylinders. Example: *Pteridium*.

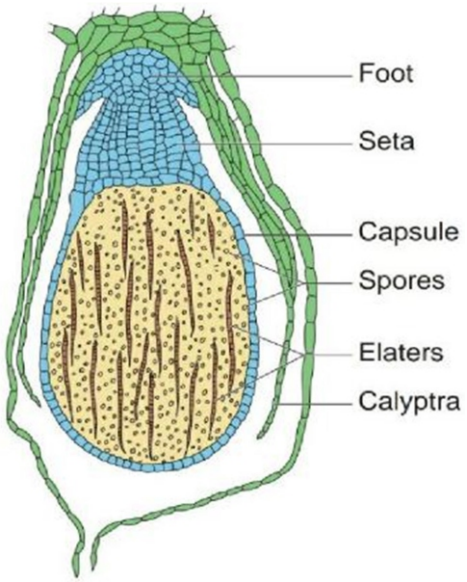
3. List out the Economical importance of Gymnosperm.

Table 2.6: Economic importance of Gymnosperms

S.No	Plants	Products	uses
1.	*Cycas circinalis, Cycas revoluta*	Sago	Starch used as food
2.	*Pinus gerardiana*	Roasted seed	Used as a food
3.	*Abies balsamea*	Resin (Canada balsam)	Used as mounting medium in permanent slide preparation
4.	*Pinus insularis, Pinus roxburghii*	Rosin and Turpentine	Paper sizing and varnishes
5.	*Araucaria* (Monkey's puzzle), *Picea* and *Phyllocladus*	Tannins	Bark yield tannins and is used in Leather industries
6.	*Taxus brevifolia*	Taxol	Drug used for cancer treatment
7.	*Ephedra gerardiana*	Ephedrine	For the treatment of asthma, bronchititis
8.	*Pinus roxburghii*	Oleoresin	Used to make soap, varnishes and printing ink
9.	*Pinus roxburghii, Picea smithiana*	Wood pulp	Used to make papers
10.	*Cedrus deodara*	wood	Used to make doors, boats and railway sleepers
11.	*Cedrus atlantica*	oil	Used in perfumery
12	*Thuja, Cupressus, Araucaria, and Cryptomeria*	whole plant	Ornamental plants/Floral Decoration

4. Explain the Sporophyte of Marchantia.

- Sporophyte is differentiated into foot, seta and capsule. The foot is bulbous and is embedded in the gametophyte.
- It derives nutrition from the gametophyte and transfers to the sporophyte.
- Seta is short and connects foot and capsule.
- The capsule consists of single layered jacket layer and encloses numerous haploid spores and elaters.
- The capsule is covered by protective covering called calyptra. capsule dehisces and spores are released.
- Elaters helps in the dispersal of spores



5.Explain the internal structure of cycas rachis.

i) The outermost layer is epidermis and is covered by thick cuticle.

ii)The hypodermis is made up of two layers of sclerenchyma on the adaxial side and many layers on the abaxial side.

iii)The ground tissue is parenchymatous.

iv)The peculiar feature of the rachis is the arrangement of vascular bundle i.e., in an inverted Omega shape (Ω)pattern

v)Each vascular bundle is covered by a single layered sclerenchymatous bundle sheath. Vascular bundles are collateral, endarch and open.

vi)A diploxylic condition is present in the vascular bundles.

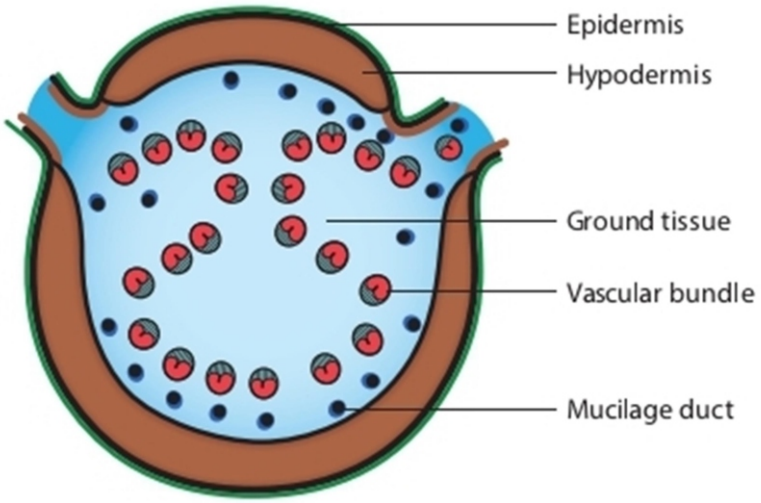


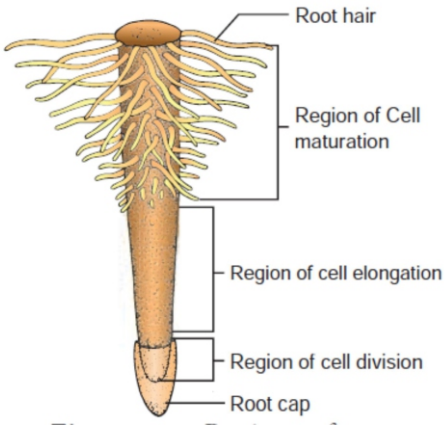
Figure 2.27: T.S. of Rachis

CHAPTER 3:VEGITATIVE MORPHOLOGY

1. Polycarpic plant is – **Mangifera.**
2. Descending, positively geotropic, negatively phototropic are **roots.**
3. Bryophyllum and Dioscorea are example for - **Foliar bud, cauline bud.**
4. Which of the following is the correct statement?**–**
***In Pisum sativum leaflets modified into* tendrils**
5. Select the mismatch pair **- Allamanda - Ternate phyllotaxy.**
6. Another name for flowering plants (Angiosperms) is **Magnoliophytes.**
7. Plants with radical buds for vegetative reproduction – **Sugar beet and Rutaceae family.**
8. Multiple root cap present in the plant is **Pantanus.**
9. The respiratory roots present in the plants like**- Avicennia, Rhizophora (mangrove plants).**
10. Soft tissues found in the roots of epiphytic plants absorb moisture from the air is called - **Velamen.**
11. Foliar or reproductive roots present in – **Bryophyllum, Begonia.**
12. Example for photosynthetic or assimilatory root is **Tinospora, Trapa.**

TWO MARKS:

1. **Draw and label the parts of regions of root.**



2. **Write the similarities and differences between**

   a. Radical buds and foliar buds.

Radical buds	foliar buds
Similarities	
♦ Adventitious buds.	
Differences	
➢ These buds are arising from lateral roots.	➢ These buds are arising from lateral roots.
➢ Ex: Millingstonia	➢ Ex: Begonia

Phylloclade	Cladode
Similarities	
➢ Green, flattened cylindrical stem which takes the over all the function of leaves, particularly photosynthesis.	
➢ Aerial modification of stem.	
Differences	
➢ A series of nodes and internodes. ➢ Ex: Opuntia	➢ One or two inter nodes only. ➢ Ex: Asparagus.

3. How root climbers differ from stem climbers?

Root climbers	Stem climbers
➢ Roots are produced from nodes of the stem for support and climbing.	➢ They lack specialized structure for climbing and stem itself coils around the support.
➢ Ex: Piper betel, Piper nigrum	➢ Ex: Ipomoea,

4.Compare sympodial branching with monopodial branching.

Sympodial branching	Monopodial branching
➢ Terminal bud grows uninterrupted and produce several branches. ➢ Ex: Polyalthia.	➢ Terminal bud ceases to grow and further growth is taken care by several lateral meristem. ➢ Ex: Cycas.

5. Differentiate pinnate unicostate with palmate multicostate venation.

Pinnate unicostate	Palmate multicostate
➢ Only one mid rib in the centre which forms many lateral to form a network. ➢ Ex: Mangifera, Musa.	➢ Two or more principal veins arising from a single point and they proceed outwards or upwards. ➢ Ex: Cucurbita ,rice.

6. Mention the primary functions of root.

- ➢ Absorb water and minerals from soil.
- ➢ Help to anchor the plant firmly in the soil.

7.Write the Characteristic features of Root System?

- ➢ Generally non-green in colour.
- ➢ Does not possess nodes, internodes and buds.
- ➢ It bears root hairs.
- ➢ It is positively geotropic and negatively phototrophic in nature.

8. What is Respiratory root?

- ➢ Some mangrove plants develop special kinds of roots for respiration because the soil becomes saturated with water and aeration is very poor.
- ➢ They have a large number of pores called Pneumatopores.
- ➢ Ex: Avicennia, Rhizophora.

9. Write the Characteristic features of the stem?

- It is an aerial portion of the plant.
- It is positively phototropic and negatively geotropic.
- It has nodes and internodes. Stem bears vegetative and floral buds.
- During reproductive growth stem bears flowers and fruits.

10. What are the Primary functions of stem?

- It Provides support and bears leaves, flowers and fruits.
- It transports water and mineral nutrients to the other parts from the root.
- It transports food prepared by leaves to other parts of the plant body.

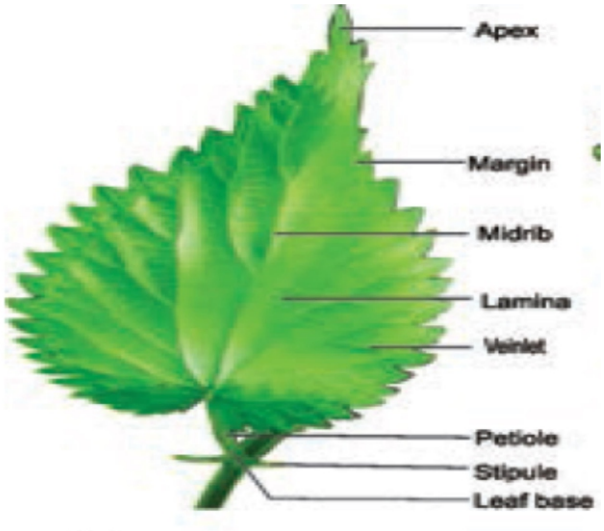
11.What is phylloclade?

- The green, flattened cylindrical or angled stem consisting of a series of nodes and inter nodes at long or short intervals
- It is characteristic adaptation of xerophytic plants and takes over all functions of leaves, particularly photosynthesis.
- Ex: Opuntia

12. what are the primary functions of leaf?

- Photosynthesis
- Transpiration
- Gaseous exchange
- Protection of buds
- Conduction of water and dissolved solutes.

3.Draw the structure of leaf and mark the parts.



14.What is Phyllode?

- Phyllodes are flat, green-coloured leaf- like modifications of petioles.
- The phyllodes perform photosynthesis and other functions of leaf.
- Ex: Acacia.

15. Write about pitcher plant.

- The leaf becomes modified into a pitcher in Nepenthes.
- In Nepenthes the basal part of the leaf is laminar and the midrib continues as a coiled tendrillar structure.
- The apical part of the leaf is modified into a pitcher.
- The mouth of the pitcher is closed by a lid which is the modification of leaf apex.

16.What are called as Pulvinus?

- In legumes leaf base become broad, thick and swollen. It is known as pulvinus.
- Ex: Clitoria.

FIVE MARKS:

1.Explain the regions of root?

- Root tip is covered by a dome shaped structure made of parenchymatous cells called **root cap.**
- It protects the meristematic cells in the apex.

Three distinct zones have been classified based on their meristematic activity.

1. Meristematic Zone
2. Zone of Elongation
3. Zone of Maturation

1.Meristematic Zone

- It lies just above the root cap. Meristematic cells, actively divide and continuously.
- increase in number. This is the main growing tip of the root

2.Zone of Elongation

- It lies just above the meristematic zone. The cells increase the length and cause enlargement of the root.

3.Zone of Maturation

- It lies above the zone of elongation.
- The cells differentiate into various tissues like epidermis, cortex and vascular bundles.

2. Explain the tap root modifications.

Conical root

- These roots are cone like, broad at the base and gradually tapering towards the apex.

  Ex: Daucus carota.

Fusiform root

- These roots are swollen in the middle and tapering towards both ends.

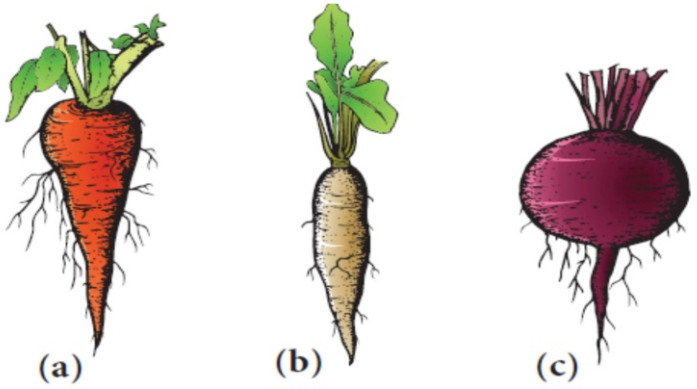
Ex: Raphanus sativus.

Napiform root

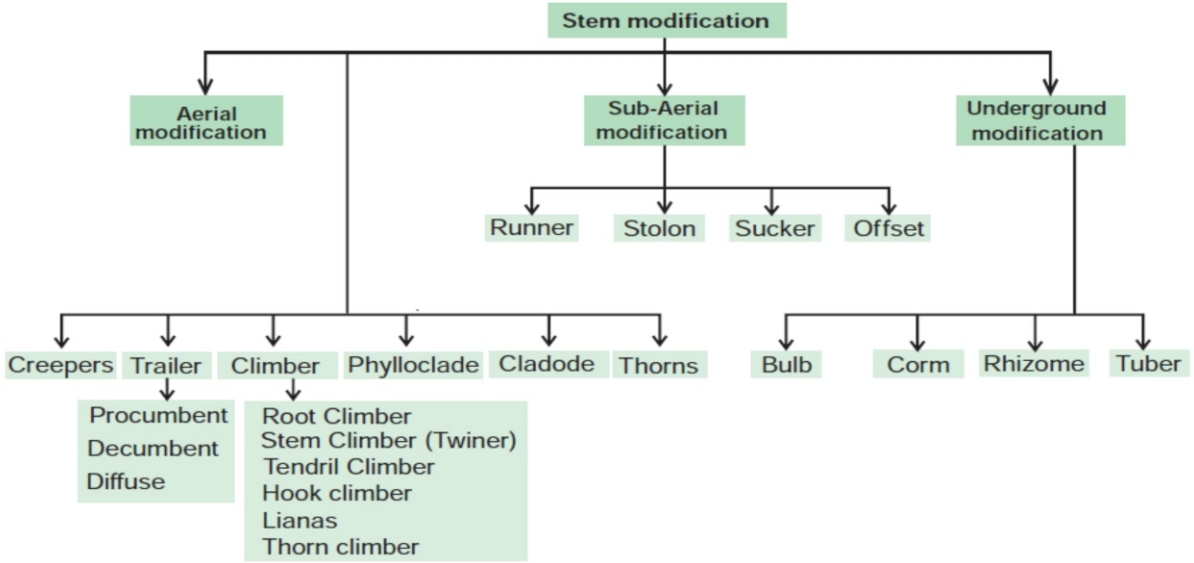
- The storage root is very broad and suddenly tapers like a tail at the apex.
  Ex: Beta vulgaris.

Respiratory root

- Some mangrove plants develop special kinds of roots for respiration because the soil becomes saturated with water and aeration is very poor.
- They have a large number of pores called pneumatopores.
- Ex: Avicennia, Rhizophora.



3. Draw the diagram of stem modification.



4. Write a short note on Phyllotaxy.

The mode of arrangement of leaves on the stem is known as phyllotaxy.
The four main types of phyllotaxy are:

1. Alternate 2. Opposite 3.Ternate 4.Whorled.

1.Alternate phyllotaxy

- Only one leaf per node and the leaves on the successive nodes are arranged alternate to each other.

2.Spiral arrangement of leaves: Leaves are arranged alternatively in a spiral manner. They are two types.

Alternate spiral

- The leaves are arranged alternatively in a spiral manner.
- Ex: Hibiscus.

Alternate distichous

- The leaves are organized alternatively in two rows on either side of the stem.
- Ex: Polyalthia.

3.Opposite phyllotaxy

- In this type each node possesses two leaves opposite to each other.
- They are organized in two different types.

Opposite superposed -Ex: Psidium

Opposite decussate -Ex: Calotropis.

3.Ternate phyllotaxy

- In this type there are three leaves attached at each node.
- Ex: Nerium

4.Whorled type of phyllotaxy

- In this type more than three leaves are present in a whorl at each node forming a circle.
- Ex: Allamanda.

Alternate *Polyalthia* | Opposite Superposed *Guava* | Opposite Decussate *Calotropis* | Ternate *Nerium* | Whorled *Allamanda*

CHAPTER 4 : REPRODUCTIVE MORPHOLOGY

One-mark questions

1.Vexillary aestivation is characteristic of the family-**Fabaceae**

2.Gynoecium with united carpels is termed as-**Multicarpellary, apocarpous ovary**

3. Aggregate fruit develops from - **Multicarpellary, apocarpous ovary**

4. In an inflorescence where flowers are borne laterally in an acropetal succession the position of the youngest floral bud shall be – **Proximal**

5. A true fruit is the one where - **Only ovary of the flower develops into fruit**

Additional one-mark questions

1.Example for Zygomorphic flower is – **Lilium**

2……. is called as Racemose of Cymes- **Thyrus**

3.Spike is belonging to …… type of inflorescence – **Racemose**

4.Example for hypanthodium inflorescence is…. **Ficus**

5.More than one locule ovaries are called **…… Plurilocular**

2,3,5 Mark questions

1.Find out the floral formula for a bisexual flower with bract, regular, pentamerous, distinct calyx and corolla, superior ovary without bracteole.

- Bracteate - Br
- Ebracteolate - Ebrl
- Bisexual flower - ♂
- Distinct calyx - K5
- Distinct Corolla - C5
- Superior ovary - G

Floral formula of the flower: Br,Ebrl,♂, K_5,C_5,G

2. Give the technical terms for the following

- A sterile stamen - Staminode
- Stamens are united in one bunch - Monadelphous
- Stamens are attached to the petals - Epipetalous
- **Answer:**
- *Staminode*
- *Monadelphous*
- *Epipetalous*

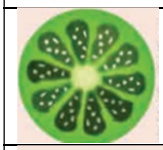
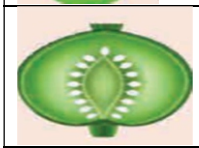
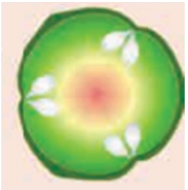
3. Differentiate between aggregate fruit with multiple fruit

Aggregate fruit	Multiple fruit
➢ It Develop from a single flower having an apocarpous pistil,	➢ It develops from a whole inflorescence

each of the free carpel develops into a single fruitlet.	➢ with its peduncle on which they are borne.
➢ Example: Annona, Polyalthia	➢ Example: Jack fruit, Ficus

4.Explain the different types of placentation with example.

The mode of distribution of placenta inside the ovary is called Placentation

	**Marginal:** The placentae along the margin of a unicarpellate ovary. Example: Fabaceae
	**Superficial:** ovules arise from the surface of the septa. Example: Nymphaeaceae
	**Free- central** : The placentae along the column in a compound ovary without Septa. Example: Caryophyllaceae,
	**Axile:** the placentae arise from the column in a compound ovary with septa. Example: Hibiscus, Tomato, Lemon
	**Parietal:** The placentae on the ovary walls or upon intruding partitions of an unilocular, compound Ovary. Example: Mustard, cucumber.
	**Basal:** The placenta at the base of the ovary. Example: Sunflower.

5.Explain different types of fleshy fruit with suitable examples.

Fleshy Fruit

- ➢ The fruits are derived from single pistil.
- ➢ Pericarp is fleshy, succulent and differentiated into epicarp, mesocarp and endocarp.

a) Berry

- ➢ The fruit develops from bicarpellary or multicarpellary, syncarpous ovary.
- ➢ Epicarp is thin, the mesocarp and endocarp remain undifferentiated.
- ➢ Example: Tomato, Grapes.

b) Drupes

- Fruit is develops from monocarpellary, superior ovary.
- Pericarp is differentiated into outer skinny epicarp, fleshy and pulpy mesocarp and hard and stony endocarp around the seed.Example : Mango, coconut

c) Pepo

- Fruit develops from tricarpellary inferior ovary.
- Pericarp terns leathery or woody which encloses, fleshy mesocarp and smooth endocarp.

d) Hesperidium

- Fruit develops from multicarpellary, multilocular, syncarpous, superior ovary.
- The fruit wall is differentiated into leathery epicarp with oil glands, a middle fibrous mesocarp. Example: Orange, Lemon.

e) Pome

- The fruit develops from multicarpellary, syncarpous, inferior ovary
- The receptacle also develops along with the ovary and becomes fleshy, enclosing the true fruit.
- In pome the epicarp is thin skin like and endocarp is cartilaginous.
- Example: Apple, Pear.

f)Balausta

- A fleshy indehiscent fruit developing from multicarpellary, multilocular inferior ovary. The pericarp is tough leathery Example: pomegranate

ADDITIONAL QUESTIONS

1.What is inflorescence?

- A group of flowers arising from branched or unbranched axis with a definite pattern is called as inflorescence.

2.Write the differences between racemose and cymose inflorescence?

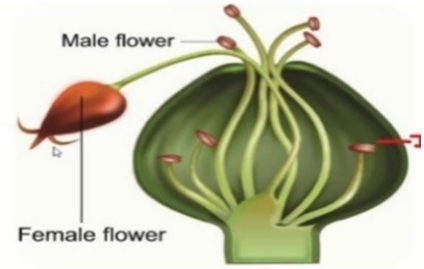
Racemose	Cymose
➢ Main axis of unlimited growth	➢ Main axis of limited growth
➢ Flowers arranged in acropetal succession	➢ Flowers arranged in a basipetal succession

➢ Usually, the oldest flower at the base of the inflorescence axis.	➢ Usually, the oldest flower at the top of the inflorescence axis.

3.What is mixed inflorescence?

- Inflorescence in which both racemose and cymose pattern of development occur in a mixed manner. Example: Thyrsus, Verticillaster.

4.Draw the structure of cyathium inflorescence and label the parts.



5.what is actinomorphic flower?

- The flower shows two mirror images when cut in any plane through the centre.
- Ex: Hibiscus, Datura.

6.what is Zygomorphic flower?

- The flower can be divided into equal halves in only one plane.
- Ex: Pisum, Bean.

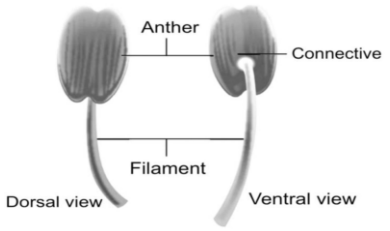
7.What is Monodelphous stamens? Give an example.

- Filaments of stamens connate in to a single bundle.
- Example: Malvaceae (China rose, Cotton)

8.What are polygamous flowers? Give an example.

- The condition in which bisexual and unisexual flowers occur in a same plant is called polygamous.
- Example: Musa, Mangifera.

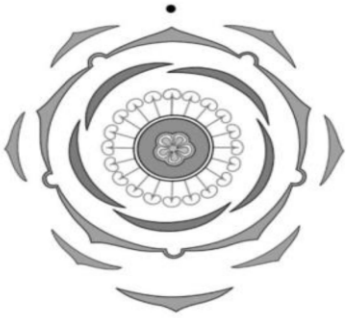
9.Draw the structure of stamen and label the parts.



10.What is Pollinium?

- Pollen grains are fused together as a single mass called pollinium.

11.Draw floral diagram and Write floral formula of Hibiscus rosa sinensis.



- Floral formula: **Br, Brl,⊕,♀,K(5), C5, $A_{(\alpha)}$, G(5).**

12.Write any three functions of fruits

- Edible part of the fruit is a source of food and gives energy for animals.
- They are source of many chemicals like sugar, pectin, organic acids, vitamins and minerals.
- The fruit protects the seeds from unfavourable climatic conditions and animals.

13.What is meant by Aestivation? Explain the types of aestivations.

- Arrangement of sepals and petals in the flower bud is called aestivation.

A.Valvate aestivation

- Margins of sepals or petals do not overlap but just touch each other.
- Ex: Malvaceae (Calyx)

B.Twisted aestivation

- One margin of each petal or sepal overlapping on the other petal.
- Ex: Petals of Chinarose.

C.Imbricate aestivation

- Sepals and petals irregularly overlap on each other.
- One member of the whorl is exterior, one interior and rest of the three having one margin exterior and other interior. Ex: Cassia, Delonix.

There are 3 types

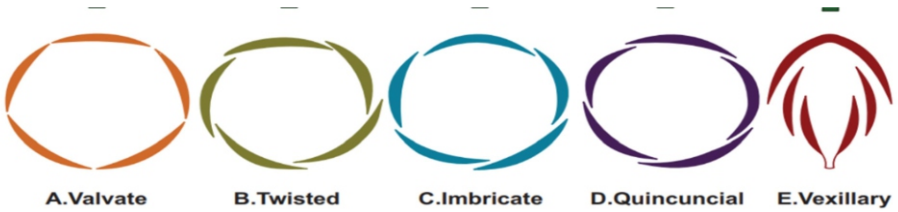
1.Ascendingly Imbricate
2.Quincuncial
3.Vexillary.

D.Quincuncial aestivation

- It is a type of imbricate aestivation.
- Two petals are external and two internal and one petal with one margin internal and the margin external. Ex: Guava, Catharanthus.

E.Vexillary aestivation

- Large posterior petals both margins overlap lateral petals.
- Lateral petals other margin overlaps anterior petals. Ex: Pea, Bean.



Write about the significance of seeds.

- The seed encloses and protects the embryo for next generation.
- It contains food for the development of embryo.
- Seeds of various plants are used as food, both for animals and men.
- They are the basis of agriculture.
- Seeds are the products of sexual reproduction so they provide genetic variation and recombination in a plant.

CHAPTER 5 : TAXONOMY AND SYSTEMATIC CLASSIFICATION

ONE MARK:

1. Phylogenetic classification is the most preferred classification because it reflects **evolutionary relationships**
2. Biological theory was proposed by **Ernest Mayr**
3. Perianth whorls are presented in **Allium cepa**
4. Zygomorphic flowers in **Ceropegia**
5. **Species** is the fundamental unit of taxonomic classification.
6. **Paul Herbert** is considered the father of DNA Barcoding.
7. **Scapigyrus** is an inflorescence found on Allium cepa.
8. **Theophrastus** is called the Father of Botany.
9. Geocarpic fruits (fruits develops and matures under soil) **Arachis hypogea.**

10. **Gaspard Bauhin** introduced binominal nomenclature**.**
11. In family **Solanaceae** which the carpels are slightly oblique**.**
12.Stipule are rolled up and the petiole is swollen is called **pulvinus.**
13. Pith plant **Aschynomene aspera.**
14. Flame of the forest **Butea frondosa.**
15. Indigo dye plant **Indigofera tinctoria.**
16.A joint pain reliever is derived from the root, the alkaloid stramonium is obtained from the **Datura stramonium.**
17.**Colchicine** used to double the chromosome numbers.
18. Rat insecticides is obtained from the bulb of the **Urginea indica.**
19. The term bio systematics was introduced by **Camp and Gilley**.
20. Natural system of classification was proposed by **Bentham and Hooker.**
21. Artificial classification system is **sexual system of classification.**
22. World's largest Botanical garden **Kew (England).**
23.The standard size of herbarium sheet is **29 cm X 41 cm.**
24. Linnaeus known as Father of taxonomy illustrated **"species plantarum".**
25. **"Origin of species"** published by Charles Darwin.
26. 19 th International botanical conference held in **China -Shenzhen.**
27.**DNA Barcoding** is a technique for identifying comminuted or pelleted plant specimens.
28.Smith's classification of Immunity and the origin of anti serum is the **serotaxonomy.**
29. The total number of Angiosperm families as per APG classification 2016 is **416.**
30.Storage reservoir of fungi(Mycobank) **index fungorum.**

TWO MARKS:

1.How do you classify the plants contain two cotyledons, flowers with cup shaped thalamus.

Class: Dicotyledonae
Sub class:Polypetalae
Series: caliciflorae

2.What is species?

- The lowest classification and shows the high-level similarities among the organisms.

3. What is herbarium?

- Plants are preserved in the form of pressed and dried specimens mounted on a sheet of paper along with the documentation label.

4. Write alkaloids in tobacco.

- Nicotin
- Nornicotin
- Anabasin

5. What is atropine?

- An alkaloid extracted from the roots of Atropa belladonna plant.
- Used to relieve muscle pain

6. Serotaxonomy.

- The classification of very similar plants by means of differences in the protein contain to solve taxonomic problems.

7. What is Aloin?

- Gelatinous glycoside from the succulent leaves of Aloe vera is called Aloin.

8. Write any two names of the dye plants in fabaceae.

1. Indigofera tinctoria – Indigo dye
2. Clitoria ternatea – Blue dye

THREE MARKS:

1. Author citation.

- Refers to valid name of the taxa accompanied by the author's name who published the name valid.
- Ex. Solanum americanum L.

2. Binomial.

- Scientific name of a species consists two words and according to binominal nomenclature.
- The first one is called genus name and the second one is specific ephithet.
- Mangifera indica. Mangifera is a genus, indica is a species.

3. Karyotaxonomy.

- During meiosis have proved the characters of chromosomes and explanation of taxonomic problems is known as cytotaxonomy or Karyotaxonomy

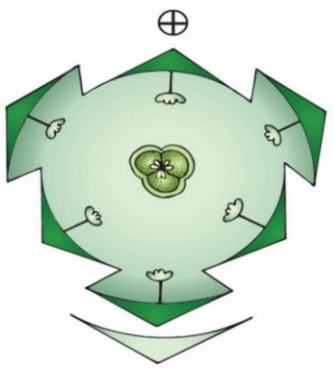
4. Write three types of classification in plant collection?

- Artificial classification
- Natural classification
- Phylogenetic classification

5. **List out the medicinal plants in Solanaceae.**
   - Atropa belladona
   - Datura stramonium
   - Solanum trilobatum
6. **Standard petal (or) vexillum.**
   - Characters of corolla in fabaceae is unequal, and papilionaceous, vexillary descending imbricate aestivation the outer petal is large is called vexillum
   - Lateral 2 petals are curved is called alae.
   - Anterior two petals are partly fused are called carina.
7. **Name any three food plants in Solanaceae.**
   - Solanum tuberosum – potato
   - Lycopersicon esculentum – tomato
   - Solanum melongena – Brinjal

FIVEMARKS:

1. **Botanical description of Allium cepa.**
   - ***Habit:***Perennial herb with bulb.
   - ***Inflorescence:***Scapigyrous
   - ***Flower:*** Bracteate, ebracteolate, pedicellate, complete, trimerous, actinomorphic, and hypogynous.
   - ***Perianth:***Tepals 6, arranged in two whorls of three each, valvate aestivation.
   - ***Androecium:***Stamens 6, arranged in two whorls of three each, epipetalous, free, dithecous, introse.
   - ***Gynoecium:***Tricarpellary, syncarpous, superior ovary trilocular, axile placentation.
   - ***Fruit:***Capsule
   - ***Seed:*** Endospermous.
   - ***Floral formula:*** $Br.,Ebrl.,\oplus,\male,P_{(3+3)}\ A_{3+3},\underline{G}_{(3)}$
   - ***Floral diagram:***



2. **Botanical description of clitoria ternatea.**

- ***Habit:*** Twining climber
- ***Inflorescence:*** Axillary cyme
- ***Flower:*** Bracteate, bracteolate, large, pedicellate, complete, bisexual, pentamerous , zygomorphic, and hypogynous
- ***Calyx:***Sepals 5, synsepalous, green, valvate aestivation.
- ***corolla:*** Petals 5, white or blue, irregular papilionaceous corolla, descending imbricate aestivation.
- ***Androecium:*** Stamens 10, diadelphous (9) +1, nine stamens fused to form a bundle, tenth one is free, dithecous.
- ***Gynoecium:***Monocarpellary, unilocular, many ovules on marginal placentation, superior ovary, feathery stigma
- ***Fruit:*** Legume
- ***Seed:*** Non – endospermous
- ***Floral formula:*** $Br.,Brl.,\%,\delta,\ K_{(5)},C_{5},A_{(9)+1},\underline{G}_{1}$
- ***Floral diagram:***

3. Uses of herbarium.

- Resource material for systematic research and studies.
- Place for orderly arrangement of voucher specimens.
- Herbarium provides opportunity for documenting biodiversity studies.
- Serves as a reference for comparing doubtful new specimen.
- Specimen play a role in studies like floristic diversity, environmental assessment and survey of unexplored areas.

4. Botanical description of Datura metel.

- ***Habit:*** Large, erect, stout herb.
- ***Inflorescence:*** Solitary cyme
- ***Flowers:*** Bracteate, ebracteolate, complete, pentamerous, bisexual, actinomorphic and hypogynous.
- ***Calyx:*** Sepals 5, Greenish sympetalous, valvate aestivation, mostly persistent.
- ***corolla:*** Petals 5, Greenish white, plicate, funnel shaped, twisted aestivation.
- ***Androecium:*** Stamens 5,free, epipetalous, dithecous.
- ***Gynoecium:*** Bicarpellary, syncarpous superior ovary, bilocular but tetralocular due to the formation of false septum, Ovules on swollen axile placentation, carpels are oblique.
- ***Fruit:*** Capsule with persistent calyx.
- ***Seed:*** Endospermous.
- ***Floral formula:*** $Br.,Ebrl.,\oplus,\male,\female,K_{(5)},\overset{\frown}{C}_{(5)},A_5,\underline{G}_{(2)}$
- ***Floral diagram:***

5.ICN Principles.

- Botanical nomenclature is independent zoo and bacterial nomenclature.
- Names of taxonomic group is determined by means of nomenclatural types.
- taxonomic group is based on priority of publication.
- Scientific names of taxonomic groups are treated as Latin derivation.
- The rules of nomenclature are retroactive unless expressly limited.

CHAPTER 6: CELL THE UNIT OF LIFE

ONE MARKS

1. The two subunits of ribosomes remain united at critical ion level of-**Magnesium**
2. Sequences used to know the phylogeny- **rRNA**.
3. Many cells function property and divide mitotically even though they do not have- **cytoskeleton**.
4. Which is used to studying detailed structure of viruses, Mycoplasma, cellular organelles-**Transmission electron microscope.**
5. Which is used to obtain three-dimensional image-**Scanning electron microscope**
6. Organisms which have true nucleus – **Eukaryotes**
7. Found in Chloroplast - **Quantosomes**
8. Comparisons are used to trace human origins -**Mitochondrial DNA.**

TWO MARK:

1.Bring out the significance of Transmission Electron Microscope?

- The magnification is 1-3 lakhs times.
- Resolving power is 2-10 Å.
- It is used for studying detailed structure of viruses, mycoplasma, cellular organelles.

2.Define Resolution?

- The ability of the lenses to show the details of object lying between two points.

3.What is Magnification?

- The optical increase in the size of an image is called Magnification.

$$\text{Magnification} = \frac{\text{Size of image seen in the microscope}}{\textit{Size of the image seen with normal eye}}$$

4.Why do we call Mitochondria as the "Power house of the cell"?

- Mitochondria contain proteins and enzymes. So, they produce energy rich ATP.

THREE MARKS:

1.Write the functions of cell wall?

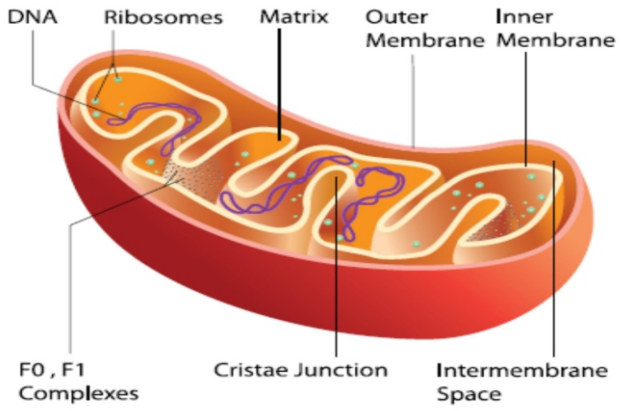
- Offers definite shape and rigidity of the cell.
- Serves as barrier for several molecules to enter the cell.
- Provides protection to the internal cytoplasm.
- Prevents bursting of cells by maintaining the osmotic pressure.

2.What are the functions of nucleus?

- Controlling all cellular activities.

- Storing genetic information.
- DNA duplication and transcription takes place.
- In nucleolus,ribosomal biogenesis takes place.

3.Draw and label the structure of Mitochondria?



FIVE MARKS:

1.Difference between plant and animal cell.

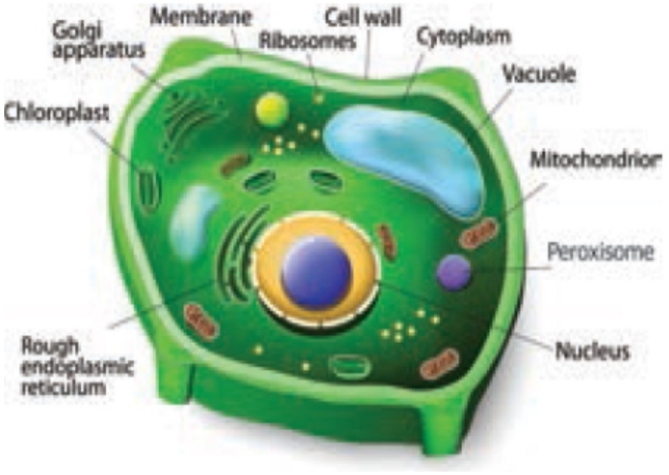
Plant cell	Animal cell
1. Usually, large	Smaller than plant cell
2. Cell wall present	Absent
3. Plasmodesmata present	Absent
4. Chloroplast present	Absent
5. Vacuole large	Small
6. Tonoplast present	Absent
7. Centrioles absent	Present

2.Distinguish between prokaryotes and Eukaryotes?

	Prokaryotes	Eukaryotes
1	DNA is Circular	DNA is linear
2	No true nucleus	True nucleus present
3	Organelles are absent	Organelles are present
4	Ribosomes 50S+30S	Ribosomes 60S+40S

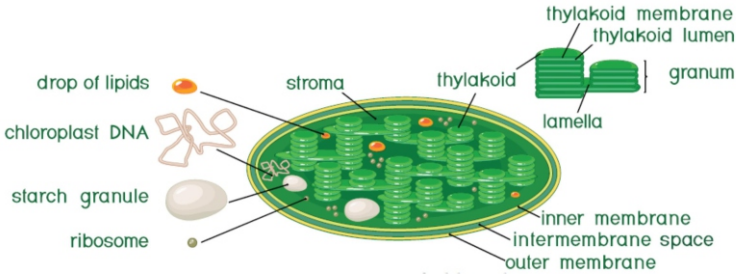
5	Cell division-Binary fission.	Cell division-Mitosis and Meiosis
6	EX: Bacteria and archea	Ex: Fungi, plants and Animals

3.Draw the structure of plant cell?



4.Draw and explain the structure of chloroplast?

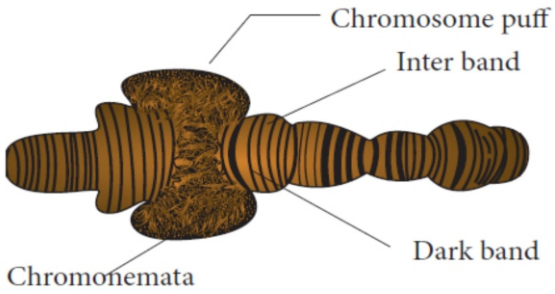
- Chloroplasts are vital organelle found in green plants.
- Chloroplast has a double membrane the outer membrane and the inner membrane.
- The space enclosed by the fluid called stroma.
- Stack of coins are called Grana.
- Granum present in the thylakoid which contain Chlorophyll pigments.
- Flat interconnected sacs called thylakoid.



5.Write short notes on polytene chromosomes?

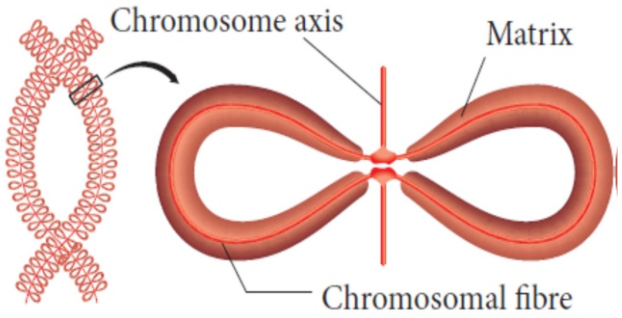
- Polytene chromosomes observed in the salivary glands of Drosophila by E.G. Balbiani.
- A single chromosome which is present in multiple copies form a structure called polytene chromosome.
- There is a distinct alternating ,dark bands and light inter-bands.
- The polytene chromosome has extremely large puff called Balbiani rings. It is also known as chromosomal puff.

- As this chromosome occurs in the salivary gland it is known as salivary gland chromosomes.



6.Write short notes on Lampbrush chromosomes?

- Lampbrush chromosomes occur at the diplotene stage of first meiotic prophase in Oocytes of Salamander
- And unicellular alga Acetabularia.
- It was first observed by Flemming.
- The highly condensed chromosome
- Forms the chromosomal axis, from which lateral loops of DNA extend as a result of Intense RNA synthesis.



CHAPTER 7:CELL CYCLE

ONE MARKS:

1.Sequence of cell cycle **G1-S-G2-M**.
2.If mitotic division is restricted in G1 phase of the cell cycle then the condition is known as **G0 phase.**
3.In S phase of the cell cycle **chromosomes will not segregate.**
4.Centromere is required for **Movement of the chromosomes towards pole.**
5.Synapsis occur between **two homologous chromosomes.**
6.In meiosis crossing over is initiated at **Pachytene.**
7.Colchicine prevents the mitosis of the cells at which of the following stage **Metaphase**.
8.The pairing of homologous chromosomes in meiosis is known as **synapsis.**

9. **Astral mitosis** is the characteristic feature of higher plants.
10. Pairing of homologous chromosomes takes place and it is known as **synapsis**.

TWO MARKS:

1.Define-Cell cycle

- A series of events leading to the formation of new cell is known as cell cycle.

2.What is Mitogen?

- The factors which promote cell cycle proliferation is called mitogen.
- Plant Mitogens: Gibberellin, Ethylene

THREE MARKS:

1.Give an account of G0 phase?

- Some cells exit G1 and enters a quiescent stage called G0.
- The cells remain metabolically active without proliferation.
- In G0, cells cease growth with reduced rate of RNA and protein synthesis.

The G0 phase is not permanent.

2.What is Synapsis?

- During Zygotene sub stage of meiotic prophase-1.
- Pairing of homologous chromosomes takes place.

3.Write any three significance of mitosis?

- Daughter cells are genetically identical.
- Growth as multicellular organisms grow, the number of cells making up their tissue
  increases.
- Damaged cells must be replaced by identical new cells by mitosis.

FIVE MARKS:

1.Bring out the significance of Meiosis.

- Maintains the definite constant number of chromosomes in organisms.
- Crossing over takes place and it leads to variation.
- The variations are the raw materials to evolution.
- Meiosis leads to genetic variability.
- Adaptation of organisms to various environmental stresses.

2.Differentiate between Mitosis and Meiosis.

	Mitosis	Meiosis.
1	One division	Two division
2	Number of chromosomes same.	Number of chromosomes remain the halves.
3	Homologous chromosomes line up separately.	Homologous chromosomes line up pairs.
4	Chiasmata do not form	Chiasmata form
5	No crossing over	Crossing over occurs
6	Daughter cells are genetically identical	Daughter cells are genetically different
7	Two daughter cells are formed	Four daughter cells are formed

3.Write about Pachytene and diptotene of prophase-I

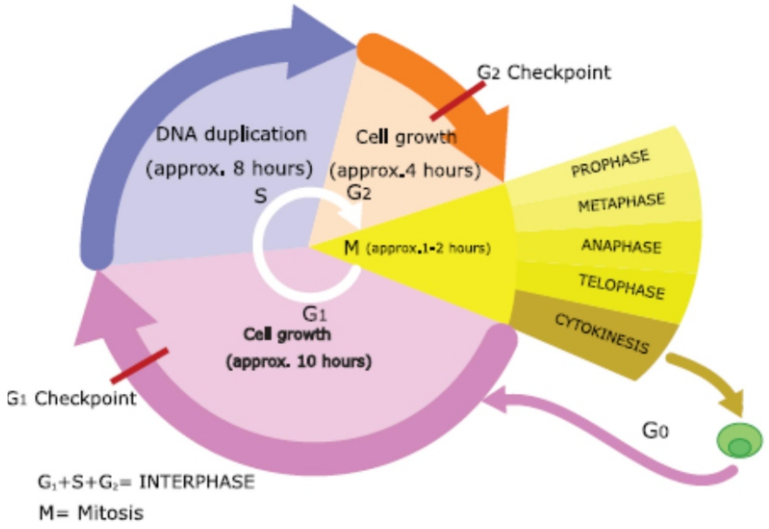
Pachytene:

- Bivalent chromosomes are clearly visible as tetrads
- Bivalent of meiosis 1 consists of 4 chromatids and 2 centromeres.
- Synapsis is completed.
- crossing over takes place between non- sister chromatids.
- Recombination of homologous chromosomes is completed by the enzyme Recombinase.

Diplotene:

- Synaptonemal complex disassembled and dissolves.
- homologous chromosomes remain attached at one or more points.
- 'X' shaped structures occur = Chiasmata.

4.Draw the diagram of cell cycle.



CHAPTER 8 : BIOMOLECULES

ONE MARKS:

1.Water is a polar molecule because **they have negative charge.**
2.The β - D Glucose units in cellulose are linked together by **β – (1,4) glycosidic linkage.**
3. Chitin is a linear polymer of **N – acetyl – D Glucosamine units.**
4. The net charge of Zwitter ion is **Zero.**
5.Watson and Crick model of DNA double helix is **B** form.
6.DNA helical structure has a diameter of **20 Å.**
7.The most basic amino acid is **Histidine**.
8.An example of feedback inhibition is **Allosteric inhibition of hexokinase by glucose-6-phosphate.**
9.Proteins perform many physiological functions for example some functions as functions as enzymes.one of the following represents an additional function that some proteins discharge: **Hormones.**

TWO MARKS:

1. Define – Enzymes.

- Enzymes are globular proteins that catalysts many thousands of metabolic reactions taking place within cells and organism.

2. What are coenzyme? Give an example.

- Organic compounds which act as cofactors but do not remain attached to the enzyme.
- The essential chemical components of many coenzymes are vitamins.
- Ex: NAD,ATP

2.Differentiate nucleoside and nucleotide.

Nucleoside	Nucleotide
1. 1. It is a combination of base and sugar	It is a combination of nucleoside and phosphoric acid.
2. Examples Adenosine = Adenine + Ribose	Examples Adenylic acid = Adenosine + Phosphoric acid
3. Guanosine = Guanine + Ribose	Guanylic acid = Guanosine + Phosphoric acid
4. Cytidine = Cytosine + Ribose	Cytidylic acid = Cytidine + Phosphoric aci
5. Deoxy thymidine = Thymine + Deoxyribose	Uridylic acid = Uridine + Phosphoric acid

3.Differentiate between DNA and RNA.

DNA	*RNA*
1. It consists of Deoxyribose sugar	It consists of ribose sugar.
2. It consists of Adenine, Guanine, cytosine and thiamine.	It consists of Adenine, Guanine, cytosine and Uracil.
3.It is double stranded	It is single stranded
4. Stable	Unstable
5. Propagation is self-replicating	Synthesized from DNA

4.Write the significance of Meiosis.

- This maintains constant number of chromosomes.
- Crossing over takes place and exchange of genetic material leads to variation among species.
- Meiosis leads to genetic variability and adaptation of organisms to environmental stress.

CHAPTER 9 : TISSUE AND TISSUE SYSTEM

ONE MARKS:

1.**Mesophyll** tissue found in a leaf between the two epidermal layers.

2. Mesophyll is not differentiated into palisade and spong tissue in **Isobilateral leaf (Monocot)**

3. Skulled shaped vascular bundles are found in monocot stem.

4. Fibres associated with phloem tissue is called **Bast fibre.**

5. Star shaped parenchyma is **Stellate parenchyma** they found in petiole of canna.

6. One or two layers of continuous or discontinuous tissue, present below epidermis is **Hypodermis.**

7. Bicollateral vascular bundles are present in **Cucurbitaceae.**

8. In a leaf trace extends from a vascular bundle in a dicot stem occurs **xylem would be on the top and the phloem on the bottom.**

9. **Dumb bell-shaped** guard cell and silica filled epidermal cells are the characteristic features of grasses and sedges.

10. **Cotton** is an example for surface fibres.

11. Sunken stomata is an adaptation seen in **Nerium.**

12. **Trichoblasts** are short cells seen in the piliferous layers of roots.

13. **Syncyte** refers to the vessels.

14. Rib meristem helps in the development of **Cortex.**
15. Father of anatomy is **Nehemia Grew.**
16. Grafting is successful inn dicots but not in monocots because the dicots have **Cambium for secondary growth.**
17. The type of **Angular collenchyma** can be seen in Datura, Nicotiana.
18. A meristem which divide in all planes is called **Mass meristem.**
19. In mature sieve tubes, the pores in the sieve plates are blocked by a substance called **callose.**
20. The term ' Hadrome ' for xylem and 'Leptome ' for phloem were coined by **Haberlandt.**

TWO MARKS:

1. Notes on albuminous cells (or) Strasburger cells.

- They are cytoplasmic nucleated parenchyma associated with sieve cells of gymnosperms.
- They are analogous to companion cells of phloem, seen in angiosperms.

2. What is "Bundle cap" or "Hard bast"?

- In dicot stem, each vascular bundle, a few layers of sclerenchyma cells occur in patches outside the phloem known as bundle cap or hard bast.

3. Write notes on passage cells.

- Cells of the endodermis opposite to the protoxylem elements, without casparian strips, help in the radial diffusion of water into xylem of roots.

4. What are Idioblasts?

- Parenchyma cells which store resin, tannins, crystal of calcium carbonate, calcium oxalate are called idioblasts.

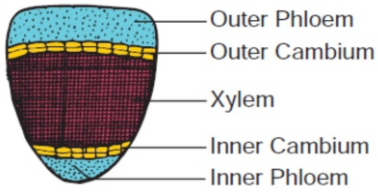
5. What is Guttation?

- Hydathodes discharge liquid water with various dissolved substances from the interior of the leaf to the surface. This process is called. Guttation. Ex : grass , tomato

6. Differentiate between Exarch and Endarch condition.

Exarch	Endarch
➢ Protoxylem lies towards the periphery and metaxylem towards the centre is called exarch condition	➢ Protoxylem lies towards the centre and metaxylem towards the periphery is known as endarch condition
➢ Ex: root	➢ Ex: stem

7. Draw and label the conjoint bicollateral vascular bundle.



8. What is Hydathodes?

- Occur at the tip or margin of leaves that are grown in moist shady places.
- Aperatures are surrounded by a ring of cuticle cells.
- The pores remain always open and involved in guttation.

9. The pulp of pear is stony & gritty . whereas the seed coat of Pisum sativum seed coat is bony & shiny give reason.

- The pulp of pear has Brachysclereids that make it stony and gritty, whereas the seed coat of peas is bony and shiny due to the presence of Osteosclereids.

THREE MARKS:

1. Notes on Casparian stripes.

- There is a band like structure, made of suberin and lignin present in the radial and inner tangential walls of endodermal cells of roots.
- Main function is to prevent re -entry of water in to the cortex from the xylem.

2. What is Protoxylem lacuna?

- In monocot stem, xylem vessels occur in the form of letter 'Y '.
- The upper two arms of Y has two metaxylem vessels, at the base one or two protoxylem vessels occur.
- At the time of mature, lowest basal protoxylem disintegrates and form a cavity known as protoxylem lacuna.

3. What is meant by Kranz anatomy? What is its importance.

- In C_4 plants like maize, the tissue outside the vein (vascular bundle) the bundle sheath is with large chloroplast whereas its spongy tissue has few chloroplasts.
- This anatomical uniqueness is Kranz anatomy, the border parenchyma has chloroplast without grana.
- It helps in efficient CO_2 fixation in C_4 plants than C_3 plants.

4. Why the cells of sclerenchyma and tracheids become dead.

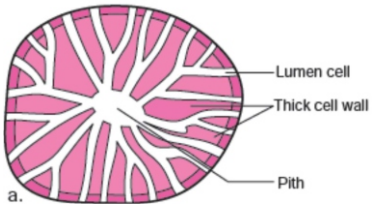
- The cells of sclerenchyma and tracheids are usually thickened by lignin.
- During the process of heavy thickening of cell wall, the content will become disorganized and used for lignification.

5. What is Bulliform cells?

- In monocot leaf anatomically occurs on upper epidermis help for the rolling and unrolling of the leaf according to the weather changes.
- Some epidermal cells are filled with silica is called silica cells.

6. Define - Brachysclereids (Stone cells)

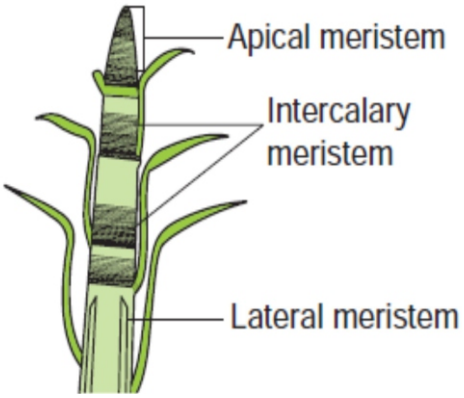
- Isodiametric sclereids, with hard cell wall.
- It is found in bark, pith, cortex, hard endosperm and fleshy portion of some fruits.
- Ex: pulp of pyrus.



FIVE MARKS:

1. Classify meristems based on their position.

Based on their position there are three types.



I Apical meristem:

- Present in the apices of root and shoot.
- Responsible for increase in the length of the plant.
- This kind of growth is called primary growth.

II Intercalary meristem:

- Occurs between the mature tissues.
- Responsible for elongation of internodes Ex: grass

III Lateral meristem:

- Occurs along the longitudinal axis of stem and root.
- It is responsible for secondary tissues and thickening of stem and root.

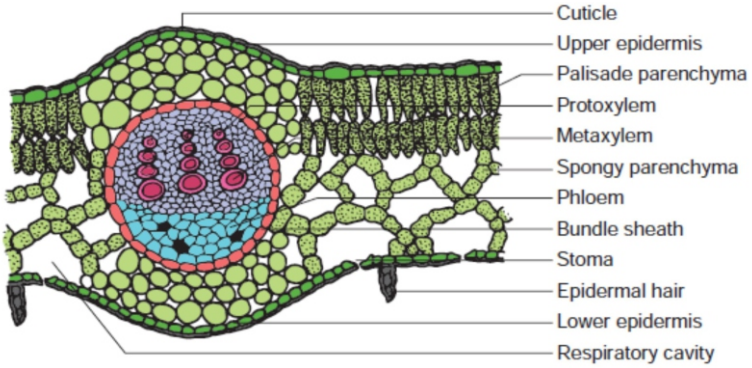
2. **Mention the function of epidermal tissue system.**

- This system in the shoot checks excessive loss of water due to the presence of cuticle. Epidermis protects the underlying tissues.
- Stomata is involved in transpiration and gaseous exchange.
- Trichomes are helpful in the dispersal of seed and fruits.
- Prickles are also providing protection against animals.

3. Distinguish the anatomy of dicot stem from monocot stem.

	Characters	Dicot stem	Monocot stem
1	*Hypodermis*	Collenchymatous	Sclerenchymatous
2	*Ground tissue*	Differentiated into cortex, endodermis, pericycle and pith.	Not differentiated, but it is a continuous mass of paranchyma.
3	*Starch sheath*	Present	Absent
4	*Medullary rays*	Present	Absent
5	*Vascular bundles*	Collateral and open Arranged in a ring Secondary growth occurs.	Collateral and closed. Scattered in ground tissue. Secondary growth usually does not occur.

4. Draw and label the T.S of dicot leaf.



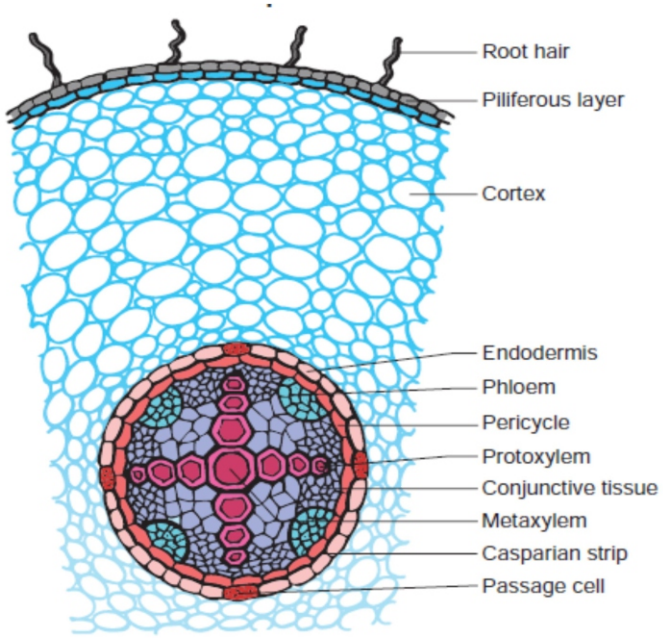
5. Distinguish the anatomy of dicot root from monocot root.

	Characters	***Dicot root***	***Monocot root***
1	Pericycle	Gives rise to lateral roots, Phellogen a part of vascular cambium	Gives raise to lateral roots only.
2	Conjunctive tissue	Parenchymatous	Mostly sclerenchymatous sometimes parenchymatous.
3	Cambium	Appears as a secondary meristem at the time of secondary growth.	Absent
4	Xylem	Usually tetrarch	Usually polyarch
5	Pith	Absent	Present at the centre

6. What are sieve tubes? Explain.

- Long tube like conducting elements in the phloem.
- They are arranged one above the other and form vertical sieve tube.
- End wall contains number of pores and it look like a sieve called as sieve plate.
- Sieve tube to be controlled by companion cells.
- Mature sieve tube contains a lining layer of cytoplasm but nucleus is absent.

7.Draw and label the C.S of dicot root.



CHAPTER-10 SECONDARY GROWTH

ONE MARKS:

1.Usually, the monocotyledons do not increase their girth because **they do not possess actively dividing cambium.**

2.Inner darker and harder option of secondary xylem that cannot conduct water in an older dicot stem is called **Duramen**.

3.The common bottle cork is a product of **Phellogen.**

4.What is the fate of primary xylem in a dicot stem showing extensive secondary growth-**It gets Crushed.**

5.Secondary xylem-**Woodis.**

6.Lenticels are present in **phellem.**

7.The dicotyledonous wood, which has vessels is called **porous wood.**

8.The wood formed during this season is called **spring wood.**

9.The determination of the age of the tree by counting the annual rings-**Dendrochromology.**

10.**Secondary growth** in dicot roots is essential to provide strength to the growing aerial parts of the plants.

TWO MARKS:

1.In a forest if the bark of the tree is damaged by the horn of a deer, How will the parent overcome the damage?

- The parenchymatic tissue is developed in cortex by the activity of phellogen.
- The callus tissue grows and covers the wound.

2. What is amber?

- Amber plants secrete resins for their protective benefits.
- Amber is a fossilized tree resin.
- It is used as a healing agent in folk medicine

3. In which season the vessels of angiosperms are larger in size?

- In the spring season, cambium is very active ad produces a large number of xylary elements having vessels/ tracheids with wide lumen.

4.Continuous state of dividing tissue is called meristem. In connection in this, what is the role of lateral meristem?

- The roots and stems grow in length with the help of apical meristems.This is called primary growth.
- The Vascular cambium is the lateral meristem that produces the secondary vascular tissues i.e., secondary xylem and secondary phloem.

5. A timber merchant bought 2 logs of wood from a forest and named them A & B. The log A was 50 yearold &B was 20 years old. Which log of wood will last longer for the merchant? Why?

- 50 years old 'A' timber wood is more durable. Because it has more growth rings.
- The centre part of the wood will be darker in colour and is called heart wood. Its wood would be more durable and can also resist microbes.

5.What is Xylotomy?

- The study of wood by preparing sections for microscopic observation.

6.A cross section of tree trunk contains 60 lighter and 60 darker rings. Determine the age the tree and justify.

- The annual rings denote the combination of early wood and late wood.
- The age of the tree is 60.

7.What is Dendrochronology?

- The determination of the age of a tree by counting the annual rings is called dendrochronology.

8.What is lenticel?

- Lenticel is raised opening or pore on the epidermis or bark of stems and roots.

9.What is periderm?

- The periderm is a protective layer of secondary growth.
- The periderm consists of phellem, phellogen and phelloderm.

THREE MARKS:

1.A transverse section of the trunk of a tree shows concrete rings which are known as growth rings. How are these rings formed? What is the significance of these rings?

- This annual ring denotes the combination of early wood and late wood.
- Each annual ring corresponds to one year growth and on this basis of these rings, the age of tree can be calculated.
- Sometimes annual rings are called growth rings.

2.What is wood?

- The secondary xylem, is also called wood.
- It is formed by the vascular cambium.
- It contains fusiform cells and elongated ray initials.

3.Write differences between porous wood and non-porous wood?

Porous wood or Hard wood Ex: Morus	Non porous wood or soft wood Ex: Pinus
➢ Common in angiosperms	➢ Common in gymnosperms
➢ Porous, It contains vessels	➢ Non porous, it does not contain vessels

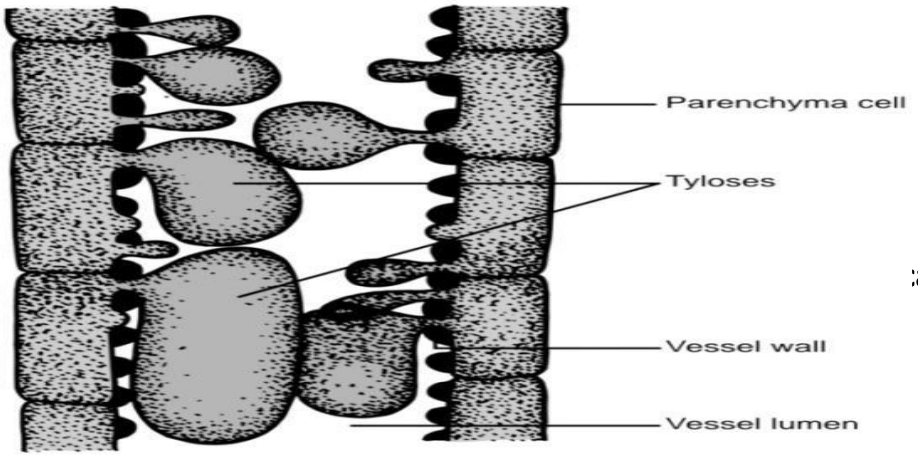
4.What is pseudo or false-annual rings?

- Additional growth rings are developed due to natural calamities like drought, Frost,defoliation,flood,mechanical injury and biotic factors during the middle of a growing season.
- It results in the formation of more than one annual ring. Such rings are called pseudo (or) false annual rings.

5.Write the short notes on tyloses.

- In many dicot plants, the lumen of the xylem vessels is blocked by many balloon like in growths from the neighbouring parenchymatous cells.These balloon-like structures are called tyloses.

- These structures are formed in secondary xylem vessels that have lost their function.
- In fully developed tyloses,starchy crystals, resins,gums,oils,tannins or coloured substances are found.



6.Differer **:ambium?**

Intra fascicular cambium	Inter fascicular cambium
Present inside the vascular bundles	Present in between the vascular bundles
Originates from the procambium	Originates from the medullary rays
Initially it forms a part of the primary meristem	From the beginning it forms a part of the secondary meristem

FIVE MARKS

1.Differences between sap wood and heart wood?

Sap wood (aburnum)	Heart wood(duramen)
➢ Living part of the wood	➢ Dead part of the wood
➢ It is situated on the outer side of wood	➢ Centre part of the wood

➢ It is pale-coloured	➢ It is dark in coloured
➢ Very soft in nature	➢ Hard in nature
➢ Tyloses are absent	➢ Tyloses are present
➢ It is not durable and not resistant to microorganisms.	➢ It is durable and resists microorganisms

2.What are the significance of growth rings?

- Age of wood can be calculated
- The quality of timber can be ascertained.
- Radio-Carbon dating can be verified.
- Past climate and archaeological dating can be made
- Provides evidence in forensic investigation

3.Explain artificial seasoning of wood?

It is the process in which moisture content from the wood is removed. There are of two types

- Air seasoning is the process in which the moisture can be removed without resorting to artificial heat.In this method of artificial seasoning,the cut timber pieces areleft exposed in the open air and the moisture is removed naturally and gradually by the heat of the sun.It increases the strength, the combustibility and renders the wood less subject to decay.

- Kiln seasoning is the process in which the moisture can be removed by artificial method in an enclosed condition. The timber pieces are enclosed in a steam-heater chamber in which air is introduced and circulated by fans, ensuring the removal of moisture uniformly, rapidly and completely.

CHAPTER 11: TRANSPORT IN PLANTS

ONE MARKS:

1.Diffusion and induction are an example – **passive transport**

2. Biological process its runs based on the energy obtain from respiration is- **Active transport**

3. when open a perfume bottle, can smell the odour everywhere in the room due to – **Diffusio**n

4.The largest transport protein found in the outer membrane of bacteria – **Porin**

5. The water channel protein embedded in the plasma membrane - **Aquapori**n

6. In maize found **30 types** of Aquaporin

7**. Peter Agre** discovered the Water Pore Aquaporin in RBC

8. The molecule move across membrane independent of other molecule in one direction is - **Uniport**.

9.Integral membrane transport protein two types of molecules across the membrane in the same direction – **Symport**
10. Integral membrane transport protein that simultaneously transports two different molecules in opposite directions -**Antiport**
11.Active transport example -**Na+, K+, ATPase pump**
12.Plants protoplasm is made of **60% - 80%** water
13.The gluten from wheat can take as much as **300 %** of its own weight
14.The swelling of dry seeds, wooden peg increases due to **– Imbibition**
15.Water potential symbol is denoted by - **Ψ(psi)**
16. At Standard temperature Water potential of pure water is - **Zero**
17.Water potential measured in – **pascal**
18.Diffusion pressure Deficit termed by **Meyer (1938**)
19.Suction pressure called by **Renner**
20.Dry raisins placed in water it swells up due to turgidity by **Endosmosis**
21.The theory of osmotic active absorption was postulated by **Atkins and preistley.**
22.Absorption of water even if the concentration of cell sap in the root hair is lower than that of soil water observed by **Bennet- Clark, Thimann and Kramer.**
23. Relay pump theory proposed by **Godlewski (1884)**
24. Pulsation theory proposed by **J.c.Bose**
25.Bose invented an instrument called **Crescograph**
26.**Strasburger and overton** experimentally proved that living cells are not mandatory for the ascent of sap
27.Father of plant physiology – **Stephen Hales**
28. The term Root pressure coined by **Stocking (1956**)
30.**Bohen (1809)** suggested that the xylem vessels work like a capillary tube
31.Imbibition theory was first proposed by **Unger (1876)**
32. Imbibition theory supported by **Sachs (1878)**
33. Cohesion – tension theory was proposed by **Dixon and Jolly (1894)**
34.Stomatal transpiration water loss up to - **90% -95%**
35. Lenticular transpiration water loss up to - **0.1%**
36.Cuticular transpiration water loss up to - **5 - 10%**
37.**Von Mohl** observed that stomata open in light and close in the night
38.Starch – sugar interconversion theory proposed by **Lloyd (1908)**
39.Rate of transpiration in corn plants – **2 Litres**
40. Rate of transpiration in Sun flower plants – **5 Litres**
41. Rate of transpiration in Maple tree plants – 2**00 Litres**

42. Rate of transpiration in Date palm plants –**450 Litres**
43.The discovery of enzyme phosphorylase in guard cells by **Hanes**
44.Theory of K+ transport was proposed by **Levit (1974)**
45.Activated diffusion theory was first proposed by **Mason and Maskell**
46. Theory of Electro -Osmosis was proposed by **Fenson and spanner**
47.Munch Mass Flow hypothesis was first proposed by **Munch (1930)**
48.Carrier concept was proposed by **Van den Honert (1937)**
49.Cytochrome pump theory proposed by **Lundegardh and Burstrom**
50. Protein – Lecithin theory proposed by **Bennet – Clark**

TWO AND THREE MARKS:

51.What is porin?

- Porin is a large transporter protein found in the outer membrane of plastids, mitochondria and bacteria.
- Which facilitates smaller molecules to pass through the membrane.

52. What is aquaporin?

- Aquaporin is a water channel protein embedded in the plasma membrane.
- It regulates the massive amount of water transport across the membrane.

53. List out the types of Plasmolysis.

- Incipient Plasmolysis
- Evident Plasmolysis
- Final Plasmolysis

54.Define - Diffusion

- The net movement of molecules from a region of their higher concentration to a region of their lower concentration along a concentration gradient until an equilibrium is attained.

55. What is meant by Stomata?

- The epidermis of leaves and green stems possess many small Pores are called stomata.

56. What is Deplasmolysis?

- The effect of plasmolysis can be reversed, by transferring them back into water or hypotonic solution.
- The normal size of the protoplasm is established.

57. What is apoplast?

- It consists of everything external to the plasma membrane of a living cell.
- The apoplast includes cell walls, extra cellular spaces, vessel elements and tracheids.

- In the apoplast pathway, water moves exclusively through the cell wall or the non-living part of the plant.

58. what is Guttation?

- During high humidity in the atmosphere,
- When plants absorb water in such a condition root pressure is developed due to excess water within the plant.
- Excess water exudates as liquid from the edges of the leaves and is called guttation.
  Ex:Grasses, tomato, potato, brinjal .

59.What are called Hydathodes?

Guttation occurs through stomata like pores called hydathodes.

60. What is Hypertonic?

- This is a strong solution.
- This attracts solvent from other solutions.

61. What is Hypotonic?

- This is a weak solution.
- It diffuses water out to other solutions.

62. What is Isotonic?

- It refers to two solutions having same concentration.
- In this condition the net movement of water molecule will be zero.

63. What is imbibition?

- Colloidal systems such as gum, starch, proteins, cellulose, agar, and gelatin when placed in water,
- will absorb a large volume of water and swell up. They are called imbibitions.

64. What is water Potential?

- It is potential energy of water in a system compared to pure water when both temperature and pressure are kept the same.

65. What is Osmosis?

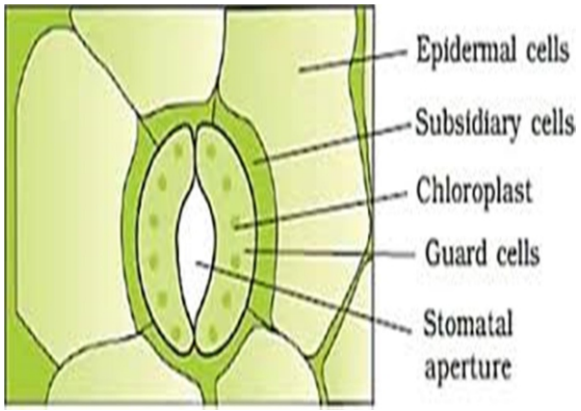
- It represents the movement of water or solvent molecules through a selectively permeable membrane from the place of its higher concentration (high water potential) to the place of its lower concentration (low water potential).

FIVE MARKS:

1. Describe the structure of stomata with the labelled diagram.

- The epidermis of leaves and green stems possess many small pores called stomata.
- The length and breadth of stomata is about 10-40µ and 3-10µ respectively.

- Stomata are made up of two guard cells, special semi-lunar or kidney- shaped living cells.
- Guard cells are attached to surrounding epidermal cells known as subsidiary cells.
- The inner wall of the guard cell is thicker than the outer wall.
- The stoma opens to the interior into a cavity called sub-stomatal cavity.



2.What is transpiration? Write the types.

The loss of excess of water in form of vapour from various aerial parts of the plants.

Types of transpiration

- Stomatal transpiration
- Cuticular transpiration
- Lenticular transpiration

Stomatal transpiration

- Stomata are microscopic structures present in the lower epidermis of leaves.
- This is the most dominant form of transpiration and is responsible for most of the water loss (90–95%) in plants.

Cuticular transpiration

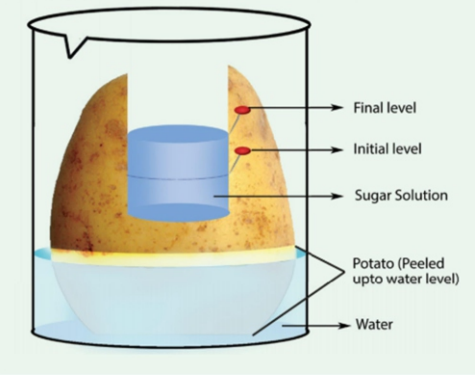
- The cuticle is a waxy layer of cutin covering the epidermis of leaves and other plant parts.
- Loss of water through cuticle is small, and it is only about 5 to 10%of the total transpiration.

Lenticular transpiration

- In stems of woody plants and trees, the epidermis is replaced by periderm because of secondary growth.
- Some pores are present on the surface of the stem called Lenticels.
- The loss of water from lenticels is very insignificant as it amounts to only 0.1% of the total.

68. Write the experiment in the potato Osmoscope.

- Take a peeled potato tuber and make a cavity inside with the help of a knife.
- Fill the cavity with concentrated sugar solution and mark the initial level.
- Place this setup in a beaker of pure water.
- After 10 minutes observe the sugar solution level and record your findings.
- Increased sugar level. It shows osmosis.



CHAPTER 12: MINERAL NUTRITION

ONE MARKS:

1.Actively mobile minerals are **– Nitrogen, phosphorus, Potassium.**

2. Relatively immobile minerals are – **Calcium, Sulphur ,Iron ,Boron.**

3. macronutrients is essential component of Chlorophyll and cytochrome is **Nitrogen.**

4.minerals maintain turgidity and osmotic potential of the cell, opening and closure of stomata – **Potassium.**

5. Nutrients involved in synthesis of calcium pectate in middle lamella and mitotic spindle formation is – **Calcium (Ca).**

6.Black heart of Celery due to deficiency of –**Calcium (Ca).**

7.Hooked leaf tip in sugar beet due to deficiency of –**Calcium (Ca**).

8.Macronutrients is essential for binding of ribosomal units – **Magnesium.**

9.Sand drown of tobacco due to deficiency of – **Magnesium.**

10. Essential component of amino acids like cystine, cysteine and methionine is – **Sulphur (S).**

11.Macronutrients is a component of Coenzymes- A, vitamins like biotin And thiamine is – **Sulphur (S).**

12. Rolling of leaf tip and reduced nodulation in legumes due to – **Sulphur (S**).

13.NPK in equal proportions is **15:15:15**
14.Minerals involved in Splitting of water to liberate oxygen is **– Mn and Cl.**
15.Interveinal chlorosis, grey spots on Oats leaves due to – **Manganese (Mn).**
16.Reclamation diseases of cereals and legumes due to – **Copper (Cu).**
17. Exanthema in citrus due to –**Copper (Cu).**
18. Minerals for the synthesis of Indole acetic acid (Auxin) is – **Zinc (Zn).**
19.Die back of citrus due to –**Copper (Cu).**
20. Khaira diseases of rice due to –**Zinc (Zn).**
21.Minerals involved Translocation of carbohydrates and pollen germination **Boran (B).**
22.Brown heart of beet root and internal cork of apple due to – **Boron (B).**
23.Component of nitrogen metabolism and nitrogen fixation – **Molybdenum.**
24.Whip tail diseases of cauliflower due to - **Molybdenum (Mo).**
25. Hydroponics term coined by **Goerick (1940).**
26.Aeroponics technique was developed by **Soifer Hilleland David Durger.**
27.Symbiotic bacterium fixes atmospheric nitrogen in leguminous plants **Rhizobium.**
28.Non Symbiotic free living bacterium fixes atmospheric nitrogen is **Clostridium.**
29. Bacterium fixes the atmospheric nitrogen in non- leguminous plants Is **Frankia, lebsiella.**
30. Frankia fixes the atmospheric nitrogen in non- leguminous plants like **Alnus and casuarinas.**
31. Klebsiella fixes the atmospheric nitrogen in non- leguminous plants like **Psychotria.**
32. Mutual association of Algae and Fungi is – **Lichen.**
33. A method of growing plants in nutrient solution is – **Hydroponics.**
34. **Calmodulin** is a calcium modulating protein in eukaryotic cells
35. A pigments acts as oxygen scavenger – **Leghaemoglobin.**
36. Hormone is required for Root nodulation -**Auxin, Cytokinins.**
37.Total stem parasite example – **Cuscuta.**
38.Total root parasite example – **Rafflesia.**
39.Partial stem parasite example –**Loranthus, viscum.**
40. Partial root parasite example - **Santalum album.**

TWO MARKS:

41. What are Saprophyte? Give examples.

- The organisms that derive energy from dead and decay organic matter. Ex: Fungi

42. What is Lichen?

- It is a mutual association of Algae and Fungi.
- Algae prepare food and Fungi absorb water and provide thallus structure.

43. What are Hydroponics (or) Soilless culture?

- It is a method of growing plants in nutrient solution.
  The roots are immersed in the solution containing nutrients and air is supplied with the help of tube.

44.What is calmodulin?

- Calmodulin is a calcium modulating protein in eukaryotic cells.

45. Name the organisms which are involved in N_2 fixation without nodulation.

- Lichen - Anabaena & Nostoc
- Anthoceros - Nostoc
- Azolla - Anabaena
- Cycas - Anabaena & Nostoc.

46. Which hormone is required for Root nodulation?

- Auxins
- Cytokinins

47.What are unclassified minerals?

Required for some plants in trace amounts and have some specific functions. Ex: Sodium, Cobalt.

48. Write a note on NPK Fertilizers.

- It consists of nitrogen, phosphate with potassium in different proportions.
- The number labelled on the bags as 15:15:15 indicates N, P & K in equal proportion.

49. What is meant by Leghaemoglobin?

- Nitrogen fixing bacteria in root nodules appears pinkish due to the presence of this leghaemoglobin pigment.

  Function

- This acts as oxygen scavenger and removes the oxygen.

50. List out the deficiency symptoms of Iron.

- Interveinal Chlorosis, formation of short, slender stalk.
- Inhibition of chlorophyll formation.

51. Define - Denitrification.

- Nitrates in the soil are converted back into atmospheric nitrogen by a process called denitrification.
- Bacteria involved in this process are Pseudomonas and Thiobacillus.

52. What is meant by nitrate Assimilation?

- The process by which nitrate is reduced to ammonia is called nitrate assimilation.

53.What are macronutrients? Give example.

- Essential minerals which are required in higher concentration are called Macronutrients. Ex: C, H, O, N, P, K, Ca, Mg and S.

54. What are Micronutrients? Give example.

- Essential minerals which are required in less concentration are called Micronutrients. Ex: Fe, Mn, Cu, Mo, Zn, B, Cl and Ni

55. What is meant by Ammonification?

- Decomposition of organic nitrogen from dead plants and animals into ammonia.

THREE MARKS:

56. What are parasites? write the types.

Organisms deriving their nutrient from another organism and causing disease to the host are called parasites.

Total parasites

- Completely depends on host for their survival and produces haustoria.

Partial parasite

- Water and mineral requirements are dependent on host plant.
- Plants of this group contain chlorophyll and synthesize carbohydrates.

57. Write the role of Nitrosomonas and Nitrobacter during Nitrification process.

- Ammonia(NH_3) is converted into Nitrite (NO_2) by Nitrosomonas bacterium.
- Nitrite is then converted into Nitrate (NO_3) by Nitrobacter bacterium.
- Plants are more adapted to absorb nitrate than ammonium ions from the soil.

58.Mention the stages of Root nodule formation.

- A legume plant secretes phenolics which attracts Rhizobium.
- Rhizobium enters into the root hair, infects the root hair and leads to curling of root hairs.
- Infection thread grows inwards and separates the infected tissue from normal tissue.
- A membrane bound bacterium is formed inside the nodule and is called bacteroid.
- Cytokinin from bacteria and auxin from host plant promotes cell.

59. Explain Nitrogen Cycle.

Fixation of atmospheric nitrogen

- Di-nitrogen molecule from the atmosphere progressively gets reduced by addition of a pair of hydrogen atoms.
- Triple bond between two nitrogen atoms (N≡N) are cleaved to produce ammonia.
- Nitrogen fixation process requires Nitrogenase enzyme.

Nitrification

- Ammonia is converted into Nitrite by Nitrosomonas bacterium.
- Nitrite is then converted into Nitrate by Nitrobacter bacterium.
- Plants are more adapted to absorb nitrate than ammonium ions from the soil.

Nitrate Assimilation

- The process by which nitrate is reduced to ammonia is called nitrate assimilation.

Ammonification

- Decomposition of organic nitrogen from dead plants and animals into ammonia is called ammonification.
- Organism involved in this process are Bacillus ramosus and Bacillus vulgaris.

Denitrification

- Nitrates in the soil are converted back into atmospheric nitrogen by a process called denitrification.
- Bacteria involved in this process are Pseudomonas, Thiobacillus.

60.Write a note on Hydroponics or Soilless culture.

- Von Sachs developed a method of growing plants in nutrient solution.

The commonly used nutrient solutions are Knop solution (1865) and Arnon and Hoagland Solution (1940).

- Later the term Hydroponics was coined by Goerick ((1940and he also introduced commercial techniques for hydroponics.
- In hydroponics roots are immersed in the solution containing nutrients and air is supplied with help of tube.

CHAPTER 13 : PHOTOSYNTHESIS

One mark question answers (Book back)

1. Assertion (A): Increase in Proton gradient inside lumen responsible for ATP synthesis.

Reason (R): Oxygen evolving complex of PS I located on thylakoid membrane facing Stroma, releases H^+ ions.

Assertion is True and Reason is False.

2. Which chlorophyll molecule does not have a phytol tail **Chl - C**
3. The correct sequence of flow of electrons in the light reaction is **PS II, plastoquinone, cytochrome**, **ferredoxin.**

4. For every CO_2 molecule entering the C_3 cycle, the number of ATP & NADPH required **3 ATP + 2NADPH.**
5. Identify true statement regarding light reaction of photosynthesis.
a. Splitting of water molecule is associate with PS I.
b. PS I and PS II involved in the formation of NADPH+H^+.
c. The reaction center of PS I is Chlorophyll a with absorption peak at 680 nm.
d. The reaction center of PS II is Chlorophyll a with absorption peak at 700 nm.

Additional one mark question answers

1. Photosynthesis is a **photochemical oxidation** and **reduction reactions**.
2. Light reaction takes place in **grana**, Dark reaction takes place in **stroma**.
3. The space between the two membranes of the chloroplast is **100 to 200 Å**.
4. A colloidal and proteinaceous matrix called **stroma** is present inside the chloroplast.
5. The sac like membranous system called **thylakoid** or **lamellae.**
6. Each chloroplast contains **40 to 80 grana**.
7. The thin Lamellae connecting the grana are called **fret membrane.**
8. Both PS I and PS II are found in **grana lamellae.**
9. Ribosomes found in chloroplast are **70S type**.
10. The lamellar membrane consists of small spherical structure called as **Quantasomes.**
11. **0.2 %** of the sunlight falling on earth is used for photosynthesis.
12. **Cholorophyll 'a'** is the primary pigment.
13. The essential component required for the formation of chlorophyll is **Magnesium.**
14. **Carotenoids** are called as shield pigments**.**
15. **Lycopenes** are red pigments found in tomatoes, red peppers and roses.
16. Phycocyanin is responsible for the blue green colour of **Cyanobacteria.**
17. Light moves at a speed of **3X$10^8 ms^{-1}$**.
18. **Phycoerythrin** is responsible for the red colour in red algae.
19. **Emerson** discovered the Red drop effect.
20. The name of the algae Emerson used for his study was **Cholorella**.
21. The photosynthetic rate of far-red light is **710nm**.
22. The photosynthetic rate of red light is **650nm**.
23. Chemiosmosis theory was proposed by **P. Mitchell.**

24. The number of quanta of light required for the release of one oxygen molecule is **8 quanta.**
25. C_4 Plants use **5 ATP** and **2 $NADPH_2$** to form an oxygen.
26. In C_3 Pathway the CO_2 acceptor molecule is **RUBP.**
27. C_3 pathway was discovered by **M Melvin Calvin** and **Benson**.
28. Dark reaction is also called **Thermo-chemical** reaction.
29. The number of ATP and $NADH_2$ molecules consumed to fix one molecule of CO_2 during dark reaction is **3 ATP** and **2 $NADH_2$.**
30. The most protein rich enzyme is **RUBISCO-RUBP Carboxylase Oxygenase.**
31. C_4 pathway was observed in sugarcane by **Kortschak Hart and Burr.**
32. The discovery of C4 pathway was confirmed by **Hatch and Slack** in 1967.
33. The number of ATP and $NADH_2$ molecules consumed to fix one molecule of CO_2 during C4 Pathway is **5 ATP** and **2 $NADH_2$.**
34. C_4 cycle is also known as **dicarboxylic acid cycle.**
35. C_4 cycle takes place in **mesophyll chloroplast** and **bundle sheath chloroplast**.
36. An example for a CAM plants **Bryophyllum, Sedum, Kalanchoe, Agave, Opuntia, Pineapple** and **Orchids.**
37. C_3 Plants require **18 ATP , 12 $NADPH+H^+$** for one glucose production.
38. C_4 Plants require **30 ATP , 12 $NADPH+H^+$** for one glucose production.
39. Photorespiration was observed by **Dekker.**
40. Photorespiration takes place in **Chloroplast, Peroxisome** and **Mitochondria**.
41. The law of limiting factor was proposed by **Black Man**.
42. The highest rate of photosynthesis is **blue** and **red**.
43. Photosynthetically active radiation is between **400nm to 700nm**.
44. The percentage of CO_2 in the atmosphere is **3%**.
45. Maximum photosynthesis **red light**, minimum photosynthesis **green light**.
46. The rate of photosynthesis decreases when there is an increase of oxygen concentration. It was discovered by **Warburg** using **Chlorella** algae.
47. Optimum temperature for photosynthesis is **25°C to 35°C**.
48. Optimum temperature for photosynthesis is **55°C algae, 20°C for lichens, 75°C algae.**
49. Minerals responsible for the production of chlorophyll are **Mg, Fe and N**.

50. Mineral **P** is required for phosphorylation.
51. Mineral required for photolysis of water are **Mn, Ca and Cl.**
52. The mineral required for the production of plastocyanin is **Cu.**
53. Pollutants affecting the rate of photosynthesis are SO_2, NO_2, O_3 **(Ozone).**
54. **Hydrated protoplasm** is essential for photosynthesis .
55. Hormones that increase the rate of photosynthesis are **Gibberellins** and **Cytokinin**.
56. **Van Neil** discovered a bacterium that releases **sulphur** instead of **oxygen** during photosynthesis.
57. Example of Green sulphur bacteria **Chlorobacterium** and **Chlorobium**.
58. Example of purple sulphur bacteria **Thiospirillum** and **Chromatium.**
59. An example of purple non-sulphur bacteria is **Rhodopseudomonas** and **Rhodospirillum**.
60. During light reaction water is oxidised to release O_2**.**
61. Bacteria have photosynthetic **pigment system I.**
62. P_{870} act as the reaction centre of bacterial photosynthesis.
63. Reaction Centre of plant photosynthesis **P700** and **P680.**
64. The experiment that is used to demonstrate that light is essential for photosynthesis is **Test tube and funnel experiment**.
65. Evolution of oxygen during photosynthesis is demonstrated by **Test tube and funnel experiment**.

Book back 2 & 3 Mark questions

1. Two groups (A & B) of bean plants of similar size and same leaf area were placed in identical Conditions. Group A was exposed to light of wavelength 400-450nm & Group B to light of wavelength of 500-550nm. Compare the photosynthetic rate of the 2 groups giving reasons.

i) A Group of plants exposed to light of 400-450 nm. Hence rate of photosynthesis will be high

ii) B group of plants expose to light of 500-550 nm. Rate of photosynthesis does not increase due to this.

2. A tree is believed to be releasing oxygen during night time. Do you believe the truthfulness of this statement? Justify your answer by giving reasons?

i) It is not true. ii)Trees do not be release Oxygen during night time.

iii) Trees generally release oxygen during day time by the light reaction of photosynthesis.

3. Grasses have an adaptive mechanism to compensate photo respiratory losses- Name and describe the mechanism.

i) Name : C_4 Pathway. ii) In this pathway it has two different types of cells.

a) Mesophyll cells b. Bundle sheath cells.

4. In Botany class, teacher explains, Synthesis of one glucose requires 30 ATPs in C4 plants and Only 18 ATPs in C_3 plants. The same teacher explains C4 plants are more advantageous than C_3 Plants. Can you identify the reason for this contradiction?

* C_4 plants are more advantageous than C_3 Plants

Reason : Potato plants lose most of their energy during photorespiration.

5. When there is plenty of light and higher concentration of O_2, what kind of pathway does the plant undergo? Analyse the reasons.

* Pathway : Photorespiration (or) C_2 Cycle

* The plant undergoes photorespiration to prevent photo oxidative damage in plants.

6. Write the overall equation of photosynthesis?

$$6CO_2 + 6H_2O \xrightarrow[chlorophyll]{Light} C_6H_{12}O_6 + O_2 \uparrow$$

7. What is the quantosomes?

- Inner surface of lamellar membrane consists of small spherical structure called as quantosome.

8. What is stroma?

- A colloidal and proteinaceous matrix called stroma is present inside the chloroplast.

9. What is Kranz anatomy?

- In C_4 plants are having two types of chloroplast.
- In C_4 plants vascular bundles are surrounded by a layer of bundle sheath.
- The chloroplast of mesophyll cells has grana, and in the bundle sheath cells are agranal.
- The characteristic feature of C4 plants is the presence of dimorphic chloroplast.

10. What are called Photosynthetic pigments?

- Pigments are involved in photosynthsis.
- Example :Chl – a, Chl – b, Cartenoids, Xanthophyll and Phycobilins.

11. What are called as Accessory pigments?

- The pigments other than Chl - a are called as accessory pigments.

12. What is Red drop (or) Emersons first effect?

- Emerson found that in the wavelength range of 600 to 680, the yield was constant.
- Suddenly dropped in the region above 680 nm (red region).
- The fall in the photosynthetic yield beyond red region of the spectrum is referred as red drop or Emerson's first effect.

13. What are called Granum?

- The thylakoids are arranged one above other forming a stack of coin like structure called granum.

14. What is Photolysis of water?

- When the pigment system II is active it receives light and the water molecule splits into protons, electrons and O_2. It is known as photolysis of water.

15. What is Dark reaction or Calvin cycle?

- Fixation and reduction of CO_2 into carbohydrates with the help of assimilatory power (ATP and NADPH + H^+) produced during light reaction.

16. Mention the Significance of C_2 Cycle (Or) photorespiration.

- Glycine and Serine synthesised during this process are precursors of many biomolecules like chlorophyll, proteins, nucleotides.
- It consumes excess NADH + H^+ generated.
- Glycolate protects cells from Photo oxidation.

17. What is meant by Photorespiration?

- It is the excess respiration taking place in photosynthetic cells due to absence of CO_2 and increase of O_2.

18. What are Cartenoids?

- Cartenoids are yellow to orange pigments.
- Carotene is a precursor of vitamin - A.
- Lycopene is a red pigment found in fruits of tomato, red peppers and rose

19. Differentiate Photo respiration from Dark respiration.

	Photo respiration	Dark respiration
1	Respiration takes place in photosynthetic cells	Respiration occurs in all kinds of cells.
2	It takes place only in presence of light.	It takes place in light and dark.
3	It involves chloroplast, peroxisome and mitochondria.	It involves only mitochondria.

FIVE MARKS QUESTION AND ANSWER:

1. Write down the Significance of Photosynthesis.

- Photosynthetic organisms provide food for all living organisms on earth either directly or indirectly.
- Balances the oxygen level of the atmosphere
- Photosynthesis balances the oxygen and carbon cycle in nature.
- Fuels such as coal, petroleum and other fossil fuels are from preserved photosynthetic plants.
- Photosynthetic organisms are the primary producers on which all consumers depend for energy.
- Plants provide fodder, fibre, fire wood, timber, useful medicinal products and these sources come by the act of photosynthesis.

2. Write the differences between Cyclic and Non - Cyclic photophosphorylation.

	Cyclic photophosphorylation.	**Non - Cyclic Photophosphorylation**
1	Only PS I involved.	PS I and PS II involved.
2	Reaction centre is P700.	Reaction centre is P 680.
3	Electron released are cycled back.	Electron released are not cycled back
4	Photolysis of water does not take place.	Photolysis of water take place.
5	Only ATP synthesized.	ATP and NADPH+H^+.
6	Photophosphorylation takes place at two places.	Photophosphorylation takes place at only one place.
7	It does not require an external electron donor.	Requires external electron donor like H_2O or H_2S.

3.Differenciate between C_3 and C_4 plants.

	C_3 Plants	**C_4 Plants**
1	CO_2 fixation takes place in mesophyll cells only	CO_2 fixation takes place in mesophyll and bundle sheath.
2	CO_2 acceptor is RUBP only.	PEP in mesophyll and RUBP in bundle sheath cells.
3	First product is 3C-PGA	First product is 4C-OAA.
4	Kranz anatomy is not present	Kranz anatomy is present.
5	Granum is present in mesophyll cells	Granum present in mesophyll cells and absent in bundle sheath.
6	Normal chloroplast	Dimorphic chloroplast.
7	Optimum temperature 20°C – 25°C.	Optimum temperature 30°C – 45°C.

4. **Draw the cyclic photophosphorylation.**

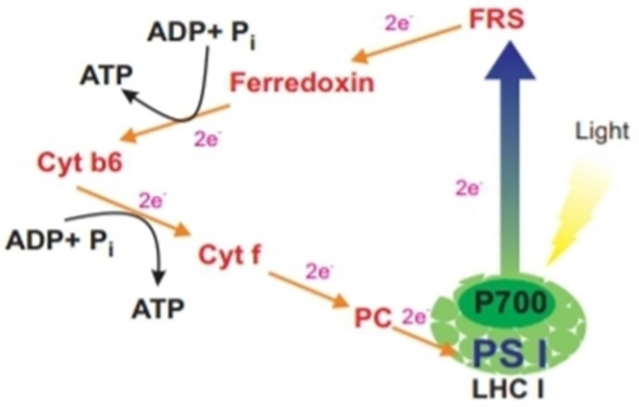


Figure 13.13: Cyclic Photophosphorylation

5. Draw the Non-Cyclic photophosphorylation.

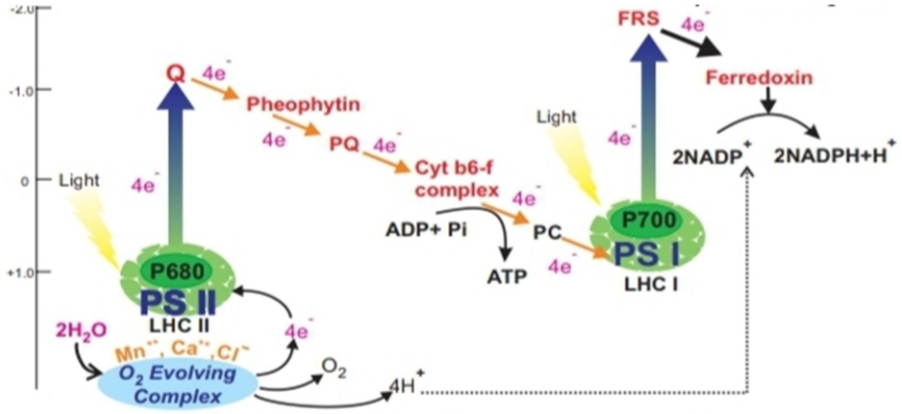


Figure 13.14: Non-Cyclic Photophosphorylation

6 Write the difference between PS I and PS II.

	PHOTOSYSTEM I	PHOTOSYSTEM II
1	The reaction centre is P700	Reaction centre is P680
2	PS I is involved in both cyclic and non-cyclic.	PS II participates in Non – cyclic pathway.
3	Not involved in photolysis of water and evolution of oxygen.	Photolysis of water and evolution of oxygen take place.
4	It receives electrons from PS II.	It receives electrons by photolysis of water.

7.Make a chart of C_2 cycle or photorespiration

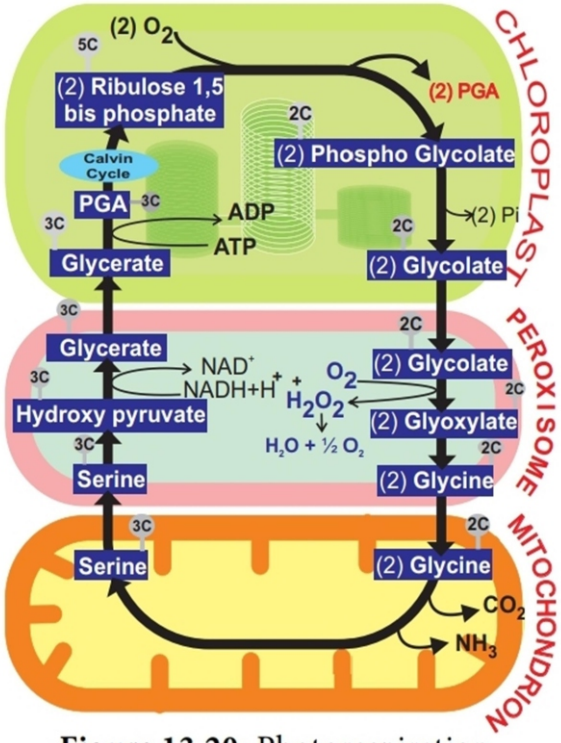


Figure 13.20: Photorespiration

CHAPTER 14: RESPIRATION

Book back one- mark questions

1. The number of ATP molecules formed by complete oxidation of one molecule of pyruvic acid is **15.**
2. During oxidation of two molecules of cytosolic NADH + H+, number of ATP molecules produced in plants are **4.**
3. The compound which links glycolysis and Krebs cycle is **acetyl CoA.**
4. **Assertion (A):** Oxidative phosphorylation takes place during the electron transport chain in mitochondria.
Reason (R): Succinyl CoA is phosphorylated into succinic acid by substrate phosphorylation
A and R is correct but R is not the correct explanation of A
5. Which of the following reaction is not involved in Krebs cycle.

a) Shifting of phosphate from 3C to 2C
b) Splitting of Fructose 1,6 bisphosphate of into two molecules 3C compounds.
c) Dephosphorylation from the substrates **d) All of these**

Additional One-mark questions

1. The gas evolved during respiration is CO_2.
2. The term respiration was coined by **Pepys.**
3. Organic substances which are oxidized during respiration are called **respiratory substrates.**
4. The common respiratory substrate is **Glucose.**
5. Power house of the cell is **Mitochondria.**
6. The energy currency of the cells is **ATP.**
7. The total amount of energy released from one molecule off glucose on oxidation is about **686 cal or 2868 KJ**.
8. **Blackman** divided respiration into Floating respiration and Protoplasmic respiration.
9. The discovery of ATP was made by **Karl Lohman**.
10. The number of high energy bonds in ATP is **Two**.
11. The energy released when an ATP hydrolyses is **7.3 k cal or 31.6 KJ/ATP**.
12. The energy transformation concept was established by **Lipman (1941).**
13. Some other compounds that contain energy inside the cell are **GTP** and **UTP**
14. Respiration occurring in the presence of oxygen is called **Aerobic respiration**.
15. The Respiration which takes place in absence of free oxygen molecule is called **Anaerobic respiration or Fermentation**.
16. Glycolysis takes place in **Cytoplasm.**
17. Link reaction and krebs cycle or TCA cycle takes place in **Mitochondrial matrix.**
18. One molecule of glucose split in to two molecule of pyruvic acid is called **Glycolysis**.
19. Glycolysis was first demonstrated by **Embden, Mayerhof and Parnas**.
20. Glycolysis is otherwise known as **EMP Pathway**.
21. The formation of ATP from a respiratory substrate is called **substrate level phosphorylation or direct phosphorylation.**
22. The end product of Glycolysis is **pyruvic acid**.
23. The net gain of the glycolysis event is **2ATP, 2 NADH+H^+.**
24. The Enolase involved the loss of water molecule from 2-phospho glycerate. As a result, enol group is formed. This process is called **Enolation.**

25. Citric acid cycle was discovered by **Sir Hans Adolf Krebs.**

26. Krebs cycle is also called **Citric acid cycle** or **Tricarboxylic acid cycle (TCA cycle).**

27.Succinate dehydrogenase is an enzyme required for the TCA Cycle found in mitochondria.

28. The net gain of the Krebs cycle is **6 NADPH+H^+, 2$FADH_2$, 2ATP**.

29. The synthesis of glucose from certain non-carbohydrate carbon substrates such as proteins and lipids are called **Gluconeogenesis**.

30.**3** protons are required for the formation of one ATP.

31. In Aerobic respiration complete oxidation of one molecule of glucose yields **36 ATP.**

32.In prokaryotes **38 ATP** molecules are formed from one glucose.

33.Respiratory quotient of glucose is **1**.

34.Respiratory quotient of Tripalmitin is **0.7 (less than unity).**

35.Respiratory quotient of Malic acid is **1.33 (more than one).**

36.Respiratory quotient of **Protein is 0.8 - 0.9**

37.Respiratory quotient of **Oleic acid (Fat) is 0.71**

38.Respiratory quotient of **Palmitic acid (Fat) is 0.36**

39.Respiratory quotient of **Tartaric acid is 1.6**

40.Respiratory quotient of Oxalic acid **4.0**

41.The apparatus used for determining respiration and RQ is called **Ganong's Respirometer**.

42.**Kuhne's fermentation tube experiment** is used to demonstrate Fermentation.

43.Who discovered pentose phosphate pathway **Warburg, Dickens and Lipmann.**

44. Pentose phosphate pathway takes place in **Cytoplasm**.

BOOK BACK TWO AND THREE MARKS:

1.What are enzymes involved in phosphorylation and dephosphorylation reactions in EMP pathway?

Enzymes of Phosphorylation reactions: i) Hexokinase ii) Phospho fructo kinase

Enzymes of Dephosphorylation reactions:

i) Phosphoglycerate Kinase ii) Pyruvate kinase.

2. Respiratory quotient is zero in succulent plants. Why?

- In some succulent plants like Opuntia, Bryophyllum carbohydrates are partially oxidised to organic acid, particularly malic acid without corresponding release of CO_2 but O_2 is consumed hence the RQ value will be zero.

$$2C_6H_{12}O_6 + 3O_2 \rightarrow 2C_4H_6O_5 \text{ (Malic acid)} + 3H_2O + \text{Energy}.$$

- RQ in succulents $= \frac{zero\ molecules\ of\ CO_2}{3\ molecules\ of\ O_2} = 0$ (Zero)

3. What is the name of alternate way of glucose breakdown? Explain the process involved in it?

Name : Pentose phosphate pathway.

* Pentose phosphate pathway was described by Warburg, Dickens and Lipmann.

*It consists of two phases, oxidative phase and non-oxidative phase.

Oxidative phase: The oxidative events convert six molecules of six carbon Glucose-6-phosphate to 6 molecules of five carbon sugar Ribulose-5 phosphate

*The remaining reactions known as **non-oxidative pathway**, converts

*Ribulose-5-phosphate molecules

*Xylulose5-phosphate(5C),

*Glyceraldehyde-3phosphate(3C),

*Sedoheptulose-7-Phosphate (7C)

*Erythrose-4-phosphate (4C).

*Finally, five molecules of glucose-6 phosphate is regenerated.

4. Explain the reactions taking place in mitochondrial inner membrane.

Complex-I (NADH dehydrogenase).

*It contains a flavoprotein (FMN) and associated with non-heme iron Sulphur protein (Fe-S).

* This complex is responsible for passing electrons and protons from mitochondrial NADH

(Internal) to Ubiquinone (UQ)

* $NADH+H^+ + UQ = NAD^+ + UQH_2$

*Complex is present on the outer surface of inner membrane of mitochondria which can oxidise cytosolic $NADH + H^+$.

Complex-II (Succinic dehydrogenase)

* It contains FAD flavoprotein is associated with non-heme iron Sulphur (Fe-S) protein.

*This complex receives electrons and protons from succinate in Krebs cycle and is converted into fumarate and passes to ubiquinone.

*Succinate UQ → Fumarate + UQH_2Complex - III (Cytochrome bc1 complex)

*This complex oxidises reduced ubiquinone (ubiquinol) and transfers the electrons through Cytochrome bc1 Complex to cytochrome c.

*Cytochrome c is a small protein attached to the outer surface of inner membrane and act as a mobile carrier to transfer electrons between complex III to complex IV (Cytochorme c oxidase).

*Complex IV is the terminal oxidase and brings about the reduction of H_2O.

*Two protons are needed to form a molecule of H_2O (terminal oxidation).

5. How will you calculate net products of one sucrose molecule upon complete oxidation during aerobic respiration as per recent view?

Table 14.2: Net Products gained during aerobic respiration per glucose molecule.

Stages	CO_2	ATP	Reduced NAD⁺	Reduced FAD	Total ATP Production
Glycolysis	0	2	2 ($2 \times 2 = 4$)	0	6
Link reaction	2	0	2 ($2 \times 3 = 6$)	0	6
Krebs cycle	4	2	6 ($6 \times 3 = 18$)	2 ($2 \times 2 = 4$)	24
Total	**6**	**4 ATPs**	**28 ATPs**	**4 ATPs**	**36 ATPs**

Additional question answer

6. Write the overall process of respiration?

- $2C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy.

7. Define: Compensation point.

- The point at which CO_2 released in respiration is exactly compensated by CO_2 fixed in photosynthesis that means no net gaseous exchange takes place. It is called compensation point.

8. What is Substrate phosphorylation?

- Direct transfer of phosphate moiety from substrate molecule to ADP and is converted into ATP is called substrate phosphorylation or direct phosphorylation.

9. What is Oxidative phosphorylation?

- The synthesis of ATP from ADP and inorganic phosphate (Pi) occurs during the transfer of electrons, which is called oxidative phosphorylation.

10. What is glycolysis?

- 6-Carbon glucose is split into two molecule of 3-carbon pyruvic acid is called glycolysis.

11. What is Enolation?

- During the reaction of Glycolysis, 2 phospho glycerate is dehydrated into

Phosphoenolpyruvate a water molecule is removed by the enzyme enolase. This process is called Enolation.

12. Name the scientists who worked out the reactions of Glycolysis?

- i) Embden ii) Meyerhoff iii) Parnas.

13. What is amphibolic pathway?

- Krebs cycle is primarily a catabolic pathway, but it provides precursors for various biosynthetic pathways there by an anabolic pathway too is called amphibolic pathway.

14. What is meant by anaerobic respiration?

- In the absence of molecular oxygen glucose is incompletely degraded into either ethyl alcohol or lactic acid.

15. Write down the overall reaction of Glycolysis?

- $C_6H_{12}O_6$ + 2ADP + 2Pi + 2NAD+ → 2XCH_3COCOOH + 2ATP + 2NADH + 2H+

16. Write the Significance of pentose phosphate pathway.

- It is associated with the generation of two important products, NADPH and pentose sugars.
- Ribose – 5 - phosphate and its derivatives are used in the synthesis of DNA, RNA, ATP, NAD+,
- FAD and Coenzyme A.
- Erythrose is used for synthesis of anthocyanin, lignin and other aromatic compounds.
- It plays a role on fixation of CO_2 in photosynthesis through RUBP.

17. Define: respiration quotient.

- The ratio of volume of carbon dioxide given out and volume of oxygen taken in during respiration is called Respiratory Quotient.

$$RQ = \frac{Volume\ of\ \ CO2\ \ liberated}{Volume\ of\ O2\ Consumed}$$

18. The value of RQ for carbohydrate will be one. Why?

- $C_6H_{12}O_6$ + $6O_2$ → $6CO_2$ + $6H_2O$ + Energy.

$$\text{RQ of Glucose} = \frac{6\ molecules\ of\ CO_2}{6\ molecules\ of\ O_2} = 1$$

19. The value of RQ will be infinity in anaerobic respiration. Why?

- If the respiratory substrate is a carbohydrate, it will be incompletely oxidised when it goes through anaerobic respiration and the RQ value will be infinity.
- RQ of Glucose = $\frac{2molecules\ of\ \ CO_2}{Zero\ molecules\ of\ O_2}$ = α (infinity)

20. What is ATP? Or ATP is called as 'universal energy currency of the cell - Give reason.

- ATP is a consisting of adenine, ribose sugar and three phosphate groups.
- On hydrolysis, it releases energy.
- It is found in all living cells and hence it is called universal energy currency of the cell.

21. What is aerobic respiration?

- Respiration occurring in the presence of oxygen is called aerobic respiration.

FIVE MARKS:

1.Differentiate between aerobic respiration and anaerobic respiration.

	Aerobic respiration	Anaerobic respiration
1	It occurs in all living cells of higher organisms.	It occurs yeast and some bacteria.
2	It requires oxygen for breaking the respiratory substrate.	Oxygen is not required for breaking the respiratory substrate.
3	The end product isCO_2 and H_2O.	The end products are alcohol, and CO_2 (or) lactic acid.
4	Oxidation of one molecule of glucose produces 36 ATP molecules.	Only 2 ATP molecules are produced.
5	It consists of four stages – glycolysis, link reaction, TCA cycle and electron transport chain.	It consists of two stages-glycolysis and fermentation.
6	It occurs in cytoplasm and mitochondria.	It occurs only in cytoplasm.

1. Differentiate between Alcoholic fermentation and Lactic acid fermentation.

	Alcoholic fermentation	Lactic acid fermentation
1	It produces alcohol and releases CO_2 pyruvic acid.	It produces lactic acid and does not release $CO_2$from pyruvic acid.
2	It takes place in two steps.	It takes place in single step.
3	It involves two enzymes, pyruvate decarboxylase with M_g++ and alcohol dehydrogenase.	It uses one enzyme, lactate dehydrogenase with Zn++.
4	It forms acetaldehyde as intermediate compound.	Does not form any intermediate compound.

5	It commonly occurs in yeast.	Occurs in bacteria some fungi and vertebrate muscles.

2.Make a chart of EMP Pathway (or) Glycolysis.

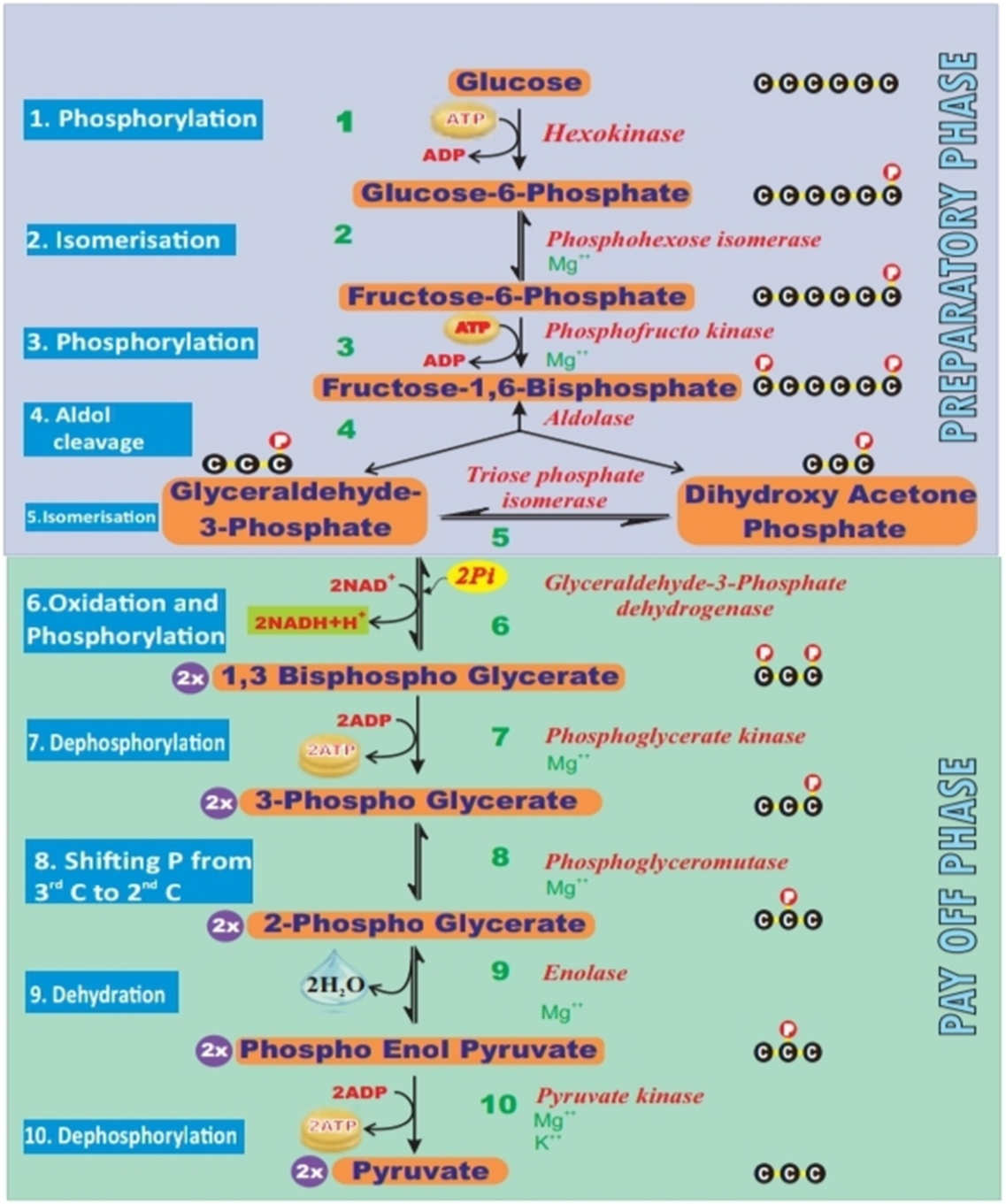


Figure 14.6: Glycolysis or EMP pathway

3.Make a chart of Krebs cycle or Citric acid cycle or TCA cycle.

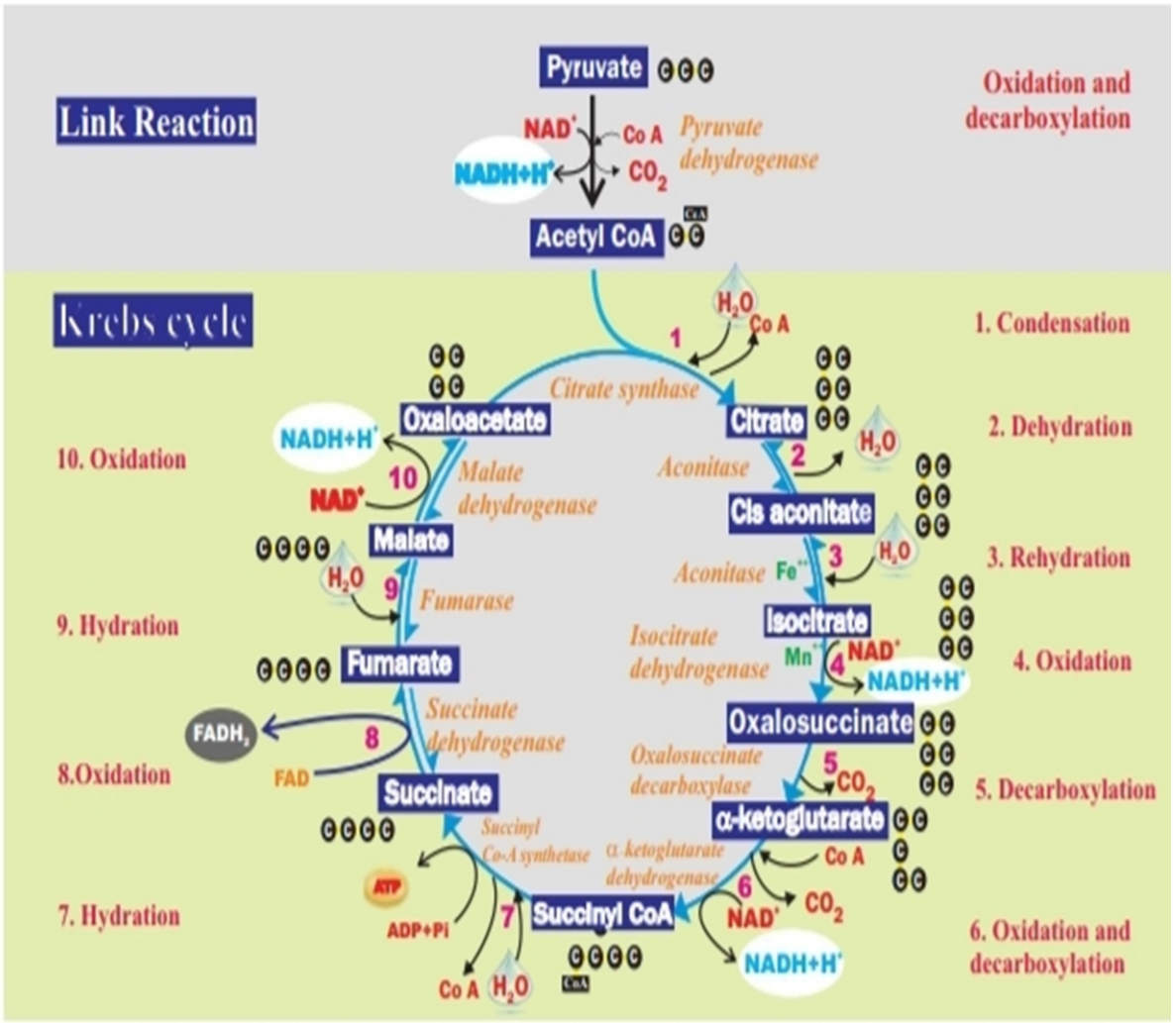


Figure 14.8: Krebs cycle or Citric acid cycle

CHAPTER 15: PLANT GROWTH AND DEVELOPMENT

ONE MARKS:

1. **Butler** named the light-absorbing blue protein pigment as phytochrome.
2. If the diameter of the pully 6 inches, length of pointer is 10 inches and distance travelled by pointer is 5 inches. The actual growth in length of plant is **1.5 inches.**
3. In unisexual plants, sex can be changed by the application of **ABA**.
4. Four types of senescence was recognized by **Leopold.**

5. Overcoming unfavourable climatic conditions in plants is **seed dormancy**.
6.**Etiolation** is when the plant turns yellow in the absence of light.
7.The word auxin was used by **Went.**
8. Agent orange is known as **2,4- D and 2,4, 5 -T**
9. **ABA** is a potent growth suppressor.
10 **T. D. Lysenko** was used the term vernalization**.**
11. The term **heterophily** refers to the ability to change the morphological characters.
12**.Phytophases** cause programmed cell death in plants.
13. The term 'allelopathy' was used by **Hans Molisch.**
14.**Abscisic acid** is a hormone that induces abscission in plants.
15.**Closed growth** is not observed in leaves and fruits.
16.**Sorgolone** is an allelopathic chemicals found in corn.
17.**Florigen** is a hormone that stimulates flower formation.
18. Critical day length plant is **Maryland mammoth (tobacco).**
19.**Cytokinin,** a hormone found in coconut sap.
20.**Arc auxanometer** measured easily the plant stem tip elongation.
21. Black walnut (Juglans nigrum) the chemical **juglone** present and it is a respiratory inhibitor.

TWO MARKS:

1.Write short notes of PCD.

- Senescence is controlled by plants genetic program and death of plants or plant parts consequent to senescence is called PCD.

2. What is Vernalization?

- Species of biennials and perennials are induced to flower by low temperature exposure (0 C to 5 C) This process is called "Vernalization".

3. Define - Bolting.

- The sudden elongation of stem followed by flowering by the application of gibberellin is called bolting.

4. What is Richmond lang effect?

- Application of cytokinin delays the process of aging by nutrient mobilization. It is known as Richmond lang effect.

5. What is photoperiodism

- The physiological change on flowering due to relative length of light and darkness is called photoperiodism

6. What is apical dominance?

- Suppression of growth in lateral bud by apical bud due to auxin produced by apical bud is termed as apical dominance.

THREE MARKS:

1. What is sigmoid curve?

- The total period from initial to final stage of growth is plotted against the time and 'S' shaped is sigmoid curve or "Grand period of growth".

2. What is the four stages consists in Sigmoid curve.

- Lag phase
- Log phase
- Decelerating phase
- Maturation phase

3. How is plants growth measured?

- Elongate or transverse growth (root and stem).
- Increase dry weight or wet weight.
- Increase in size and thickness (fruits and leaves)

4. Explain the mechanisms of action of biotic stress.

- Adverse effects on plants caused by other living organisms such as viral bacteria, fungi, parasites, insect weeds and competing plants.
- An organism producing one or more chemical substances that influence the germination, growth, reproduction of other organisms.
- Ex: Xanthomonas citri

5. What is Phytogerontology?

- The branch of botany which deals with ageing, abscission and senescence is called Phytogerontology.

FIVE MARKS:

1. **Physiological effects of Cytokinin.**
   - Cytokinin promotes the cell division in the presence of auxin (IAA).
   - Cytokinin promotes the growth of lateral bud in the Prescence of apical bud.
   - Application of cytokinin delays the process of ageing by nutrient mobilization. It is known as Richmond lang effect.
   - Break the dormancy of certain light -sensitive seeds like tobacco and induces seed germination.
   - Induce to formation of new leaves, and lateral shots.

2. Physiological effects of Ethylene.

- Stimulates respiration and ripening in fruits.
- It breaks the dormancy of buds, seeds.
- Reduce flowering in plants except pine apple and mango.

- Formation of abscission zone in leaves, flowers, and fruits it makes to shed prematurely.
- Inhibition of stem elongation.

3. Physiological effects of Auxin.

- Promote cell elongation in stem and coleoptile.
- Auxin prevents abscission.
- Suppression of growth in lateral bud by apical bud due to auxin produced by apical bud is termed as apical dominance.
- Synthetic Auxin are used in the formation of seedless fruits (Parthenocarpic fruits).
- Used to eradicate weeds. Ex: 2,4 -D

4. Physiological effects of Abscisic acid (ABA).

- It helps in reducing transpiration rate by closing stomata.
- Induces bud and seed dormancy.
- It promotes the abscission of leaves, flowers by forming abscission layer.
- ABA plays role in water stress, it results in loss of turgor and closure stomata.
- Promotes sprouting in storge organs like potato.

5. Physiological effects of gibberellins.

- Produces extraordinary elongation of stem caused by cell division and cell elongation.
- Promotes elongation of inter-nodes in sugarcane.
- The sudden elongation of stem followed by flowering by the application of gibberellin is called bolting.
- Formation of seedless fruits is induced by gibberellins.
  Ex: seedless apple. Tomato.
- It stimulates the seed germination.

6. Mechanism of drought resistance.

- Xerophytes are well adopted drought resistance.
- The protoplasm of such plant does not die when it faces extreme dehydration.
- Stomata present only on the lower epidermis with by dense trichomes.
- Improved water uptake by roots which penetrate deep water source.
- During drought stress an essential protection mechanism is induced stress protein “dehydrin and osmotin”.