9.What are the parameters which control water potential?

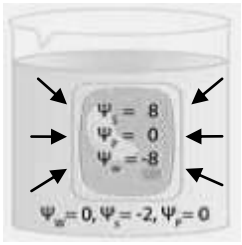
Water potential (**Ψ**) is controlled by the following parameters.

1. Solute concentration or Solute potential (**ΨS**)
2. Pressure potential (**ΨP**)

Water Potential = Solute potential + Pressure potential **ΨW = ΨS + ΨP**

10.An artificial cell made of selectively permeable membrane immersed in a beaker (in the figure). Read The values and answer the following questions?

a. Draw an arrow to indicate the direction of water movement



b. Is the solution outside the cell isotonic, hypotonic or hypertonic?

Ans: Hypotonic.

c. Is the cell isotonic, hypotonic or hypertonic?

Ans: Hypertonic.

d. Will the cell become more flaccid, more turgid or stay in original size?

Ans: More turgid.

e. With reference to artificial cell state, is the process endosmosis or exosmosis? Give reasons.

Ans: Endosmosis.

Reason: Endosmosis is defined as the osmotic entry of solvent into a cell or a system when it is placed in a pure water or hypotonic solution.

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UNIT-V.Plant Physiology
Chapter-12.Mineral Nutrition

I.Choose the correct answer:-

1.Identify correct match.

1. Die back disease of citrus - (i) Mo
2. Whip tail disease - (ii) Zn
3. Brown heart of turnip - (iii) Cu
4. Little leaf - (iv) B

a. 1 (iii) 2 (ii) 3 (iv) 4 (i)
b. 1 (iii) 2 (i) 3 (iv) 4 (ii)
c. 1 (i) 2 (iii) 3 (ii) 4 (iv)
d. 1 (iii) 2 (iv) 3 (ii) 4 (i)

2.If a plant is provided with all mineral nutrients but, Mn concentration is increased, what will be the deficiency?

a. Mn prevent the uptake of Fe, Mg but not Ca b. Mn increase the uptake of Fe, Mg and Ca
c. Only increase the uptake of Ca d. Prevent the uptake Fe, Mg, and Ca

3.The element which is not remobilized?

a. Phosphorous b. Potassium **c. Calcium** d. Nitrogen

4.Match the correct combination.

Minerals		Role	
A	Molybdenum	1.	Chlorophyll
B	Zinc	2.	Methionine
C	Magnesium	3.	Auxin
D	Sulphur	4.	Nitrogenase

a. A-1 B-3 C-4 D-2
b. A-2 B-1 C-3 D-4
c. A-4 B-3 C-1 D-2
d. A-4 B-2 C-1 D-3

5.Identify the correct statement

i. Sulphur is essential for amino acids Cystine and Methionine.
ii. Low level of N, K, S and Mo affect the cell division.
iii. Non-leguminous plant Alnus which contain bacterium Frankia.
iv. Denitrification carried out by nitrosomonas and nitrobacter.

a. I, II are correct **b. I, II, III are correct** c. I only correct d. all are correct.

II.Two, Three, Five mark questions:-

6.The nitrogen is present in the atmosphere in huge amount but higher plants fail to utilize it. Why?

i) The atmospheric nitrogen in gaseous state.
ii) The gaseous nitrogen must be fixed in the form of nitrate salts in the soil to facilitate absorption by plants.
iii) Hence, The higher plants cannot utilize the atmospheric nitrogen.

7.Why is that in certain plants deficiency symptoms appear first in younger parts of the plants while in others, they do so in mature organs?

i) Calcium, Sulphur, Iron, Boron and Copper shows deficiency symptoms first that appear on young leaves due to the immobile nature of minerals.
ii) Nitrogen, Phosphorus, Potassium and Magnesium deficiency symptoms first appear on old and senescent leaves due to active movement of minerals to younger leaves.

8.Plant A in a nutrient medium shows whiptail disease plant B in a nutrient medium shows a little leaf disease. Identify mineral deficiency of plant A and B?

i) Plant A is caused by whiptail disease due to the deficiency of Molybdenum.
ii) Plant B is caused by little leaf disease due to the deficiency of Zinc.

9.Write the role of nitrogenase enzyme in nitrogen fixation?

i) Nitrogen fixation process requires Nitrogenase enzyme complex.
ii) Nitrogenase enzyme is active only in anaerobic condition.
iii) Leghaemoglobin pigment creates this anaerobic condition.
iv) Which acts as oxygen scavenger and removes the oxygen.
v) Nitrogen fixing bacteria in root nodules appears pinkish colour due to the presence of this leghaemoglobin pigment.

10.Explain the insectivorous mode of nutrition in angiosperms?

a. Nepenthes (Pitcher plant):
i) Pitcher is a modified leaf and contains digestive enzymes.
ii) When insect is trapped, proteolytic enzymes will digest the insect.

b. Drosera (Sundew):
i) It consists of long club shaped leaves with tentacles.
ii) That secrete sticky digestive fluid which looks like a sundew and attracts insects.

c. Utricularia (Bladder wort):
i) Submerged plant in which leaf is modified into a bladder to collect insect in water.

d. Dionaea (Venus fly trap):
i) Leaf of this plant modified into a colourful trap.
ii) Two folds of lamina consist of sensitive trigger hairs and when insects touch the hairs it will close and traps the insects.

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UNIT-V.Plant Physiology
Chapter-13.Photosynthesis

I.Choose the correct answer:-

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.
a. Both Assertion and Reason are True. **b. Assertion is True and Reason is False.**
c. Reason is True and Assertion is False. d. Both Assertion and Reason are False.

2.Which chlorophyll molecule does not have a phytol tail?
a. Chl- a b. Chl-b **c. Chl- c** d. Chl -d

3.The correct sequence of flow of electrons in the light reaction is
a. PS II, plastoquinone, cytochrome, PS I, ferredoxin. b. PS I, plastoquinone, cytochrome, PS II ferredoxin.
c. PS II, ferredoxin, plastoquinone, cytochrome, PS I. d. PS II, plastoquinone, cytochrome, PS II, ferredoxin.

4.For every CO2 molecule entering the C3 cycle, the number of ATP & NADPH required
a. 2ATP 1 2NADPH b. 2ATP 1 3NADPH **c. 3ATP 1 2NADPH** d. 3ATP 1 3NADPH

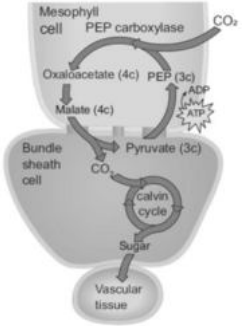
5.Identify true statement regarding light reaction of photosynthesis.
a. Splitting of water molecule is associate with PS I.
b. PS I and PS II involved in the formation of NDPH1H1.
c. The reaction center of PS I is Chlorophyll a with absorption peak at 680 nm.
d. The reaction center of PS II is Chlorophyll a with absorption peak at 700 nm.

II.Two, Three, Five mark questions:-

6.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 plants are having high photosynthetic rate.
ii) Because, chlorophyll 'a' and 'b' are more efficiently absorbing blue spectrum in the wavelength of 400-450nm.
iii) B group plants are having low photosynthetic rate.
iv) Because, chlorophyll 'a' and 'b' does not absorb green spectrum in the wavelength of 500-550nm.

7.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) No, it is not true. Because, during daytime oxygen is evolved through photosynthesis.
ii) During night time Co_2 is evolved through respiration.
iii) Overall reaction of Photosynthesis.
$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2\uparrow$
iv) Overall reaction of Respiration.
$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + 2868$ KJ energy.

8.Grasses have an adaptive mechanism to compensate photorespiratory losses- Name and describe the mechanism.
Grasses compensate photorespiratory losses through C_4 cycle or Hatch & Slack Pathway.



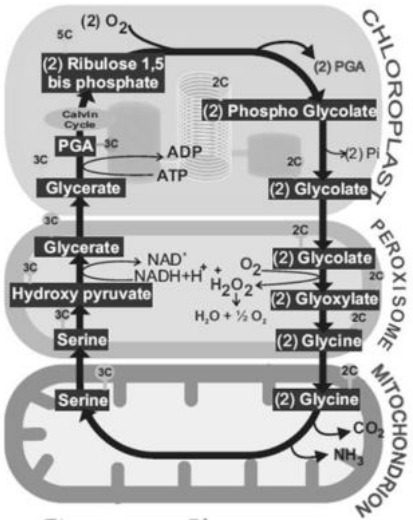
C_4 cycle or Hatch & Slack Pathway

9.In Botany class, teacher explains, Synthesis of one glucose requires 30 ATPs in C_4 plants and only 18 ATPs in C_3 plants. The same teacher explains C_4 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 because most of the energy lost during photo respiration in C_3 plants.

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

Plants undergo C_2 cycle or Photorespiration.



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UNIT-V.Plant Physiology
Chapter-14.Respiration

I.Choose the correct answer:-

1.The number of ATP molecules formed by complete oxidation of one molecule of pyruvic acid is
a. 12 b. 13 c. 14 **d. 15**

2.During oxidation of two molecules of cytosolic $NADH+H^+$, number of ATP molecules produced in plants are
a. 3 **b. 4** c. 6 d. 8

3.The compound which links glycolysis and Krebs cycle is
a. succinic acid b. pyruvic acid **c. acetyl CoA** d. citric acid

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. A and R is correct. R is correct explanation of A
b. A and R is correct but R is not the correct explanation of A
c. A is correct but R is wrong
d. A and R is wrong.

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.

II.Two, Three, Five mark questions:-

6.What are enzymes involved in phosphorylation and dephosphorylation reactions in EMP pathway?
i) Phosphorylation enzymes – 1.Hexokinase 2.Phosphofructo kinase.
ii) Dephosphorylation enzymes – 1.Phosphoglycerate kinase 2.Pyryvate kinase.

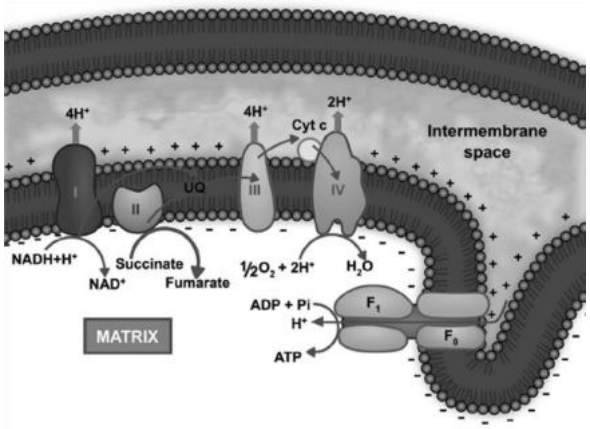
7.Respiratory quotient is zero in succulent plants. Why?

i) 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.

ii) RQ of glucose in succulent plants $= \frac{0CO_2}{3O_2} = 0$

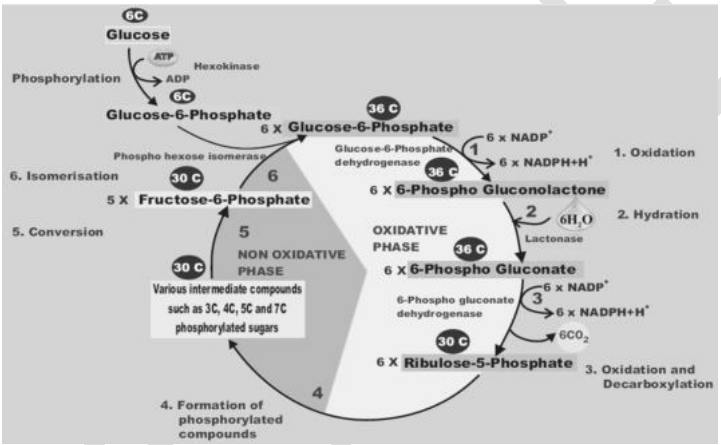
8.Explain the reactions taking place in mitochondrial inner membrane.

Electron Transport Chain or Oxidative phosphorylation is takes place in mitochondrial inner membrane.



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

Pentose phosphate pathway or HMP shunt is the alternate way of glucose breakdown.



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

As per recent view the cost of transport of ATPs from matrix into the cytosol is considered, the number will be 2.5 ATPs for each $NADH+H^+$ and 1.5 ATPs for each $FADH_2$ oxidised during electron transport system.

Stages	CO_2	ATP	Reduced NAD^+	Reduced FAD	Total ATP Production
Glycolysis	0	2	2(2X2=4)	0	6
Link reaction	2	0	2(2X3=6)	0	6
Krebs cycle	4	2	6(6X3=18)	2(2X2=4)	24
Total	6 CO_2	4 ATP	28 ATP	4 ATP	36 ATP

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UNIT-V.Plant Physiology
Chapter-15.Plant Growth and Development

I.Choose the correct answer:-

1.Select the wrong statement from the following:
a. Formative phase of the cells retain the capability of cell division.
b. In elongation phase development of central vacuole takes place.
c. In maturation phase thickening and differentiation takes place.
d. In maturation phase, the cells grow further.

2.If the diameter of the pulley is 6 inches, length of pointer is 10 inches and distance travelled by pointer is 5 inches. Calculate the actual growth in length of plant.
a. 1.5inches (3 inches) b. 6 inches c. 12 inches d. 30 inches

3._____ is the powerful growth inhibitor
a. Ethanol b. Cytokinins **c. ABA** d. Auxin

4.Select the correctly matched one

A) Human urine i) Auxin – B	a) A-iii, B-iv, C-v, D-vi, E-i, F-ii,
B) Corn gram oil ii) GA3	**b) A-v, B-i, C-ii, D-iv, E-vi, F-iii,**
C) Fungus iii) Abscisic acid II	c) A-iii, B-v, C-vi, D-i, E-ii, F-iv,
D) Herring fish iv) Kinitin sperm	d) A-ii, B-iii, C-v, D-vi, E-iv, F-i
E) Unripe maize v) Auxin A grains	
F) Young cotton vi) Zeatin bolls	

5.Seed dormancy allows the plants to
a. overcome unfavourable climatic conditions b. develop healthy seeds
c. reduce viability d. prevent deterioration of seeds.

6.Which one of the following method are used to break the seed dormancy?
a) Scarification b) Impaction c) Stratification **d) All the above.**

II.Two, Three, Five mark questions:-

7.Write the physiological effects of Cytokinins.
i) Cytokinin promotes the cell division.
ii) Cytokinin induces cell enlargement.
iii) Cytokinin can break the seed dormancy.
iv) Cytokinin promotes the growth of lateral buds.
v) Cytokinin delays the process of aging in plants. It is known as Richmond Lang effect.

8.Describe the mechanism of photoperiodic induction of flowering.
i) An appropriate photoperiod in 24 hours' cycle constitutes one inductive cycle.
ii) Plants may require one or more inductive cycles for flowering.
iii) The phenomenon of conversion of leaf primordia into flower primordia under the influence of suitable inductive cycles is called photoperiodic induction.
iv) Example: Xanthium (SDP) – 1 inductive cycle and Plantago (LDP) – 25 inductive cycles.

9.Give a brief account on Programmed Cell Death (PCD).
i) Senescence of an individual cell is called Programmed Cell Death (PCD).
ii) The proteolytic enzymes involving PCD in plants are phytaspases and in animals are caspases.
iii) Senescence in plants are controlled by their own genetic programme.

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Additional important five mark questions:-

1.Explain – Multiplication or Life cycle of phages.

Phages multiply through two different types of life cycle.

a. Lytic or Virulent cycle b. Lysogenic or Avirulent life cycle.

a. Lytic or Virulent cycle:

Following steps are involved in the lytic cycle of phages.

i) Adsorption:

1.Phage particles interact with cell wall of host.

2.The process involving the recognition of phage to bacterium is called landing.

3.Once the contact is established between tail fibres and bacterial cell, tail fibres bend to anchor the pins and base plate to the cell surface. This step is called pinning.

ii) Penetration:

1.The penetration process involves mechanical and enzymatic digestion of the cell wall of the host.

2.The step involving injection of DNA particle alone into the bacterial cell is called Transfection.

3.The empty protein coat leaving outside the cell is known as 'ghost'.

iii) Synthesis:

This step involves the degradation of bacterial chromosome, protein synthesis and DNA replication.

iv) Assembly and Maturation:

1.The DNA of the phage and protein coat are synthesized separately and are assembled to form phage particles.

2.The process of assembling the phage particles is known as maturation.

v) Release:

The phage particle gets accumulated inside the host cell and are released by the lysis of host cell wall.

b. Lysogenic or Avirulent life cycle:

1.In the lysogenic cycle the phage DNA gets integrated into host DNA and gets multiplied along with nucleic acid of the host.

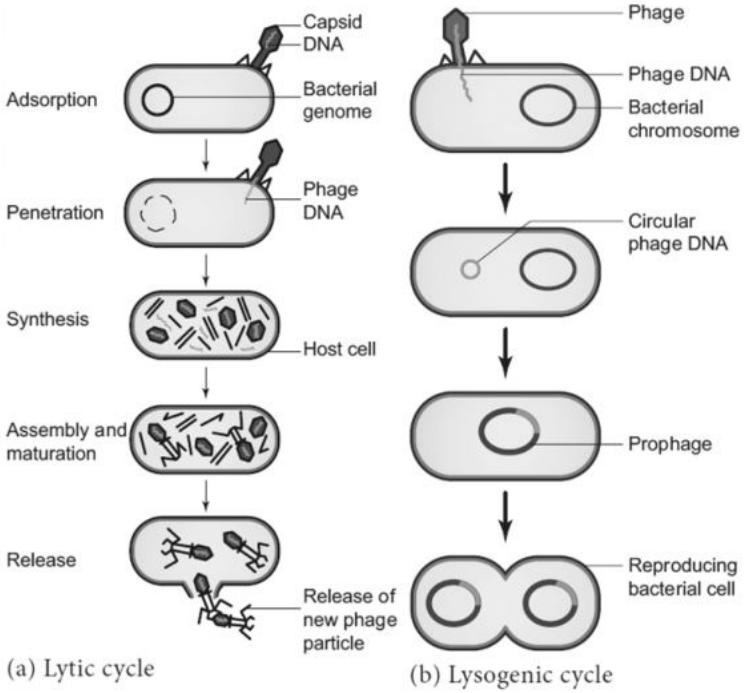
2.No independent viral particle is formed. As soon as the phage injects its linear DNA into the host cell.

3.It becomes circular and integrates into the bacterial chromosome by recombination.

4.The integrated phage DNA is now called prophage.

5.Each time the bacterial cell divides, the prophage multiplies along with the bacterial chromosome.

6.On exposure to UV radiation and chemicals the excision of phage DNA may occur and results in lytic cycle.



2.Write the Plant, Animal, Human diseases caused by virus.

Plant diseases	Animal diseases	Human diseases
1.Tobacco mosaic	1.Foot and mouth disease of cattle	1.Common cold
2.Cauliflower mosaic	2.Rabies of dog	2.Hepatitis B
3.Sugarcane mosaic	3.Encephalomyelitis of horse	3.Cancer
4.Cucumber mosaic	-	4.SARS
5.Tomato mosaic	-	5.AIDS

3.Explain the ultrastructure of a Bacterial cell.

1.Capsule or Glycocalyx:

A thick layer of glycocalyx bounded tightly to the cell wall is called capsule.

2.Cell wall:

i) Cell wall is made up of peptidoglycan or mucopeptide.

ii) It helps in the diffusion of solutes.

3.Cytoplasm:

i) Cytoplasm is thick and semi-transparent.

ii) It contains ribosomes and other cell inclusions.

4.Plasma membrane:

i) The plasma membrane is made up of lipoprotein.

ii) It controls the entry and exit of small molecules and irons.

5.Bacterial chromosome:

The bacterial chromosome is a single circular DNA molecule.

6.Plasmid:

Plasmids are extrachromosomal double stranded, circular, self-replicating elements.

7.Mesosomes:

These are localized inflodings of plasma membrane.

8.Polysomes or polyribosomes:

i) Ribosomes are the site of protein synthesis.

ii) Ribosomes are held together by mRNA and form polyribosomes or polysomes.

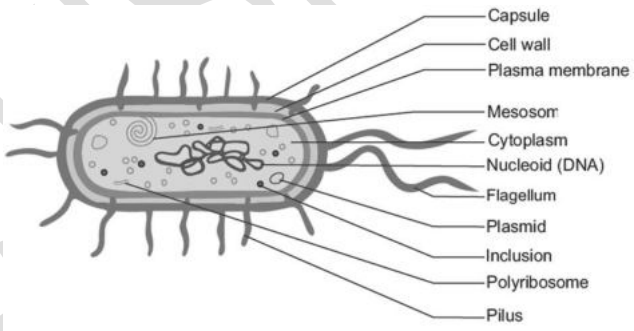
9.Flagella:

i) A thin hair like structure is called flagella.

ii) It is used for locomotion of the bacteria.

10.Fimbriae or Pili:

Fimbriae or Pili are hair like appendages found on the surface of the gram-negative bacteria.



4.**write the difference between Gram Positive and Gram Negative Bacteria.**

Characteristics	Gram positive Bacteria	Gram negative Bacteria
1.Cell wall	Thick layered	Thin layered
2.Outer membrane	Absent	Present
3.Periplasmic space	Absent	Present
4.Lipid and lipoproteins	Low	High
5.Lipopolysaccharides	Absent	Present

5.Write the human diseases caused by Bacteria.

Name of the disease	Name of the pathogen
1.Cholera	*Vibrio cholerae*
2.Typhoid	*Salmonella typhi*
3.Tuberculosis	*Mycobacterium tuberculosis*
4.Leprosy	*Mycobacterium leprae*
5.Pneumonia	*Diplococcus pneumoniae*

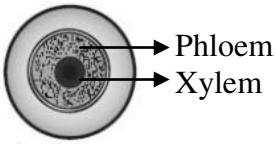
6.Describe the different types of stele seen in plants with neat sketches.

The term stele refers to the central cylinder of vascular tissues consisting of xylem, phloem and pericycle. There are two types of steles 1. Protostele 2. Siphonostele.

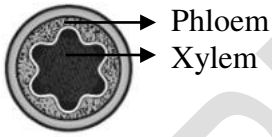
1.Protostele:

In protostele phloem surrounds xylem. The type includes Haplostele, Actinostele, Plectostele, and Mixed protostele.

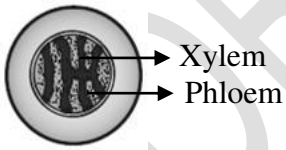
(i)**Haplostele**: Xylem surrounded by phloem is known as haplostele. Example: Selaginella.



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



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

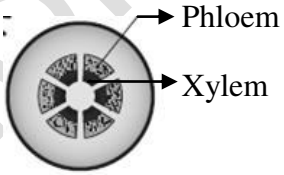


(iv)**Mixed prototostele**: Xylem groups uniformly scattered in the phloem. Example: Lycopodium cernuum.

2.Siphonostele:

In siphonostele xylem is surrounded by phloem with pith at the centre.

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



7.Write the general characteristics of lichens.

1.The symbiotic association between algae and fungi is called lichens.
2.The algal patner is called phycobiont or photobiont.
3.The fungal patner is called mycobiont.
4.Asexual reproduction takes place through fragmentation, soredia and isidia.
5.Phycobionts reproduce by akinetes, hormogonia, aplanospores etc.,
6.Mycobionts undergo sexual reproduction and produce ascocarps.

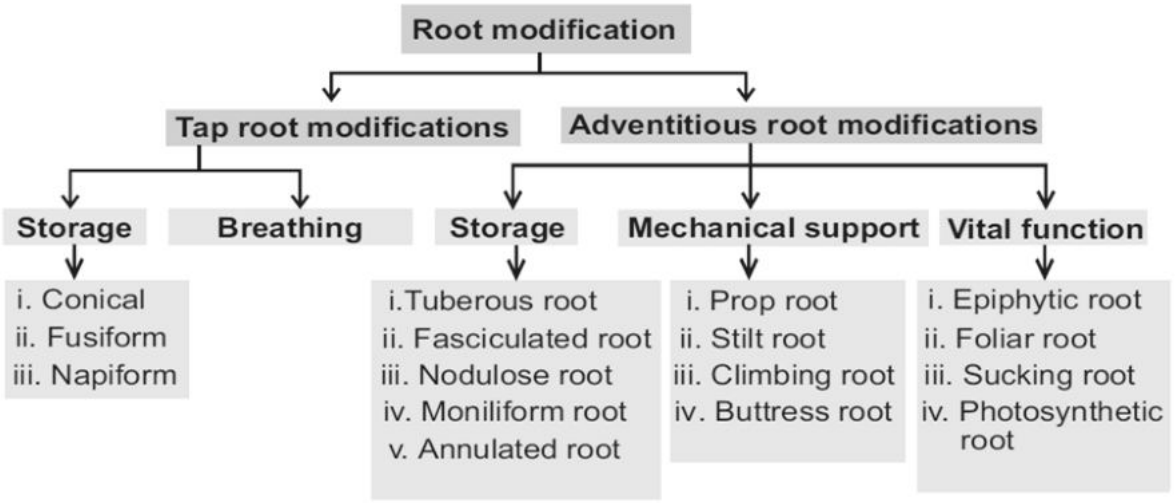
8.Write the economic importance of Gymnosperms

Plants	Products	uses
1.Cycas circinalis	Sago	Starch used as food
2.Pinus gerardiana	Roasted seed	Used as a food
3.Araucaria (Monkey's puzzle)	Tannins	Used in Leather industries
4.Pinus roxburghii	Wood pulp	Used to make papers
5.Thuja and Araucaria	whole plant	Ornamental plants

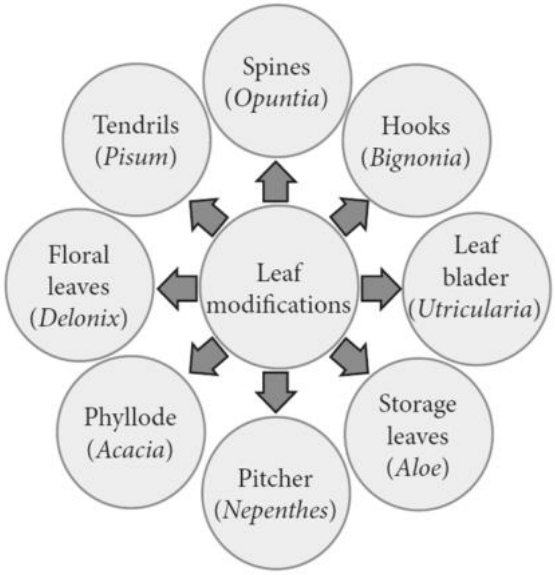
9.Write the difference between Gymnosperms and Angiosperms.

Gymnosperms	Angiosperms
1.Vessels absent	Vessels present
2.Double fertilization is absent	Double fertilization is present
3.Endosperm is haploid	Endosperm is triploid
4.Fruit formation is absent	Fruit formation is present
5.Flowers absent	Flowers present

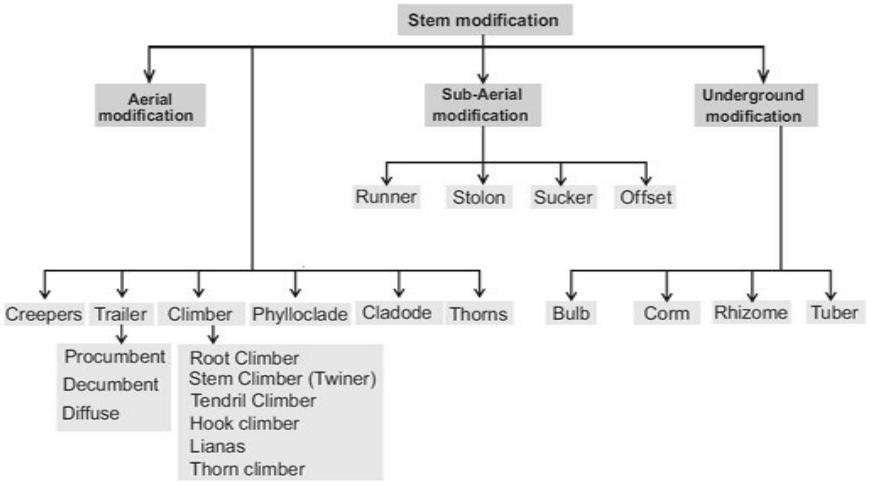
10.Write the types of Root modification.



11.Write about leaf modification.



12.Write the types of stem modification.



13.Describe the underground stem modification.

1.Bulb:

It is a condensed conical or convex stem surrounded by fleshy scale leaves.Example: Allium cepa.

2.Corm:

The corm is surrounded by scale leaves and exhibit nodes and internodes. Example: Colocasia.

3.Rhizome:

This is an underground stem growing horizontally with several lateral growing tips.
Example: Zingiber officinale.

4.Tuber:

This is a succulent underground spherical or globose stem with many embedded axillary buds called "eyes". Example: Solanum tuberosum.

14.Write the characteristic features of Root, Stem, Leaf.

Root	Stem	Leaf
1.Root is the underground part of the plant.	1.Stem is the aerial part of the plant.	1.Leaf is a lateral part of the stem.
2.It lacks chlorophyll.	2.It has chlorophyll.	2.It borne on the nodal region of the stem.
3.Does not possess nodes, Internodes.	3.It possess nodes and internodes.	3.It has limited growth.
4. It bears root hairs.	4.It has multicellular hairs.	4.It does not posses apical bud.
5.It is positively geotropic and negatively phototropic in nature.	5.It is positively phototropic and negatively geotropic.	5.It has three main parts namely, leaf base, petiole and lamina.

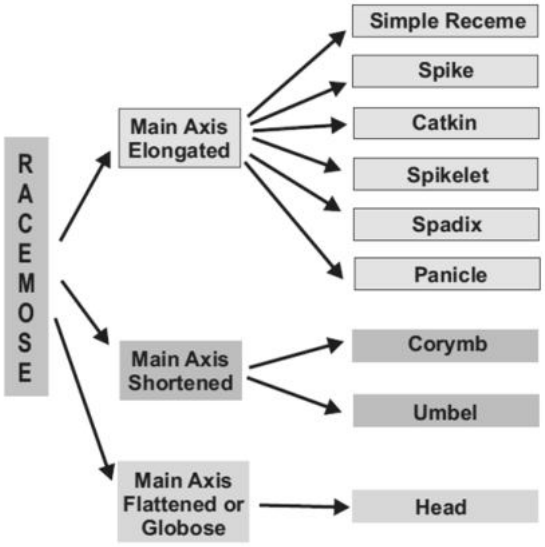
15.Write the functions of Root, Stem, Leaf.

Root	Stem	Leaf
1.It absorb water and minerals from soil.	1.It provide support.	1.Photosynthesis.
2.It help to anchor the plant into soil.	2.It bears leaves, flowers and fruits.	2.Transpiration.
-	3.It transports the water and minerals from the root.	3.Gaseous exchange.
-	4.It transports the food from leaves to entire plant.	4.Protection of buds.
	-	5.Conduction of water and dissolved solutes.

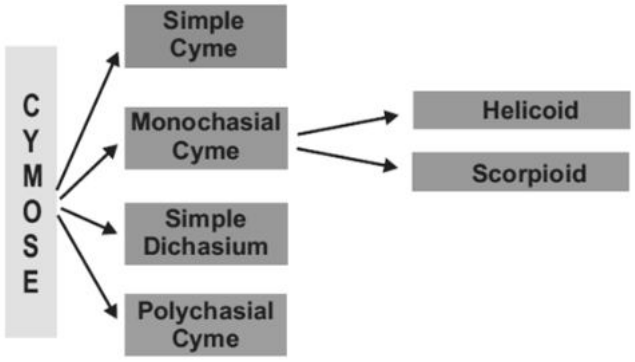
16.Write the difference between Racemose and Cymose inflorescence.

Racemose	Cymose
1.It is unlimited growth.	It is limited growth.
2.It is an acropetal succession.	It is an basipetal succession.
3.Opening of flowers is centripetal.	Opening of flowers is centrifugal.
4.Oldest flower at the base of the inflorescence axis.	Oldest flower at the top of the inflorescence axis.

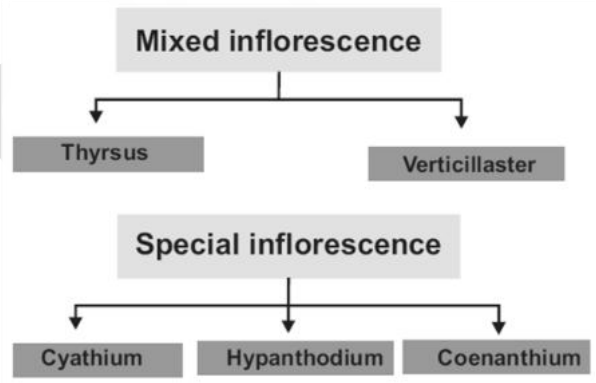
17.Write the types of Racemose inflorescence.



18.Write the types of Cymose inflorescence.



19.Write the types of Mixed and special inflorescence.



20.Describe about types of Aestivation.

Arrangement of Sepals and Petals in the flower bud is called aestivation.

A.Valvate:

i) Margins of sepals or petals do not overlap but just touch each other.

ii) Example: Calyx in members of Malvaceae, Calotropis, Annona.

B.Twisted or Convolute or Contorted:

i) One margin of each petal or sepal overlapping on the other petal.

ii) Example: Petals of Chinarose.

D.Quincuncial:

i) It is a type of imbricate aestivation.

ii) Two petals are external and two internal and one petal with one margin internal and the other margin external.

iii) Example: Guava, Calyx of Ipomoea, Catharanthus.

C.Imbricate:

i) Sepals and petals irregularly overlap on each other.

ii) one member of the whorl is exterior, one interior and rest of the three having one margin exterior and other interior.

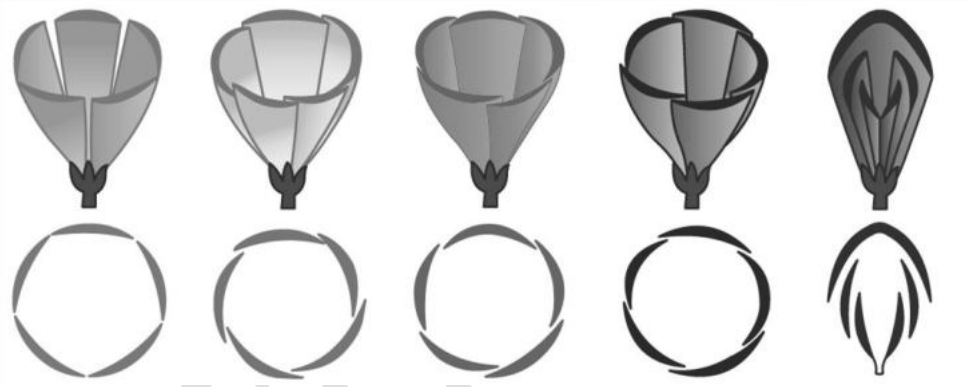
iii) Example: Cassia, DelonixThere are 3 types: 1. Ascendingly imbricate; 2. Quincuncial; 3. Vexillary.

E.Vexillary:

i) Large posterior petals both margins overlap lateral petals.

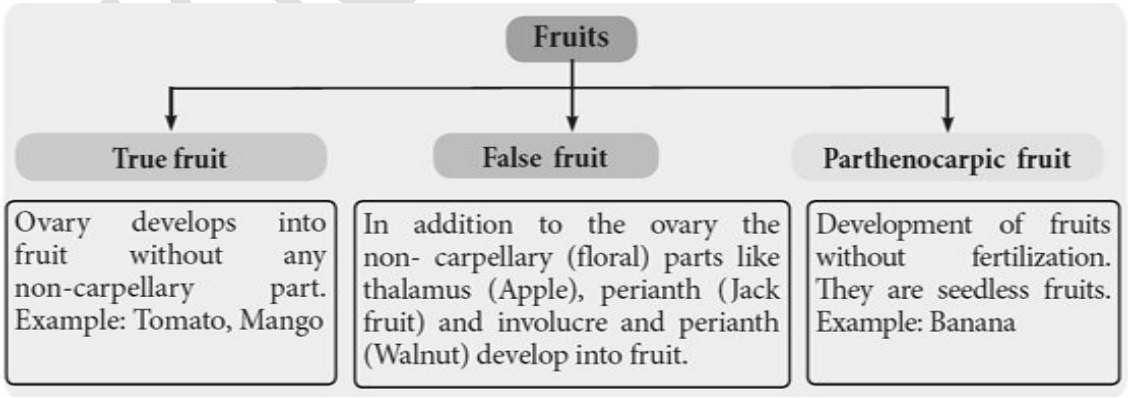
ii) Lateral petals other margin overlaps anterior petals.

iii) Example: Pea, Bean.

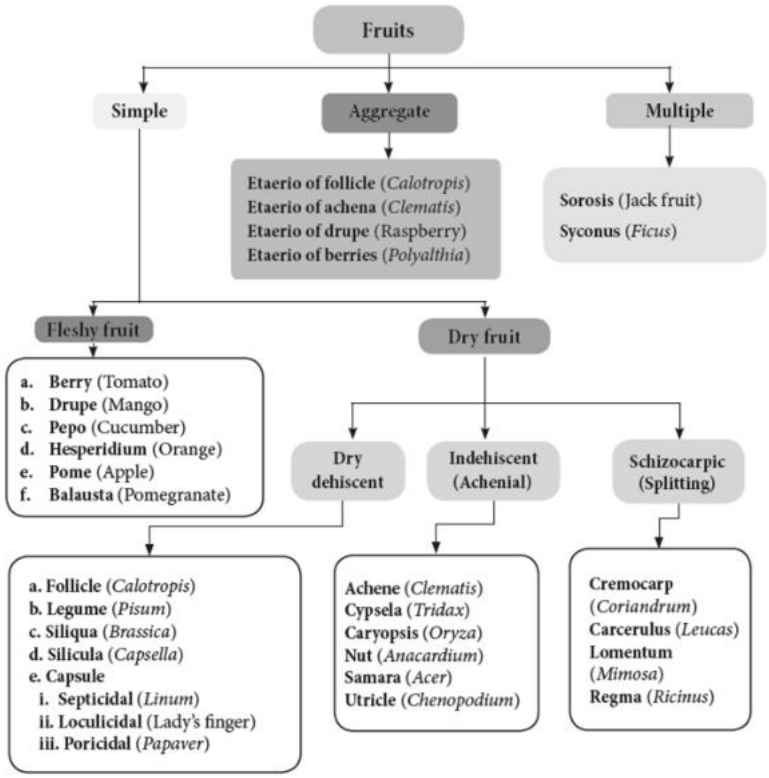


A.Valvate B.Twisted C.Imbricate D.Quincuncial E.Vexillary

21.Write about classification of fruits based on formation.



22.Write about types of fruits.



23.Explain about fusion of stamens.

1.Connation:

i) Refers to the fusion of stamens among themselves.

ii) It is of 3 types. **a.** Adelphy. **b.** Syngenecious. **c.** Synandrous.

a. Adelphy: Filaments connate into one or more bundles but anthers are free.

1. Monadelphous: Filaments of stamens connate into a single bundle.Example: Malvaceae (Chinarose).

2. Diadelphous: Filaments of stamens connate into two bundles. Example: Fabaceae (pea).

3. Polyadelphous: Filaments connate into many bundles. Example: Citrus (Lemon).

b. Syngenesious: Anthers connate, filaments free. Example: Asteraceae.

c. Synandrous: Filaments and anthers are completely fused. Example: Coccinea.

2. Adnation: Refers to the fusion of stamens with other floral parts.

a. Epipetalous : Stamens are adnate to petals .Example: brinjal.

b. Episepalous: stamens are adnate to sepals. Example: Grevillea (Silver oak).

c. Epitepalous (**epiphyllous**): stamens are adnate to tepals. Example: Asparagus.

d. Gynostegium:Connation product of stamens and stigma is called gynostegium. Example: Calotropis.

e. Pollinium: Pollen grains are fused together as a single mass Example: Calotropis.

24.Describe about International code of Botanical Nomenclature (ICBN).

i) Assigning name for a plant is known as Nomenclature.

ii) This is based on the rules and recommendations of the International Code of Botanical Nomenclature.

iii) The elementary rule of naming of plants was first proposed by Linnaeus in 1751 in his Philosophia Botanica.

iv) In 1813 a detailed set of rules regarding plant nomenclature was given by A.P. de Candolle in his famous work "Theorie elementaire de la botanique".

v) Then the present ICBN was evolved by following the same rules of Linnaeus, A.P. de Candolle and his son Alphonse de Candolle.

25.Write about Herbarium preparation.

1.Plant collection:
Field collection, Liquid preserved collection, Living collection, Collection for molecular studies.
2.Documentation of field site data.
3.Preparation of plant specimen.
4.Mounting herbarium specimen.
5.Herbarium labels.
6.Protection of herbarium sheets against mold and insects.

26.Write about uses of Herbarium.

1.Herbarium provides resource material for systematic research and studies.
2.It is a place for orderly arrangement of voucher specimens.
3.Voucher specimen serves as a reference for comparing doubtful newly collected fresh specimens.
4.Voucher specimens play a role in studies like floristic diversity, environmental assessment, ecological mechanisms and survey of unexplored areas.
5.Herbarium provides opportunity for documenting biodiversity and studies related to the field of ecology and conservation biology.

27.Write about national Herbarium.

Herbarium	Year Established	Acronym	Number of specimens
1.Madras Herbarium BSI campus, Coimbatore.	1955	MH	4,08,776
2.Central National Herbarium, West Bengal.	1795	CAL	2,00,000
3.Jawaharlal Nehru Tropical Botanical Garden and Research Institute, Thiruvananthapuram, Kerala.	1979	TBGRI	30,500
4.Presidency College Herbarium, Chennai.	1844	PCM	15,000

28.Describe - types of Classification.

i) Artificial system of classification:

1.This system of classification was proposed by Carolus Linnaeus (1707 -1778). He also called as "Father of Taxonomy."
2.This system was published in "Species Plantarum" in 1753.
3.He described 7,300 species in 24 classes.
4.This system based on number, union, length, and distribution of stamens.
5.Hence, this system is also known as sexual system of classification.

ii) Natural system of classification:

1.It is widely followed system of classification.
2.This system was proposed by George Bentham (1800 – 1884) and Joseph Dalton Hooker (1817–1911).
3.This system was published in "Genera Plantarum" in three volumes.
4.They described 202 families, 7569 genera and 97,205 species.
5.In this system seeded plants were classified into 3 major classes such as Dicotyledonae, Gymnospermae and Monocotyledonae.

iii) Phylogenetic system of classification:

1.This system was proposed by Adolph Engler (1844 -1930) and Karl A.Prantl (1849 - 1893).
2.Charles Darwin's concept of Origin of Species (1859) had given enough stimulus for the creation of this system of classification.
3.This system was published in "Die Naturelichen Pflanzen Familien" in 23 volumes.
4.In this system plant kingdom was classified into 13 divisions.
5.This system is based on evolutionary sequence as well as genetic relationships among different groups of plants.

29.Write the different between classical and modern taxonomy.

Classical Taxonomy	Modern Taxonomy
1.This is called old or Alpha (ά) taxonomy.	This is called Neosystematics or Omega (Ω) taxonomy.
2.It is pre Darwinean.	It is post Darwinean.
3.Species is considered as basic unit.	species is considered as dynamic entity.
4.Classification is mainly based on morphological characters.	Classification is based on morphological, re-productive and phylogenetic characters.
5.This system is based on the observation of a few samples.	This system is based on the observation of large number of samples.

30.Write the economic importance of Fabaceae.

Sources	Binomial	Useful part	Uses
1.Pulses	Cajanus cajan (Pigeon Pea)	Seeds	Used as food.
2.Food plant	Lablab purpureus (field bean)	Tender fruits	Used as vegetable.
3.Oil Plant	Arachis hypogea (ground nut)	Seeds	Used as a food and cooking oil.
4.Timber Plant	Dalbergia latifolia (rose wood)	Timber	Used to make furnitures.
5.Dye Plant	Indigofera tinctoria (Avuri)	Leaves	Used as a natural dye.

31.Write the economic importance of Solanaceae.

Sources	Binomial	Useful part	Uses
1.Food plant	Solanum tuberosum (Potato)	Underground stem	Used as a vegetable.
2.Medicinal plant	Atropa belladonna (Deadly nightshade)	Root	Atropine used to cure muscular pain.
3.Medicinal plant	Solanum trilobatum (Thuthuvalai)	Leaves	Used to cure asthma and whooping cough.
4.Tobacco	Nicotiana tabaccum (Pukaiellai)	Leaves	Used to make beedi and cigarettes.
5.Ornamental plant	Cestrum diurnum (Day jasmine)	Flowers	Used as ornamental plant.

32.Write the economic importance of Liliaceae.

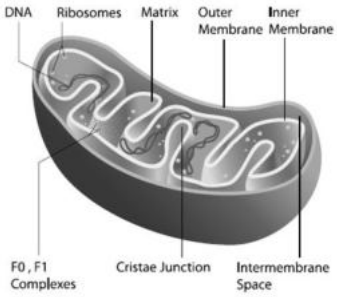
Sources	Binomial	Useful part	Uses
1.Food plant	Allium cepa (onion)	Bulbs	Used as a vegetable.
2.Medicinal plant	Aloe vera (kattrazhai)	Leaves	Aloin used as soothing lotions.
3.Fiber plant	Phormium tenax	Fibre	Used to make fishing net.
4.Raticides	Urginea indica	Bulbs	Used to kill rats.
5.Insecticides	Veratrum album	Bulbs	Used to kill insects.

33.Write the functions of Cell wall.

1.Cell wall protect the entire cell.
2.Provide definite shape and size to the cell.
3.Maintaining the osmotic pressure of the cell.
4.Acting as a mechanism of defense for the cell.
5.Serves as barrier for several molecules to enter the cell.

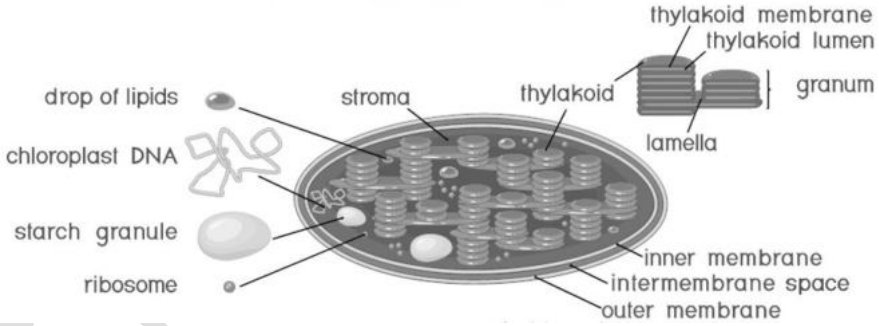
34.Describe about Mitochondria.

1.It was first observed by A. Kolliker (1880). Altmann (1894) named it as Bioplasts. Later Benda (1897, 1898), named as mitochondria.
2.Mitochondrion consists of double membrane, the outer and inner membrane.
3.The outer membrane is smooth, highly permeable to small molecules and it contains proteins called Porins.
4.The inner membrane infoldings are called cristea.
5.Inner chamber of the mitochondrion is filled with proteinaceous material called mitochondrial matrix.
6.The Inner membrane consists of stalked particles called F1 particles or Oxysomes.
7.Mitochondria contain 73% of proteins, 25-30% of lipids, 5-7 % of RNA, DNA and enzymes.
8.Mitochondria are called Power house of a cell, as they produce energy rich ATP.



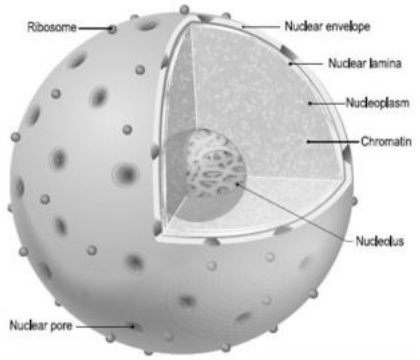
35.Explain the structure of Chloroplast.

1.Chloroplasts are vital organelle found in green plants.
2.Chloroplast has a double membrane the outer membrane and the inner membrane.
3.Inner membrane is separated by a space called periplastidial space.
4.The inner membrane filled with gelatinous matrix is called stroma.
5.Inside the stroma there are flat interconnected sacs called thylakoid.
6.The membrane of thylakoid enclose a space called thylakoid lumen.
7.Thylakoids are attached together and form Granum.
8.Light energy is converted into chemical energy in granum.
9.Thylakoid contain chlorophyll pigments.
10.The main functions of the choloplast is Photosynthesis, Light reactions in granum, Dark reactions in Stroma and also involved in photorespiration.



36.Describe the structure of Nucleus.

1.Nucleus is an important unit of cell which controls all activities of the cell.
2.Nucleus holds the hereditary information.
3.It is the largest among all cell organelles.
4.It is surrounded by a double membrane structure called nuclear envelope.
5.which has the inner and outer membrane.
6.The membrane is perforated by pores known as nuclear pores. which allows materials such as mRNA, ribosomal units and proteins.
7.The pores enclosed by circular structures called annuli. The pore and annuli form the pore complex.
8.The space between two membranes is called perinuclear space.
9.Nuclear space is filled with nucleoplasm.
10.During cell division chromatin is condensed into an organized form called chromosome.

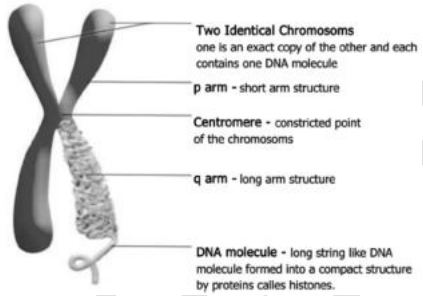


37.Write the functions of the nucleus.

1.Controlling all the cellular activities.
2.Storing the genetic or hereditary information.
3.Coding the information from DNA for the production of enzymes and proteins.
4.DNA duplication and transcription takes place in the nucleus.
5.In nucleolus ribosomal biogenesis takes place.

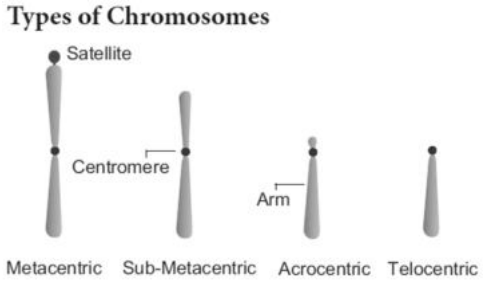
38.Describe the structure of Chromosomes.

1.Chromosomes are composed of thread like strands called chromatin.
2.Which is made up of DNA, protein and RNA.
3.Each chromosome consists of two symmetrical structures called chromatids.
4.A typical chromosome has narrow zones called constrictions.
5.There are two types of constrictions, namely primary constriction and secondary constriction.
6.The primary constriction is made up of centromere and kinetochore.
7.The monocentric chromosome has one centromere and the polycentric chromosome has many centromeres.
8.Centromere contains a complex system of protein fibres called kinetochore.
9.Telomere is the terminal part of chromosome.
10.It offers stability to the chromosome.



39.Write the types of Chromosomes.

i) Based on the position of centromere, chromosomes are called 1.Telocentric 2.Acrocentric 3.Sub metacentri 4.Metacentric.
1.Telocentric - The rod shaped chromosome with one arm.
2.Acrocentric - The rod shaped chromosome with two arms.
3.Sub-metacentric – "L" shaped chromosome with two arms.
4.Metacentric – "V" shaped chromosome with two arms.
ii) Based on the functions of chromosome it can be divided into autosomes and sex chromosomes.
1.Autosomes are present in all cells controlling somatic characteristics of an organism.
2.In human diploid cell, 44 chromosomes are autosomes whereas two are sex chromosomes.
3.XY – Male and XX – Female Chromosomes.
4.Sex chromosomes are involved in the determination of sex.



40.Explain about special types of chromosomes.

i) These chromosomes are larger in size and are called giant chromosomes.

ii) They are two different types such as 1.Polytene chromosomes and 2.Lampbrush chromosomes.

1.Polytene chromosomes:

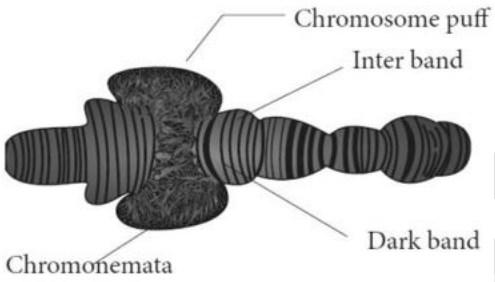
i) It was first observed by E.G. Balbiani in 1881in salivary glands of Drosophila.

ii) A single chromosome which is present in multiple copies form a structure called polytene chromosome.

iii) The polytene chromosome has extremely large puff called Balbiani rings.

iv) It is also known as chromosomal puff.

v) This chromosome are occurs in the salivary gland. Hence, it is called as salivary gland chromosomes.



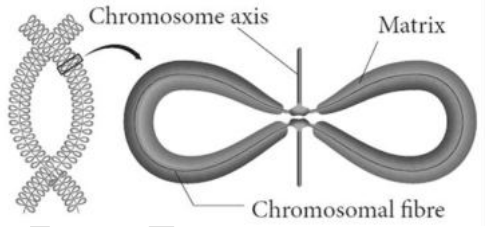
2.Lampbrush chromosomes:

i) Lampbrush chromosomes are occurs in oocyte cells of Salamandar and unicellular alga Acetabularia.

ii) It was first observed by Flemming in 1882.

iii) The highly condensed chromosome forms the chromosomal axis.

iv) Lateral loops of DNA extend as a result of intense RNA synthesis.



41.Explain about Mitosis.

i) Mitosis is divided into the following four stages.

ii)1.Prophase 2.Metaphase 3.Anaphase 4.Telophase.

1.Prophase:

i) Prophase is the longest phase in mitosis.

ii) Chromosomes become visible as long thin thread like structure.

iii) Nuclear envelope breaks down and golgi apparatus, endoplasmic reticulum disappear.

2.Metaphase:

i) Two sister chromatids are attached to the spindle fibres by kinetochore.

ii) The spindle fibres are made up of tubulin.

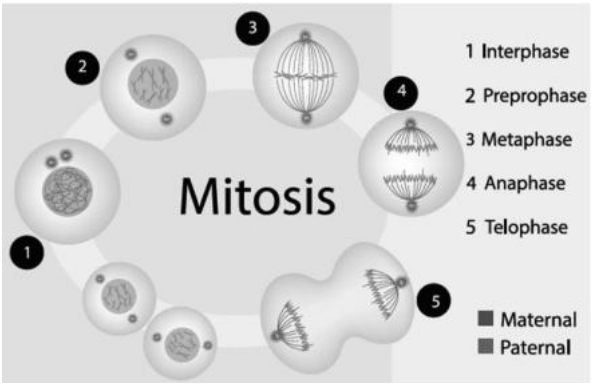
iii) The alignment of chromosome into compact group at the equator of the cell is known as metaphase plate.

3.Anaphase:

i) Two daughter chromatids begin to migrate towards two opposite poles of a cell.
ii) Anaphase promoting complex is leads to the separation of chromatids during mitosis.
iii) It helps in the transition of metaphase to anaphase.

4.Telophase:

i) Division of genetic material is completed during karyokinesis.
ii) Nucleolus and nuclear membranes reforms.
iii) Cell plate is formed between the two daughter cells. Reconstruction of cell wall takes place.
iv) Finally cells are separated into two newly formed daughter cells.

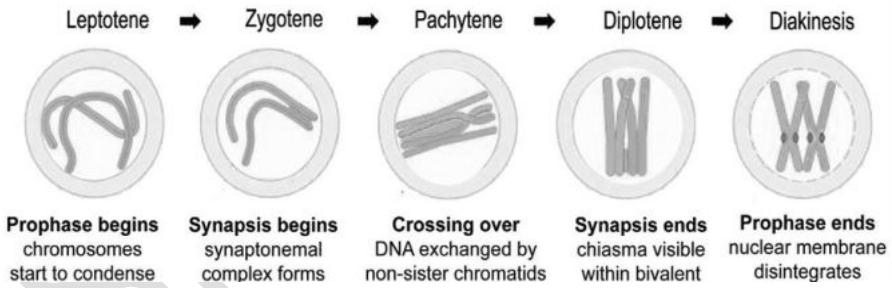


42.Given an account of Meiosis.

i) It is takes place by the two divisions such as… 1.Meiosis - I and 2.Meiosis - II.
ii) Meiosis - I is also called as reduction division.

1.Prophase - I:

i) It is the first phase of the meiosis cell division.
ii) It is takes place by the long duration.
ii) It is divided into five substages such as 1.Leptotene 2.Zygotene 3.Pachytene 4.Diplotene 5.Diakinesis.



2.Metaphase – I:

i) Spindle fibres are attached to the centromeres of the two homologous chromosomes.
ii) Bivalent aligned at the equator of the cell known as metaphase plate.
iii) The random distribution of homologous chromosomes in a cell in Metaphase - I is called independent assortment.

3.Anaphase – I:

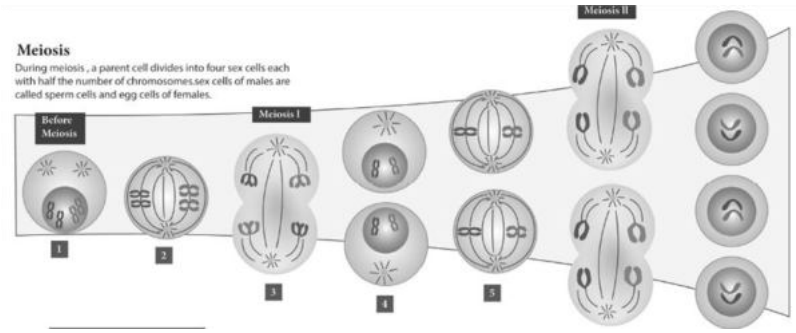
i) Homologous chromosomes are separated from each other by shortening of spindle fibers.
ii) The actual reduction in the number of chromosomes takes place at this stage.
iii) Sister chromatids are remaining attached with their centromeres.

4.Telophase – I:

i) Haploid set of chromosomes are present at each poles.
ii) The formation of two daughter cells, each with haploid number of chromosomes takes place.
iii) Nuclear envelope forms around the chromosome and the chromosomes become uncoiled.

Meiosis – II:

i) It is also called as equational division.
ii) It is resembles as mitosis cell division.
iii) Since it includes all the stages of mitotic divisions.



43.Describe the Xylem tissue.

i) Xylem is a complex tissue.
ii) It is made up of four different cells.
iii) Xylem conducting water and minerals from the soil.

Types of xylem elements:

1.Xylem tracheids 2.Xylem vessels 3.Xylem fibre 4.Xylem parenchyma.

1.Xylem tracheids:

i) It is a dead cell.
ii) It is long and blund end cells.
iii) Cell wall is made up of lignine.

2.Xylem vessels:

i) It is a dead cell.
ii) Cell wall is made up of lignine.
iii) Simple perforation plates are present in Mangifera.
iv) Multiple perforation plates are present in Liriodendron.

3.Xylem fibre:

i) It is a dead cell.
ii) Cell wall is made up of lignine.
iii) Xylem fibre is called libriform fibre.
iv) It is narrow and long cells.

4.Xylem parenchyma:

i) It is a living cell.
ii) Cell wall is made up of cellulose.
iii) It is short cells.
iv) Xylem bind with parenchyma is called xylem parenchyma.

44.Describe the Phloem tissue.

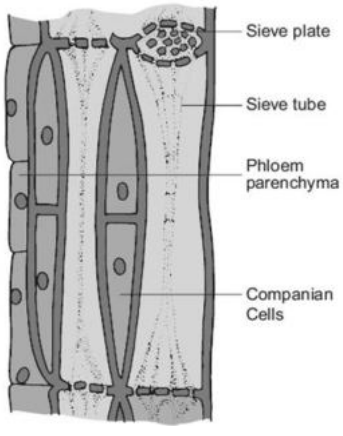
i) Phloem is a complex tissue.
ii) It is made up of four different cells.
iii) Phloem conducting the food materials.

Types of Phloem elements:

1.Sieve elements 2.Companion cells 3.Phloem parenchyma 4.Phloem fibres.

1.Sieve elements:

i) It is a living cell.
ii) Cell wall is made up of cellulose.
iii) Nucleus is absent.
iv) Sieve plates are blocked by the substance is called “Callose”.



2.Companion cells:

i) It is a living cell.
ii) Cell wall is made up of cellulose.
iii) Nucleus is present.

3.Phloem parenchyma:

i) It is a living cell.
ii) Cell wall is made up of cellulose.
iii) Nucleus is present.
iv) Phloem bind with parenchyma is called phloem parenchyma.

4.Phloem fibres:

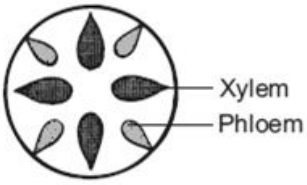
i) It is a dead cell.
ii) Cell wall is made up of lignine.
iii) It is long and narrow cells.
iv) Phloem fibres are called "Bast fibre".

45.Describe - Vascular Tissue System.

The xylem and phloem are always organized in groups. They are called vascular bundles.

1.Radial vascular bundle:

i) Xylem and phloem are present on different radii alternating with each other.
ii) Example: Monocot and Dicot root.



2.Conjoint vascular bundle:

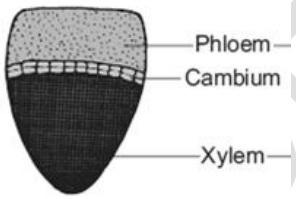
i) Xylem and phloem are present on the same radius in one bundle.
ii) Example: All the stems.
iii) They are two types I.Collateral II.Bicollateral.

I.Collateral vascular bundle:

i) Xylem placed towards inner side and phloem placed towards outer side.
ii) They are two different types. Such as…

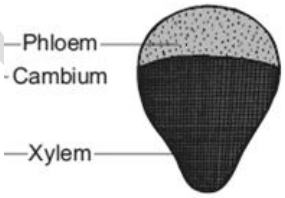
a.Open vascular bundle:

i) Cambium is present between xylem and phloem.
ii) Example: Dicot stem.



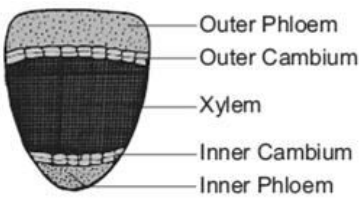
b.Closed vascular bundle:

i) Cambium is absent between xylem and phloem.
ii) Example: Monocot stem.



II.Bicollateral vascular bundle:

i) Phloem present on both the side of xylem.
ii) Example: Cucurbiataceae.



3.Concentric vascular bundle:

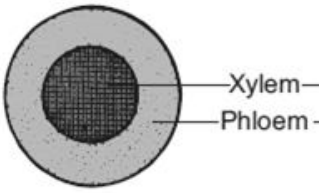
i) Xylem and phloem are present in concentric circles.

ii) They are two different types. such as…

a.Amphicribral vascular bundle:

i) Phloem surrounds the xylem.

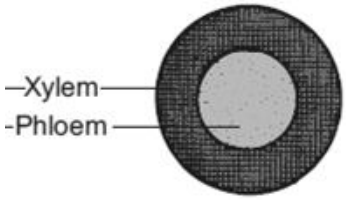
ii) Example: Polypodium.



b.Amphivasal vascular bundle:

i) Xylem surrounds the phloem.

ii) Example: Yucca.



46.Explain the types of Parenchyma tissue.

1.Aerenchyma:

i) Parenchyma which contains air in its intercellular spaces. It helps in aeration and buoyancy.

ii) Example: Nymphae and Hydrilla.

2.Storage Parenchyma:

i) Parenchyma stores food materials.

ii) Example: Root and stem tubers.

3.Stellate Parenchyma:

i) Star shaped parenchyma.

ii) Example: Petioles of *Banana and Canna*.

4.Chlorenchyma:

i) Parenchyma cells with chloroplast.

ii) Function is photosynthesis.

iii) Example: Mesophyll of leaves.

5.Prosenchyma:

i) Parenchyma cells became elongated, pointed and slightly thick walled.

ii) It provides mechanical support to the plant.

47.Describe the primary structure of Monocot root – Maize root.

The transverse section of monocot root shows the following regions.

1.Epiblema:

i) The outermost layer of the root is known as epiblema.

ii) It is made up of single layered parenchymatous cells without intercellular space.

iii) Epidermal pores and cuticle are absent.

iv) Root hairs are present.

2.Cortex:

i) Homogenous cortex.

ii) It is made up of thin-walled parenchymatous cells with lot of intercellular spaces.

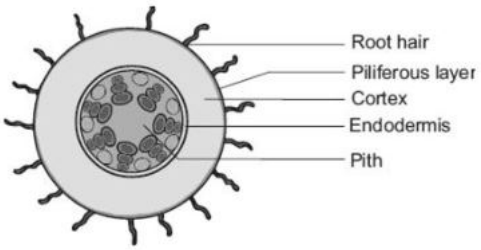
iii) The function of cortical cells is storage. They are oval or rounded in shape.

iv) Chloroplasts are absent in the cortical cells, but they store starch.

v) The inner most layer of the cortex is endodermis. It is made up of parenchymatous cell.

3.Stele:
i) All the tissues inside the endodermis is called stele.
ii) This includes pericycle, vascular bundle and pith.

4.Pericycle:
i) Pericycle is the outermost layer of the stele and lies inner to the endodermis.
ii) It is made up of single layered parenchymatous cells.



5.Vascular Bundle:
i) Vascular tissues are radial.
ii) Xylem is **polyarch** and **exarch**.
iii) Conjunctive tissue is made up of **sclerenchymatous** tissue.

6.Pith:
i) Pith is **present**.
ii) It is made up of thin-walled parenchymatous cells with intercellular spaces.
iii) These cells are filled with abundant starch grains.

48.Describe the primary structure of Dicot root – Bean root.

The transverse section of dicot root shows the following regions.

1.Epiblema:
i) The outermost layer of the root is known as epiblema.
ii) It is made up of single layered parenchymatous cells without intercellular space.
iii) Epidermal pores and cuticle are absent.
iv) Root hairs are present.

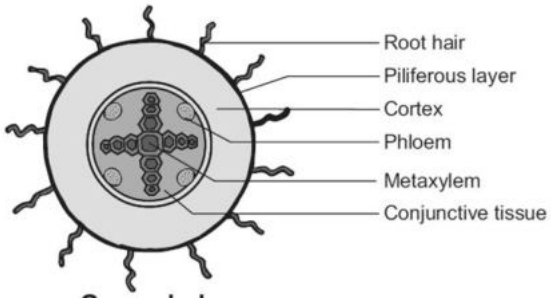
2.Cortex:
i) Homogenous cortex.
ii) It is made up of thin-walled parenchymatous cells with lot of intercellular spaces.
iii) The function of cortical cells is storage. They are oval or rounded in shape.
iv) Chloroplasts are absent in the cortical cells, but they store starch.
v) The inner most layer of the cortex is endodermis.
vi) It is made up of single layered barrel shaped parenchymatous cells.

3.Stele:
i) All the tissues inside the endodermis is called stele.
ii) This includes pericycle, vascular bundle and pith.

4.Pericycle:
i) Pericycle is the outermost layer of the stele and lies inner to the endodermis.
ii) It is made up of single layered parenchymatous cells.

5.Vascular Bubdle:
i) Vascular tissues are radial.
ii) Xylem is **tetrach** and **exarch**.
iii) Conjunctive tissue is made up of **parenchymatous** tissue.

6.Pith:
Pith is **absent**.

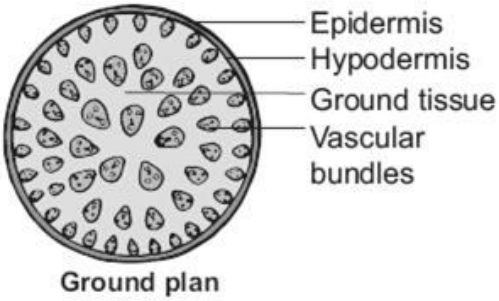


49.Explain the primary structure of monocot stem – Maize stem.

The transverse section of monocot stem shows the following regions.

1.Epidermis:

i) It is the outermost layer of the stem.
ii) It is made up of single layered parenchymatous cells.
iii) Epidermal outgrowth is **absent.**



Ground plan

2.Hypodermis:

i) It is made up of sclerenchymatous cells.
ii) It gives the mechanical strength to the plant.
iii) Hypodermis is interrupted by the chlorenchymatous cells.

3.Ground Tissue:

i) Ground tissue is not differentiated into cortex, endodermis, pericycle and pith.
ii) It is made up of parenchymatous cells.
iii) Food reserve material is starch.

4.Vascular Bundle:

i) **Cambium is absent.**
ii) Vascular bundles are scattered in ground tissue.
iii) Vasacular bundles are skull shaped.
iv) Vascular bundles are conjoint, collateral, endarch and **closed.**

5.Phloem:

i) Phloem consists of sieve tube and companion cells.
ii) Phloem parenchyma and phloem fibres are absent.

6.Xylem:

ii) Xylem arranged in the form of **"Y" shape.**
iii) **Protoxylem lacuna** is present.

7.Pith:

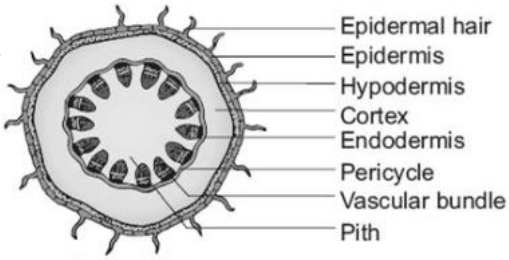
Pith is **absent.**

50.Explain the primary structure of dicot stem – Sunflower stem

The transverse section of dicot stem shows the following regions.

1.Epidermis:

i) It is the outermost layer of the stem.
ii) It is made up of single layered parenchymatous cells.
iii) Epidermal outgrowth is **present.**



Ground plan

2.Cortex:

i) It is differentiated into collenchymatous, Chlorenchymatous and parenchymatous.
ii) Hypodermis is made up of collenchymatous cells.
iii) It gives mechanical strength to the plant.
iv) Inner to the hypodermis cells, few layers of chlorenchymatous cells are present.
v) This region performs photosynthesis.
vi) Food materials are stored in parenchymatous cells.

3.Stele:

i) All the tissues inside the endodermis is called stele.
ii) This includes pericycle, vascular bundle and pith.
iii) **Eustele** is present.

4.Pericycle:

i) Pericycle is present between endodermis and vascular bundle.
ii) It is called as **Bundle cap or Hardbast.**

5.Vascular Bundle:

i) **Cambium is present.**
i) Vascular bundles are **Wedge shaped.**
ii) Vascular bundles are conjoint, collateral, endarch and **open.**

6.**Phloem:**
i) Phloem consists of sieve tube, companion cells and phloem parenchyma.
ii) Phloem fibres are absent.

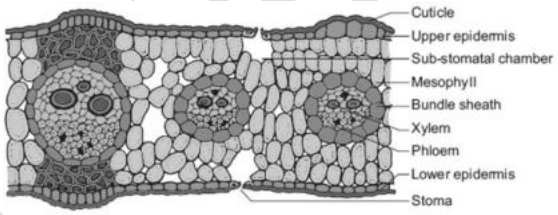
7.Cambium:
i) Cambium **brick shaped.**
ii) **Secondary growth** is present.

8.Xylem:
Xylem fibres, xylem parenchyma, xylem vessels and xylem tracheids are present.

9.Pith:
Pith is **present.**

51.Describe the anatomy of monocot leaf – Grass leaf.

The transverse section of monocot leaf shows the following regions.



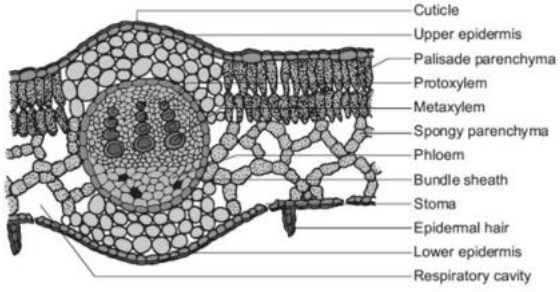
1.Epidermal tissue:
i) It is a **isobilateral** leaf.
ii) A small opening found on the epidermis is called stomata.
iii) Stomata is surrounded by **dumb - bell shaped** Guard cells.
iv) Cuticle is present.
v) **Bulliform cells or Motor cells** and **Silica cells** are present.

2.Mesophyll tissue:
i) The upper and lower epidermis of leaf is called mesophyll.
ii) It is **not differentiated** into palisade parenchyma and spongy parenchyma.
iii) Air space found on the mesophyll tissue is called respiratory cavity.

3.Vascular tissue:
i) Vascular bundles are conjoint, collateral and closed.
ii) Xylem is present towards the upper epidermis.
iii) Pholem is present towards lower epidermis.
iv) Vascular bundles are surrounded by bundle sheath or border parenchyma.

52.Describe the anatomy of dicot leaf – Sunflower leaf.

The transverse section of dicot leaf shows the following regions.

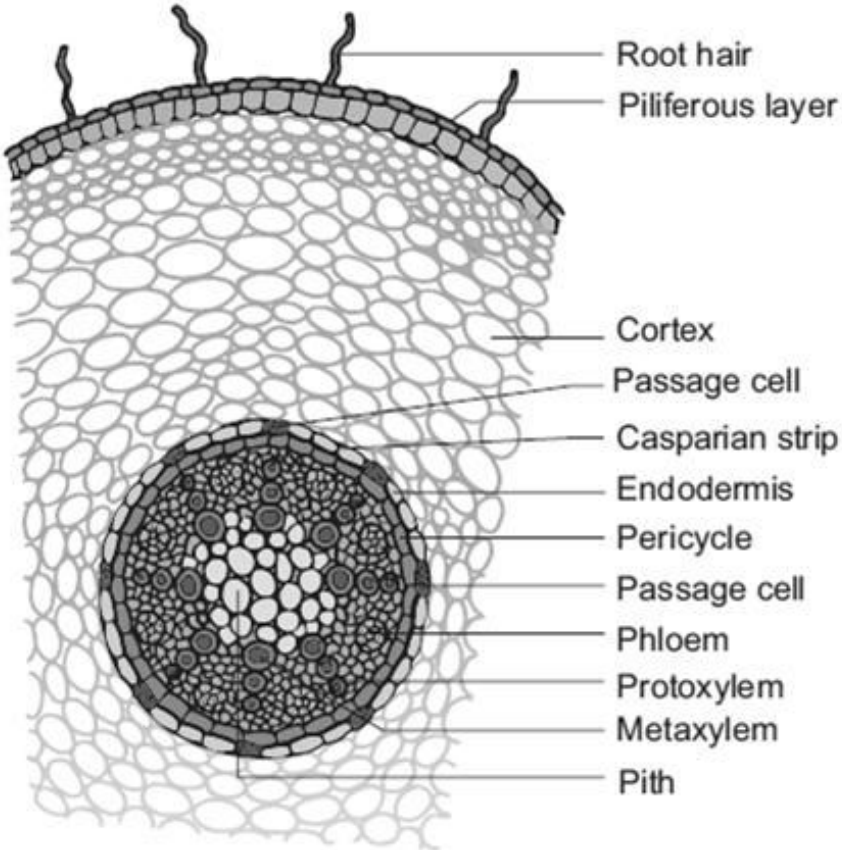


1.Epidermal tissue:
i) It is a **dorsiventral** leaf.
ii) A small opening found on the epidermis is called stomata.
iii) Stomata is surrounded by **bean shaped** Guard cells.
iv) Cuticle is present.

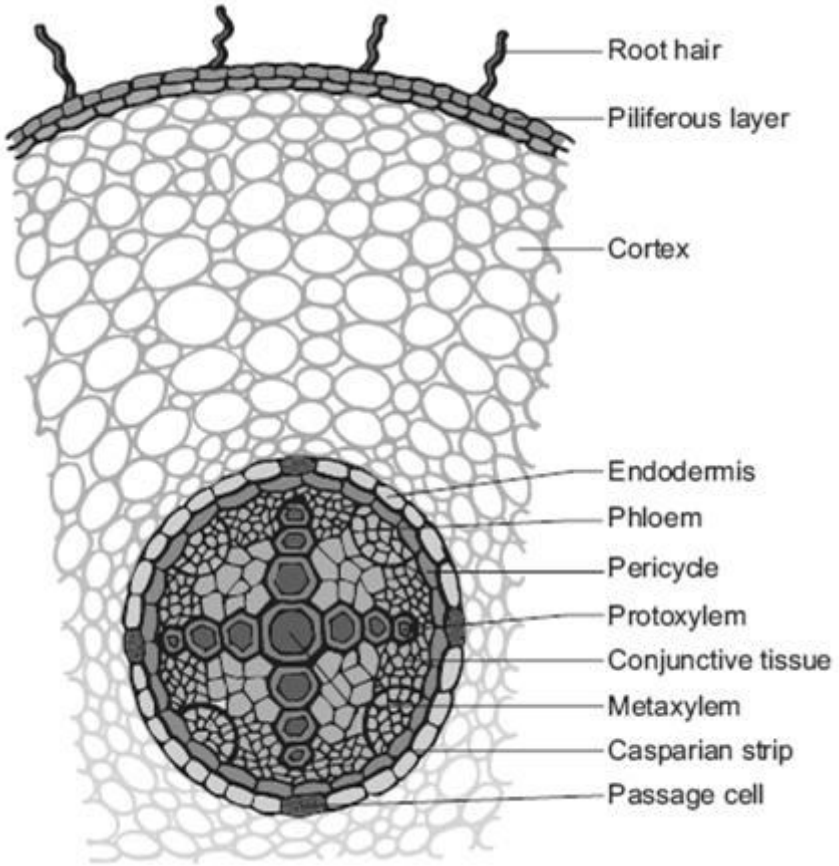
2.Mesophyll tissue:
i) The upper and lower epidermis of leaf is called mesophyll.
ii) It is **differentiated** into palisade parenchyma and spongy parenchyma.
iii) Function of palisade parenchyma is photosynthesis.
iv) Function of spongy parenchyma is storage.
v) Air space found on the mesophyll tissue is called respiratory cavity.

3.Vascular tissue:
i) Vascular bundles are conjoint, collateral and closed.
ii) Xylem is present towards the upper epidermis.
iii) Pholem is present towards lower epidermis.
iv) Vascular bundles are surrounded by bundle sheath or border parenchyma.

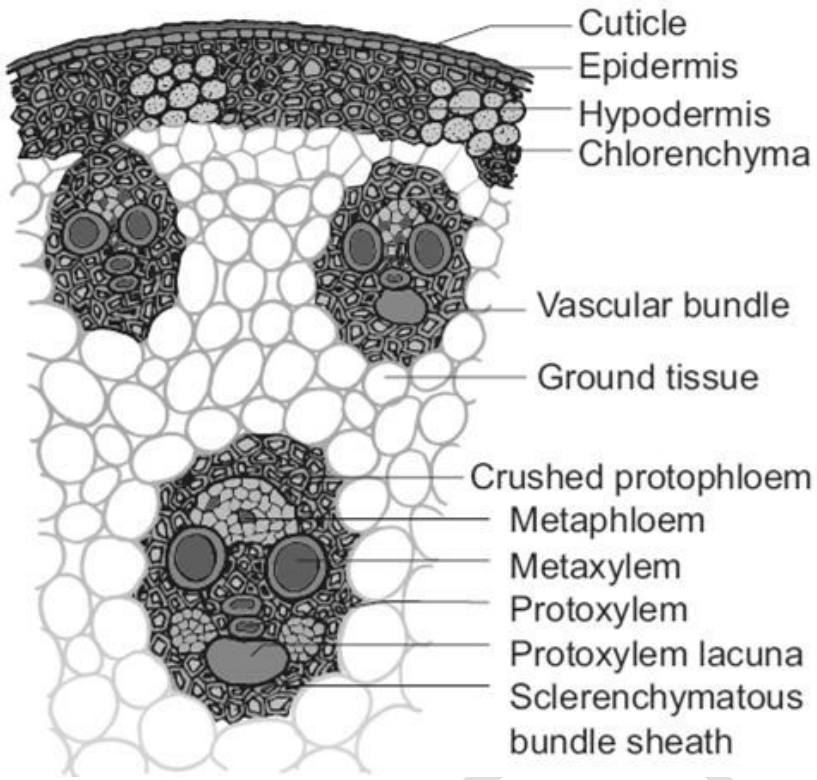
53.Draw and label the parts of transverse section of monocot root – Maize root.



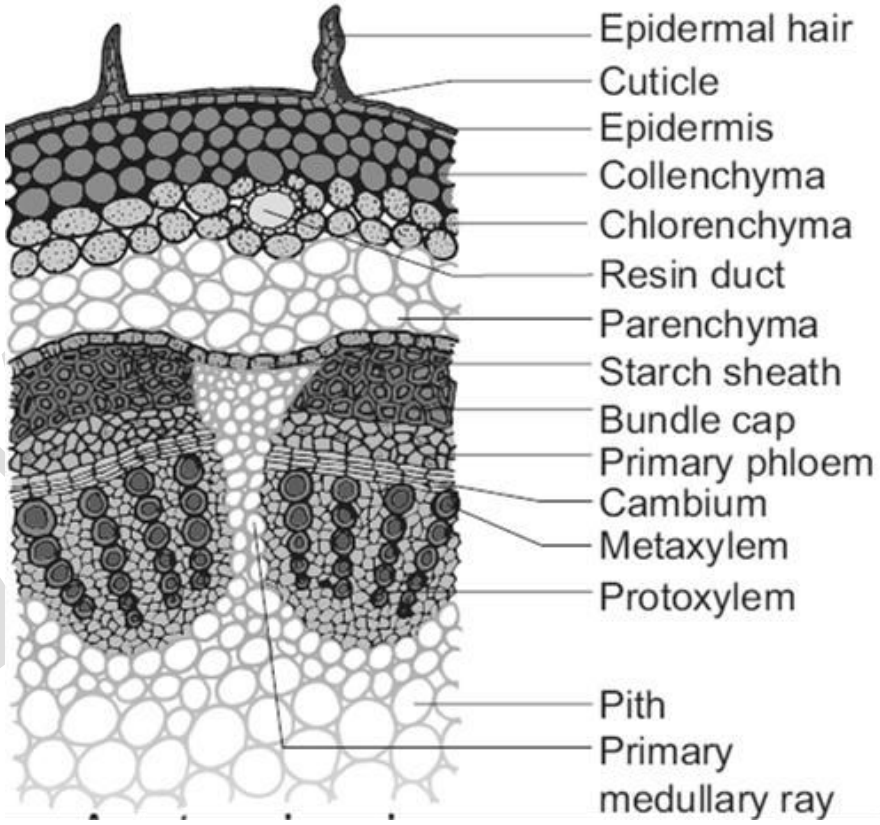
54.Draw and label the parts of transverse section of dicot root – Bean root.



55.Draw and label the parts of transverse section of monocot stem – Maize stem.



56.Draw and label the parts of transverse section of dicot stem – Sunflower stem.



57.Describe the secondary growth in dicot stem

i) Vascular cambium is the lateral meristem that produces the secondary vascular tissue.

ii) Example: secondary xylem and secondary phloem.

1.Intrafascicular or fascicular cambium:

Procambium is present between xylem and phloem of the vascular bundle. This cambial strip is know as Intrafascicular or fascicular cambium.

2.Interfascicular cambium:

Fasicular cambium become meristematic and form strips of vascular cambium. It is called as Interfascicular cambium.

3.Vascular cambial ring:

This interfascicular cambium joins with the intrafascicular cambium on both sides to form a continuous ring. It is called vascular cambial ring.

4.Activity of vascular cambium:

The vascular cambial ring become active and produces inner secondary xylem and outer secondary phloem.

5.Phellogen or cork cambium:

It is a secondary lateral meristem. It comprises homogenous meristematic cells. It arises from epidermis, cortex, phloem or pericycle.

6.Phellem or cork:

The cells of the cork cambium cut off cells on both the sides. Those formed on the outerside become suberised. This region is called cork or phellem.

7.Phelloderm or secondary cortex:

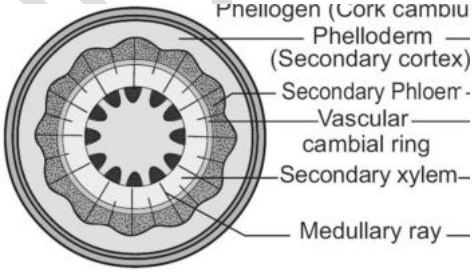
The cork cells are uniform in size and arranged in radial rows without intercellular spaces. This parenchymatous cells are cut off on the inner side of the cork cambium. This region is called phelloderm or secondary cortex.

8.Periderm:

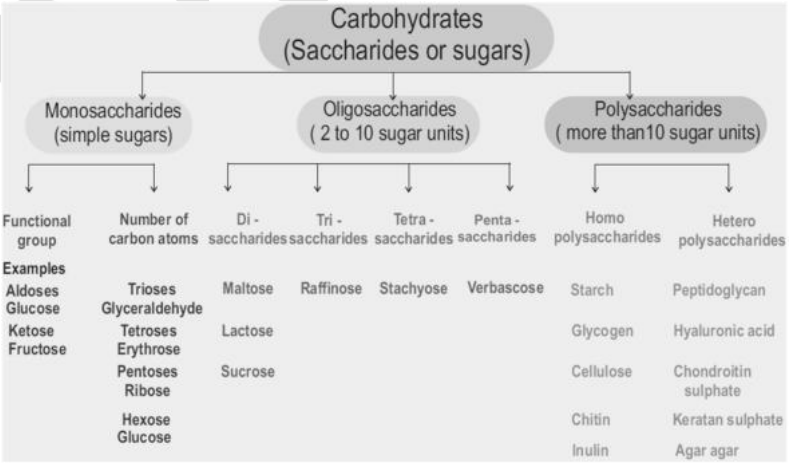
The cork (phellem), cork cambium (phellogen) and the secondary cortex (phelloderm) altogether called periderm.

9.Bark:

All the tissues outside the vascular cambium (secondary phloem, cortex and periderm) are called bark.



58.Describe carbohydrates.



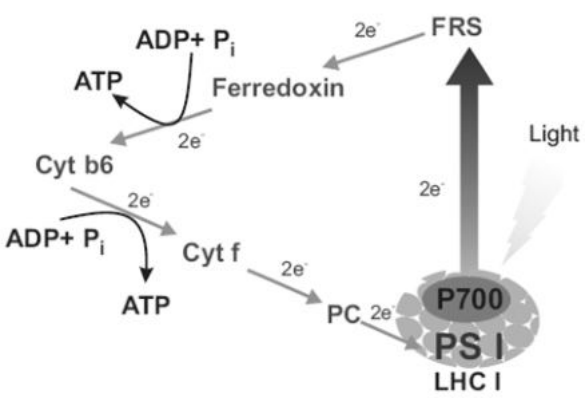
59.Write the significance of Photosynthesis.

1.Photosynthetic organisms provide food for all living organisms.
2.It is the only natural process that liberates oxygen in the atmosphere.
3.Photosynthesis balances the oxygen and carbon cycle in nature.
4.Fossil fuels like coal, petroleum are formed by photosynthesis.
5.Plants provide fodder, fibre, fire wood, timber and useful medicinal products by photosynthesis.

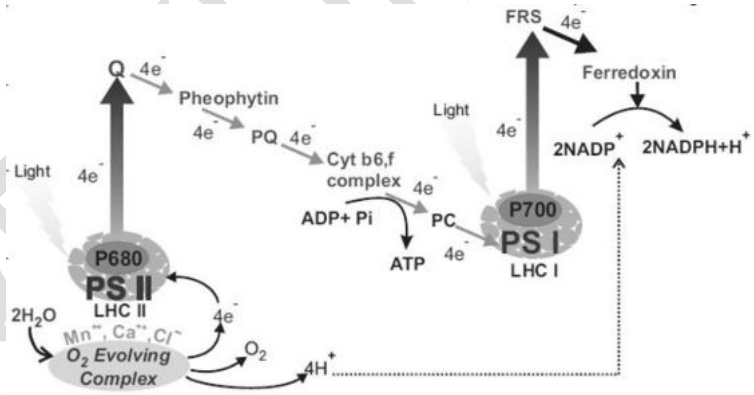
60.Write the difference between photosystem-I and photosystem-II.

Photosystem I	Photosystem II
1.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.	Involved in photolysis of water and evolution of oxygen.
4.It receives electrons from PS-II during non-cyclic photophosphorylation.	It receives electrons by photolysis of water.
5.Chlorophyll and Carotenoid ratio is 20 to 30:1.	Chlorophyll and Carotenoid ratio is 3 to 7:1.

61.Draw the outline diagram of cyclic and non-cyclic photophosphorylation.



Cyclic Photophosphorylation

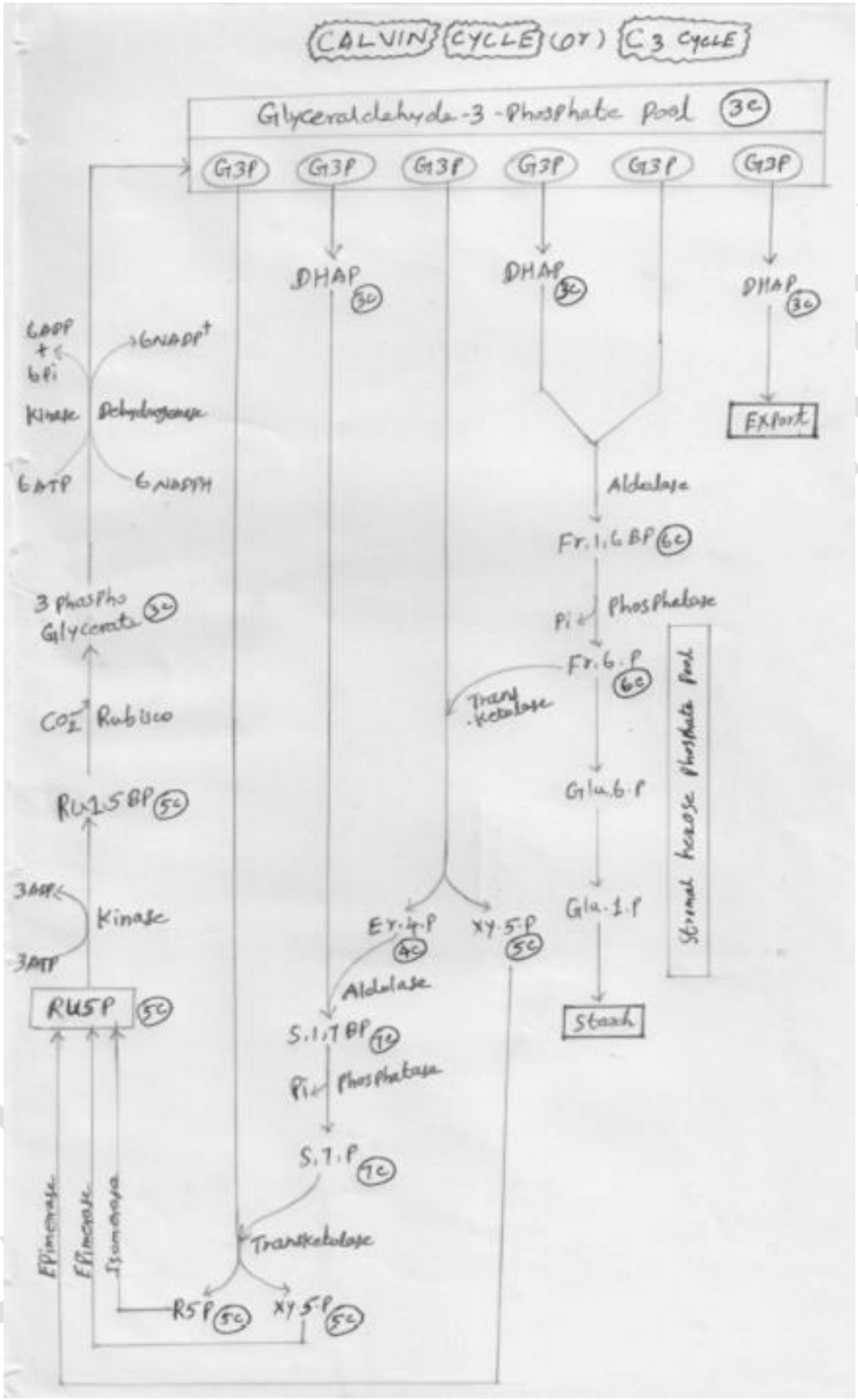


Non-Cyclic Photophosphorylation

62.Differentiate Cyclic and Non-cyclic photophosphorylation.

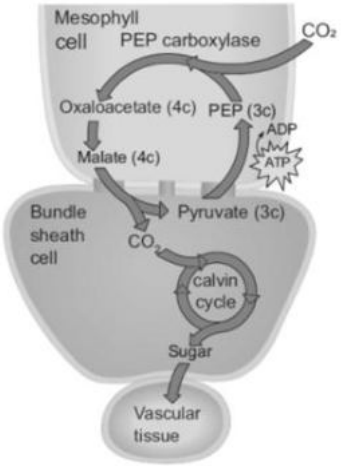
Cyclic Photophosphorylation	Non-Cyclic Photophosphorylation
1.PS I only involved.	PS I and PS II involved.
2.Reaction centre is P700.	Reaction centre is P680.
3.Electrons released are cycled back.	Electron released are not cycled back.
4.Photolysis of water does not take place.	Photolysis of water takes place.
5.Only ATP synthesized.	ATP and NADPH + H^+ are synthesized.
6.Phosphorylation takes place at two places.	Phosphorylation takes place at only one place.

63.Describe Dark reaction or C_3 Cycle or Biosynthetic phase or Phtosynthetic Carbon Reduction (PCR) Cycle or Melvin Calvin cycle.



64.Hatch & Slack Pathway or C_4 Cycle or Dicarboxylic Acid Pathway or Dicarboxylation Pathway (Chapter: 14 Question No: 8. Grasses have an adaptive mechanism to compensate photorespiratory losses- Name and describe the mechanism).

Grasses compensate photorespiratory losses through C_4 cycle or Hatch & Slack Pathway.



C_4 cycle or Hatch & Slack Pathway

65.Differentiate C_3 and C_4 platns.

C_3 Plants	C_4 Plants
1. First product is 3C- PGA.	First product is 4C- OAA.
2. Kranz anatomy is not present.	Kranz anatomy is present.
3. Granum is present in mesophyll cells.	Granum present in mesophyll cells and absent in bundle sheath cells.
4. Normal Chloroplast is present.	Dimorphic chloroplast is present.
5. Optimum temperature 20° to 25°C.	Optimum temperature 30° to 45°C.
6. Example: Paddy, Wheat, Potato.	Example: Sugarcane, Maize, Sorghum, Amaranthus.

66.Differentiate Photorespiration and Dark respiration.

Photorespiration	Dark respiration
1. It takes place in photosynthetic cells.	It takes place in all living cells.
2. It takes place only in the presence of light	It takes place in all the time.
3. It involves chloroplast, peroxisome, mitochondria.	It involves only mitochondria.
4. Substrate is glycolic acid.	Substrate is carbohydrates, protein or fats.
5. It is not essential for survival.	Essential for survival.

67.What are the factors affecting Photosynthesis.

External and internal factors are affecting photosynthesis.

1.External factors:

a. Intensity of Light:

Under low intensity the photosynthetic rate is low and at higher intensity photosynthetic rate is higher.

b. Quality of light:

Photosynthetic rate is maximum in blue and red light. Photosynthetically Active Radiation (PAR) is between 400 to 700 nm.

c. Carbon dioxide:

CO_2 is found only 0.3 % in the atmosphere but plays a vital role. Increase in concentration of CO_2 increases the rate of photosynthesis (CO_2 concentration in the atmosphere is 330 ppm).

d. Oxygen: The rate of photosynthesis decreases when there is an increase of oxygen concentration.

2.Internal Factors:

a.Photosynthetic Pigments:

It is an essential factor and even a small quantity is enough to carry out photosynthesis.

b.Protoplasmic factor:

Hydrated protoplasm is essential for photosynthesis. It also includes enzymes responsible for Photosynthesis.

c.Anatomy of leaf:

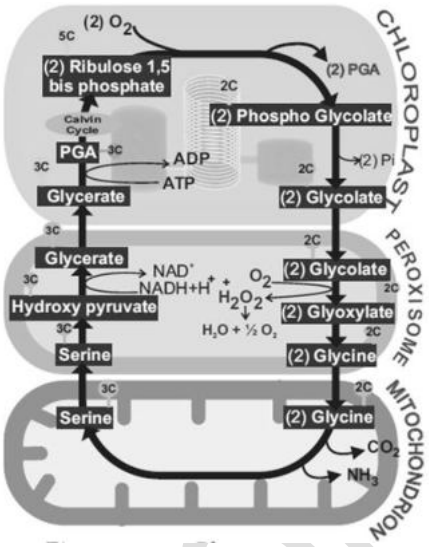
Thickness of leaf, cuticle, epidermis and distribution of stomata are affect the photosynthesis.

d.Hormones: Hormones like gibberellins and cytokinin increase the rate of photosynthesis.

68. Explain Photorespiration or C_2 Cycle or Photosynthetic Carbon Oxidation (PCO) Cycle.

(Chapter:13 Question no:10. When there is plenty of light and higher concentration of O_2, what kind of pathway does the plant undergo? Analyse the reasons.

Plants undergo C_2 cycle or Photorespiration.



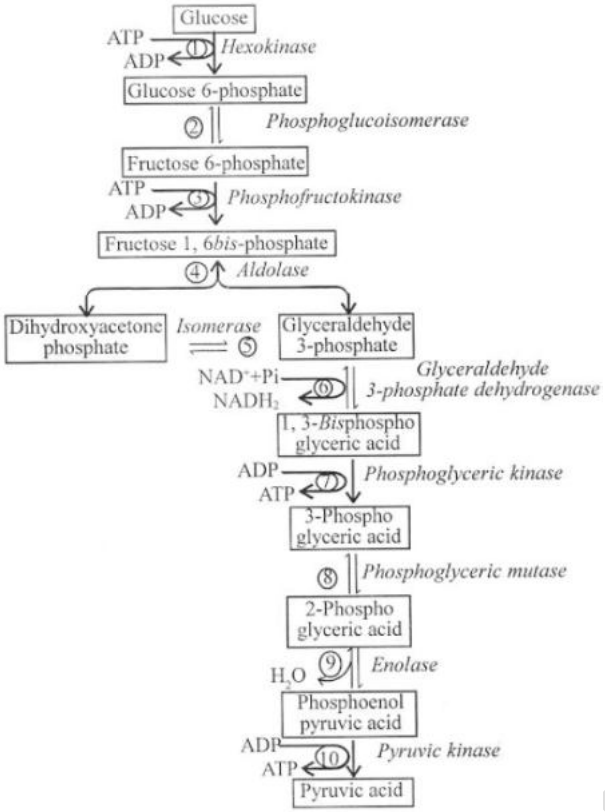
69.Write the difference between photosynthesis in Plants and photosynthesis in Bacteria.

Photosynthesis in Plants	Photosynthesis in Bacteria
1.Photosystem I and II involved	Photosystem I only involved
2.Electron donor is water	Electron donor is H_2S
3.Oxygen is evolved	Oxygen is not evolved
4.Reaction centres are P700 and P680	Reaction centre is P870
5.PAR is 400 to 700 nm	PAR is above 700 nm

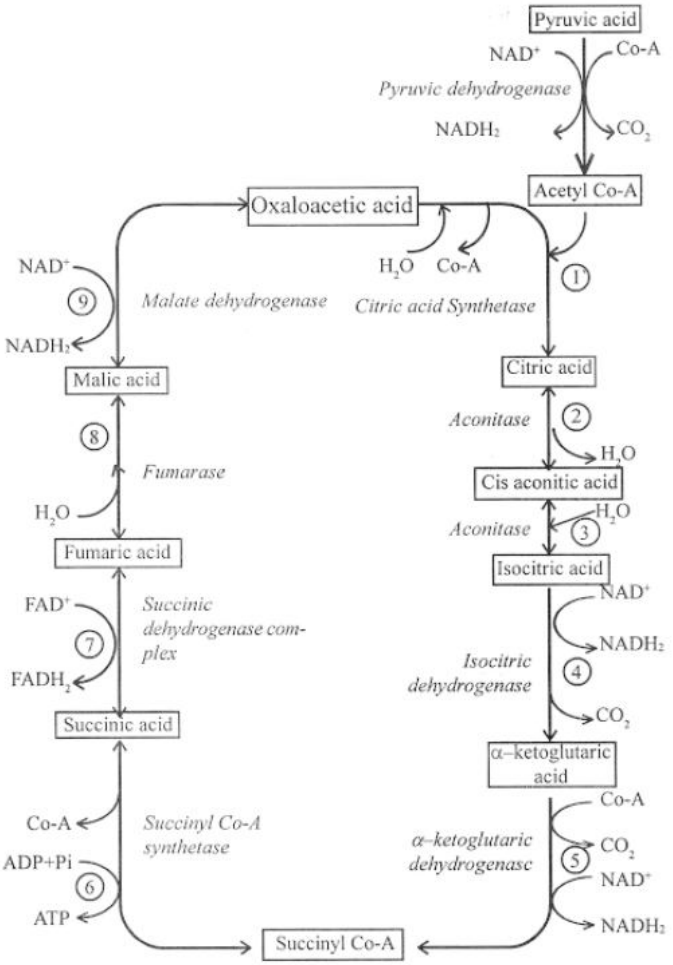
70.Differentiate aerobic respiration and anaerobic respiration.

Aerobic respiration	Anaerobic Respiration
1.It occurs in all the living cells.	It occurs yeast and bacterial cells.
2.Oxygen is required.	Oxygen is not required.
3.End products are CO_2 and H_2O.	End products are alcohol, and CO_2.
4.One molecule of glucose produces 36 ATP.	4.One molecule of glucose produces 2 ATP.
5.It occurs in cytoplasm and mitochondria.	It occurs only in cytoplasm.

71.Describe about Glycolysis or EMP pathway.



72.Explain – Kerbs cycle or Citric acid cycle or TCA cycle.



73.Tabulate the net product of aerobic respiration. (Chapter:14 Question no:10.How will you calculate net products of one sucrose molecule upon complete oxidation during aerobic respiration as per recent view?)

As per recent view the cost of transport of ATPs from matrix into the cytosol is considered, the number will be 2.5 ATPs for each $NADH+H^+$ and 1.5 ATPs for each $FADH_2$ oxidised during electron transport system.

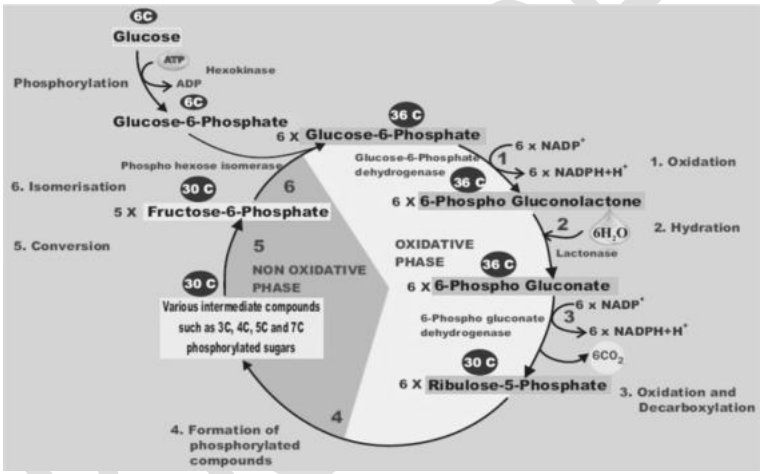
Stages	CO_2	ATP	Reduced NAD^+	Reduced FAD	Total ATP Production
Glycolysis	0	2	2(2X2=4)	0	6
Link reaction	2	0	2(2X3=6)	0	6
Krebs cycle	4	2	6(6X3=18)	2(2X2=4)	24
Total	6 CO_2	4 ATP	28 ATP	4 ATP	36 ATP

74.Differentiate alcoholic fermentation and lactic acid fermentation.

Alcoholic fermentation	Lactic acid fermentation
1. It produce alcohol and releases CO_2.	It produce lactic acid only.
2. It takes place in two steps.	It takes place in single step.
3. It involves two enzymes.	It involves only one enzyme.
4. It forms acetaldehyde as intermediate compound.	It does not form any intermediate compound.
5. It commonly occurs in yeast.	It commonly occurs in bacteria.

75.Describe about Pentose phosphate pathway or Phospho gluconate pathway. (Chapter:14 Question no:9. What is the name of alternate way of glucose breakdown? Explain the process involved in it?).

Pentose phosphate pathway or HMP shunt is the alternate way of glucose breakdown.



76.Write the physiological effects of Auxin.

1.Auxin promote cell elongation in stem.
2.Auxin induce **apical dominance** and prevents abscission.
3.It is used to eradicate weeds. Example: 2,4-D and 2,4,5-T.
4.Synthetic auxins are used in the formation of seedless fruits (Parthenocarpic fruit).
5.It is used to break the dormancy in seeds.

77.Write the physiological effects of Gibberellin.

1.It produces extraordinary elongation of stem.
2.Sudden elongation of stem followed by the flowering is called **bolting.**
3.Gibberellin breaks the dormancy in potato tubers.
4.Gibberellin induced seedless fruits. Example: Tomato, apple and cucumber.
5.It stimulate the seed germination.

78.Write the physiological effects of Cytokinin.

1.Cytokinin promotes the cell division.
2.Cytokinin induces cell enlargement.
3.Cytokinin break the dormancy of Tobacco seeds.
4.Cytokinin delays the process of aging of the plant. It is known as **Richmond Lang effect**.
5.Cytokinin increases the rate of protein synthesis.

79.Write the physiological effects of Ethylene.

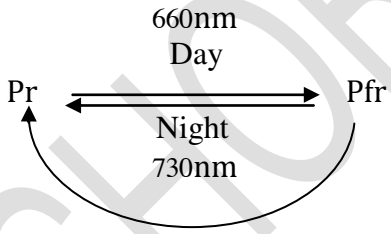
1.Ethylene stimulates the **ripening of fruits.**
2.It breaks the dormancy of buds and seeds.
3.It stimulates the formation of abscission zone in leaves, flowers and fruits.
4.Ethylene inhibit the stem elongation (shortening the internode).
5.Ethylene reduces flowering in plants except in Pine apple and Mango.

80.Write the physiological effects of Abscisic acid.

1.It helps to reduce transpiration rate by closing of stomata.
2.ABA is a powerful growth inhibitor. It causes 50% inhibition of growth in Oats plant.
3.It induce bud and seed dormancy.
4.It promotes the abscission of leaves, flowers and fruits.
5.ABA protect the plants from water stress. Hence, ABA is called as **stress hormone**.

81.Describe about Phytochrome.

i) In 1959, Butler et al. were able to discover a photoreceptor flower inducing pigment in plants which they name phytochromes.
ii) Chemically, phytochrome is a biliprotein and exists in two forms.
iii) One form absorbs red with the wave length of 660 nm called Pr and the other form absorbs far red with the wave length of 730 nm called Pfr.
iv) In short day plants, Pr promotes flowering and Pfr inhibit the flowering.
v) In long day plants, Pfr promotes flowering and Pr inhibit the flowering.



**********Best wishes**********