11th STD. **PUBLIC EXAM - MARCH 2025**

PART - III

Reg. No.

Time Allowed : 3.00 Hours] **BIOLOGY (with Answers)** **[Maximum Marks : 70**

Instructions: (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART - I

(BIO - BOTANY) (Marks : 35)

SECTION - 1

Note : (i) Answer **all** the questions. **(8 × 1 = 8)**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. The taxonomy which involves the similarities and dissimilarities among the immune system of different taxa is termed as :

(a) Serotaxonomy (b) Chemotaxonomy

(c) Numerical taxonomy

(d) Molecular Systematics

2. Select the correctly matched one.

(1)	Human Urine	(i)	Auxin-B
(2)	Corn gram oil	(ii)	GA_3
(3)	Fungus	(iii)	Auxin-A
(4)	Herring fish sperm	(iv)	Kinetin

(a) (1) - (iii), (2) - (i), (3) - (ii), (4) - (iv)

(b) (1) - (iii), (2) - (iv), (3) - (i), (4) - (ii)

(c) (1) - (ii), (2) - (iii), (3) - (iv), (4) - (i)

(d) (1) - (iv), (2) - (i), (3) - (ii), (4) - (iii)

3. **Statement I** : Spring wood is darker in colour and has lower density.

Statement II: Diffuse porous wood is formed where the climatic conditions are uniform throughout the year.

(a) **Statement I** is wrong but **Statement II** is correct

(b) Both **Statements** are correct

(c) **Statement I** is correct but **Statement II** is wrong

(d) Both **Statements** are wrong

4. Watson and Crick Model of DNA double helix is _____ form.

(a) H (b) A (c) B (d) C

5. Bicollateral Vascular bundles are present in _____.

(a) Dracena (b) Cucurbitaceae

(c) Yucca (d) Lilliaceae

6. Which of the plant group has gametophyte as a dominant phase?

(a) Gymnosperms (b) Pteridophytes

(c) Angiosperms (d) Bryophytes

7. An example for Zygomorphic Cyathium inflorescence:

(a) Clerodendron (b) Ocimum

(c) Pedilanthus (d) Euphorbia

8. If respiratory substrate is protein, RQ (Respiratory Quotient) value is :

(a) 0.7 (b) ∞ (c) 1.33 (d) 0

SECTION - 2

Note: Answer **any four** questions. **(4 × 2 = 8)**

9. Write any two types of special inflorescence.

10. Differentiate - Nucleoside and Nucleotide.

11. Write short notes on Tyloses.

12. Mention the types of Transpiration.

13. What is Aeroponics?

14. Define Enolation.

SECTION - 3

Note: Answer **any three** questions. Question No. **19** is **Compulsory.** **(3 × 3 = 9)**

15. What is Plectostele? Give an example.

16. Write short notes on Pitcher plant.

17. Differentiate Cytokinesis in plant cells and animal cells.

18. Draw and label the parts of open vascular bundle.

19. Give a brief account on Programmed Cell Death (PCD).

Section - 4

Note: Answer **all** the questions **(2 × 5 = 10)**

20. (a) Differentiate between Gram positive and Gram negative bacteira. **(OR)**

(b) Write any five economic importance of family Fabaceae.

21. (a) Explain the structure of Chloroplast with diagram. **(OR)**

(b) Explain C_4 Cycle (Explanation or Flow chart).

Answers

PART - I ; Section - 1

1. (a) Serotaxonomy

2. (a) (1) - (iii), (2) - (i), (3) - (ii), (4) - (iv)

3. (a) **Statement I** is wrong but **Statement II** is correct

4. (c) B

5. (b) Cucurbitaceae

6. (d) Bryophytes

7. (c) Pedilanthus

8. (a) 0.7

Section - 2

9. **1.** Cyathium **2.** Hypanthodium

10.

Nucleoside	Nucleotide
It is a combination of Nitrogenous base and sugar.	It is a combination of nucleoside and phosphoric acid.
Examples: Adenosine = Adenine + Ribose.	**Examples:** Adenylic acid = Adenosine + Phosphoric acid.

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

12. **Transpiration is of following three types:**

1. Stomatal transpiration 2. Lenticular transpiration 3. Cuticular transpiration

13. **1.** This technique was developed by Soifer Hillel and David Durger.

2. It is a system where roots are suspended in air and nutrients are sprayed over the roots by a motor driven rotor.

14. **1.** During the Glycolytic pathway of respiration, 2 phospho glycerate is converted to phospho enol pyruvate.

2. During this process, a molecule of water is removed by the enzyme *enolase*. This is called Enolation.

Section - 3

15. 1. Protostele - Stele in which phloem surrounds xylem.

Plectostele

2. Plectostele is a type of protostele in which xylem plates alternate with phloem plates. Eg : *Lycopodium clavatum*.

16. ***Nepenthes*** **(Pitcher plant):**

i. Pitcher is a modified leaf and contains digestive enzymes.

ii. Rim of the pitcher is provided with nectar glands and acts as an attractive lid.

iii. When insect is trapped, proteolytic enzymes will digest the insect.

17. **Cytokinesis in Animal Cells :**

i. It is a contractile process.

ii. The ring consists of a bundle of microfilaments assembled from **actin** and **myosin.**

iii. This fibril helps for the generation of a contractile force.

iv. This force draws the contractile ring inward forming a cleavage furrow in the cell surface dividing the cell into two.

Cytokinesis in Plant Cell :

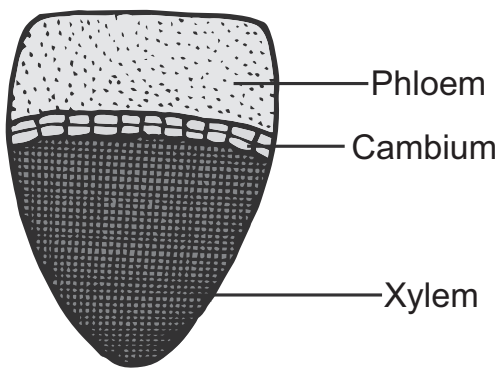
i. Division of the cytoplasm often starts during telophase. In plants, cytokinesis cell plate grows from centre towards lateral walls - centrifugal manner of cell plate formation.

ii. Phragmoplast contains microtubules, actin filaments and vesicles from **golgi apparatus** and **ER**.

iii. Microtubule of the pharagmoplast to the equator fuse, forming a new plasma membrane and the materials which are placed there becomes new cell wall.

iv. The first stage of cell wall construction is a line dividing the newly forming cells called a **cell plate.**

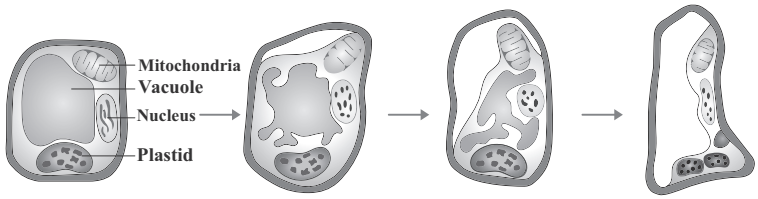
18. **Open vascular bundle**



19. 1. Old age is called senescence in plants.

2. Senescence is controlled by plants own genetic programme and death of the plant or plant part consequent to senescence is called Programmed Cell Death.

3. In short senescence of an individual cell is called PCD.



Programmed cell death

4. The proteolytic enzymes involving PCD in plants are phytaspases and in animals are caspases.
5. The nutrients and other substrates from senescing cells and tissues are remobilized and reallocated to other parts of the plant that survives.
6. The protoplasts of developing xylem vessels and tracheids die and disappear at maturity to make them functionally efficient to conduct water for transport.
7. In aquatic plants, aerenchyma is normally formed in different parts of the plant such as roots and stems which encloses large air spaces that are created through PCD.
8. In the development of unisexual flowers, male and female flowers are present in earlier stages, but only one of these two completes its development while other aborts through PCD.

Section - 4

20. (a) Gram positive and Gram negative bacteria:

No.	Characteristics	Gram positive Bacteria	Gram negative Bacteria
1.	Cell wall	Thick layered with 0.015µm-0.02µm	Thin layered with 0.0075µm–0.012µm thick
2.	Rigidity of cell wall	Rigid due to presence of Peptidoglycans	Elastic due to presence of lipoprotein-polysaccharide mixture
3.	Chemical composition	Peptidoglycans-80% Polysaccharide-20% Teichoic acid present	Peptidoglycans-3 to 12% rest is polysaccharides and lipoproteins. Teichoic acid absent
4.	Outer membrane	Absent	Present
5.	Periplasmic space	Absent	Present
6.	Susceptibility to penicillin	Highly susceptible	Low susceptible

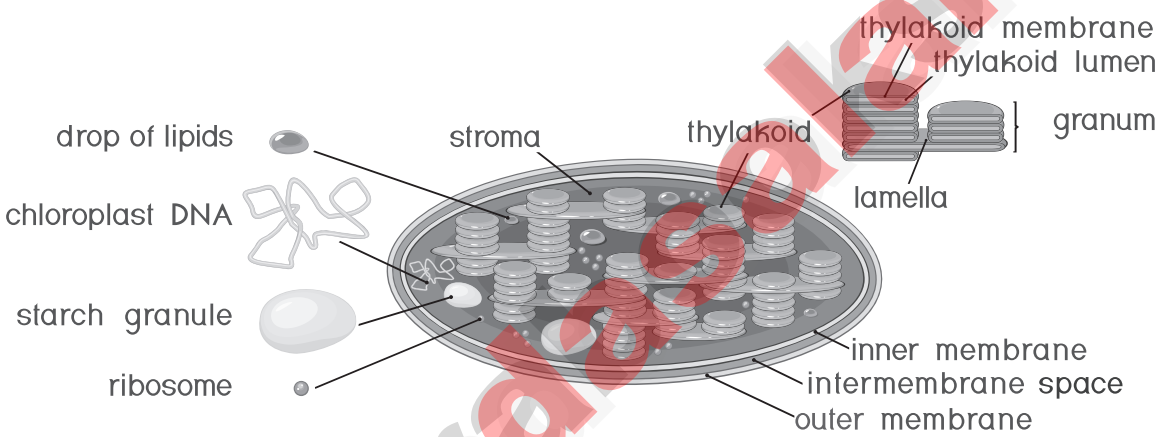
(OR)

(b) Economic importance of family Fabaceae :

Economic importance	Binomial	Useful part	Uses
Pulses	*Cajanus cajan* (Pigeon Pea) *Phaseolus vulgaris* (Frech bean)	Seeds	Sources of protein and starch of our food.
Food plants	*Sesbania grandiflora* (agathi, vegetable huming bird) *Cyamopsis tetragonoloba* (cluster bean)	Leaves Tender fruits	Greens Vegetable

Economic importance	Binomial	Useful part	Uses
Oil Plants	*Arachis hypogea* (Ground nut) *Pongamia pinnata* (Pungam)	Seeds Seeds	Oil extracted from the seeds is edible and used for cooking. Pongam oil has medicinal value and is used in the preparation of soap.
Timber Plants	*Dalbergia latifolia* (rose wood) *Pterocarpus santalinus* (red sandalwood)	Timber	Timber is used for making furniture, cabinet articles and as building materials.
Medicinal Plants	*Crotalaria albida* *Mucuna pruriens*	Roots Seeds	Used as purgative Neurological remedy.

21. (a)



Structure of Chloroplast

1. Chloroplasts are vital organelle found in green plants. Chloroplast has a double membrane, the outer membrane and the inner membrane separated by a space called periplastidial space.
2. The space enclosed by the inner membrane of chloroplast is filled with gelatinous matrix, lipo-proteinaceous fluid called stroma.
3. Inside the stroma there is flat interconnected sacs called thylakoid. The membrane of thylakoid enclose a space called thylakoid lumen.
4. Grana (singular: Granum) are formed when many of these thylakoids are stacked together like pile of coins.
5. Light is absorbed and converted into chemical energy in the granum, which is used in stroma to prepare carbohydrates.
6. Thylakoid contain chlorophyll pigments. The chloroplast contains osmophilic granules, 70s ribosomes, DNA (circular and non histone) and RNA. These chloroplast genome encodes approximately 30 proteins involved in photosynthesis including the components of photosystem I & II, cytochrome bf complex and ATP synthase, subunits of Rubisco. It is the major protein component of chloroplast stroma, single most abundant protein on earth.
7. The thylakoid contain small, rounded photosynthetic units called quantosomes.

(OR)

(b) Hatch & Slack Pathway or C4 Cycle or Dicarboxylic Acid Pathway or Dicarboxylation Pathway :

(i) Till 1965, Calvin cycle is the only pathway for CO_2 fixation. But in 1965, Kortschak, Hart and Burr made observations in sugarcane and found C_4 or dicarboxylic acid pathway.

(ii) This observation was confirmed by Hatch & Slack in 1967. This alternate pathway for the fixation of CO_2 was found in several tropical and sub-tropical grasses and some dicots. C_4 cycle is discovered in more than 1000 species.

(iii) C_4 plants represent about 5% of Earth's plant biomass and 1% of its known plant species. Despite this scarcity, they account for about 30% of terrestrial carbon fixation. Increasing the proportion of C_4 plants on earth could assist biosequestration of CO_2 and represent an important climate change avoidance strategy.

(iv) C_4 pathway is completed in two phases, first phase takes place in stroma of mesophyll cells, where the CO_2 acceptor molecule is 3-Carbon compound, phospho enol pyruvate (PEP) to form 4-carbon Oxalo acetic acid (OAA).

(v) The first product is a 4-carbon and so it is named as C_4 cycle. oxalo acetic acid is a dicarboxylic acid and hence this cycle is also known as dicarboxylic acid pathway. Carbon dioxide fixation takes place in two places one in mesophyll and another in bundle sheath cell (di carboxylation pathway).

(vi) It is the adaptation of tropical and sub tropical plants growing in warm and dry conditions. Fixation of CO_2 with minimal loss is due to absence of photorespiration. C_4 plants require 5 ATP and 2 NADPH + H^+ to fix one molecule of CO_2.

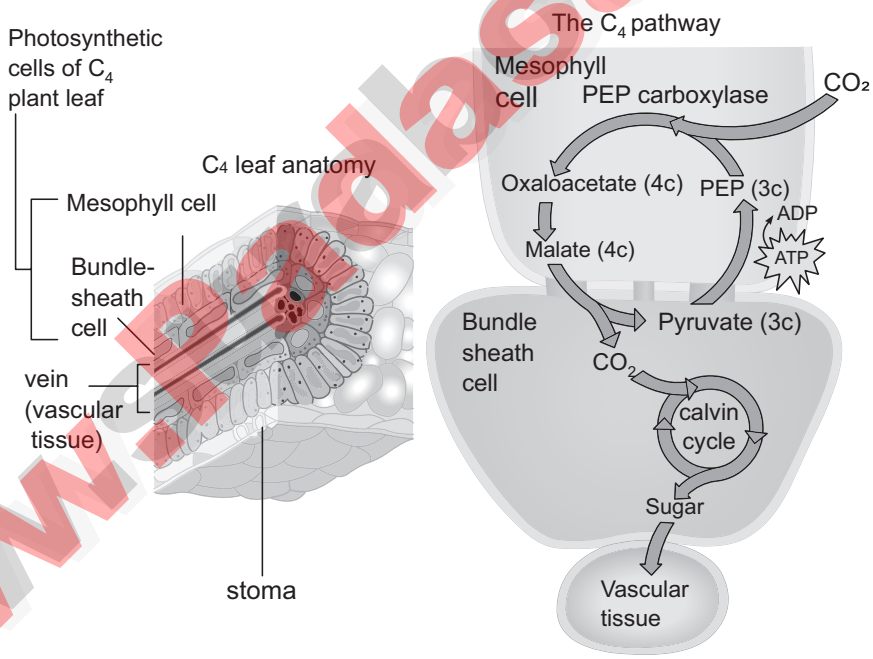


Figure : C4 Cycle

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PART - III

BOTANY (with Answers)

Reg. No.

Time Allowed : 3.00 Hours] [Maximum Marks : 70

Instructions: (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART - I

Note : (i) Answer **all** the questions. **(15 × 1 = 15)**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. Consider the following statements.

In spring season vascular cambium :

(i) is less active. (ii) produces a large number of xylary elements.

(iii) forms xylem vessels with wide cavities of these

(a) (i) and (ii) are correct but (iii) is not correct (b) (i) is correct but (ii) and (iii) are not correct

(c) (i) and (ii) are not correct but (iii) is correct (d) (i) is not correct but (ii) and (iii) are correct

2. Identify the reason for "Chloroplast is a semi-autonomous organelle".

(a) carry out photosynthetic reactions (b) membrane bounded

(c) presence of DNA (d) presence of RNA

3. In Gymnosperm, endosperm is formed :

(a) after fertilization (b) at the time of fertilization

(c) along with the development of embryo (d) before fertilization

4. The Classification system of Carolus Linnaeus is _____.

(a) Phylogenetic system of classification (b) Artificial system of classification

(c) Chemotaxonomy (d) Natural system of classification

5. Which one of the following methods are used to break the seed dormancy?

(a) Impaction (b) Stratification (c) Scarification (d) All the above

6. Match :

	Stem modification		Plant name
(1)	Bulb	(i)	Colocasia
(2)	Corm	(ii)	Canna
(3)	Rhizome	(iii)	*Allium cepa*
(4)	Tuber	(iv)	*Solanum tuberosum*

(a) (1) - (iii), (2) - (i), (3) - (ii), (4) - (iv) (b) (1) - (iii), (2) - (ii), (3) - (i), (4) - (iv)

(c) (1) - (iv), (2) - (ii), (3) - (i), (4) - (iii) (d) (1) - (i), (2) - (ii), (3) - (iii), (4) - (iv)

7. In a fully turgid cell :

(a) DPD = 0 atm; OP = 5 atm; TP = 10 atm; (b) DPD = 10 atm; OP = 5 atm; TP = 10 atm;

(c) DPD = 20 atm; OP = 20 atm; TP = 10 atm; (d) DPD = 0 atm; OP = 10 atm; TP = 10 atm;

8. Synapsis occur between :
(a) two homologous Chromosomes
(b) mRNA and Ribosomes
(c) a male and a female gamete
(d) Spindle fibres and Centromeres.

9. The β-D Glucose units in cellulose are linked together by:
(a) 1 → 3 Linkage (b) N-acetyl side chains
(c) β-(1,4) glycosidic Linkage
(d) N-acetyl D-Glucosamine

10. During oxidation of two molecules of cytosolic NADH + H^+, number of ATP molecules produced in plants are :
(a) 6 (b) 3 (c) 8 (d) 4

11. Match the correct combination.

	Minerals		Role
(1)	Molybdenum	(i)	Chlorophyll
(2)	Zinc	(ii)	Methionine
(3)	Magnesium	(iii)	Auxin
(4)	Sulphur	(iv)	Nitrogenase

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

12. The correct statement regarding Blue green algae is _____ .
(a) absence of mucilage around the thallus
(b) lack of motile structure
(c) presence of floridean starch
(d) presence of cellulose in cell wall

13. The tissue found in hypodermis of dicot stem :
(a) Sclerenchyma (b) Parenchyma
(c) Chlorenchyma (d) Collenchyma

14. Which chlorophyll molecule does not have a phytol tail?
(a) Chl-c (b) Chl-a
(c) Chl-d (d) Chl-b

15. A true fruit is the one where :
(a) Ovary, calyx and thalamus of the flower develop into fruit.
(b) Only ovary of the flower develops into fruit
(c) All floral whorls of the flower develop into fruit
(d) Ovary and calyx of the flower develop into fruit

Part - II

Note: Answer **any six** questions. Question No. **24** is **Compulsory**. **(6 × 2 = 12)**

16. Name the types of mycelium found in Agaricus.

17. What do you infer from the term "Pycnoxylic"?

18. What is Phylloclade? Give an example.

19. Write any two differences between plant cell and animal cell.

20. Write any two significance of mitosis.

21. Differentiate the wood formed in *Pinus* from that of *Morus*.

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

23. Write the types of RNA.

24. Point out the uses of plant anti-transpirants.

Part - III

Note: Answer **any six** questions. Question No. **33** is **Compulsory.** **(6 × 3 = 18)**

25. Draw and label the parts of Cycas Rachis T.S.

26. Differentiate pinnate unicostate with palmate multicostate venation.

27. Write the floral formula of *Musa Paradisiaca* and draw their floral diagram.

28. Differentiate cytokinesis in plant cells and animal cells.

29. Write short notes on Tyloses.

30. List out the non-photosynthetic parts of a plant that need a supply of sucrose.

31. Write any three differences between Photorespiration and Dark respiration.

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

33. Respiratory Quotient value of Anaerobic respiration is infinity. Why?

Part - IV

Note: Answer **all** the questions **(5 × 5 = 25)**

34. (a) Describe Five Kingdom classification. Add a note on its merits and demerits. **(OR)**

(b) What is Aestivation? Explain their types with diagram.

35. (a) Write any five economic importance of family Euphorbiaceae. **(OR)**

(b) Write the differences between Prokaryotes and Eukaryotes.

36. (a) List the properties of Enzymes. **(OR)**

(b) Distinguish the anatomy of Dicot stem from Monocot stem.

37. (a) Explain the insectivorous mode of nutrition in Angiosperms. **(OR)**

(b) What is the name of alternate way of glucose break down? Explain the processes involved in it.

38. (a) Give the flow chart of Krebs cycle.

(OR)

(b) Which is the gaseous phytohormone? Write their physiological effects.

Answers

PART - I

1. (d) (i) is not correct but(ii) and (iii) are correct

2. (a) carry out photosynthetic reactions

3. (d) before fertilization

4. (b) Artificial system of classification

5. (d) All the above

6. (a) (1) - (iii), (2) - (i), (3) - (ii), (4) - (iv)

7. (d) DPD = 0 atm; OP = 10 atm; TP = 10 atm;

8. (a) two homologous Chromosomes

9. (c) β-(1,4) glycosidic Linkage

10. (a) 6

11. (a) (1) - (iv), (2) - (iii), (3) - (i), (4) - (ii)

12. (b) lack of motile structure

13. (d) Collenchyma

14. (a) Chl-c

15. (b) Only ovary of the flower develops into fruit

PART - II

16. The thallus is made up of branched structures called **hyphae**. A large number of hyphae constitute the mycelium.

Types of mycelium:

i. Primary mycelium:

ii. Secondary mycelium.

iii. Tertiary mycelium

17. It refers to a type of wood in Gymnosperms which is compact with narrow medullary ray. Eg : ***Pinus.***

18. **Phylloclade :** Phylloclade is characteristic adaptation of xerophytes where the leaves often fall off early and modified into spines or scales to reduce transpiration. The phylloclade takes over all the functions of leaves, particularly photosynthesis. The phylloclade is also called as cladophyll.

Example: Opuntia, Phyllocactus, Muehlenbeckia (flattened phylloclade) Casuarina, Euphorbia tirucalli, Euphorbia antiquorum (cylindrical phylloclade).

19.

No.	Plant cell	Animal cell
1	Usually they are larger than animal cells.	Usually smaller than plant cells.
2	Cell wall present in addition to plasma membrane and consists of middle lamellae, primary and secondary walls.	Cell wall absent.

20. 1. **Genetic stability** - Daughter cells are genetically identical to parent cells.

2. **Growth** - As multicellular organisms grow, the number of cells making up their tissue increases. The new cells must be identical to the existing ones.

21.

No.	Wood formed in *Morus*	Wood formed in *Pinus*
1.	Commonly called as Porous wood or Hard wood.	Commonly called as Non-Porous wood or soft wood.
2.	Common in angiosperms	Common in gymnosperms
3.	Porous because it contains vessels	Non-porous because it does not contain vessels

22. Br., Ebrl., ⊕, ♀♂, K_5, C_5, A_5, $\underline{G}_{(5)}$.

23. 1. mRNA (messenger RNA)
2. tRNA (transfer RNA)
3. rRNA (ribosomal RNA)

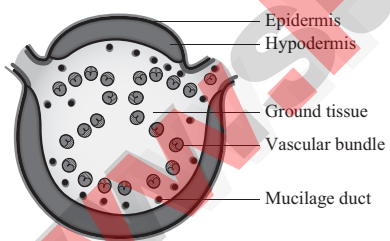
24. **Uses:**

(i) Antitranspirants reduce the enormous loss of water by transpiration in crop plants.

(ii) Useful for seedling transplantations in nurseries.

PART - III

25. ***Cycas* Rachis T.S.**



T.S. of *Rachis*

26. 1. **Reticulate venation:**

(i) Pinnately reticulate venation (unicostate):
In this type of venation there is only one midrib in the centre which forms many lateral branches to form a network. Example: *Mangifera indica.*

(ii) Palmately reticulate venation (multicostate):
In this type of venation there are two or more principal veins arising from a single point and they proceed outwards and upwards.

2. **Parallel venation:**

(i) Pinnately parallel venation (unicostate):
There is a prominent midrib in the center, from which arise many veins perpendicularly and run parallel to each other.

Example: *Musa, Zinger.*

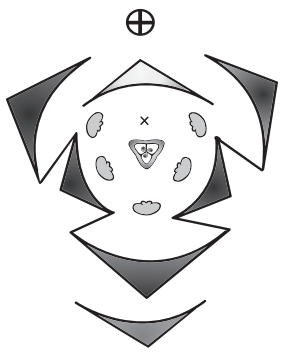
(ii) Palmately parallel venation (multicostate):
In this type several veins arise from the tip of the petiole and they all run parallel to each other and unite at the apex.

27. **Floral Formula**

Male flower: Br, Ebrl, %, ♂, $P_{(3+2)+1}$, A_{3+3}, G_0.

Female flower: Br, Ebrl, %, ♀, $P_{(3+2)+1}$, A_0, $\overline{G}_{(3)}$.

Bisexual flower: Br, Ebrl, %, ♀♂, $P_{(3+2)+1}$, A_{3+3}, $\overline{G}_{(3)}$.



Floral diagram

Floral formula : Bisexual flower

Br.,Ebrl.,%,♀♂, $P_{(3+2)+1}$, A_{3+3}, $\overline{G}_{(3)}$

28. **Cytokinesis in Animal Cells :**

i. It is a contractile process.

ii. The ring consists of a bundle of microfilaments assembled from actin and myosin.

iii. This fibril helps for the generation of a contractile force.

iv. This force draws the contractile ring inward forming a cleavage furrow in the cell surface dividing the cell into two.

Cytokinesis in Plant Cell :

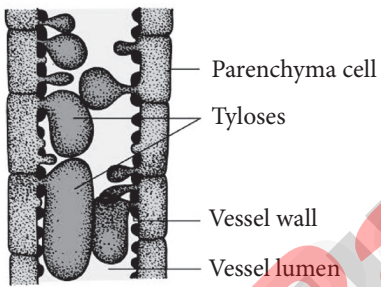
i. Division of the cytoplasm often starts during telophase. In plants, cytokinesis cell plate grows from centre towards lateral walls - centrifugal manner of cell plate formation.

ii. Phragmoplast contains microtubules, actin filaments and vesicles from golgi apparatus and ER.

iii. Microtubule of the pharagmoplast to the equator fuse, forming a new plasma membrane and the materials which are placed there becomes new cell wall.

iv. The first stage of cell wall construction is a line dividing the newly forming cells called a cell plate.

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



30. 1. Roots
2. Stems of Older Plants
3. Flowers and fruits

31.

	Photorespiration	Dark Respiration
1.	It takes place in photosynthetic green cells.	It takes place in all living cells
2.	It takes place only in the presence of light.	It takes place all the time.
3.	It involves chloroplast, peroxisome and mitochondria.	It involves only mitochondria.

32. Phosphorylation reactions in EMP pathway :

(i) Glucose ⟶ Glucose - 6 - Phosphate

Enzyme : *Hexokinase*

(ii) Fructose - 6 - Phosphate ⟶ Fructose -1, 6 - Bisphosphate

Enzyme : *Phosphofructokinase*

(iii) Glyceraldehyde - 3 Phosphate ⟶ 1, 3 Bisphospho Glycerate

Enzyme : *Glyceraldehyde* -3- *Phosphate dehydrogenase*

Dephosphorylation reactions :

(i) 1,3 Bisphospho Glycerate ⟶ 3-Phospho glycerate

Enzyme : *Phosphoglycerate Kinase*

(ii) Phospho Enol pyruvate ⟶ Pyruvate

Enzyme : *Pyruvate kinase.*

33. 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.

$$\underset{\text{Glucose}}{C_6H_{12}O_6} \longrightarrow 2CO_2 + \underset{\text{Ethyl alchohol}}{2C_2H_5OH} + \text{Energy}$$

$$\text{RQ of glucose Anaerobically} = \frac{2 \text{ molecules of } CO_2}{\text{zero molecule of } O_2}$$

$$= \infty \text{ (infinity)}$$

PART - IV

34. a) R.H.Whittaker proposed five kingdom classification in the year 1969.

(i) **Kingdoms :**

	Cell type	Level of organization	Cell wall	Nutrition	Motility	Organisms
Monera	Prokaryotic	Mostly unicellular rarely multicellular	Present (made up of Peptidoglycan and Mucopeptides)	Autotrophic (Phototrophic, Chemoautotrophic) Heterotrophic (parasitic and saprophytic)	Motile or non-motile	Archaebacteria, Eubacteria, Cyanobacteria, Actinomycetes and Mycoplasma
Protista	Eukaryotic	Unicellular	Present in some (made up of cellulose), absent in others	Autotrophic - Photosynthetic. Heterotrophic	Motile or non-motile	Chrysophytes, Dinoflagellates, Euglenoids, Slime molds, *Amoeba*, Plasmodium, Trypanosoma, Paramecium
Fungi	Eukaryotic	Multicellular and unicellular	Present (made up of chitin or cellulose)	Heterotrophic - parasitic or Saprophytic	Non-motile	Yeast, Mushrooms and Molds
Plantae	Eukaryotic	Tissue/organ	Present (made up of cellulose)	Autotrophic (Photosynthetic)	Mostly Non-motile	Algae, Bryophytes, Pteridophytes, Gymnospherms and Angiosperms
Animalia	Eukaryotic	Tissue/organ/ organ system	absent	Heterotrophic (Holozoic)	Mostly motile	Sponges, Invertebrates and Vertebrates

(ii) **Merits :**

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

(iii) **Demerits :**

1. 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.
2. Viruses were not included in the system.

(OR)

b) **Aestivation:** Arrangement of sepals and petals in the flower bud.

(i) **Valvate:** Margins of sepals or petals do not overlap but just touch each other.
Eg: Calyx in members of Malvaceae, *Calotropis*, *Annona*.

(ii) **Twisted or Convolute or Contorted:** One margin of each petal or sepal overlapping on the other petal.
Eg: *Petals of chinarose*.

(iii) **Imbricate:** 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 the other interior.

Eg: *Cassia*, *Delonix*. There are 3 types. 1.Ascendingly imbricate. 2.Quincuncial. 3.Vexillary.

(iv) **Quincuncial:** It is a type of imbricate aestivation in which two petals are external and two internal and one petal with one margin internal and the other margin external.

Eg: Guava, calyx of *Ipomoea*, *Catharanthus*.

(v) **Vexillary:** Large posterior petals both margins overlap lateral petals. Lateral petals other margin overlaps anterior petals.

Eg: Pea,bean.

35. a)

Economic importance	Binomial	Useful part	Uses
Food plant	*Emblica officinalis* *P. acidus* *Manihot esculenta* (Tapioca)	Fruits Tuberous roots	Rich in vitamin C, which are edible and pickled. Roots are rich in starch and used for preparing bread, biscuits, chips and other food stuffs.
Oil plant Croton oil Castor Oil Jatropha Oil	 *Croton tiglium* *Ricinus communis* (Castor) *Jatropha curcas*	 Seed Seeds Seeds	 Used as a powerful purgative and also to treat skin diseases. Used as vegetable oil, ricinoleic acid present in this oil eliminate acne causing bacteria apart from that it acts as laxative and lubricant. Used for biofuels.
Rubber	*Hevea brasiliensis* (Para rubber) *Manihot glaziovii* (Manicoba rubber)	Coagulated latex	Latex is used in rubber products like tube and tyre.
Medicinal plants	*Euphorbia resinifera* *Euphorbia hirta* *Phyllanthus amarus* *Jatropha gossypifolia* *Ricinus communis*	Latex Whole plant Entire shoot system Leaves and roots Seed oil	*Euphorbium* drug is obtained from the latex and used as a purgative. Lactogogue Used to treat Jaundice. Used in the treatment of leprosy and snakebite. Purgative
Dye yielding plants Kamela dye, Blue dye Red dye	 *Mallotus philippensis* *Jatropha curcas* *Phyllanthus reticulatus*	 Fruits Bark Roots	 Used for dyeing wool and silk. Used for dyeing clothes and fishing nets. Used for tanning and *dyeing* fishing lines and nets

(OR)

b)

Features	Prokaryotes	Eukaryotes
Size of the cell	~1 - 5 µm	~10 - 100 µm
Nuclear character	Nucleoid, no true nucleus,	True nucleus with nuclear membrane
DNA	Usually circular without histone proteins	Usually linear with histone proteins
RNA/Protein synthesis	Couples in cytoplasm	RNA synthesis inside nucleus/Protein synthesis in cytoplasm
Ribosomes	50S + 30S	60S + 40S
Organelles	Absent	Numerous
Cell movement	Flagella	Flagella and cilia
Organization	Usually single cell	Single, colonial and multicellular
Cell division	Binary fission	Mitosis and meiosis
Examples	Bacteria and Archaea	Fungi, plants and animals

36.a) 1. All are globular proteins.
2. They act as catalysts and effective even in small quantity.
3. They remain unchanged at the end of the reaction.
4. They are highly specific.
5. They have an active site where the reaction takes place.
6. Enzymes lower activation energy of the reaction they catalyse.

(OR)

b)

Anatomical differences between dicot stem and monocot stem			
No.	**Characters**	**Dicot Stem**	**Monocot Stem**
1.	Hypodermis	Collenchymatous	Sclerenchymatous
2.	Ground tissue	Differentiated into cortex, endodermis and pericycle and pith	Not differentiated, but it is a continuous mass of parenchyma.
3.	Starch Sheath	Present	Absent
4.	Medullary rays	Present	Absent
5.	Vascular bundles	(a) Collateral and open	(a) Collateral and closed
		(b) Arranged in a ring	(b) Scattered in ground tissue
		(c) Secondary growth occurs	(c) Secondary growth usually does not occur.

37. a) Plants which are growing in nitrogen deficient areas develop insectivorous habit to resolve nitrogen deficiency.

a. ***Nepenthes*** **(Pitcher plant):**
Pitcher is a modified leaf and contains digestive enzymes. Rim of the pitcher is provided with nectar glands and acts as an attractive lid. When insect is trapped, proteolytic enzymes will digest the insect.

b. ***Drosera*** **(Sundew):**
It consists of long club shaped tentacles which secrete sticky digestive fluid which looks like a sundew.

c. ***Utricularia*** **(Bladder wort):**

Submerged plant in which leaf is modified into a bladder to collect insect in water.

d. ***Dionaea*** **(Venus fly trap):**

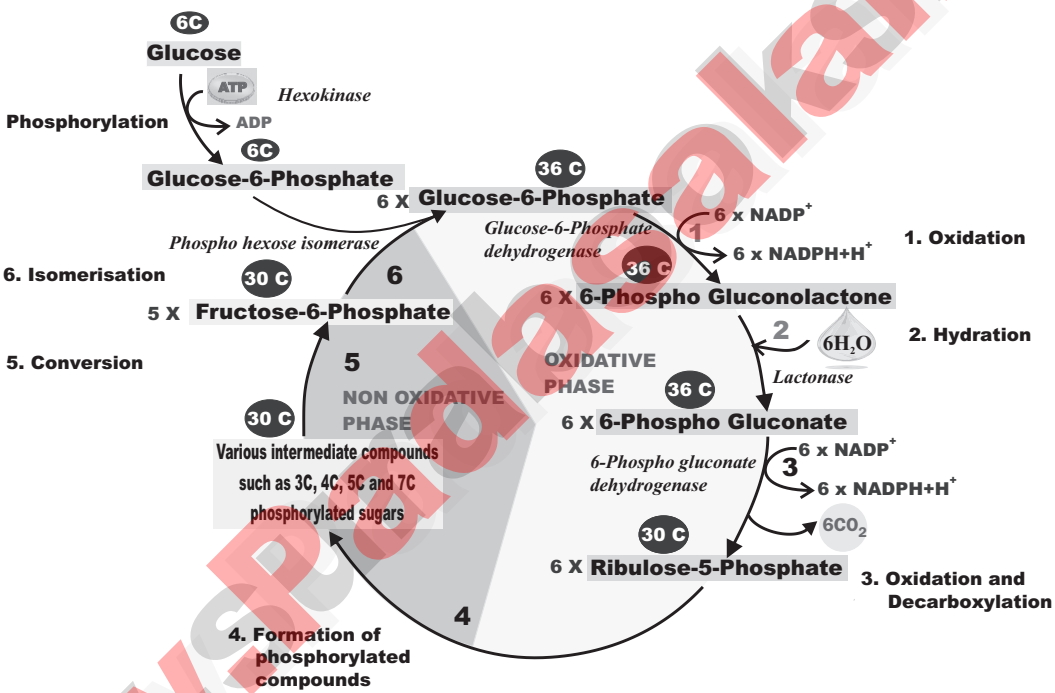
Leaf of this plant modified into a colourful trap. Two folds of lamina consist of sensitive trigger hairs and when insects touch the hairs it will close.

(OR)

b) Pentose Phosphate pathway:

(i) During respiration breakdown of glucose in cytosol occurs both by glycolysis (about 2/3) as well as by oxidative pentose phosphate pathway (about 1/3). Pentose phosphate pathway was described by Warburg, Dickens and Lipmann (1938).

(ii) Hence, it is also called **Warburg-Dickens-Lipmann pathway**. It takes place in cytoplasm of mature plant cells. It is an alternate way for breakdown of glucose.



Pentose phosphate pathway or HMP shunt

(iii) It is also known as Hexose monophosphate shunt (HMP Shunt) or Direct Oxidative Pathway. It consists of two phases, oxidative phase and non-oxidative phase.

(iv) The oxidative events convert six molecules of six carbon glucose-6-phosphate to 6 molecules of five carbon sugar ribulose-5 phosphate with loss of $6CO_2$ molecules and generation of 12 NADPH+ H^+ (not NADH).

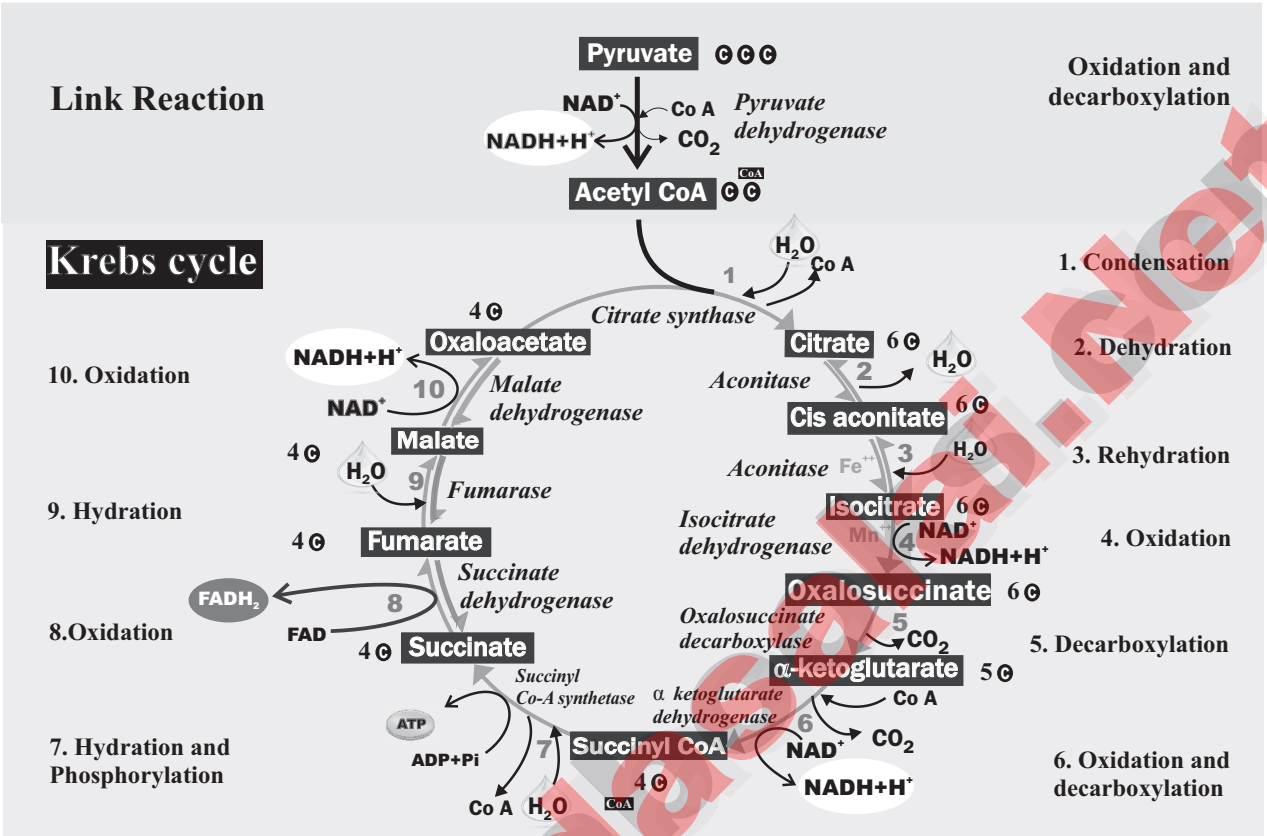
(v) The remaining reactions known as non-oxidative pathway, convert Ribulose-5-phosphate molecules to various intermediates such as ribose-5-phosphate (5C), xylulose 5-phosphate (5C), glyceraldehyde-3-phosphate (3C), sedoheptulose-7-Phosphate (7C), and erythrose-4-phosphate (4C).

(vi) Finally, five molecules of glucose-6-phosphate is regenerated. The overall reaction is:

$$6 \times \text{glucose-6-phosphate} + 12\ NADP^+ + 6H_2O \longrightarrow 5 \times \text{glucose-6-phosphate} + 6CO_2 + Pi + 12\ NADPH + 12H^+$$

The net result of complete oxidation of one glucose-6-phosphate yield $6CO_2$ and 12 NADPH + H^+. The oxidative pentose phosphate pathway is controlled by *glucose-6-phosphate dehydrogenase* enzyme which is inhibited by high ratio of NADPH to NADP+.

38. a) Krebs cycle



Krebs cycle or Citric acid cycle

(OR)

b) **Ethylene** is the gaseous phytohormone

Physiological Effects :

- Ethylene stimulates respiration and ripening in fruits.
- It breaks the dormancy of buds, seeds and storage organs.
- It stimulates formation of abscission zone in leaves, flowers and fruits. This makes the leaves to shed prematurely.
- Inhibition of stem elongation (shortening the internode).
- Growth of lateral roots and root hairs. This increases the absorption surface of the plant roots.
- Ethylene normally reduces flowering in plants except in Pine apple and Mango.