

# KAMARAJ COLLEGE (Autonomous)

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(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

(4 Pages)

Reg. No:.....

Question Code: 26E03501

Course Code : 24PMBO41

PG Degree - End Semester Examinations, April 2026

Fourth Semester

M.Sc., BOTANY

Plant Physiology

(For those who joined in July 2024 onwards)

Time : 3Hours

Maximum : 75 Marks

## PART - A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer :

- CO:1  
K:1
1. Which of the following components of water potential is typically negative in a plant cell under normal conditions?
- (a) Pressure Potential                      (b) Solute Potential  
(c) Gravity Potential                      (d) Matrix Potential
- CO:1  
K:1
2. During plasmolysis, what is the first sign observed in the plant cell?
- (a) Rupture of the cell wall              (b) Swelling of the vacuole  
(c) Shrinkage of the protoplast away from the cell wall              (d) Increase in turgor pressure
- CO:2  
K:1
3. Photosystem involved in cyclic photophosphorylation is:
- (a) Photosystem I only                      (b) Photosystem II only  
(c) Both PS I and PS II                      (d) Cytochrome b<sub>6</sub>f complex only
- CO:2  
K:1
4. Which three organelles are involved in the photorespiratory pathway?
- (a) Chloroplast, Mitochondria, Ribosome                      (b) Chloroplast, Peroxisome, Mitochondria  
(c) Chloroplast, Vacuole, Golgi body                      (d) Mitochondria, Peroxisome, Lysosome

- CO:3 5. Where is the Electron Transport System (ETS) located in the plant  
K:1 cell?
- (a) Mitochondrial matrix (b) Inner mitochondrial membrane
- (c) Cytoplasm (d) Stroma of chloroplast
- CO:3 6. Which of the following is a free-living (non-symbiotic) nitrogen-  
K:1 fixing bacterium?
- (a) *Rhizobium* (b) *Azotobacter*
- (c) *Frankia* (d) *Bradyrhizobium*
- CO:4 7. The hormone which is responsible for apical dominance in plants?  
K:1
- (a) Gibberellin (b) Cytokinin
- (c) Auxin (d) Ethylene
- CO:4 8. Which hormone is often referred to as the "Stress Hormone"  
K:1 because it induces stomatal closure?
- (a) Cytokinin (b) Gibberellic acid
- (c) Abscisic acid (ABA) (d) Indole-3-acetic acid (IAA)
- CO:5 9. "Heat Shock Proteins" (HSPs) function primarily as:  
K:1
- (a) Enzymes for photosynthesis (b) Molecular chaperones that prevent protein denaturation
- (c) Pigments that absorb excess heat (d) Structural components of the cell wall
- CO:5 10. Which of the following is a non-enzymatic antioxidant used by  
K:1 plants to combat oxidative stress?
- (a) Catalase (b) Peroxidase
- (c) Ascorbic acid (Vitamin C) (d) Glutathione reductase

**PART - B (5 X 5 = 25 Marks)**

**Answer ALL Questions choosing either (a) or (b).**

**Answer should not exceed 250 words.**

- CO:1 11. (a) Compare and contrast the Apoplast and Symplast concepts.

K:4

**(OR)**

- (b) Explain the roles and specific deficiency symptoms of Nitrogen, Phosphorus and Potassium.

CO:2 12. (a) Describe the ultrastructure of chloroplast with neat diagram.

K:4

**(OR)**

(b) Explain the three main stages of the Calvin Cycle.

CO:3 13. (a) Examine the sequence of reactions involved in Glycolysis.

K:4

**(OR)**

(b) Explain the various steps of the Tri-carboxylic Acid cycle occurring in the mitochondrial matrix.

CO:4 14. (a) Define plant growth and explain the sigmoid growth curve.

K:4

**(OR)**

(b) List out the physiological roles of Auxins and Gibberellins in plant growth and development.

CO:5 15. (a) Explain the concepts of Stress Avoidance, Stress Escape and Stress Tolerance.

K:4

**(OR)**

(b) Write a short account of the physiological responses of plants to water deficit.

**PART - C (5 X 8 = 40 Marks)**

**Answer ALL Questions choosing either (a) or (b).**

**Answer should not exceed 600 words.**

CO:1 16. (a) Discuss the Cohesion-Tension-Transpiration Pull theory of water transport.

K:6

**(OR)**

(b) Elaborate the Pressure Flow (Munch) Hypothesis for the translocation of organic solutes.

CO:2 17. (a) Describe photorespiration and add notes on its significance.

K:6

**(OR)**

(b) Elaborate the Crassulacean Acid Metabolism (CAM) pathway.

CO:3 18. (a) Write in detail about symbiotic and non-symbiotic nitrogen fixation.

K:5

**(OR)**

(b) Explain the oxidative and non-oxidative phases of the Pentose Phosphate Pathway.

CO:4 19. (a) Define Vernalization and discuss its physiological  
K:6 mechanism.

**(OR)**

(b) Elaborate on the various causes of seed dormancy.

CO:5 20. (a) Discuss the morphological and biochemical changes in the  
K:6 abscission zone.

**(OR)**

(b) Explain the effects of high-temperature (Heat) stress and low-temperature (Chilling/Freezing) stress on plant membranes.