2026

BOTANY

(Major)

Paper : BOT0600304

(Plant Metabolism and Biochemistry)

Full Marks : 45

Time : 2 hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : 1×5=5

(a) Who proposed the Chemiosmotic theory of ATP synthesis?

(b) How many turns of Calvin cycle are taken to produce one molecule of hexose?

(c) Name a free-living nitrogen-fixing bacteria.

(d) What is the primary CO_2 acceptor in C_4 pathway?

(e) What is the end product of β-oxidation?

2. Answer any *five* of the following questions : 2×5=10

(a) Write two properties of enzyme.

(b) Define dual activities of RuBisCo.

(c) What is photorespiration? Mention the cell organelles involved in photorespiration.

(d) Write three phages of aerobic respiration.

(e) What is ammonification? Name two bacteria directly involved in ammonification process.

(f) Define signal transduction.

(g) What are the first stable products in C_3 and C_4 cycle?

(h) What are antenna molecules and what are their primary functions?

(i) What is prosthetic group? What are the different types of prosthetic groups?

(j) What are secondary metabolites? Name two alkaloids in plants.

3. Answer any *four* of the following questions : 5×4=20

(a) Explain the role of leg-hemoglobin in the root nodules of leguminous plants.

(b) Describe the mechanism and significance of the MAP kinase signalling pathway.

(c) Write a note on enzyme inhibition.

(d) Define non-symbiotic nitrogen fixation. List non-symbiotic nitrogen-fixing micro-organisms and mention their role in soil fertility.

(e) Elucidate the role of calcium-calmodulin cascade in signal transduction mechanism. What do you mean by receptor-ligand interaction?

(f) Differentiate between C_3 and C_4 pathways.

(g) Describe cyanide-resistant respiration and its alternative pathway.

(h) Explain the biosynthesis of starch in plants.

4. Answer any *one* of the following questions : 10

(a) What is photophosphorylation? Explain the process of cyclic and non-cyclic photophosphorylation. 2+8=10

(b) What is biological nitrogen fixation? Describe the process of formation of mature nodule during biological nitrogen fixation. 2+8=10

(c) What are triglycerides? Name two common glycerides in plants. Give an account on breakdown of fatty acid by β-oxidation in plants. 1+1+8=10

(d) Define shikimate pathway. Discuss the biosynthesis of phenolic compounds by this pathway. Mention the significance of shikimate pathway. 2+7+1=10

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