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3 (Sem-6/CBCS) BOT HC 1

2024

BOTANY

(Honours Core)

Paper : BOT-HC-6016

(Plant Metabolism)

Full Marks : 60

Time : Three hours

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

1. Answer the following questions : $1 \times 7 = 7$

(a) Name the type of the metabolic pathway which is involved in the synthesis of compounds in plant bodies.

(b) What is the first stable product in the C₄ pathway ?

(c) Which of the given lights are strongly absorbed by plants ?

(i) Indigo and Yellow

Contd.

(ii) Yellow and Violet

(iii) Blue and Red

(iv) Orange and Violet

(d) Name the enzyme which catalyses the conversion of N_2 into ammonia during the biological N_2 fixing process.

(e) Name one simple lipid.

(f) Which enzyme is required for the synthesis of ATP?

(g) The end product of glycolysis under anaerobic conditions is _____.

(Fill in the blank)

2. Answer the following questions shortly :

2×4=8

(a) Write the roles of PS-II during photosynthesis.

(b) Write a note on ATP as high energy molecule.

(c) Define aerobic respiration.

(d) Distinguish between RuBP and RuBisCO.

3. Answer the following questions briefly :
(any three) 5×3=15

(a) Explain Glycolysis. State its end products. In both aerobic and anaerobic respiration, determine the fate of these products.

(b) Discuss the key events and outcomes of the light reaction of photosynthesis.

(c) Discuss different types of nitrogen-fixing bacteria and their symbiotic relationships with plants.

(d) Explain the mechanisms of enzyme inhibition with suitable example.

(e) What is meant by the term 'signal transduction'? What are some of the steps by which signal transduction can occur?

4. Answer the following questions as instructed :
(any three) 10×3=30

(a) Explain how the irreversible reaction catalysed by the pyruvate dehydrogenase complex leads to the entry of acetyl-CoA into the TCA cycle. Why cannot acetyl-CoA be used as a substrate for gluconeogenesis?

4+6=10

(b) What is a second messenger? Why do you suppose it is called this? Elucidate the role of calcium-binding proteins eliciting a response. $2+2+6=10$

(c) Distinguish between aerobic respiration and anaerobic respiration. Explain the significance of oxygen in aerobic respiration in the context of ETS. $3+7=10$

(d) Describe the β -oxidation pathway of fatty acid degradation. Draw the glyoxylate cycle. $6+4=10$

(e) Why do you suppose RuBisCO performs more carboxylation in C₄ plants than in other plants? Explain the Hatch and Slack pathways with proper schematic sketch. $4+6=10$

(f) What are mono, oligo and polysaccharides? Describe their role in plant metabolism. $3+7=10$

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3 (Sem-6/CBCS) BOT HC 2

2024

BOTANY

(Honours Core)

Paper : BOT-HC-6026

(Plant Biotechnology)

Full Marks : 60

Time : Three hours

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

1. Fill in the blanks : 1×7=7

(a) _____ discovered totipotency.

(b) A single strand of nucleic acid tagged with a radioactive molecule is called a _____.

(c) The element _____ provides a very stable ultra-low temperature environment.

Contd.

(d) _____ is a type of hybrid that contains a lambda phage cos sequence.

(e) A _____ is a collection of DNA fragments that have been cloned into vectors.

(f) The basic target of _____ is a living cell.

(g) _____ genes are used to track the physical location of a segment of DNA.

2. Answer the following questions very briefly :
2×4=8

(a) What are cloning vectors ?

(b) What is the principle of totipotency ?

(c) What are the applications of somatic embryogenesis in plant tissue culture ?

(d) Mention the types and uses of microinjection.

3. Answer **any three** of the following :
5×3=15

(a) What do you mean by colony hybridization? Mention its practical applications.

(b) Write a note on industrial enzymes.

(c) Where is linear DNA found? What are the advantages of linear DNA over circular DNA?

(d) What is the difference between androgenesis and gynogenesis? What do you mean by direct androgenesis?

(e) Write a note on Ti plasmid.

4. Answer **any three** of the following :
10×3=30

(a) Write about various types of reporter genes with their applications.

(b) What do you mean by primary and secondary metabolites? How can biotechnological approaches enhance the production of secondary metabolites?

(c) Give an account on transgenic crops with improved quality traits.

(d) What are restriction enzymes? Mention the specific properties of various types of restriction enzymes, alongwith their importance for recombinant DNA technology.

(e) Differentiate between genomic DNA and cDNA libraries. Discuss about the construction of genomic library.

(f) Discuss elaborately various steps involved in plant tissue culture.

Write a note on Ti plasmid.

Answer any three of the following:

(a) Write about various types of reporter genes with their applications.

(b) What do you mean by primary and secondary metabolites? How can biotechnological approaches enhance the production of secondary metabolites?

(c) Give an account on transgenic crops with improved quality traits.

(d) What are restriction enzymes? Mention the specific properties of various types of restriction enzymes, along with their importance for recombinant DNA technology.