

PLANT BIOTECHNOLOGY
(BIOT 3221)

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) The plant part which used for tissue culture in the medium is called
(a) nectar (b) explant
(c) plastid (d) mitochondria
- (ii) Which of the following is not used for surface sterilization of explants?
(a) HgCl₂ (b) H₂O₂
(c) UV radiation (d) Sodium hypochlorite
- (iii) Growth hormone producing shoot induction is
(a) auxin (b) ethylene
(c) gibberrelin (d) cytokinin
- (iv) Pathogenesis resistant proteins are
(a) expressed when a plant is attacked by a pathogen
(b) expressed only at the site of infection
(c) expressed only in plants that are resistant to the pathogen
(d) only expressed away from the infection site in the SAR response.
- (v) In which phase of growth curve of plant secondary metabolites accumulate:
(a) Stationary phase (b) Lag phase
(c) log phase (d) lag and stationary phase.
- (vi) Synthetic seed is produced by encapsulating somatic embryos with
(a) Sodium alginate (b) Sodium nitrate
(c) Sodium acetate (d) Sodium sulphate
- (vii) C-value paradox is due to
(a) Complexity of genome (b) Complexity of an organism
(c) Cardiac value (d) Repeated sequence

- (viii) In Zn-finger protein, the central Zn is bonded by
 (a) Covalent bond to 4 cystein residue
 (b) Coordination complex to 4 cystein residue
 (c) Ionic bond to 4 cystein residue
 (d) Coordination complex to either 4 cystein or 4 (His+ Cys) residue
- (ix) Find out among following whose genome has not been fully sequenced
 (a) Rice (b) Arabidopsis
 (c) Tagetes (d) Zea
- (x) VirA is a/an
 (a) Auto phosphorylating kinase
 (b) Transcriptional activator of vir operon
 (c) Endonuclease
 (d) ssDNA binding protein

Fill in the blanks with the correct word

- (xi) NOR contains repeated _____ genes.
- (xii) DST elements _____ plant mRNA.
- (xiii) Spermidine has a role in DNA _____.
- (xiv) ABRE-35S is a type of _____ promoter.
- (xv) Tissue culture technique was first practised by _____.

Group - B

2. (a) Define micro propagation, recurrent embryogenesis. [[CO1](Analyse/HOCQ)]
 (b) Mention briefly with suitable schematic representation the stages of micro propagation. [[CO1](Remember/LOCQ)]
 (c) Mention the role of following factors on micro propagation media, genotype and cultural conditions with suitable examples. [[CO1](Apply/IOCQ)]
 (d) Mention the application of both micro propagation and somatic embryogenesis. [[CO1](Apply/IOCQ)]
2 + 2 + 4 + 4 = 12
3. (a) The nutrient medium used in plant tissue culture is a combination of micro and macro element. Mention any four such elements citing the necessity of them, choose from both the categories. [[CO1](Analyse/HOCQ)]
 (b) Adding small amount of ammonium compound is essential for plant tissue culture media – justify with suitable reason. [[CO1](Remember/LOCQ)]
 (c) Iron cannot be added as an individual compound in the media preparation state the reason and mention how iron salt is added. [[CO1](Apply/IOCQ)]
(4 × 2) + 2 + 2 = 12

Group - C

4. (a) What are elicitors? [[CO3](Analyse/HOCQ)]

- (b) Give an example of each type of elicitors. [[C04](Remember/LOCQ)]
 (c) Mention the name of a stress metabolite which is produced in tobacco cell suspension culture and describe how this is achieved. [[C02](Apply/IOCQ)]
2 + (4 × 2) + 1 + 1 = 12

5. (a) What do you mean by immobilization? [[C03](Analyse/HOCQ)]
 (b) Mention how viability can be tested in immobilized cells. [[C04](Remember/LOCQ)]
 (c) Write any three polymers associated with immobilization. [[C02](Apply/IOCQ)]
 (d) Mention two examples of secondary metabolites in immobilized system with product and the type of immobilization. [[C02](Apply/IOCQ)]
2 + 3 + 3 + 4 = 12

Group - D

6. (a) Describe the molecular mechanism of DNA binding by the following plant transcription factors:
 (i) bZIP class [[C03](Remember/LOCQ)]
 (ii) Zn-finger. [[C04](Understand/IOCQ)]
 (b) Differentiate between transposon and retrotransposon. [[C03](Apply/HOCQ)]
 (c) Describe the structure of the smallest chloroplast genome. [[C03](Apply/HOCQ)]
(3 + 3) + 3 + 3 = 12
7. (a) Describe the structure of basic leucine zipper class of transcription factor with a diagram. How it binds the DNA? [[C03](Remember/LOCQ)]
 (b) Discuss the regulation of following in plant:
 (i) FCA gene [[C04](Understand/IOCQ)]
 (ii) SAUR transcripts. [[C03](Apply/HOCQ)]
 (c) How acetylation affects chromatin conformation? [[C03](Apply/HOCQ)]
4 + (2 + 2) + 4 = 12

Group - E

8. (a) What is Ti plasmid? Discuss its structure in two different strains of *Agrobacterium*. [[C03](Analyse/IOCQ)]
 (b) Describe the steps of Agro-mediated development of transgenic plants. [[C04](Remember/LOCQ)]
 (c) Why *Agrobacterium* was not suitable for monocot transformation? How it was overcome? [[C04](Apply/HOCQ)]
(2 + 3) + 4 + (2 + 1) = 12
9. (a) What is herbicide? [[C03](Analyse/HOCQ)]
 (b) Mention two examples gene-based herbicide resistance in plants. [[C06](Remember/LOCQ)]

- (c) Mention briefly any two strategies followed for engineering herbicide resistant plants citing suitable examples.

[[CO6)(Apply/IOCQ)]

$$2 + 4 + (3 \times 2) = 12$$

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	34.37	38.54	27.09