Time: 2.5 hrs **Max. Marks: 60**

Instructions: 1. All questions are compulsory.
2. Draw neat and labeled diagram wherever necessary.
3. Figures to the right indicate full marks.

Q.1.What is Organogenesis? Explain in detail various stages of micropropagation. (12)

OR

Q.1. Discuss-Role of somaclonal variation in crop improvement. (12)

Q.2.What are elicitors? Citing suitable examples describe how elicitors influence the formation of product in plant tissue culture. (12)

OR

Q. 2. A. Discuss on the different types of contaminants in plant tissue culture. (06)

Q. 2. B. Explain the types of freezing as method for cryopreservation (06)

Q.3 A. Explain the process of Biotransformation by freely suspended cells. (06)

Q.3 B. Enumerate the main steps of vanillin production in Capsicum cell cultures through Biotransformation (06)

OR

Q.3. Describe the procedure of *Agrobacterium* mediated gene transfer. (12)

Q4. With reference to bioreactor, explain different modes of operation. (12)

OR

Q.4. Give a detailed account of important factors to be considered while designing a bioreactor. (12)

Q.5. Attempt any four from the following. (12)

a. Advantages of Biotransformation
b. Application of Cryopreservation
c. Suspension Culture
d. Factors responsible for *in vitro* hardening
e. Uses of Shikonin
f. Causes of somaclonal variation

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