

**Department of Biochemical Engineering and Biotechnology**

**Indian Institute of Technology, Delhi**

**BEL712 (II Semester, 2008-2009) MAJOR EXAM, Plant Cell Technology**

**Date:** 04<sup>th</sup> May 2009

**Timing:** 10:30-12:30 p.m.

**Maximum Marks:** 30

1. What is the role of peroxisome in plants? 2
2. Give one word for: 2.5
  - i. a gaseous plant hormone
  - ii. compound used for synchronization of cells in culture
  - iii. antitumor compound from plant extracts
  - iv. enzyme catalyzing conversion of citrate to isocitrate in glyoxylate cycle
  - v. starch synthesis in plants in regulated by the enzyme -----
3. 'Dark reaction' in photosynthesis is a misnomer. Comment 3
4. What are the factors affecting fluidity of lipid bilayer? 2
5. What do you understand by "Z scheme" in photosynthesis? 2.5
6. Describe Microencapsulation method for immobilization of Plant Cell Cultures. What are the distinct advantages of Immobilization in plant cell cultures ? 3
7. Briefly describe the operation of Multi-membrane Bioreactor highlighting its characteristic features of removal of gaseous and liquid products. 2
8. Write down the protocol steps for generation of hairy root cultures. What are the advantages of hairy root cultivation over normal cell cultivation ? How you will establish that the roots generated are hairy roots and not the normal roots of the plant. 3
9. Briefly describe the disadvantages of liquid phase hairy root reactors which can be possibly be overcome by using the gas phase reactor. 2
10. Describe the operation of Mist hairy root reactor. 2
11. Write down the steps involved in the development of mathematical model for the plant cell culture system. What are the two main uses of the model. 2
12. Describe Kolmogorov's theory for the formation of eddies and quantification of shear stress in the bioreactor. 2
13. Describe the consequences of shearing of plant cells. What are the means to quantify these effects. 2