

# Question Paper Code : 6453

M.Sc. (Semester-II) Examination, 2018

**BIOTECH**

[BT-201]

( Molecular Cell Biology )

Time : Three Hours]

[Maximum Marks : 70

**Note :** Answer **five** questions in all. Question **no. 1** is **compulsory**. Beside this, attempt **one** question from each Unit.

1. Answer the following questions in brief : [3x10=30]
- (a) Explain the endosymbiotic theory of cells. Give examples.
  - (b) The steroid cholesterol has different effects on membrane fluidity at different temperatures. Justify.
  - (c) Discuss a technique that can be used to monitor membrane potential.
  - (d) Why does the soluble actin in cells not polymerized into filaments even if the

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concentration of soluble actin is high ?

- (e) 14-3-3 proteins inhibit phosphorylated nitrate reductase in leaves in the dark. Discuss.
- (f) Briefly discuss the significance of Ras protein.
- (g) How are the cytosolic  $\text{Ca}^{2+}$  levels maintained inside the cell ?
- (h) Explain the immune surveillance theory.
- (i) What is replicative senescence ? Briefly describe the role of telomerase in this process.
- (j) Properties of collagen may be manipulated by controlling crosslinking of molecules. Explain.

### **Unit-I**

- 2. (a) How do changes in conductance of sodium and potassium ions across neuronal membrane bring about generation of action potential ? Never impulse is propagated on a wave of polarization, depolarization, hyperpolarization and repolarization". Explain. [7]

- (b) What are detergent resistant membranes ? Briefly discuss their properties and functional significance. [3]
3. (a) A yeast culture growing at 30°C in a rich medium was treated with N-ethylmaleimide, which is an inhibitor of glycolysis. What effect will this treatment have on the process of oxidative phosphorylation in the cells ? Is it possible for the cells to continue their normal growth ? If yes, what mechanisms will cells utilize ? Discuss in detail. [7]
- (b) Discuss the mechanism by which ion pumps maintain membrane potential, giving an example. [3]

## UNIT-II

4. (a) Filament treadmilling and dynamic instability are consequences of nucleotide hydrolysis by tubulin and actin. Explain in detail. [5]
- (b) GPCR signaling pathway is involved in the activation of phospholipase C (PLC). Discuss in detail the mechanism of activation and the downstream effects. [5]

5. (a) Discuss the roles of any five accessory proteins of the microtubule cytoskeleton. [5]
- (b) How GPCR regulate the activity of adenylyl cyclase ? Discuss in detail the pathways involved and their downstream effects. [5]

### UNIT-III

6. (a) Give details of the role of cell cycle checkpoints in the regulation of cell cycle. [6]
- (b) How do external signals affect the process of cell division ? Discuss with examples. [4]
7. Describe the structure of an eukaryotic cell. Also comment on process of mitosis. [6+4=10]

### UNIT-IV

8. (a) The p53 protein is a master regulator involved in DNA damage and repair process inside the cell. Explain the mechanism of this regulation. What is the role of Mdm2 protein in p53 regulation ? Why p53-Mdm2 interaction is an important target for cancer therapy ? [7]

- (b) How is cytochrome c involved in the mechanism of apoptosis. [3]

9. (a) What are TSTAs ? Design an experiment using Mouse model to identify genes encoding TSTAs. [6]
- (b) Discuss the death receptor initiated pathway of apoptosis in detail. [4]

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