

**M.TECH/BT/2<sup>ND</sup> SEM/BIOT 5202/2015  
2015**

**Advanced Cell Biology & Immunotechnology  
(BIOT5202)**

**Time Allotted : 3 hrs**

**Full Marks : 70**

***Figures out of the right margin indicate full marks.***

***Candidates are required to answer Group A and  
any 5 (five) from Group B to E, taking at least one from each group.***

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

**Group - A**

**(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 x 1=10**
- (i) Which one is the non-membranous organelle?  
(a) Mitochondria (b) Endoplasmic reticulum  
(c) Ribosome (d) Nucleus.
- (ii) Microfilaments are mainly composed of  
(a) Actin (b) Tubulin (c) Chitin (d) Myoglobin.
- (iii) The cellular transport system for which ATP is required is called  
(a) uniport (b) antiport (c) symport (d) active transport.
- (iv) Clathrin-coated vesicles are associated with  
(a) Exocytosis (b) Glycolysis (c) Transport of glucose (d) TCA cycle.
- (v) Membrane proteins are attached to the membrane mostly by  
(a) hydrophobic interaction (b) ionic interaction  
(c) salt-bridge (d) hydrogen bonds.
- (vi) In the cell cycle, DNA replication occurs during  
(a) G1 phase (b) G2 phase (c) S phase (d) Prophase.
- (vii) A cell divides every one minute. At this rate of division it can fill a 100 ml beaker in one hour. How much time does it take to fill a 50 ml beaker?  
(a) 30 minutes (b) 60 minutes (c) 59 minutes (d) 1 minute.
- (viii) Which of the following statement is incorrect about HAT medium?  
(a) HAT medium is a selective medium  
(b) Aminopterin in the HAT medium blocks de novo pathway  
(c) Hypoxanthine is converted to Guanine by HGPRT  
(d) Salvage pathway requires Aminopterin and Thymidine.
- (ix) p21, the protein activated by p53 on DNA damage is  
(a) Cyclin inhibitor (b) Cdk inhibitor  
(c) pro-apoptotic protein (d) anti-apoptotic protein.

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- (x) Organisms suitable for use as modified live vaccines are produced by  
(a) Inactivation (b) genetic recombination (c) attenuation d) hybridization.

### Group - B

2.(a) Define mediated and non-mediated transport. Discuss their kinetics with graphical presentation.

(b) Discuss the mode of action of Na<sup>+</sup>K<sup>+</sup>ATPase with a diagram.

**(3+4)+5=12**

3.(a) Name and describe the major translocator proteins present in mitochondria.

(b) Describe protein trafficking from cytoplasm to mitochondria.

**6+6=12**

### Group - C

4.(a) What is hormone response element?

(b) Discuss how gene expression is regulated by steroid hormones.

**3+9=12**

5.(a) What are G proteins? How G proteins are activated?

(b) Discuss the role of G proteins in signal transduction pathway induced by adrenalin hormone.

**(2+5)+5=12**

### Group - D

6.(a) Describe briefly the role of Cdk and cyclin in the G1-M transition checkpoint.

(b) What do you mean by START?

(c) Discuss the dual role of p53 in cell cycle and apoptosis.

**5+2+2=12**

7.(a) Explain the extrinsic apoptotic pathway by TNF receptor signalling.

(b) Discuss how Mitochondria plays an important role in Apoptotic pathways.

(c) What are Tight junctions? How do Gap junctions help in cell communication?

**4+4+(1+3)=12**

**Group - E**

8.(a) What are anti-idiotypic antibodies?

(b) How does a cancer cell bypass the immune surveillance?

(c) Illustrate how you can design a vaccine against a tumour cell.

**2+5+5=12**

9.(a) What are the uses of immunoelectron microscopy in immunodiagnostics?

(b) Give a comparative analysis between traditional and reverse vaccinology.

(c) Elucidate any one approach of reverse vaccinology in the post-genomics era.

**4+4+4=12**