ADVANCED CELL BIOLOGY AND IMMUNOTECHNOLOGY
(BIOT 5202)

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 × 1 = 10**

    (i)   The statement that applies for a membrane is
        (a) membrane lipids are totally hydrophobic in nature
        (b) membrane lipids rapidly change their positions across the layres
        (c) membrane lipids rapidly moves along the same layer
        (d) composition of membrane lipids in the two layers is identical.

    (ii)   Simple gases like oxygen and carbon dioxide crossing the membrane is
        (a) simple passive diffusion
        (b) facilitated diffusion
        (c) primary active transport
        (d) secondary active transport.

    (iii)   Steroid molecules
        (a) have their receptors in cytoplasm
        (b) have their receptors in nucleus
        (c) have their receptors in plasma membrane
        (d) do not have receptors

    (iv)   The term 'quiescent phase' refers to
        (a) G_1 phase   (b) G_2 phase
        (c) G_0 phase   (d) S phase.

    (v)   What is responsible for the equal distribution of replicated chromosomes into each of two daughter cells?
        (a) Mitotic spindle   (b) Random motion
        (c) Centromeres   (d) Chromatids.

(vi)   In order to enter the cell cycle a cell must be stimulated from outside. What type of molecule provides this stimulation?
(a) Cyclins
(b) Cyclin-dependent kinases
(c) Cytokines and growth factors
(d) Tyrosine kinases.

(vii)   The cell cycle of a germinal cell has
(a) two successive mitotic divisions
(b) two successive reduction divisions
(c) very short prophase in first division
(d) one reduction division followed by one mitotic division.

(viii) In hybridoma technology, which of the following cells are made deficient of HGPRT enzyme?
(a) B cells   (b) Hybrid cells
(c) Myeloma cells   (d) None of these.

(ix)   Hybridoma technology was developed by
(a) Kohler and Milstein   (b) Beadle and Tatum
(c) Khorana and Nirenberg   (d) Khorana and Kornberg

(x)   Vaccination is an example of
(a) naturally acquired active immunity
(b) artificially acquired active immunity
(c) naturally acquired passive immunity
(d) artificially acquired passive immunity

Group - B

2. (a)   Define carrier protein and channel protein.

    (b)   Carrier protein mediated transport may be active or passive but channel protein mediated transport is always passive. Justify the statement.

    (c)   Transport of glucose in the epithelial cells of GI tract is associated with transport of sodium ion. Describe the process.

(2 + 2) + 4 + 4 = 12

3. (a)   What do you mean by constitutive and regulated exocystosis?

    (b)   What are secretory vesicles? How are they triggered to fuse with plasma membrane in case of regulated exocytosis?

4 + (2 + 6) = 12

Group - C

4. (a)   An increase in calcium level in cytoplasm stimulates secretory pathways of a cell. Discuss how calcium concentration increases in a cell.

    (b)   Discuss the role of calmodulin in signal transduction process.

6 + 6 = 12

5. (a)   What is hormone response element? Discuss its role in signal transduction process.

    (b)   Discuss how cAMP dependent protein kinases are activated by cAMP.

8 + 4 = 12

Group - D

6. (a)   Give some examples where apoptosis occurs in normal human cells.

    (b)   Discuss the role of myc proteins in stimulation of mitogenic signals.

    (c)   Explain how formation of apoptosome helps in activation of caspases

4 + 4 + 4 = 12

7. (a)   What are the functions of cell cycle checkpoints?

    (b)   Explain how telomeres help in regulating cell senescence.

    (c)   Discuss the role of PDGF in stimulation of mitogenic signals.

4 + 4 + 4 = 12

Group - E

8. (a)   What do you mean by Humanized antibodies?

    (b)   Write a brief note on bispecific antibodies.

    (c)   Mention the principle of Immunofluorescence and its applications in clinical diagnostics.

4 + 4 + 4 = 12

9. (a)   What are the advantages of synthetic vaccines?

    (b)   How can you use immunotherapy to treat cancer cells?

    (c)   Discuss the applications of chimeric immunotoxins.

4 + 4 + 4 = 12