Group - E

8. (a) How can you design a DNA vaccine?

(b) How does a polyscaacharide vaccine work?

(c) Describe the applications of synthetic peptide vaccines in immunotherapy.

4 + 4 + 4 = 12

9. (a) What is sub-unit vaccine? Mention its applications.

(b) How do cancer cells escape the immune surveillance?

(c) Discuss the advantages and limitations of edible vaccines.

(2+2) + 4 + 4 = 12

M.TECH/BT/2ND SEM/BIOT 5202/2017
ADVANCED CELL BIOLOGY & 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 x 1=10**

(i) Which of the following is NOT a characteristic of a plasma membrane?
(a) Plasma membrane provides mechanical strength
(b) Plasma membrane is responsible for the synthesis of ATP
(c) Plasma membrane maintains cellular homeostasis
(d) Plasma membrane regulates passage of molecules into and out of the cell .

(ii) The protein that allows a particular molecule or ion to freely cross the plasma membrane as it enters or exists the cell is
(a) a channel protein
(b) a carrier protein
(c) a receptor protein
(d) an enzymatic protein.

(iii) Receptor type tyrosine kinases (RTKs) are targeted for cancer treatment because
(a) RTKs bind to growth factor
(b) RTKs bind to other cells
(c) RTKs bind to neurotransmitters
(d) RTKs bind to insulin.

(iv) Which of the following processes uses a carrier protein and an ATP?
(a) Simple diffusion (b) Facilitated diffusion
(c) Active transport (d) Osmosis.

(v) Proteins cross mitochondrial membranes in which of the following manner?
(a) Bound to the importing protein via a signal sequence
(b) In fully folded form
(c) In unfolded extended form attached to Hsp chaperons
(d) In unfolded form without chaperon.

(vi) In somatic cell cycle
(a) in G1 phase DNA content is double the amount of DNA present in the origin cell
(b) G2 phase follows mitotic phase
(c) a short interphase is followed by mitotic phase
(d) DNA replication takes place in S phase.

(vii) Number of mitotic divisions required to produce 128 cells from a single cell is
(a) 7 (b) 8 (c) 16 (d) 32.

(viii) Which of the following is not an example of apoptosis?
(a) Removal of cells with damaged DNA that cannot be repaired.
(b) Removal of developing neurons that fail to make profitable connections with other cells.
(c) Removal of heart muscle cells damaged by oxygen depletion following cardiac infarction.
(d) Removal of virus infected cells.

(ix) Which cellular organelles are involved in the initiation of the intrinsic pathway of apoptosis?
(a) Endoplasmic reticulum (b) Mitochondria
(c) Lysosomes (d) Peroxisomes.

(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. Discuss the role of the following proteins in transport of proteins from ER to Golgi bodies:
i) COPI,
ii) COPII,
iii) BiP / calnexin.

(4 + 4 + 4) = 12

3. (a) Describe the common structural features of sodium channels.

(b) Discuss the role of voltage-gated sodium channels in transmission of neuronal impulse.

(c) How the channels get deactivated?

4 + 5 + 3 = 12

Group - C

4. (a) How synthesis of cGMP is stimulated by peptide hormones and nitric oxide?

(b) How protein kinase C gets activated and regulate cell metabolism?

(3 + 3) + (3 + 3) = 12

5. (a) Describe the activation of JAK/STAT pathway for signal transduction by cytokines.

(b) Discuss the mechanism of inactivation of cytokine response.

6 + 6 = 12

Group - D

6. (a) Differentiate between apoptosis and necrosis.

(b) Discuss how helper T cells commit suicide during HIV infection.

(c) Explain how mitochondria play a significant role in intrinsic apoptotic pathways.

4 + 4 + 4 = 12

7. (a) What do you mean by G0 phase?

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

(c) Explain the role of cyclin and cdk in regulation of cell cycle progression.

2 + 5 + 5 = 12