Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (BT)/SEM-2/MBT-202/2011

2011

CELL BIOLOGY & IMMUNOLOGY

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) The foetus can be considered as

a) allograft b) xenograft

c) heterograft d) isograft.

ii) The elimination of self-reactive *T* cells form the Thymus is called

a) negative selection b) positive selection

c) clonal selection d) apoptosis.

iii) β2-Microglobulin is an integral part of

a) IgM b) MCH Class I

c) MHC Class II d) *T* cell receptor.

iv) The major force linking antigen to antibody is

a) Hydrogen bonds b) Covalent bonds

c) Hydrophobic bonds d) Ionic bonds.

v) Philadelphia chromosome is observed in

a) Chronic myelocytic leukemia

b) Burkitt's lymphoma

c) Wilm's tumor

d) Retinoblastoma.

vi) An example of tumour-suppressor gene is

a) Rb b) myc

c) abl d) ras.

vii) Kinetochore help is in

a) spindle attachment b) apoptosis

c) centrosome formation d) G1-S transition.

viii) Which of the following statement's is true for a second messenger ?

a) Second messenger is a cyotplasmic protein that helps in signal transduction

b) Second messenger is a membrane protein that helps in signal transduction

c) Second messenger is a small molecule in the cytoplasm the helps in signal transduction

d) Second messenger is a small molecule attached to plasma membrane that helps in signal transduction.

ix) JAK-STAT pathways is associated with signal transduction through

a) direct diffusion

b) enzyme-linked receptor

c) *G*-protein linked receptor

d) intracellular receptor.

x) HRE is present in the

a) cytoplasm b) DNA

c) plasma membrane d) RNA.

xi) The technique for isolation and identification of a particular protein from a mixture is called

a) Southern blotting b) Northern blotting

c) Western blotting d) None of these.

xii) FACS is the abbreviation for

a) Fluorescence Activated Cell Sorter

b) Fluorescence Activated Cell Stimulator

c) Fluorescence Activated Cell Sequencer

d) Fluorescence Activated Cytotoxicity Stimulator.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. a) Distinguish between apoptosis and necrosis. 3

b) Mention two important cellular characteristics of a cancer cell. 2

3. a) What is the origin of the term "Caspase" ? 1

b) Describe the Caspase activation pathway by apoptosome formation. 4

4. What is RIA ? Describe the principle and the procedure in brief. 1 + 4

5. Discuss the role of calcium as the second messenger.

6. Describe the change in gene expression by MAP Kinase pathway.

7. Explain the dynamic instability property of spindle microtubules.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. a) Explain the formation of kappa light chain by V-D-J recombination. 5

   b) What do you mean by antibody affinity and antibody avidity ? 4

   c) Explain with a suitable diagram the structure of a typical antibody molecule. 4

   d) Define the following :

   Immunogen, Hapten. 1 + 1

9. a) Distinguish between the structural features of MHC – I and MHC – 2. 3

b) Define the following : Isograft, Allograft, Xenograft, Autograft. 4 × 1

c) Write a short account on Graft Versus Host Disease (GVHD). 4

d) Illustrate the classical complement pathways in the immune system. 4

10. a) Site an example of proto-oncogene activation by point mutation. 5

b) How dose a cell become cancerous if there is a mutation in the Rb gene ? 5

c) "p53 has a dual role in cell cycle as well as a tumor suppressor gene." Justify the statement. 5

11. a) What do you mean by passive and active immunization ? 2 + 2

b) Discuss the basic principle behind the use of live attenuated bacteria or virus for vaccination. 5

c) Name two bacteria against which attenuated vaccines are used. 2

d) Discuss how synthetic peptide can be used for vaccination. 4

12. a) What is primary immunodeficiency ? 2

b) Name a disease caused by primary immunodeficiency. 1

c) With a diagram, discuss the reproduction of an AIDS virus after entering in the CD4+ cell. 7

d) Discuss the mode of action of the anti-AIDS drug AZT and its side effects. 5

13. a) Discuss the role of autoimmunity in rheumatoid arthritis and insulin dependent diabetes mellitus. 5 + 5

b) Discuss the therapeutic approach for treatment of autoimmune diseases. 5