Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech-BT(NEW)/SEM-6/BT-602/2013

2013

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 × 1 = 10

i) C3 is cleaved to form C3a and C3b by C3 convertase.

C3b is involved in all of the following *except*

a) altering vascular permeability

b) promoting phagocytosis

c) forming alternative-pathway C3 convertase

d) forming C5 convertase.

ii) A primary immune response in an adult human requires approximately how much time to produce detectable antibody levels in the blood ?

a) 12 hours b) 3 days

c) 1 week d) 3 weeks.

iii) An antibody directed against the idiotypic determinants of a human IgG antibody would react with

a) the Fc part of the IgG

b) an IgM antibody produced by the same plasma cell that produced the IgG

c) all human kappa chains

d) all human gamma chains.

iv) The structural basis of blood group *A* and *B* antigen specificity is

a) a single terminal sugar residue

b) a single terminal amino acid

c) multiple differences in the carbohydrate portion

d) multiple differences in the protein portion.

v) Lysozyme

a) is a cytoplasmic organelle

b) activates complement

c) is a proteolytic enzyme

d) splits peptidoglycan.

vi) Natural killer (NK) cells do not

a) respond to interferon

b) contain perforin

c) contain tumor necrosis factor (TNF)

d) kill only by damaging the target cell outer membrane.

vii) A complement component which is strongly chemotactic for neutrophils is

a) C9 b) C5a

c) C3 d) C3b.

viii) Intracellular parasites within macrophages are killed more readily in the presence of

a) Antibody b) Properdin

c) Kinins d) Gamma-interferon.

ix) The elimination of the self-reactive *T* cells in the Thymus is called

a) negative selection b) positive selection

c) clonal selection d) clonal energy.

x) The epitopes formed by an antibody antigen-binding site are called

a) Isotypes b) Allotypes

c) Haplotypes d) Idiotypes.

xi) One problem associated with the use of modified live vaccines is

a) Toxicity b) Muscle pain

c) Encephalitis d) Residual virulence.

xii) Immune complexes cause hypersensitivity by stimulating

a) IgG production

b) *T* cells

c) Neutrophil invasion

d) Eosinophil invasion.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Explain the role of external physical barriers against pathogen attack.

3. a) What is Arthus reaction ?

b) How is hypersensitivity reaction type III treated ?

$2\frac{1}{2} + 2\frac{1}{2}$

4. Discuss the MHC Class II-peptide interaction leading to antibody secretion.

5. Explain the mechanism of Immunoelectrophoresis and its applications.

6. What is a cytokine ? Define monokine, lymphokine, interleukin and colonystimulating factor. 1 + 4

GROUP – C
(Long Answer Type Questions)

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

7. a) What is super-antigen ? 2

   b) Define clonal abortion. 1

   c) Discuss the mechanism of a bacterium bypassing the immune system. 3

   d) What are the roles of Interferons during a viral infection ? 3

   e) Briefly describe the initiation phase of Lectin-dependent complement activation. 3

   f) Discuss the action of Pepsin and Papain on antibody structure. 3

8. a) IgM is present in the body both as secretory and membrane-bound forms. Explain the mechanism behind the phenomenon. 5

   b) What are the forces acting on antibody interactions ? 5

   c) Briefly illustrate the different types of ELISA techniques. 5

9. What is a vaccine ? Briefly describe and contrast active and passive immunization. Describe the major differences between inactivated and attenuated vaccines. Discuss the advantages and disadvantages of using attenuated microorganisms as vaccines. Give the three types of purified macromolecules that are currently used as vaccines. What are some advantages and some disadvantages of genetically engineered vaccines ? 2 + 3 + 3 + 2 + 3 + 2

10. What is an autoimmune disease and how might it develop ? What is an immunologically privileged site and how is it related to transplantation success ? How does a tissue rejection reaction occur ? Describe an immunodeficiency. How might immunodeficiencies arise ? 4 + 3 + 3 + 5

11. Distinguish between BCR and TCR. What is the experimental basis of joining of immunoglobulin genes ? What are the applications of monoclonal antibody ? What are the functions of complement ? How does normal cells evade from complement mediated lysis ? Describe the lectin pathway of complement activation. 2 + 4 + 2 + 2 + 2 + 3

12. Why O (–) blood group is considered as the universal donor ? What are inbred mice ? How are the *T* cells activated ? What is the importance of MLR and CTL assays in transplantation ? What is the mechanism of immune tolerance ? 3 + 2 + 4 + 3 + 3