

IMMUNOLOGY
(BTC3201)

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

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

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) The initial complement component activated by complement-fixing antibodies
 - (a) C1r
 - (b) C1s
 - (c) C3b
 - (d) C1q
- (ii) The intermolecular forces which contribute to the interaction between antibody and antigen:
 - (a) Are all electrostatic
 - (b) Are all van der waals forces
 - (c) Are all hydrogen bonds
 - (d) All of the above
- (iii) Binding of antigen to antibody
 - (a) is usually unaffected by molecular rigidity
 - (b) is optimized by spatial complementarity
 - (c) involves covalent bonding
 - (d) is usually unaffected by pH
- (iv) Which of the following statements does not apply to IgG?
 - (a) Appears early in the primary immune response
 - (b) Neutralizes bacterial toxins
 - (c) Crosses the human placenta
 - (d) Opsonizes bacteria
- (v) Recombination of V, D and J Ig gene segments
 - (a) Only occurs in mature B-cells
 - (b) Only occurs in light chains
 - (c) Involves heptamer-spacer-heptamer flanking sequences
 - (d) Is effected by recombinase enzymes
- (vi) Transplanted graft may be rejected due to
 - (a) cell-mediated immune response
 - (b) humoral immune response
 - (c) innate immune response
 - (d) passive response

- (vii) Graft vs host disease occurs on injecting adult T-cells of strain A into:
 (a) F1(A × B) animals (b) Unirradiated strain B
 (c) Irradiated strain A (d) Cultures of lymphocytes from strain B
- (viii) Which of the following diseases has been completely eradicated worldwide?
 (a) Measles (b) Cowpox
 (c) Smallpox (d) Tuberculosis
- (ix) Anaphylaxis can be triggered by cross- linking of Ig E receptors on:
 (a) Monocytes (b) Neutrophil
 (c) Eosinophil (d) Mast cells
- (x) What are the major effector molecules involved in type IV hypersensitivity reactions?
 (a) Complement components (b) Cytokines
 (c) Antibodies (d) Prostaglandins

Fill in the blanks with the correct word

- (xi) The first Ig heavy chain class to be expressed on the surface of a newly produced B-cell is _____.
- (xii) Using only random VDJ recombination, from 40 V, 30 D and 6 J gene segments, the number of possible variable regions of an antigen receptor molecule would be _____.
- (xiii) In agglutination reactions, the antigen is a _____, and in precipitation reactions, the antigen is a _____.
- (xiv) _____ immunoglobulin can cross the placenta.
- (xv) Macrophage present in liver is known as _____.

Group - B

2. (a) Illustrate with a diagram how innate immunity is critical to adaptive immune response. [[CO1](Apply/IOCQ)]
 (b) Discuss about factors of innate immunity along with its mode of action. [[CO1](Remember/LOCQ)]
 (c) Discuss about the innate immunity in terms of (i) species immunity, (ii) racial immunity and (iii) individual immunity. [[CO1](Understand/LOCQ)]
4 + 4 + 4 = 12
3. (a) Decipher how B cells produce antibodies via T dependent and T independent antigens? [[CO1](Evaluate/HOCQ)]
 (b) Distinguish between haptens and antigens. [[CO1](Apply/IOCQ)]
 (c) What are the various factors that determine antigenicity? [[CO1](Understand/LOCQ)]
4 + 4 + 4 = 12

Group - C

4. (a) Describe the formation of mature kappa light chain by genetic recombination. [[CO2](Remember/LOCQ)]

- (b) Analyze how Somatic Hypermutation plays an important role in generating antibody diversity. [[C02](Analyze/IOCQ)]
- (c) Give a brief description of the Radio Immunoassay technique (RIA). [[C02](Describe/LOCQ)]
- 4 + 4 + 4 = 12**
5. (a) Discuss how HAT medium is used as a selection tool in MAb production. [[C03](Understand/LOCQ)]
- (b) Evaluate with examples how antibody engineering techniques can be used towards targeted therapy. [[C03](Justify/HOCQ)]
- (c) Explain the mechanism of action of Ouchterlony Double Immunodiffusion (ODD). [[C03](Understand/LOCQ)]
- 4 + 4 + 4 = 12**

Group - D

6. (a) Compare the structural and functional aspects of MHC Class I and Class II. [[C03](Compare/IOCQ)]
- (b) Explain briefly the principle of a cross-matching test. [[C04](Remember/LOCQ)]
- (c) Describe the role of Proteasome in antigen processing and presentation. [[C04](Remember/LOCQ)]
- 4 + 4 + 4 = 12**
7. (a) Discuss the different types of immunosuppressive drugs. [[C04](Analyse/HOCQ)]
- (b) Why is the human foetus not rejected as an allograft? [[C04](Justify/HOCQ)]
- (c) Write a brief note on the transplantation antigens. [[C04](Remember/LOCQ)]
- 4 + 4 + 4 = 12**

Group - E

8. (a) Explain graphically the stages of HIV infection. [[C05](Analyze/IOCQ)]
- (b) What is meant by negative and positive selection of T cells? [[C05](Apply/IOCQ)]
- (c) Describe the mode of action of the following vaccines: (i) Toxoid vaccines, (ii) Conjugate vaccines and (iii) Vaccine adjuvant. [[C06](Understand/LOCQ)]
- 4 + 4 + 4 = 12**
9. (a) What are edible vaccines? Describe the mode of action of edible vaccines. [[C06](Apply/IOCQ)]
- (b) Distinguish between inactivated and attenuated vaccines. [[C06](Analyze/IOCQ)]
- (c) What is the mechanism behind Graves' and Myasthenia Gravis disease? [[C05](Apply/IOCQ)]
- 4 + 4 + 4 = 12**

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	45.83	37.50	16.67

