

IMMUNOLOGY
(BIOT 3201)

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) Name the cytokines which released in response to virus infection?
(a) Interferons (b) Monokines
(c) Lymphokines (d) Interleukins.
- (ii) Which of the following is characteristic of B-but not T-cells?
(a) Class-I MHC (b) CD3
(c) Measles virus receptor (d) Surface immunoglobulin.
- (iii) The initial complement component that is bound by complement fixing antibodies is
(a) C1q (b) C3b (c) C9 (d) C5a.
- (iv) IgE
(a) is abundant in saliva (b) binds strongly to Mast cells
(c) activates the complement cascade (d) cannot bind to macrophages.
- (v) Clonal selection occurs when antigen is encountered by
(a) T cells (b) Basophils
(c) Neutrophils (d) Mast cells.
- (vi) A hapten is a/an
(a) epitope
(b) paratope
(c) Immunogen
(d) small chemical grouping which reacts with preformed antibodies.
- (vii) 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.

- (viii) Hepatitis is an example of _____
- (a) Subunit Vaccine (b) Killer Vaccine
(c) Toxoids Vaccine (d) Recombinant Vaccine.
- (ix) Which of the following cells of the immune system do not perform phagocytosis?
(a) Macrophage (b) Neutrophil
(c) Eosinophil (d) Basophil.
- (x) The association constant (k_a) at equilibrium is represented by
(a) $\frac{[AgAb\ complex]}{[free\ Ag][free\ Ab]}$ (b) $[AgAb\ complex]$
(c) $\frac{[free\ Ag]}{[free\ Ab]}$ (d) $[free\ Ag][free\ Ab]$.

Group- B

2. (a) Analyse the different processes involved in cell mediated immunity and antibody mediated immunity. *[[CO1)(Analyze/IOCQ]]*
(b) Discuss and classify the different types of acquired immunity. *[[CO1)(Applying/IOCQ]]*
(c) Discuss the main principle behind how ADCC works. *[[CO1)(Applying/IOCQ]]*
4 + 4 + 4 = 12
3. (a) Explain what do you mean by antibody affinity and antibody avidity. *[[CO1)(Understand/LOCQ]]*
(b) Justify the role of NK cells as 1st line of defence and their nonspecific function. *[[CO1)(Evaluate/IOCQ]]*
(c) Describe in detail how HCG works for pregnancy testing. *[[CO1)(Applying/IOCQ]]*
4 + 4 + 4 = 12

Group - C

4. (a) Describe the formation of mature antibodies by B-cell activation. *[[CO4)(Remember/LOCQ]]*
(b) Analyze the phenomenon of class switching between antibody isotype formation. *[[CO2)(Analyze/IOCQ]]*
(c) Give a comparative evaluation between Indirect, Competitive and Sandwich ELISA. *[[CO3)(Evaluate/HOCQ]]*
4 + 4 + 4 = 12
5. (a) Discuss how HAT medium was used as a selection tool in MAb production. *[[CO3)(Understand/LOCQ]]*
(b) Evaluate with examples how antibody engineering can be used towards more targeted therapy. *[[CO3)(Justify/HOCQ]]*
(c) Explain the mechanism of action of Ouchterlony Double Immunodiffusion (ODD). *[[CO3)(Understand/LOCQ]]*
4 + 4 + 4 = 12

Group - D

6. (a) Give a comparative analysis between MHC Class I and Class II. [[CO4](Differentiate/IOCQ)]
 (b) Illustrate the role of Proteasome in antigen processing. [[CO4](Analyze/IOCQ)]
 (c) Analyze the formation of mature Class-II MHC molecules inside the endocytic vesicle. [[CO4](Analyze/IOCQ)]
4 + 4 + 4 = 12
7. (a) Define: Isograft, Allograft, Autograft, Xenograft. [[CO4](Understand/LOCQ)]
 (b) Evaluate the role of immunosuppressive drugs in organ transplantation. [[CO4](Evaluate/HOCQ)]
 (c) Analyze with reasons why the foetus is not rejected as an allograft. [[CO4](Analyze/IOCQ)]
4 + 4 + 4 = 12

Group - E

8. (a) Explain how tumours escape immunoservillence. [[CO5](Remember/LOCQ)]
 (b) Distinguish between the four types of hypersensitivities in terms of their mode of action. [[CO5](Understand/LOCQ)]
 (c) Describe the functions of tumour antigens. [[CO5](Analyze/IOCQ)]
4 + 4 + 4 = 12
9. (a) Explain the pathway leading to T-cell Anergy. [[CO5](Analyze/IOCQ)]
 (b) Discuss the processes of Central B-cell and Peripheral B-cell tolerance and also discuss how they are different. [[CO5](Evaluate/HOCQ)]
 (c) Differentiate between One-step and Two-step activation of T-cells. [[CO5](Understand/LOCQ)]
4 + 4 + 4 = 12

<i>Cognition Level</i>	<i>LOCQ</i>	<i>IOCQ</i>	<i>HOCQ</i>
<i>Percentage distribution</i>	<i>33.33</i>	<i>50</i>	<i>16.67</i>

Course Outcome (CO):

After completing the course, the students will be able to:

1. Understand the basic principles of innate and adaptive immunity and the underlying mechanisms of cellular and humoral immune responses.
2. Develop an idea about structure, biogenesis, function and molecular diversity of different antibody classes.
3. Apply the techniques of antibody engineering and antigen-antibody reactions in disease diagnostics and research.

4. Analyze the role of MHC molecules in transplantation and the diseases due to their incompatibility.
5. Understand the immunological basis of hypersensitivity, autoimmunity and immunodeficiency disorders.
6. Gain knowledge about different approaches of vaccine development and their applications in human diseases.

**LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question*