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) A living microbe with reduced virulence that is used for vaccination is called
(a) toxoid (b) virulent
(c) attenuated (d) denatured.

(ii) Fc region is involved in
(a) cell surface receptor binding (b) complement activation
(c) diffusivity of antibody molecule (d) all of these.

(iii) Removal of the bursa of fabricius from a chicken results in
(a) a markedly decreased number of circulating T lymphocytes
(b) anaemia
(c) delayed rejection of skin graft
(d) low serum levels of antibodies in serum.

(iv) Clonal selection occurs when antigen is encountered by
(a) T-cells (b) neutrophils
(c) mast cells (d) basophils.

(v) Light chains and heavy chains are joined by
(a) covalent bond (b) hydrogen bond
(c) disulphide bond (d) ionic bond.

(vi) A hybridoma is a cell formed by the fusion of
(a) T cell with a myeloma cell
(b) macrophage with a myeloma cell
(c) T cell with a B cell
(d) plasma cell with a myeloma cell .

(vii) The major clinical problem associated with bone marrow transplants is
(a) contact dermatitis (b) allograft rejection
(c) graft arteriosclerosis (d) graft-versus-host disease.

(viii) The ability to distinguish between self-cells and non-self-cells can lead to
(a) hypersensitivity (b) auto-immune disease
(c) immunodeficiency (d) tolerance.

(ix) Kupffer and microglia phagocytes are found in
(a) muscle and liver (b) liver and brain
(c) skin and liver (d) none of the above.

(x) Type IV hypersensitivity is also called
(a) immediate hypersensitivity
(b) delayed hypersensitivity
(c) cytotoxic hypersensitivity
(d) immune complex hypersensitivity.

Group – B

2. (a) How do anti-microbial proteins help in immune defence mechanism?

(b) Describe the pathways of complement fixation.

(c) Explain the reasons for fever and how C-reactive protein acts as a biomarker for determination of inflammation.

2 + 5 + 5 = 12

3. (a) Describe the inflammation process in immune response.

(b) What is innate immunity? Describe the functions of its different components.

(c) Describe the functions of primary and secondary lymphoid organs.

5 + 5 + 2 = 12

Group – C

4. (a) Explain how infinite amount of diversity is produced from finite amounts of germline antibody DNA.

(b) Discuss the role of alternate splicing in generating membrane-bound and secretory forms of IgM.

(c) During antibody formation, a V region gene always joins with a J region gene. How is this accomplished?

4 + 4 + 4 = 12

5. (a) What are the end products of antibodies after digestion with pepsin and papain?

(b) What are hetero-conjugate antibodies? Mention their applications.

(c) Discuss the principle of radial immunodiffusion technique.

4 + (2 + 2) + 4 = 12

Group – D

6. (a) Illustrate the B cell activation process by MHC Class-II molecules.

(b) How can you develop an inbred strain of mice?

(c) Analyse the immunological basis of Haemolytic Disease of a newborn.

4 + 4 + 4 = 12

7. (a) Define:
(i) Isograft (ii) Autograft (iii) Allograft (iv) Xenograft.

(b) Discuss the mode of action of immunosuppressive drugs.

(c) What is the immunological basis of ABO blood grouping?

(1 × 4) + 4 + 4 = 12

Group – E

8. (a) Write a brief note on Rheumatoid Arthritis.

(b) What are the reasons behind autoimmune haemolytic anaemia?

(c) A technician in a snake venom-producing farm, being careless one day, was bitten by a rare lethal Egyptian cobra. He was rushed to the emergency department, and a call went out immediately for antivenom serum. Fortunately some was located, and within 5 hours he was given 15 ml intravenous serum. The next day he received another 10 ml, the last available. Within days he was well on the way to recovery and left the hospital a week later. He returned 10 days after leaving the hospital complaining of joint pain, fever, and recurrent itchy hives on his trunk, arms, and legs. What do you suspect is happening, and how would you confirm it?

4 + 4 + 4 = 12

9. (a) Explain the mechanism of B cell deficiency with an example.

(b) What are tumour-specific antigens?

(c) Illustrate with an example how you can design a vaccine against cancer cells.

4 + 3 + 5 = 12