

**B.Sc. BIOTECHNOLOGY**  
**Fifth Semester**  
**IMMUNOLOGY**  
**(BBT - 22)**

**Duration: 3Hrs.**

**Full Marks: 70**

Part-A (Objective) =20  
Part-B (Descriptive) =50

**(PART-B: Descriptive)**

**Duration: 2 hrs. 40 mins.**

**Marks: 50**

**Answer any *five* of the following questions:**

1. Describe the characteristics of innate immunity and acquired immunity. Explain the concepts of antigen processing and presentation with a suitable diagram. (5+5=10)
2. Describe the structure and function of the thymus and spleen. (5+5=10)
3. What are the different forces acting on an antigen-antibody interactions/binding? What is cross reactivity? Differentiate between affinity and avidity? (5+1+4=10)
4. Explain the different classes of antibodies and their role in immunity. (10)
5. Define antigens, immunogenicity and antigenicity and epitopes. What are the factors that influence immunogenicity? (4+6=10)
6. Why antigen processing and presentation is important? How differently B cells and T cells interact with antigen? Explain cytosolic pathway of antigen processing. (2+2+6=10)
7. Explain the principle of competitive ELISA. A patient is suffering from an allergic condition (type I hypersensitive reaction). What type of antibody will increase during this condition? What experiment will you design to prove the presence of that antibody? (5+1+4=10)

8. Write short notes on any *two*:

(5+5=10)

- a) Classical pathway of Complement activation.
- b) Adjuvants and its types.
- c) Systemic Lupus Erythematosus.
- d) Type III Hypersensitivity.
- e) Cytokines.

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**Duration: 20 minutes**

**Marks – 20**

**(PART A- Objective Type)**

**I. Choose the correct answer:**

**1×20=20**

- i. An Epitope associates with which part of an antibody molecule?
  - a) The antibody binding site
  - b) the H – chain constant region
  - c) V – regions of H and L – chain combined
  - d) the L – chain constant region
- ii. The membrane attack complex consists of:
  - a) OH
  - b) Colicins
  - c) C3b3b,Bb
  - d) C5b, 6, 7, 8, 9
  - e) Properdin
- iii. Plasma cell secretes:
  - a) Antibody of a single specificity related to that on the surface of the parent B-cell.
  - b) Antibody of two antigen specificities.
  - c) The antigen it recognizes.
  - d) Many different types of antibody.
  - e) Lysozyme.
- iv. Which of the following is the site for T cell maturation?
  - a) Bone marrow
  - b) Thymus
  - c) Spleen
  - d) Liver
- v. Secondary antibody responses are better because:
  - a) They provide defense against unrelated antigens.
  - b) The antibody can be made by both T and B cells.
  - c) Complement-fixing antibodies are made.
  - d) They do not require T-cell help.
  - e) They are stronger and faster.
- vi. Complementarity determining regions:
  - a) Are restricted to light chains.
  - b) Are in the constant part of the Ig molecule.
  - c) Bind to Fc receptors.
  - d) Are concerned in antigen recognition.
  - e) Occur at the C-terminal end of the Ig peptide chains.
- vii. Ig idiotypes are found:
  - a) In the constant region of the heavy chain
  - b) In the constant region of the light chain
  - c) In the hinge region
  - d) In the variable region of both heavy and light chains
  - e) Only in the light chain.

- viii. T cell surface receptors for antigen partly recognize:  
a) Cytokines                      b) MHC                      c) ADCC                      d) Antibody                      e) IL-2
- ix. Haptens cannot activate T or B cells because –  
a) Of its low molecular weight                      b) Its inability to bind to MHC  
c) Both (a) and (b)                      d) none of these
- x. Alternate pathway of complement system is activated by –  
a) Antigen-antibody complexes                      b) Antigen  
c) Microorganisms or its toxins                      d) Antigen bound to MHC
- xi. Injection of anti-venom to a patient for snake bite is an example of:  
a) Naturally acquired active immunity                      b) Artificially acquired active immunity.  
c) Naturally acquired passive immunity                      d) Artificially acquired passive immunity.
- xii. Vaccination is an example of:  
a) Naturally acquired active immunity                      b) Artificially acquired active immunity  
c) Naturally acquired passive immunity                      d) Artificially acquired passive immunity
- xiii. Primary lymphoid organs include:  
a) Thymus and spleen                      b) Thymus and bone marrow.  
c) Thymus, bone marrow and spleen                      d) Thymus, bone marrow, spleen and lymph nodes
- xiv. Activation of B cell receptor by the binding of an epitope result in the formation of :  
a) plasma cells and T cytotoxic cells.  
b) memory cells and T cytotoxic cells.  
c) Plasma cells for antibody production and memory cells for primary response.  
d) Plasma cells for antibody production and memory cells for secondary response.
- xv. Antibodies are:  
a) proteins                      b) glycoproteins  
c) carbohydrates                      d) nucleic acid
- xvi. The hypervariable region resides in the:  
a) N terminal region of light chain.  
b) N-terminal region of light and heavy chain.  
c) C-terminal region of light chain.  
d) C-terminal region of light chain and heavy chain.
- xvii. Mast cells have receptor for:  
a) IgE                      b) IgA                      c) IgG                      d) IgM
- xviii. Secondary immune response is generated due to:  
a) naive B cells                      b) memory cells  
c) naive T cells                      d) NK cells
- xix. Immunologic memory is provided by –  
a) B cells                      b) T cells  
c) Both (a) and (b)                      d) macrophages

xx. Newborns get their antibodies from mother's milk. This is an example of:

- a) Naturally acquired active immunity.
- b) Artificially acquired active immunity.
- c) Naturally acquired passive immunity.
- d) Artificially acquired passive immunity.

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