

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST -2 EXAMINATION- 2023  
B.Tech-V Semester (BT)

Course Code (Credits): 18B11BT513 (4)

Max. Marks: 25

Course Name: Immunology

Course Instructors: Dr. Abhishek

Max. Time: 1 Hour 30 Minutes

**Note:** (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

1. Antigen processing provides the host with a means of scanning the molecules constantly being produced and turned over in the body. With respect to protein antigens, there are two major pathways of antigen processing the exogenous processing pathway and the endogenous processing pathway. Illustrate both the pathway in detail with suitable example. Also write down the concept of active immunity and its relation with exogenous and endogenous pathway [5] [CO-1]
2. For each immunoglobulin isotype (a–e) select the description(s) listed below (1–5) that describe that isotype. Each description may be used once, more than once, or not at all; more than one description may apply to some isotypes. [5] [CO-2]

**Isotypes:**

- a. IgA                      b. IgE                      c. IgM                      d. IgD                      e. IgG

**Descriptions:**

- (1) Binds to Fc receptors on mast cells
  - (2) The most abundant isotype in serum
  - (3) Plays an important role in immediate hypersensitivity
  - (4) Multimeric forms may contain a secretory component
  - (5) Least abundant isotype in serum
3. Because immunoglobulin molecules possess antigenic determinants, they themselves can function as immunogens, inducing formation of antibody. For each of the following immunization scenarios, indicate whether anti-immunoglobulin antibodies would be formed to isotypic (IS), allotypic (AL), or idiotypic (ID) determinants: [5] [CO-2]
    - a. Anti-DNP antibodies produced in a BALB/c mouse are injected into a C57BL/6 mouse.
    - b. Anti-BGG monoclonal antibodies from a BALB/c mouse are injected into another BALB/c mouse.
    - c. Anti-BGG antibodies produced in a BALB/c mouse are injected into a rabbit.
    - d. Anti-DNP antibodies produced in a BALB/c mouse are injected into an outbred mouse.
    - e. Anti-BGG antibodies produced in a BALB/c mouse are injected into the same mouse.

4. Indicate whether each of the following statements is true or false. In both the cases whether statement is true or false, explain why. [5] [CO-3]
- A large protein antigen generally can combine with many different antibody molecules.
  - A hapten can stimulate antibody formation but cannot combine with antibody molecules.
  - MHC genes play a major role in determining the degree of immune responsiveness to an antigen.
  - Both TH and TC cells recognize antigen that has been processed and presented with an MHC molecule.
  - Antibodies can bind hydrophilic or hydrophobic compounds, but T-cell receptors can only bind peptide-MHC complexes but T-cell receptors can only bind peptide-MHC complexes.
5. Antibodies are proteins that protect patient body when an unwanted substance enters your body. Produced by immune system, antibodies bind to these unwanted substances in order to eliminate them from your system. There are five major class of immunoglobulin molecule (IgG, IgM, IgD, IgA, IgE). Draw a neat labeled diagram of IgG molecule and explain the structure of immunoglobulin. Also write down the structural difference between IgM and IgG molecule. [5] [CO-2]