

Jaypee University of Information Technology, Waknaghat  
T-3 Examination- 2023

B.Tech- V Semester (Biotechnology)

Course Code (Credits): 18B11BT513 (4)

Max. Marks: 35

Course Name: Immunology

Course Instructors: Dr. Abhishek

Max. Time: 2 Hour

*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. Vaccine development begins with basic research. Recent advances in immunology and molecular biology have led to effective new vaccines and to promising strategies for finding new vaccine candidates. Knowledge of the differences in epitopes recognized by T cells and B cells has enabled immunologists to begin to design vaccine candidates to maximize activation of both arms of the immune system. (3+2+3) [CO-5, CO-1]
  - a. Proposed a mechanism of multi-epitope based subunit vaccine development to elicit a protective immune response against different disease.
  - b. Discuss the importance of adjuvant in vaccine development
  - c. What would be the disadvantages of having only an passive immunity? Comment on how possession of both types of immunity (active and passive) enhances protection against infection.
2. Autoimmune diseases involving direct cellular damage occur when lymphocytes or antibodies bind to cell-membrane antigens, causing cellular lysis and/or an inflammatory response in the affected organ. Gradually, the damaged cellular structure is replaced by connective tissue (scar tissue), and the function of the organ declines. (3+3) [CO-4]
  - a. In similar conditions a patient produces auto-antibodies that bind the receptor for TSH and mimic the normal action of TSH activating adenylate cyclase and resulting in production of the thyroid hormones.
  - b. If patient produces auto-antibodies that bind the acetylcholine receptors on the motor end-plates of muscles and blocking the normal binding of acetylcholine  
What disease your are expecting in both the cases and how autoantibody regulating the hormone concentration and disease progression.
3. Hypersensitivity as an immunological dysfunction is defined as exaggerated or inappropriate response of the immune system, which is mostly targeted at innocuous antigens with consequent tissue damage. Hypersensitivity can be classified into four types; namely, type I, type II, type III, and type IV hypersensitivity. Detail out the mechanism of all four type of hypersensitive reactive and possible treatment of such reactions and also mention the role of complement pathway in hypersensitive reactions (2+2+2+2+1) [CO-5]

4. The biological activities of this system affect both innate and acquired immunity and reach far beyond the original observations of antibody mediated lysis of bacteria and red blood cells. Structural comparisons of the proteins involved in complement pathways place the origin of this system in primitive organisms possessing the most rudimentary innate immune systems. Outlines the different pathways of complement activation with neat and clean diagram and which portion of the overall activation sequence differs in the three pathways? Which portion is similar? [6] [CO-3]
5. Draw diagrams illustrating the general structure, including the domains, of class I MHC molecules, class II MHC molecules, and membrane-bound antibody on B cells. Label each chain and the domains within it, the antigen-binding regions, and regions that have the immunoglobulin-fold structure. (6) [CO-2]

T-3 Examinations Dec 2023