

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Test -3 Examinations -2022

M.Sc-II Semester (BT)

Course Code (Credits): 20MS1BT212 (3)

Max. Marks: 35

Course Name: Immunology

Course Instructors: Dr. Abhishek

Max. Time: 2 Hours

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

- Q1. How might an arthropod, such as a cockroach or beetle, protect itself from infection? In what ways might the innate immune responses of an arthropod be similar to those of a plant and how might they differ? [3]
- Q2. Considering only combinatorial joining of gene segments and association of light and heavy chains, how many different antibody molecules potentially could be generated from germ-line DNA containing 500 V_L and 4 J_L gene segments and 300 V_H , 15 D_H , and 4 J_H gene segments? [4]
- Q3. 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]
- Q4. Complement activation can occur via the classical, alternative, or lectin pathway. [6]
- How do the three pathways differ in the substances that can initiate activation?
 - Which portion of the overall activation sequence differs in the three pathways? Which portion is similar?
 - How do the biological consequences of complement activation via these pathways differ?
- Q5. A young girl who had never been immunized to tetanus stepped on a rusty nail and got a deep puncture wound. The doctor cleaned out the wound and gave the child an injection of tetanus antitoxin. [4]
- Why was antitoxin given instead of a booster shot of tetanus toxoid?
 - If the girl receives no further treatment and steps on a rusty nail again 3 years later, will she be immune to tetanus?
- Q6. Treatments with combinations of anti-HIV drugs have reduced virus levels significantly in some treated patients and delayed the onset of AIDS. If an AIDS patient becomes free of opportunistic infection and has no detectable virus in the circulation, can that person be considered cured? Explain in detail [3]

- Q7. Molecular mimicry is one mechanism proposed to account for the development of autoimmunity. How has induction of Experimental autoimmune encephalitis (EAE) with myelin basic protein contributed to the understanding of molecular mimicry in autoimmune disease? [3]
- Q8. Explain the difference between antibody affinity and antibody avidity. Which of these properties of an antibody better reflects its ability to contribute to the humoral immune response to invading bacteria? [2]
- Q9. You are given two solutions, one containing protein X and the other containing antibody to protein X. When you add 1 ml of anti-X to 1 ml of protein X, a precipitate forms. But when you dilute the antibody solution 100-fold and then mix 1 ml of the diluted anti-X with 1 ml of protein X, no precipitate forms. [4]
- Explain why no precipitate formed with the diluted antibody.
 - Which species (protein X or anti-X) would likely be present in the supernatant of the antibody-antigen mixture in each case?

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