

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATIONS-2022

M.Sc-II Semester (BT)

COURSE CODE: 20MS1BT212

COURSE NAME: Immunology

COURSE CREDITS: 3

Coordinator: Dr. Abhishek

MAX. MARKS: 25

MAX. TIME: 1 Hour 30 Min

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

- Q1. Secondary lymphoid organ like MALT and GALT have a strong mucus layer, elucidate the mechanism of immunoglobulin transport across such mucus membrane layer because there is a strong probability of immunoglobulin entrapment in the mucus and also explain which class of immunoglobulin are classified as secretory antibody and why? [3]
- Q2. Although the five type of immunoglobulin share many common structural features, the differences in their structures affect their biological activities. [3+1.5+1.5]
1. Draw a schematic diagram of a typical IgG molecule and label each of the following parts: H chains, L chains, interchain disulfide bonds, intrachain disulfide bonds, hinge, Fab, Fc, and all the domains. Indicate which domains are involved in antigen binding.
 2. How would you have to modify the diagram of IgG to depict an IgA molecule isolated from saliva?
 3. How would you have to modify the diagram of IgG to depict serum IgM?
- Q3. 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: [4]
- 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-BGG antibodies produced in a BALB/c mouse are injected into the same mouse.
- Q4. You prepare an immunotoxin by conjugating diphtheria toxin with a monoclonal antibody specific for a tumor antigen.
- a) If this immunotoxin is injected into an animal, will any normal cells be killed? Explain.
 - b) If the antibody part of the immunotoxin is degraded so that the toxin is released, will normal cells be killed? Explain. [2+2]
- Q5. Adaptive immunity has evolved in vertebrates but they have also retained innate immunity. What would be the disadvantages of having only an adaptive immune system? Comment on how possession of both types of immunity enhances protection against infection. [2]

Q6. For each pair of antigens listed below, indicate which is likely to be more immunogenic and why? Explain your answer. [3]

- a) A protein with same amino acid sequence (-Gly-Gly-Gly-Gly-Gly-)
A protein with different amino acid sequence (-Gly-Trp-Lys-Cys-Ala-)
- b) A protein with a molecular weight of 30,000
A protein with a molecular weight of 150,000
- c) BSA in Freund's complete adjuvant
BSA in Freund's incomplete adjuvant

Q7. Some microorganisms are classified as intracellular pathogens such as (e.g., *Neisseria gonorrhoeae*). Diagrammatically explain why the immune response to these pathogens differs from that to other extracellular pathogens such as *Staphylococcus aureus* and *Streptococcus pneumoniae*. [3]

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