

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

MSc-II Semester (BT)

Course Code (Credits): 20MS1BT212 (3)

Max. Marks: 25

Course Name: Immunology

Course Instructors: Dr.Abhishek

Max. Time: 1.5 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. Lymphocytes are the central cells of the immune system, responsible for adaptive immunity and the immunologic attributes of diversity, specificity, memory, and self/nonself recognition. The other types of white blood cells play important roles, engulfing and destroying microorganisms, presenting antigens, and secreting cytokines. Using above information, explain why each of the following statements related with immune cells is true or false and why? [4]
 - a) All TH cells express CD4 and recognize only antigen associated with class II MHC molecules.
 - b) Activation of macrophages increases their expression of class I MHC molecules, making the cells present antigen more effectively
 - c) Infection has no influence on the rate of hematopoiesis.
 - d) Follicular dendritic cells can process and present antigen to T lymphocytes.
2. Early in hematopoiesis, a stem cell differentiates along one of two pathways, giving rise to either a common lymphoid progenitor cell or a common myeloid progenitor cell. The types and amounts of growth factors in the microenvironment of a particular stem cell or progenitor cell control its differentiation. During the development of the lymphoid and myeloid lineages, stem cells differentiate into progenitor cells, list-out all the progenitor cells belongs to lymphoid as well as myeloid lineage, also explain how stem cells differ from progenitor cells. What will happen if stem cell unable to differentiate into progenitor cells? [4+1+1]
3. The role of the thymus in immune function can be studied in mice by examining the effects of thymectomy. Answer the following question using above statement. [5]
 - a) What effect does thymectomy have on a neonatal mouse?
 - b) What effect does thymectomy have on an adult mouse?
 - c) Explain why these effects differ.
 - d) What effect would removal of the bursa of Fabricius (bursectomy) have on chickens?
 - e) What do nude mice and humans with DiGeorge's syndrome have in common?

4. For each of the following statements, indicate whether it is true only for B-cell epitopes (B), only for T-cell epitopes (T), or both types of epitopes (BT) within a large antigen and why? [3]
- They almost always consist of a linear sequence of amino acid residues.
 - They generally are located in the interior of a protein antigen.
 - They generally are located on the surface of a protein antigen.
5. 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. Also write down the structural difference between IgG and IgE. [3]
6. TH cells are activated by recognition of an antigen–class II MHC complex on an antigen-presenting cell. After activation, the TH cell begins to divide and gives rise to a clone of effector cells, each specific for the same antigen–class II MHC complex. These TH cells secrete various cytokines, which play a central role in the activation of B cells, T cells, and other cells that participate in the immune response. Changes in the pattern of cytokines produced by TH cells produce the following response; explain each of the following response and its significance in adaptive immunity. [4]
- TH1 response
 - TH2 response
 - ADCC
 - Opsonization