

M.Sc. ZOOLOGY
Fourth Semester (Repeat)
IMMUNOLOGY, BIOINFORMATICS &
RESEARCH METHODOLOGY
(MSZ - 401)

Duration: 3Hrs.

Full Marks: 70

PART A (Objective) =20
PART-B (Descriptive)=50

PART-B (Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

1. Answer the following questions (any five):

2×5=10

- a) What are the roles of β_2 -microglobulin in class I MHC?
- b) Write about the importance of IPR.
- c) What are the reasons behind human-wildlife conflict?
- d) What do you understand by Bioethics?
- e) What is GenBank?
- f) What is an Ig superfamily? Explain with suitable examples.
- g) What are the objectives of Research?

2. Answer the following questions (any five):

3×5=15

- a) Differentiate class I MHC from class II MHC on the basis of their peptide binding domain, nature of peptide binding cleft and size of the bound peptides.
- b) What are the roles of antigen presenting cells?
- c) Differentiate between attenuated vaccines and inactivated vaccines.
- d) Explain the 'Prozone effect' in relation to agglutination.

- e) Explain the phenomenon of cross reactivity with suitable examples.
- f) What do you mean by sequence alignment? Write differences between Pairwise alignment and Multiple alignment.

OR

What is BLAST? What are the major extensions of BLAST?

- g) Describe Descriptive vs. Analytical Research.

3. Answer the following questions (any five):

5×5=25

- a) What are main objective of writing a literature review? What are the main requisites for writing a good literature review?
- b) Human red blood cells are not nucleated and do not express any MHC molecules. Why is this property fortuitous for blood transfusions?
- c) Write briefly what you know about precipitation reaction and add a note on the Zone of Equivalence.
- d) Elucidate about the ELISA technique and add a note on the applications of ELISA.
- e) What are the various types of protein databases? Which are the most important examples of their type?
- f) Describe the important concepts relating to Research Design.
- g) Describe the functions of IACUC (Institutional and Animal Care and Use Committee).

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Duration: 20 minutes

Marks – 20

PART-A (Objective)

I. Choose the correct option:

1×20=20

- Cells not expressing class I HLA antigenic products include:
(a) Monocytes (b) B lymphocytes
(c) Skin cells (d) Striated muscle cells
- The stimulation of cytotoxic (CD8⁺) T lymphocytes requires the association of an antigen-derived peptide with a(n):
(a) MHC-I molecule
(b) MHC-II molecule
(c) MHC-I molecule identical to one of those expressed by the cytotoxic T lymphocyte
(d) MHC-II molecule identical to one of those expressed by the cytotoxic T lymphocyte.
- The molecular basis for the control that MHC-II genes have over the immune response is best explained by the:
(a) Ability of MHC-II-antigen complexes to be released from antigen-processing cells and activate helper T cells.
(b) Involvement of MHC-II molecules in targeting reaction by cytotoxic T lymphocytes.
(c) Existence of genes controlling the immune response in linkage disequilibrium with MHC-II genes.
(d) Need for antigen-derived peptides to bind to an MHC-II molecule for proper presentation to the TCR of a helper T lymphocyte.
- Which of the following cellular antigens is (are) not coded by genes in the MHC region?
(a) β_2 -Microglobulin (b) Class I HLA antigens
(c) Class II HLA antigens (d) Tumor necrosis factor (TNF).
- Alloantigens are best defined as antigens:
(a) Identically distributed in *all* individuals of the same species.
(b) That define protein isotypes.
(c) That differ in distribution in individuals of the same species.
(d) Unique to human immunoglobulin G (IgG).

- Which of the following sets of characteristics is most closely associated with haptens?
(a) Constituted by repeating units, able to induce responses in sublethally irradiated mice reconstituted with B cells only.
(b) Do not induce an immune response by themselves, but induce antibody formation when coupled to an immunogenic molecule.
(c) Induce cellular immune responses but not antibody synthesis.
(d) Induce tolerance when injected intravenously in soluble form and induce an immune response when injected intradermally.
- Which of the following procedures is less likely to enhance antigenicity?
(a) Chemical polymerization of the antigen.
(b) High-speed centrifugation to eliminate aggregates.
(c) Immunization on antigen obtained from a phylogenetically distant species to that of the animal immunized.
(d) Injection of an antigen-adjutant emulsion.
- To determine the frequency with which something occurs or with which it is associated with something else; studies with this object in view are known as
(a) diagnostic research studies (b) exploratory research
(c) descriptive research (d) hypothesis testing research
- Descriptive research
(a) includes surveys and fact-finding enquiries of different kinds.
(b) aims at finding a solution for an immediate problem facing a society or an industrial/business organization.
(c) is mainly concerned with generalisations and with the formulation of a theory.
(d) None of the above.
- The sampling design which deals with
(a) the method of selecting items to be observed for the given study.
(b) which relates to the conditions under which the observations are to be made.
(c) which concerns with the question of how many items are to be observed and how the information and data gathered are to be analysed.
(d) which deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.
- The variable that is antecedent to the dependent variable is termed as
(a) dependent variable (b) an independent variable
(c) extraneous variable (d) none of the above
- During the third trimester of gestation in humans is passed from the mother to the fetus through the placental tissues.
(a) IgA (b) IgM (c) IgG (d) IgE
- Poaching refers to
(a) Catching (b) Hunting (c) Trades (d) Protection

