Name: **Enrolment No:**	

UPES

End Semester Examination, May 2025

Course: Immunology **Semester : II**

Program: M.Sc. Microbiology **Duration : 3 Hours**

Course Code: HSGN7012 **Max. Marks: 100**

Instructions: Read all questions carefully.

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
Q 1	Most effective immune cells in antigen presentation to naïve T-cells: A) Neutrophils B) Dendritic Cells C) Basophils D) Eosinophils	**1.5**	**CO1**
Q 2	Select the best statements explaining the difference between humoral and cell-mediated immunity: A) Both are part of innate immunity B) Humoral immunity involves cytotoxic T cells C) Cell-mediated immunity directly targets intracellular pathogens D) Humoral immunity involves only macrophages	**1.5**	**CO1**
Q 3	MHC Class II molecules primarily present antigens to: A) CD8+ T cells B) NK cells C) CD4+ T cells D) B cells	**1.5**	**CO2**
Q 4	Cell surface molecule is essential for T-cell receptor recognition of MHC-bound antigen: A) CD28 B) CD3 C) CD40 D) CD19	**1.5**	**CO1**
Q 5	Choose the correct pair in context to antigen-antibody interaction:	**1.5**	**CO3**

	A) IgA – Placenta transfer B) IgE – Mast cell activation C) IgM – Secretory antibody D) IgD – Complement activation		
Q 6	Hybridoma technology was developed to: A) Clone genes of B cells B) Create vaccines C) Produce monoclonal antibodies D) Map T-cell receptors	**1.5**	**CO2**
Q 7	Epitope mapping is essential for: A) Enhancing vaccine thermostability B) Predicting allergic reactions C) Identifying antigenic determinants D) DNA sequencing	**1.5**	**CO3**
Q 8	A child born without a thymus will lack which immune cells: A) B cells B) Plasma cells C) T cells D) NK cells	**1.5**	**CO1**
Q 9	CD8+ T-cells are best described as: A) Helper T-cells B) Cytotoxic T lymphocytes C) Regulatory T cells D) Memory B cells	**1.5**	**CO1**
Q 10	A primary immune response is characterized by: A) Predominance of IgG B) Shorter lag phase C) Higher affinity antibodies D) Predominance of IgM	**1.5**	**CO2**
Q 11	T-cell activation requires only TCR recognition of antigen. (True/False)	**1.5**	**CO3**
Q 12	B cells require T-cell help for class switching. (True/False)	**1.5**	**CO2**
Q 13	NK cells directly kill MHC-expressing cells. (True/False)	**1.5**	**CO1**
Q 14	Immunological memory is a hallmark of innate immunity. (True/False)	**1.5**	**CO1**
Q 15	TLR agonists mimic pathogen signals to activate innate immunity. (True/False)	**1.5**	**CO1**
Q 16	MHC molecules determine transplant compatibility. (True/False)	**1.5**	**CO1**
Q 17	Virosomes act as both antigen and delivery system. (True/False)	**1.5**	**CO2**

Q 18	Hybridoma cells are immortal and produce specific antibodies. (True/False)	**1.5**	**CO1**
Q 19	Plasma cells are activated T cells. (True/False)	**1.5**	**CO2**
Q 20	Vaccines containing only antigen without adjuvant are equally effective. (True/False)	**1.5**	**CO3**
Section B (4Qx5M=20 Marks)			
Q 21	Discuss the mechanism of action of adjuvants in vaccines and explain how they enhance immunogenicity.	**5**	**CO3**
Q 22	Describe the steps and cellular interactions involved in the activation of a naïve T-helper (CD4+) cell.	**5**	**CO2**
Q 23	Explain the structural and functional differences between MHC class I and class II molecules and their role in antigen presentation.	**5**	**CO1**
Q 24	Describe the structural components of an antibody molecule and explain how they contribute to antigen binding and effector function.	**5**	**CO1**
Section C (2Qx15M=30 Marks)			
Q 25	**Case study:** A new recombinant vaccine for a viral disease includes a novel saponin-based adjuvant. **Questions:** a) Explain the role of adjuvants included in vaccines, and how do they work. b) Discuss the type of immune responses enhanced by saponin-based adjuvants. c) Compare the benefits of saponin with alum as an adjuvant.	**5+5+5**	**CO2**
Q 26	**Case study:** A COVID-19 recovered individual tests positive for IgG antibodies but is asymptomatic. **Questions:** a) Explain the presence of IgG about the individual's immune status. b) Explain viral neutralization with antibodies help. c) Can this individual be a candidate for convalescent plasma therapy? Justify.	**5+5+5**	**CO3**

Section D (2Qx10M=20 Marks)			
Q 27	Compare and contrast the innate and adaptive immune systems in terms of cells involved, mechanisms of action, and clinical significance.	**10**	**CO2**
Q 28	Discuss the role of antigen-antibody interactions in immunodiagnostic techniques. Provide examples such as ELISA, Western blotting, and flow cytometry.	**10**	**CO3**