U.S.N.										

B.M.S.College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Biotechnology **Duration: 3 hrs.**

Course Code: 23BT5PCIMM /22BT5PCIMM /19BT5DCIMM **Max Marks: 100**

Course: Immunotechnology

Instructions: 1.Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Explain the distinctions between innate immunity and adaptive immunity, emphasizing their unique characteristics and roles in the immune response.	*CO1*	*PO 1*	**6**
	b)	Compare and contrast T-cells and B-cells in terms of their structure, functions, and roles within the immune system.	*CO1*	*PO2*	**7**
	c)	Highlight the key differences between innate and adaptive immunity, focusing on their mechanisms and response timelines.	*CO1*	*PO2*	**7**
		OR			
2	a)	Evaluate the effectiveness of passive and active immunity in controlling infectious diseases, and propose strategies to enhance their application in public health.	*CO1*	*PO2*	**6**
	b)	Propose a model to study the development and activation of primary and secondary lymphoid organs, emphasizing their roles in immune cell maturation and response.	*CO1*	*PO2*	**7**
	c)	Discuss the relationship between humoral and cellular immunity, and analyze a clinical scenario where both are required to resolve an infection effectively.	*CO1*	*PO1*	**7**
		UNIT - II			
3	a)	Outline the process of antibody gene and protein assembly in humans, focusing on the in vivo mechanisms involved.	*CO2*	*PO2*	**7**
	b)	How do T-cells contribute to adaptive immunity by recognizing antigens, coordinating with other immune cells, and enhancing immune response effectiveness?	*CO2*	*PO2*	**6**

		c)	Discuss the organization of human antibody genes and how it contributes to the generation of diverse antibody repertoires.	*CO2*	*PO3*	**7**
			OR			
	4	a)	Antigens come in different shapes and types. Justify this statement mentioning various types of antigens.	*CO2*	*PO3*	**6**
		b)	Draw the typical structures of immunoglobulins and discuss their primary functions in the immune defense system.	*CO2*	*PO3*	**6**
		c)	Differentiate between Class I and Class II MHC proteins, detailing their structure and roles in antigen presentation.	*CO2*	*PO3*	**8**
			UNIT - III			
	5	a)	List various autoimmune disorders and describe how they involve the immune system targeting the body's own tissues.	*CO3*	*PO3*	**8**
		b)	How Major Histocompatibility Complex (MHC) molecules contribute to allograft rejection during transplantation.	*CO3*	*PO3*	**8**
		c)	Elaborate on the concept of tumor antigens, discussing their origin, expression patterns, and examples across different cancer types.	*CO3*	*PO3*	**4**
			OR			
	6	a)	What is the primary role of the complement system, and how is it activated to enhance immune responses?	*CO3*	*PO2*	**8**
		b)	Enumerate and describe the different types of hypersensitivity reactions, providing examples for each.	*CO3*	*PO2*	**8**
		c)	Explain the purpose of organ transplantation in medicine and discuss the circumstances that may necessitate such procedures.	*CO3*	*PO2*	**4**
			UNIT - IV			
	7	a)	Design an outline for developing a synthetic vaccine against a novel viral strain, specifying the steps and considerations involved.	*CO4*	*PO3*	**6**
		b)	Critique the role of immuno-toxins in targeted cancer therapy, providing examples of their mechanisms and potential side effects.	*CO4*	*PO2*	**6**
		c)	Discuss the engineering principles behind antibody mimics like adnectins and affibodies, and propose a scenario where they could be more advantageous than traditional antibodies.	*CO4*	*PO2*	**8**
			OR			
	8	a)	Evaluate the therapeutic potential of chimeric and humanized minibodies in treating autoimmune diseases compared to monoclonal antibodies.	*CO4*	*PO3*	**8**

		b)	Assess the challenges in producing monoclonal antibodies using hybridoma technology and propose modern alternatives to address these challenges.	*CO4*	*PO4*	**8**
		c)	Examine the ethical and logistical challenges associated with large-scale production of therapeutic antibodies for global pandemics.	*CO4*	*PO8*	**4**
			UNIT - V			
	9	a)	Differentiate between affinity and avidity in antigen-antibody interactions and discuss how these properties influence assay sensitivity.	*CO5*	*PO4*	**5**
		b)	Design a workflow to detect a rare biomarker in a patient sample using a combination of immunoprecipitation and Western blotting.	*CO5*	*PO3*	**8**
		c)	Assess the role of cytotoxicity assays in evaluating the efficacy of immuno-therapeutic agents and propose a scenario for their application.	*CO5*	*PO3*	**7**
			OR			
	10	a)	Discuss the principle of immuno-electrophoresis and design a protocol to identify a specific antibody in a serum sample.	*CO5*	*PO3*	**7**
		b)	Compare precipitation reactions and agglutination reactions in terms of their mechanisms and applications in clinical diagnostics.	*CO5*	*PO2*	**7**
		c)	Suggest an experimental approach to visualize antigen-antibody complexes in tissue sections using immunofluorescence, highlighting the importance of controls.	*CO5*	*PO3*	**6**

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