

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - IV EXAMINATION - SUMMER 2025

Subject Code: 3140410

Date: 17-05-2025

Subject Name: Immunology

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

	Marks
Q.1 (a) List any three factors affecting immunogenicity.	03
(b) Describe the structural differences between MHC Class I and MHC Class II molecules.	04
(c) Discuss the structural features of different classes of antibodies (IgG, IgA, IgM, IgE, IgD) by neat sketch and explain their major functions.	07
Q.2 (a) Name any four important cells of the immune system and state one function of each.	03
(b) Describe the process of inflammation and mention its four main signs.	04
(c) Explain the structural and functional organization of the lymphoid system, highlighting the role of spleen and lymph nodes.	07
OR	
(c) Describe the process of hematopoiesis and explain how it gives rise to different immune cells.	07
Q.3 (a) Differentiate between precipitation and agglutination reactions.	03
(b) Outline the steps involved in exogenous pathway of antigen processing and presentation.	04
(c) Describe the basic working of Western blotting. What are its main components and applications in protein detection?	07
OR	
(a) Mention two differences between RIA and ELISA.	03
(b) Outline the steps involved in the endogenous antigen processing pathway.	04
(c) Explain the principle and steps involved in the ELISA technique. How is it used to detect antigen or antibody in a sample?	07
Q.4 (a) Define monoclonal antibodies. What is their significance in research or therapy?	03
(b) Discuss how complement activation contributes to inflammation.	04
(c) Outline the phases of T-cell differentiation. How are effector T-cells and memory T-cells generated and what are their functions?	07

OR

- (a) What is the role of SCID mice in immunological research? 03
- (b) Differentiate between the classical and alternative pathways of complement activation. 04
- (c) Describe the steps involved in B-cell maturation in the bone marrow. What mechanisms ensure central tolerance? 07
- Q.5** (a) Define vaccine. What is the difference between active and passive immunization? 03
- (b) Compare whole-organism vaccines and purified macromolecule-based vaccines. 04
- (c) Explain the mechanisms of all four types of hypersensitivity reactions with suitable examples. 07

OR

- (a) What are multivalent subunit vaccines? 03
- (b) Compare the features of innate and adaptive immunity. 04
- (c) Describe different types of transplantation. What immunological challenges are associated with organ transplantation? 07
