PART-I OPTIONAL PAPERS

Programme: M. Sc. (Biochemistry)

Course Code: BCO 401 **Title of the Course:** Immunology and Immunotechniques

Number of Credits: 3

Effective from AY: 2021-22

Prerequisites for the course:	Basic understanding of pathogens, blood cells, and human physiology studied at B.Sc level.	
Course Objectives	1. The objective of the course is to provide an insight into the components of the immune system, their development, their functions and their mechanisms of action and various Immunological techniques.	
Course Outcomes	1. This course will enlighten the students on the importance of immune system in human body to fight pathogens. 2. Students will be able to understand mechanisms of Immunological response. 3. Students will develop an understanding of antigen-antibody interactions and various serological techniques for immunological research.	
Content	1. **Cells and organs of the immune system** 2. **Innate immune response:** Mechanical barriers to infection, Physiological factors contributing to innate immunity, Inflammatory response and Phagocytic system, Complement system. 3. **Adaptive immune response:** Cell-mediated and Humoral immunity- primary and secondary immune response, Major Histocompatibility Complex- Molecular organization of MHC molecules (H-2, HLA), Structure of MHC molecules. Class I MHC-peptide and Class II MHC-Peptide	**5h** **5 h** **5h**

	interactions. Antigen presenting cells (APCs), Antigen processing and presentation pathways.	**4h**
	4. Antigens and Antibodies: Antigens: Chemical complexity and molecular property of Antigens, Immunogens, Haptens, Epitopes. Antibodies: Structure and function of various, classes of immunoglobulins, Antigenic determinants on immunoglobulins, monoclonal and polyclonal antibodies and their production by hybridoma technology.	**2h**
	5. **Immunogenetics:** Generation of antibody diversity, class switching among constant-region genes	**5h**
	6. **Immune effector mechanisms** – Cytokines (properties, receptors and functions), Immunological tolerance, Hypersensitivity reactions and Autoimmunity.	**4h**
	7. **Immune system in health and disease**: Immunodeficiencies, AIDS, Transplantation immunology, Concepts of vaccines.	**6h**
	8. **Immunotechniques:** Antigen – antibody reactions: Principles and techniques- *in vitro* precipitation, agglutination, immunofluorescence, immunodiffusion, immunoprecipitation, immunoelectrophoresis, ELISA, RIA, Western blotting, Immunohistochemistry, flow cytometry.	
Pedagogy:	Lectures (online or physical)/ tutorials/ laboratory work/ viva/ seminars/ term papers/assignments/ presentations.	
Text Books/ References / Readings:	1. J. Owen, J. Punt, S. Stranford. J. Patricia. Kuby Immunology, WH Freeman and Company, USA. 8th Edition (2012)	

	2. S.J. Martins, D.R. Burton, I.M. Roitt, P.J. Delves. Roitt's Essential Immunology. Wiley Blackwell. 13th edition (2017). 3. A. Abbas, A. Lichtman, S. Pillai. Cellular and Molecular Immunology. Saunders, Elsevier, USA. 8th edition (2014). 4. S.C. Parija. Textbook of Microbiology and Immunology. Elsevier. 2nd edition (2012). 5. F.C. Hay and O.M.R. Westwood. Practical Immunology. Cold spring Harbour. 4th edition (2002).	