

B. E. BIOTECHNOLOGY			
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)			
SEMESTER - IV			
IMMUNOTECHNOLOGY			
Course Code	18BT43	CIE Marks	40
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	60
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ul style="list-style-type: none"> • Learn the underlying concepts of molecular and cellular mechanisms involved in the development and regulation of the immune response • Describe the cause and treatment for Immune System Pathologies and Dysfunctions. • Learn the important techniques of Immunodiagnosis. 			
Module-1			
IMMUNE SYSTEM :			
Cells and organs of immune system, Process of hematopoiesis and role of each cells, primary and secondary lymphoid organs, innate and acquired immunity, Humoral and Cell mediated immunity. Antigens: Chemical and biological Factors affecting antigenicity/Immunogenicity and molecular nature, Haptens, adjuvants, Antibodies: their structure and function, Immunoglobulin classes and subclasses (isotypic, allotypes, idiotypes and anti-idiotypic antibodies).			
Module-2			
HUMORAL AND CELL MEDIATED IMMUNITY:			
B-lymphocytes and their activation, Class switching mechanism , antibody genes and generation of diversity, production of monoclonal antibodies, polyclonal antibodies and applications, cytokines, Thymus derived lymphocytes (T cells) - their ontogeny and types, Activation of T-cells, Major histocompatibility Complex (MHC) Complex - MHC Class I and II molecules. Antigen processing and presentation process.			
Module-3			
IMMUNE SYSTEM IN HEALTH AND DISEASE:			
Complement system and its pathways, Gell and Coombs classification of Hypersensitivity reactions and Diagnosis and treatment. Autoimmune disorders, types, animal model and treatment. Immune response to infections: immunity to viruses, bacteria, fungi and parasites, Immunodeficiency disorders: Primary and secondary (AIDS). Injury and inflammation, Vaccines and their types, classification and immunization schedule			
Module-4			
TRANSPLANTATION AND TUMOR IMMUNOLOGY:			
Transplantation and its classification, Immunologic basis of graft rejection and its mechanism , Transplantation antigens, tissue typing role of MHC molecules in allograft rejection, Clinical transplantations, bone marrow, HSC transplantation and immune suppressive therapy. Tumors of the immune system, tumor antigens and immune response to tumors, tumor immunotherapy.			
Module-5			
MOLECULAR IMMUNOLOGY & IMMUNODIAGNOSIS			
Antigen antibody interaction – Precipitation reactions, Agglutination reactions, ABO Blood typing principles. Principles and applications of ELISA, Radio Immuno Assay (RIA), western blot analysis, immuno-electrophoresis, Immunofluorescence, chemiluminescence assay, fluorescence activated cell sorting (FACS) analysis. Role of stem cells technology in immunology, Production of humanized monoclonal antibodies (Single chain fragment variable), immunotherapy with genetically engineered antibodies,			

Course Outcomes: At the end of the course the student will be able to:

- Outline the molecular and cellular mechanisms involved in the development and regulation of the immune response,
- Describe the cause, challenges and treatment for Immune System Pathologies and Dysfunctions.
- Apply the major immunological laboratory techniques and their application to both clinical analysis and experimental research.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbook/s				
1	Immunology – an Introduction	Tizard	Thomson.	1984
2	Immunology & Immunotechnology	Ashim K Chakravarthy	Oxford University Press	2006
3	Immundiagnosics	S C Rastogi	New Age International	1996
Reference Books				
1	Essential Immunology	Roitt I. Blackwell	Scientific Publications, Oxford	13th Edition 2017
2	Immunology: A Short Course	Richard Coico, Geoffrey Sunshine	Wiley-Blackwell	7th Edition 2015
3	Understanding Immunology	Peter Wood	Pearson Education	2001