

Course	Discipline Specific Core
Semester	IV
Paper Number	MBTCR4092T & MBTCR4092P
Paper Title	IMMUNOLOGY
No. of Credits	6
Theory/Composite	Composite
No. of periods assigned	4 Theory + 4 Practical
Course description/objective	<ol style="list-style-type: none"> 1. Through this paper the students will be introduced to the very complex but intriguing vertebrate immune system. 2. They will realise the significance of innate immunity and how it contributes to the activation of the adaptive branch. 3. The enormous diversity in recognition of foreign antigens resulting from the very unique ‘gene segment rearrangement’ phenomenon will be dealt with at molecular level. 4. The different immuno-techniques of wide-spread applications in different branches of biological research will be explained to the students. 5. The students will realise the details of intricate cell-cell, as well as intracellular signalling in the context of the immune system. 6. In the practical module, students would learn about immunological techniques like Western blot, ELISA and immunofluorescence.
Syllabus	<p>Theory</p> <p>Module A: (25 marks)</p> <p>UNIT I: Immune Response: an overview; components of mammalian immune system; humoral & cellular immune responses; T-lymphocytes & immune response (cytotoxic T-cell, helper T-cell, suppressor T-cells); immunogenicity versus antigenicity; epitopes; molecular structure of immunoglobulins or antibodies; antibody-mediated effector functions; antibody classes and biological activity.</p> <p>UNIT II: Vaccines & Immunodiagnostics:</p> <ol style="list-style-type: none"> 1. <i>Vaccines & Vaccination:</i> active and passive immunization; adjuvants; cytokines; live, attenuated vaccines; inactivated or “killed” vaccines; DNA vaccines; recombinant vaccines; vaccines to infectious agents other than bacteria and viruses. 2. <i>Introduction to immunodiagnostics:</i> RIA, ELISA. <p>No. of Classes: 2 Classes per week</p> <p>Module B: (25 marks)</p> <p>UNIT III: Regulation of immunoglobulin gene expression: Genetic basis of antibody diversity - genome rearrangements during B-lymphocyte generation, development and differentiation; allelic exclusion; activation of B-cells - clonal selection theory, class switching, antibody affinity maturation; immunologic memory; assembly of T-cell receptor genes by somatic recombination.</p> <p>UNIT IV: Major Histocompatibility Complex: Major Histocompatibility complexes – class I & class II MHC antigens, antigen processing.</p>

	<p>UNIT V: Complement system: components, activation and biological functions.</p> <p>No. of Classes: 2 Classes per week</p> <p>Practical</p> <ol style="list-style-type: none"> 1. Haemagglutination assay - tutorial 2. Haemagglutination inhibition assay - tutorial 3. Double immunodiffusion test using specific antibody and antigen. 4. ELISA 5. Western Blotting 6. Immunoprecipitation - demonstration 7. Immunofluorescence - demonstration
Readings	<ol style="list-style-type: none"> 1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia. 2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition WileyBlackwell Scientific Publication, Oxford. 3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York. 4. Jane, Travers, Walport, Shlomchik. Immunology. 6th or later Edition. 5. Khan FH. The Elements of Immunology. Pearson Publishers. 6. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York. 7. Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition. Churchill Livingstone Publishers, Edinberg. 8. Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication.
Evaluation	<p>Theory: Continuous Internal Assessment: 10 marks End-Semester Theory Examination: 50 marks</p> <p>Practical: Continuous Internal Assessment: 32 marks End-Semester Examination: 8 marks</p>
Paper Structure for End Sem Theory	<p>Module A (25 marks) Answer Q. 1. (Compulsory) and any two from the rest (Q.2 – Q.4) Q.1 Compulsory (10 marks) Q.2 – Q.4: Any two out of three questions (7.5 marks each) i.e. 7.5 x 2 = 15 marks.</p> <p>Module B (25 marks) Q.5. Compulsory (10 marks) Q.6 – Q.7: Any one. (15 marks) No sub-part will be less than 1 or more than 5.</p>