Subject Code: 02MB0457

Subject Name: Immunology and Immunotechnology

M. Sc. Semester - II

Objective: To provide comprehensive knowledge of inner workings of Immune System and its implications in medicine and health.

Credits Earned: 6 Credits

Course Outcomes: After completion of this course, student will be able to

- Distinguish various components of Immune System
- Explain the development and role of various cells and organs of Immune System.
- Rationalize the disease conditions in created during Immune System malfunction.
- Explain various experimental methods of immunology and its application in disease diagnosis and treatment

Pre-requisite of course: Fundamental knowledge of Cell Biology, Biomolecules and Molecular Biology.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE(I)	Viva (V)	Practical	
5	0	2	6	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Structure and Organization of Immune System** Significance, roles and functions of Immune System; Principles of innate and adaptive immunity: Haematopoiesis; Cells and molecules of the innate and adaptive immune system and their functions; Lymphoid organs and tissues; Mucosa-associated lymphoid tissues. Types of antigens Various types of antibodies and their functions; Antigen-antibody complexes and immunoassays. The compliment system.	15
2	**The cell mediated immunity and regulation** The B cell receptor complex, co-receptors and signalling; B cell activation; The role of T cells in immune responses; T cell recognition of antigen Shaping the T cell repertoire; T cell activation; Clonal expansion and development of effector function. Cell mediated cytotoxicity. Overview of response regulation; Central, peripheral and acquired tolerance; Cytokines signalling and the neuroendocrine system.	15
3	**Immune system disorders and diseases** Deficiencies in the immune system: Primary/congenital (inherited) immunodeficiency; Secondary (acquired) immunodeficiency, Diagnosis and treatment of immunodeficiency. Hypersensitivity and its classification. The spectrum and prevalence of autoimmunity; Factors contributing to the development of autoimmune disease; Autoimmune diseases – mechanisms of development. Disease pathogenesis; effector mechanisms; Diagnosis and treatment of autoimmune disease.	15
4	**Medical implication of Immunology** **Transplantation:** The transplantation problem; Transplantation antigens; Rejection mechanisms; Prevention of graft rejection. **Tumor Immunology**: Origin and host defense against tumors; Tumor antigens; Immune responses to tumors; Immunodiagnosis; Cytokine and cellular immunotherapy of tumors; Immunotherapy of tumors with antibodies; Tumor vaccines. **Immunosenescence:** Developmental changes in primary lymphoid tissue and lymphocytes with age; Effects of aging on innate immunity; The effects of aging on T cell immunity; The effects of aging on humoral immunity. Immunosenescence and morbidity, mortality and longevity	15
	Total Hours	**60**

References:

1. B. M. Hannigan, C. B. T. Moore and D. G. Quinn (2010) Immunology 2nd Edn., Viva Books.
2. K. D. Elgert (2009) Immunology, 2nd Edn., Wiley Blackwell.
3. K. M. Murphy, P. Travers, M. Walport (2011) Janeway's Immunobiology, 8th Edition, Garland Science.
4. W. E. Paul (2008) Fundamental Immunology, 6th Edition, Lippincott Williams & Wilkins.
5. K. Abbas, A. H. Lichtman & S. Pillai (2007) Cellular and Molecular Immunology, 6th Edition, Saunders.
6. Kindt, T. J., Osborne, B. A. & Goldsby, R. A. (2006) Kuby Immunology, 6th edition, W. H. Freeman.
7. P. J. Delves, S. J. Martin, D. R. Burton and I. M. Roitt (2006) Roitt's Essential Immunology 11th Edn., Blackwell Publ..
8. D. Male, J. Brostoff, D. B. Roth & I. Roitt (2006) Immunology, 7th Edn., Mosby-Elsevier.
9. T. W. Mak and M. E. Saunders (2006) The Immune Response – Basic and Clinical Principles, Academic Press.
10. R. Coico, G. Sunshine and E. Benjamini (2003) Immunology - A Short Course, 5th edition, John Wiley & Sons.
11. M. Wilson (2005) Microbial inhabitants of humans, Cambridge Univ. Press.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	15%	0%

Instructional Method:

g. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board may also use any of tools such as demonstration, role play, Quiz, brainstorming, etc.

h. The internal evaluation will be done based on continuous evaluation of students in the classroom in the form of attendance, assignments, presentations, verbal interactions etc.

i. Students will use supplementary resources such as online videos, ebooks, ppts etc.

List of Experiments

Sr. No. Experiments

1. To perform the total count of RBC using haemocytometer.
2. To perform the differential count of WBC.
3. To determine the clotting time of blood using capillary method.
4. To perform the VDRL test for diagnosing the presence of *Tryponema palladium* in the given sample.
5. To perform the RPR test for diagnosing the presence of *Tryponema palladium* in the given sample.
6. To perform the DOT ELISA for detecting the presence of Hepatitis B antigen in the given sample.
7. To perform the Single Radial Immunodiffusion assay.
8. To perform the Ouchterlony double immunodiffusion assay.
9. To perform the Rocket Immunoassay.