

IMMUNOLOGY & IMMUNOTECHNOLOGY

Semester	Subject Code	Category	Lecture		Theory		P	C
II	21CPBT2C	Core - VI	5hrs per week	75	5 hrs per week	75	0	5

COURSE OBJECTIVE:

- To understand the structural features and components of the immune system as well as their functions to provide applied aspects of immunology such as diagnosis of immune related disorders along with immunotherapy.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

COS	CO STATEMENT	KNOWLEDGE LEVEL (K1-K6)
CO1	Understand the cells and organs of immune system	K2
CO2	Understand the nature of antigens and Classify immunoglobulin on their structure and function.	K2
CO3	Analyze the generation of B and T cell responses	K4
CO4	Manipulate immune system to fight against infections.	K4
CO5	Testing antigen antibody interaction and antibody engineering for interpretation of immune diseases.	K3

Knowledge level: K1- Remember; K2- Understand; K3- Apply; K4- Analyze; K5- Synthesize; K6- Evaluate

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	M	S	M
CO2	S	M	S	M	M	M
CO3	M	M	S	M	M	S
CO4	M	M	S	S	S	S
CO5	M	M	S	S	S	S

S-strong; M- medium; L-low

UNIT I

Cells and organs of immune system:

14 Hours

Immunity –innate immunity, barriers involved in innate immunity. Acquired immunity-humoral and cell mediated immunity. Cells and molecules involved in innate and adaptive immunity-B cells, T-cells, NK cells, Dendritic cells, Monocytes, Macrophages, neutrophils, eosinophils, basophils and mast cells. Humoral and cell- mediated immune responses, primary and secondary immune modulation.

Organs of the immune system- primary and secondary lymphoid organs; Lymphatic system; Mucosal, Gut and Cutaneous associated Lymphoid tissue (MALT, GALT & CALT);

UNIT II

Antigens and immunoglobulins:

15 Hours

Antigens: Properties of antigen, Immunogens, Haptens, Role of adjuvants, antigenicity and immunogenicity. Epitopes-B and T cell epitopes.

Immunoglobulins-Basic structure, classes and subclasses of antibody molecules. Immunoglobulin mediated effector functions-Opsonization, complement activation, ADCC, Cytokines and their role in immune recognition.

UNIT III

Generation of B-cell and T –cell responses:

14 Hours

MHC molecules-organization, MHC class I , II and III structure and genes. Structure ,types and biology of complement system.

Antigen processing and presentation-Endogenous antigen(Cytosolic pathway),Exogenous antigen(Endocytic pathway). T cell receptors-Structure, maturation, Activation and differentiation. B cells receptors-Structure, Activation and differentiation.

UNIT IV

Clinical Immunology

17 Hours

Immune response during bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections, Hypersensitivity – Type I-IV; Autoimmunity-Types of autoimmune diseases, Treatment of autoimmune diseases. Immunodeficiencies - congenital and acquired immunodeficiencies. Transplantation – Immunological basis of graft rejection; Clinical transplantation and immunosuppressive therapy.

Tumor immunology: Tumor antigens; Immune response to tumors and tumor evasion of the immune system and Cancer immunotherapy. **Vaccines:** Active and passive immunization; recombinant vaccines.

UNIT V

Immunological techniques:

15 Hours

Antigen-antibody interactions: Salient features of antigen-antibody interaction, Precipitation reactions-precipitation reaction in fluids, in gel: Radial immunodiffusion, Double immunodiffusion and immunoelectrophoresis. Agglutination

reactions-haemagglutination, bacterial and passive agglutination. ABO blood grouping. Advanced immunological techniques- RIA, ELISA, Western blotting, immunoprecipitation, , immunofluorescence microscopy, flow cytometry.

Antibody engineering- Production of Chimeric and hybrid monoclonal antibodies & its clinical uses.

Distribution of Marks: Theory 80% and Problems 20%

TEACHING METHODOLOGY:

- Class room teaching
- Assignments
- Discussions
- Homework
- PPT presentations
- Seminars
- Models and charts

TEXT BOOKS:

S.no	Authors	Title	Publishers	Year of publication
1.	Janis Kuby, Thomas J Kindt, Goldsby	Immunology	W.H. Freeman and company	2018
2.	Ivan Roitt	Essentials of Immunology	Blackwell scientific publication	2017

REFERENCES:

S.no	Authors	Title	Publishers	Year of publication
1.	Primrose S.B., Twyman R.H., and Old R.W	Principles of Gene Manipulation	Blackwell Science	2015
2.	Paul W.E	Fundamentals of immunology	Raven press	2019
3.	Glick B.R. and Pasternak J.J	Principles and applications of recombinant DNA	ASM Press	2015

WEB SOURCES:

1. <https://www.youtube.com/redirect.patreon.com>
2. <https://www.youtube.com/redirectFunacademy.com>
3. <https://www.google.com/> www.ncbi.nlm.nih.
4. <https://www.google.com/uwww.biologydiscussion.commonoclonal-antibodies-production-advantages-and-limitations>
5. <https://www.google.com/what-is-immunity-definition-types.html&usg>

Syllabus Designer:

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