

Syllabus of Theory

PART 'A' – Introduction			
Program: Honours/Research	Class: B.Sc.	Year: IV	Session: 2024-25
Subject: Zoology			
1	Course Code:	S4-ZOOL2T	
2	Course Title:	Immunology	
3	Course Type:	CORE TH 2	
4	Pre-requisite:	To study this course, a student must have had the subject Zoology in B.Sc. III Year / Degree	
5	Course Learning Outcome (CLO):	<p>Upon completion of the course the student will be able to understand:</p> <ol style="list-style-type: none"> 1. Introduction, definition, scope and significance of Immunology. 2. Innate and adaptive immunity. 3. Antigenicity and immunogenicity, B and T-cells epitopes. 4. Structure and function of different classes of immunoglobulins. 5. Hybridoma technology, monoclonal antibodies and Cytokines. 6. Major Histocompatibility Complex (MHC), Complement system, Hypersensitivity & various types of vaccines. 7. Common job opportunities for graduates in immunology are as:- <ul style="list-style-type: none"> • Clinical research assistant in hospitals. • Laboratory technician. • Sales executive in pharmaceuticals and medical supplies. • Assistant biologist in food inspection agencies. • Teaching assistant / consultant. • Biomedical researcher • Healthcare worker 	
6	Credit Value:	4	
7	Total Marks:	Max Marks: 30+70	Min. Passing Marks: 35

Jan 31.7.24
Dr. Shampa Jain
31/7/24
Dr. Manu Dixit

31/7/24
Dr. P. S. Saxena

31/07/24
Ms. Anita Saxena


31/07/24
Dr. U. S. Parmar


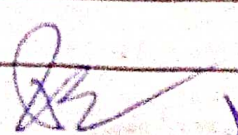
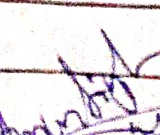


PART 'B' - Content of the Course

Total No. of Lectures - Tutorials - Practical (2 hours /Week)

L - T - P Total No. of Lectures = 60

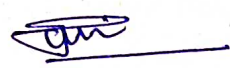
Unit/ S.No.	Topics	No. of Lectures
I	<p>Historical Background and Overview of Immune System:</p> <ol style="list-style-type: none"> 1. Historical background of Immunology. 2. Introduction: Definition, scope and significance of Immunology. 3. Brief idea of lymph and lymphatic system. 4. Nonspecific resistance to disease: Skin and mucous membrane, production of antimicrobial chemicals, natural killer cells, phagocytosis, inflammation and fever, <p>Keyword: Immunity, Lymph, Antimicrobial, Killer cells.</p>	<p align="right">(1 Hour Each)</p> <p align="center">12</p>
II	<p>Types of Immunity:</p> <p>1. Innate Immunity:</p> <ol style="list-style-type: none"> 1.1 Cell and molecules involved in innate immunity, <p>2. Adaptive immunity:</p> <ol style="list-style-type: none"> 2.1 Cell mediated Immunity 2.2 Humoral Immunity <p>3. Passive Immunity</p> <ol style="list-style-type: none"> 3.1 Artificial Immunity 3.2 Natural immunity <p>4. Active Immunity</p> <ol style="list-style-type: none"> 4.1 Artificial Immunity 4.2 Natural immunity. <p>5. Immune dysfunctions.</p> <p>Keywords: Innate, Adaptive, Humoral, Active immunity, Passive immunity.</p>	<p align="center">12</p>
III	<p>Antigens:</p> <ol style="list-style-type: none"> 1. Antigenicity and immunogenicity, 2. Complete antigen (immunogens), 3. Chemical nature of antigens, 4. Adjuvants and haptane. 5. Role of dendritic cells. 6. Factors influencing immunogenicity, 7. Diversity of antigenic receptors; B and T-cells epitopes, <p>Keywords: Antigens, Adjuvants, Heptane, Epitopes</p>	<p align="center">12</p>
IV	<p>Immunoglobulins:</p>	<p align="center">12</p>


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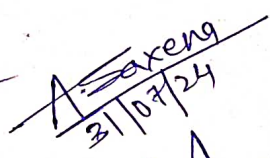






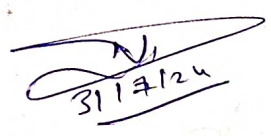
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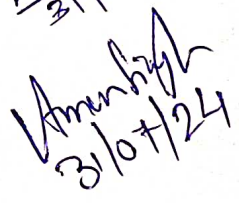
	<ol style="list-style-type: none">1. Structure and functions of different classes of immunoglobulins.2. Antigen-Antibody interactions.3. Immunoassays (ELISA & RIA)4. Hybridoma technology, monoclonal antibodies in therapeutics and diagnosis.5. Cytokines: Properties and functions of cytokines, Therapeutics Cytokines (Interleukins, TNF, TGB-B, Interferons.) <p>Keywords: Immunoglobulins, Antigen-Antibody, Cytokines, Interleukins.</p>	
V	<p>Major Histocompatibility Complex (MHC)</p> <ol style="list-style-type: none">1. Structure and functions of MHC molecules.2. Endogenous and exogenous pathways of antigen processing and presentation.3. Complement system: Components and pathways of compliment activation.4. Hypersensitivity: Gell and Coomb's classification and brief description of various types of hypersensitivities.5 Vaccines: Various types of vaccines. <p>Keywords: MHC, Complement system, Hypersensitivity, Vaccines.</p>	12

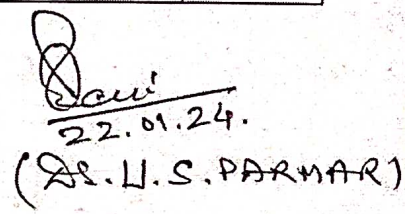





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PART 'C' - Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Kindt T.J., Goldsby, R.A., Osborne, B.A. and Kuby,, J "Immunology", VI Edition, W.H. Freeman,2006
2. David M., Jonatham B., David R.B. and Ivan R. "Immunology", VII Edition, Mosby, Elsevier Publication, 2006
3. Abbas K. Abul, Lechtman H. Andrew, "Cellular and Molecular Immunology", Saunders Publication, V Edition, 2003.
4. Reddy Rajeshwar K, "Text Book Immunology", AITBS Publishers, 3rd Edition, India
5. Gupta S.K., "Essentials of Immunology" Arya Publications.
6. Rastogi S.C., "Elements of Immunology", CBS Publication.
7. Nandini Shetty, "Text Book of Immunology" New Age international (P) Ltd. Publishers.
8. Narasimha Murthy C.V. Immunology Notes.

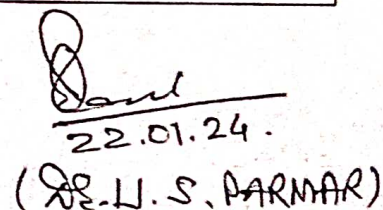
Suggested equivalent online courses:

1. <https://www.onlinelibrary.wiley.com>
2. <https://meripustak.com>
3. <https://nptel.ac.in> cellular and molecular immunology
4. <https://www.coursera.org>
5. <https://www.classcentral.com>
6. <https://www.zapmeta.co.in/>
7. <https://en.m.wikipedia.org>
8. <https://coursera.edx.org>


A. Saxena




Anurag


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Part D: Assessment and Evaluation (Theory)

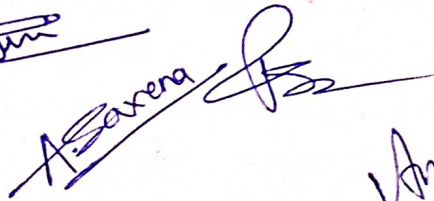
Suggested Continuous Evaluation Methods:

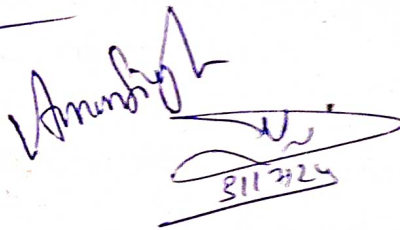
Maximum Marks: 100

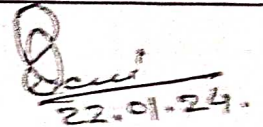
Continuous Comprehensive Evaluation (CCE): 30 University Exam (UE): 70

Internal Assessment: Continuous comprehensive Evaluation (CCE) : 30	Class Test Assignment/Presentation	30
External Assessment: University Exam Section: 70 Time: 03:00 Hours	Section (A): Very Short Questions Section (B): Short Questions Section (C): Long Questions	70
Any remarks/Suggestions:		




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21/1/24


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(Dr. U.S. Parmar)

Syllabus of Practical

Part - A: Introduction			
Program: Honours/Research	Class: B.Sc.	Year: IV	Session: 2024 -25
Subject: Zoology			
1	Course Code:	S4-ZOOL2P	
2	Course Title:	Immune System	
3	Course Type:	CORE PR-2	
4	Pre-requisite:	To study this course, a student must have had the subject Zoology in B.Sc. III Year / Degree	
5	Course Learning Outcome (CLO):	<p>Upon completion of the course the student will be able to understand:</p> <ol style="list-style-type: none"> 1. Identification of various immune cells and their enumeration 2. Histology of lymphoid organs. 3. Identification of blood groups and their types 4. Total and differential count of leucocytes. 5. Principle and methods of ELISA. 6. Analysis of the components of human sera. 7. Common employment opportunities for immunology graduates are:- <ul style="list-style-type: none"> • Clinical research assistant in hospitals. • Laboratory technician. • Sales executive in pharmaceuticals and medical supplies. • Pursue research in immunology. • Teaching assistant. 	
6	Credit Value:	2	
7	Total Marks:	Max Marks: 100	Min. Passing Marks: 35

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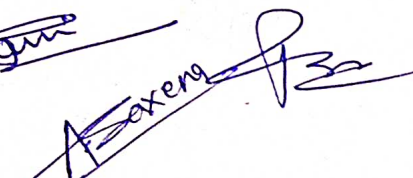
Part B - Content of the Course



Total No. Of Lectures-Tutorials-Practical (2 hours per week)

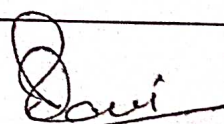
LTP: Total Number of Lectures: 30

Unit/S.No.	Topics	No. of Lectures (2 hours Each)
I	e-Demonstration of morphology of lymphoid organs	2
II	Histological study of spleen, thymus and lymph nodes through slides/photographs.	4
III	Preparation of stained blood film to study various types of blood cells.	4
IV	Identification of various immune cells by morphology-Leishman staining / Geimsa staining	4
V	ABO blood group typing and Rh factor.	4
VI	Total count of leucocytes (TLC/DLC)	4
VII	Demonstration of ELISA	4
VIII	Analyze the components of human sera by performing agarose /polyacrylamide gel electrophoresis	4

Keywords/Tags: Lymphoid organs, Spleen, Thymus, TLC, DLC, Leucocytes, ELISA.



Anshu



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PART 'C' - Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Talwar G.P. Gupta S.K "A Handbook of Practical & Clinical Immunology" Vol I, Second Edition,
2. Franek C. Hay, Olwyn M.R. "Westwood Practical Immunology", Publishers John Wiley and Sons Ltd. Fourth Edition
3. Rastogi S. C. "Elements of Immunology", CBS Publications.
4. Lal S.S. Kumar S. "Immunology" "2nd Edition Rastogi Publications.

Suggested digital platforms weblinks:

1. <https://www.labster.com>
2. <https://immunologylink.com>
3. <https://www.biointeractive.org>
4. <https://m.youtube.com/immunology.virtual.lab>
5. <https://www.scilinks.org>

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Part -D: Assessment & Evaluation (Practical)

Suggested Continuous Evaluation Methods:

S.No	Internal Assessment	Marks	External Assessment	Marks
1	Class interaction/Quiz		Viva Voce on Practical	
2	Attendance		Practical Record File	
3	Assignments (Charts/Model Seminar/Rural Service/ Technology Dissemination/ Report of Excursion/Lab Visits Survey/Industrial Visit		Table work/Experiments	
	Total	30		70

Any remarks/Suggestions:

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