



ADIKAVI SRI MAHARSHI VALMIKI UNIVERSITY, RAICHUR

SYLLABUS

**B.Sc. Three Year Degree Program for the Subject
Bio-Technology**

With Effect from 2024-25

**DISCIPLINE SPECIFIC CORE COURSE (DSC) FOR SEM I-IV, SKILL
ENHANCEMENT COURSE (SEC) FOR SEM IV/V/VI and ELECTIVE
COURSES FOR SEM V AND VI**

AS PER N E P (Revised): 2024

B.Sc. Semester-III

Discipline Specific Course (DSC)

Course Title: - Microbiology and Immunology

Course Code:C3BIT1T1

Type of Course	Theory /Practical	Credits	Instruction Hour / Week	Total No. of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSC-5	Theory	04	04	60hrs.	3hrs.	20	80	100

Course Outcomes (COs):

At the end of the course students will be able to:

- CO1: Understand the of Basics of Microbiology and Immunology.
- CO2: Gain the knowledge of Microbiology instruments and their working principle
- CO3: Attain knowledge of Identification, Classification, Nomenclature of microbes.
- CO4: Differentiate Bacterial , Fungal, Viral diseases, students learn clinical aspects of infection.
- CO5: Gain the knowledge of Microbial media, Culturing and Growth studies
- CO6: Differentiate Antigen and Antibodies and Innate and Acquired immunity.

Unit	Title: Microbiology and Immunology (Credits: Theory-4, Practicals-2)	60 hrs/ sem
Unit 1	1.1: Introduction and Scope of Microbiology - Historical perspectives. Importance and scope of microbiology as a modern science. Branches of microbiology. 1.2: Microbial techniques A) Sterilization – Physical and chemical methods of sterilization. B) Staining techniques –Simple, Differential and Structural staining. 1.3: Ultra structure of bacteria and virus 1.4: Microbial taxonomy Concept of microbial species and strains, (bacteria, fungi, algae, protozoa and virus), types of classification and numerical taxonomy.	15 hrs
Unit 2	2.1: Culture of microorganisms Culture media, Types of culture media, Isolation of microorganisms by different methods, Preservation and maintenance of culture. 2.2: Microbial growth Nutritional requirements of microorganisms. Bacterial growth curve. Factors affecting growth, Counting of Bacteria. 2.3: Applied microbial methods - Quality of air, water and soil sampling methods, food and dairy quality methods (SPC, MBRT, Resazurin test, phosphatase test), biogas production and its advantages, Biomining. 2.4: Pathogenic microorganisms- Bacterial diseases- Tetanus, Tuberculosis, Cholera. Fungal diseases – Candidiasis. Viral disease – AIDS (HIV), Covid-19.	15 hrs
Unit 3	3.1: History and Scope of Immunology, Clonal selection theory, Defence against pathogenic organisms- Viruses, Bacteria , Fungi. Immunity- Innate and acquired immunity. Humoral and cell – mediated immunity. 3.2:Cells of the immune system Lymphoid cells. B-Lymphocytes, T-lymphocytes and null cells, Mono-nuclear cells -phagocytosis, antimicrobial and cytotoxic activities. Antigen processing cells. Granulocytic cells. Mast cells and Dendritic cells. 3.3:Organs of the Immune systems Bone marrow. Thymus, lymph node and spleen.	15 hrs

Unit 4	4.1: Antigens - Types, haptens, epitopes, paratope, role of adjuvants in immunogenicity (Fraud's complete adjuvant and Fraud's incomplete adjuvant), Blood group antigens. Antibodies (Immunoglobulins) - Structure, Types, Properties and Functions of Immunoglobulins. Monoclonal and polyclonal antibodies.	15hrs
	4.2: Antigen – Antibody reactions - Mechanism of precipitation, Agglutination, Immunodiffusion reactions, Complement fixation, Mechanism of Immuno-toxin reaction, Immunofluorescence, ELISA and RIA.	
	4.3: Vaccines and vaccination: Conventional vaccines, Bacterial vaccine, Viral vaccine, Peptide vaccines, subunit vaccine, DNA vaccine, recombinant vaccine, edible vaccine, plantibodies, cancer vaccines	

Formative Assessment for Theory	
Assessment Occasion / type	Marks
Internal Assessment Test1	05
Internal Assessment Test2	05
Assignment	10
Total	20Marks

Formative Assessment as per guidelines.

B.Sc. Semester- III

Discipline Specific Course (DSC)

Course Title: - Microbiology and Immunology

Course Code:C3BIT1P1

Type of Course	Theory /Practical	Credits	Instruction Hour / Week	Total No. of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSC-6	Practical	02	04	56hrs.	3hrs.	10	40	50

Course Outcomes (COs):

At the end of the course, students will be able to:

- CO1: Understanding of laboratory skills for inoculation and staining methods.
- CO2: Understanding of importance of safety measures in microbiology laboratory, sterilisation Methods and instrument studies
- CO3: Understanding of culturing methods and biochemical techniques
- CO4: Understanding of RBC and WBC and their counting
- CO5: Understanding of various immunological techniques.

List of the Experiments, each will have 04Hrs / Week

1. Safety measures in microbiology laboratory
2. Cleaning, sterilization of glassware and Media Preparation: Nutrient agar, Nutrient broth and potato dextrose agar.
3. Study of instruments: Compound microscope. Autoclave, Hot air oven, pH meter, Laminar airflow and centrifuge.
4. Isolation of bacteria from air (exposure method), soil and water – by serial dilution methods
5. Isolation of fungi from soil by serial dilution method.
6. Cell size measurement by Micrometry and cell structure by using camera lucida
7. Inoculation techniques: Slant, Stab, Point, Streak, Pour plate and Spread plate
8. Bacterial staining techniques; Simple and differential (Gram's)
9. Antibiotic sensitivity test – Paper method
10. Counting of micro-organisms using Haemocytometer
11. Motility test – Hanging drop method.
12. Biochemical tests - Starch hydrolysis, Catalase and Gelatin liquefaction.
13. Total WBC and RBC count
14. Estimation of hemoglobin content in blood.
15. Diagnosis of infectious disease by Immuno Assay- Widal test for Typhoid and Wassermann test for Syphilis by using kit.

Books recommended:

1. Abbas, A. K. Litchman, A.H and Pober, J.S. 1994: cellular to molecular immunology, 2nd edition W.B Saunders Company, New York Charles
2. Ananthanarayan R. Jayarman Paniker 2005: Textbook of Microbiology Longman publication
3. Aneja K R 2000: Experimental in Microbiology Plant and Tissue culture. New age International. New Delhi.
4. Atlas R. M 1998: Microbiology, Fundamentals and application 2nd McMillan publishing Co. New York
5. Auro, P.T Kapoor, K.K. Yadav, KS 1996: An introduction to Microbiology, New Age International Pvt. Ltd.
6. Cobman, R. M. Lambard, M. F. And Sieard, R. F. 1992: Fundamental of immunology. 2ndEdn W.C. Brown Publishing.
7. Eli Benjamin, Richard Coiro, Geoffery Sunshine. 1992: immunology, 2ndedn, William and William Baltimore.
8. Gerhot, p. Murry, R. G. Wood W. A and Kreig, N. R 1994: Methods for general and molecular bacteriology American Society for Microbiology Washington DC.
9. Holt, J. S. Kreig, N. R. Sneaik P. H. A and Williams, S. T 1994: Berge's Manual of systematic bacteriology. 9th edition. Williams and Williams Baltimore.
10. Ivan M. Roitt 1994: Immunology, Black Well Scientific Publication. London.
11. Janeway, Paul Travers, 2001: Immunology, Garland Publishing, New York.
12. Joshi K.R and Osama, N.O 1998: Immunology Agro BotonicaBikoner.
13. Klaus D. Elgert 1996: Immunology – Understanding of immune system. Wiley liss New York
14. Kuby Immunology 9th edn. 2018
15. Kumar, H. D and Swati Kumar 1998: Modern concepts of Microbiology. Vikas Publishing House Pvt, Ltd, NewDelhi
16. Mayforth, R.D 1993: Designing antibodies. Academic Press New York
17. Osborne 2000:
18. Pelezar, chan, krieg, 2003: Microbiology – Tata McGraw Hill Publications
19. Prescott, I. M. Harley, J.P and Klien, D. A 1996: Microbiology WMC Brown Publishers.
20. Purohit, S.S 2000: Microbiology, Agrobois ◦ Sharma P. D 2001: Microbiology, Rastogi Publications, Meerut
21. Richard Goldaby, Thomas, J. Kindt Barbara, A. immunobiology, W.H.Freeman Company, New York.
22. Stainer,R. Y. Ingraham, J.I. Wheelis, M.L and Painter, P.R 1992: General Microbiology, McMillon Publishing Ltd. London
23. Sundarrajan, S 1999: College Microbiology, Vardhan Publishing, Bangalore,
24. William, E. Paul 1989: fundamental immunology, 2nd Edition Raven Press, New York.