

BSC (CBCS) Industrial Microbiology- III year
Semester – V (Discipline Specific Elective)
IMMUNOLOGY AND MEDICAL MICROBIOLOGY

Theory syllabus

Credits – 4

UNIT-I

1. History and Scope of Immunology, Contributions of Edward Jenner, Louis Pasteur. Early theories of immunity.
2. Types of Immunity – Innate immunity, Acquired immunity. Immune response-Humoral and Cell mediated immune response.
3. Structure and Functions of Primary Lymphoid Organs- Thymus and Bone marrow, Secondary Lymphoid Organs- Spleen and Lymphnodes. Functions of B- and T-lymphocytes, Natural killer cells and Granulocytes.

Unit – II

1. Antigens: Structure and Classification of antigens, Factors affecting antigenicity.
2. Antibodies: Basic structure of immunoglobulin, types, properties and functions of immunoglobulin's (IgG, IgM, IgA, IgE and IgD). Monoclonal antibody production and applications.
3. Antigen and Antibody Interactions: Agglutination, Precipitation, Complement fixation test. Labeled antibody techniques- ELISA, Radio immunoassay (RIA) and Immunofluorescence. Types of hypersensitivity reactions: Immediate and Delayed.

Unit-III

1. History of Medical Microbiology, Normal flora human body and their importance.
2. Host-Pathogen Interactions: Bacterial toxins, virulence and attenuation, antimicrobial resistance.
3. Collection, transport and processing of clinical specimens. General methods of laboratory diagnosis-cultural, bio-chemical and serological.

Unit-IV

1. Airborne Diseases- Tuberculosis, Influenza, Food water born disease- Typhoid, Amoebiasis.
2. Insect Born Disease- Malaria, Dengue fever, Zoonotic diseases- Rabies.
3. Viral Diseases- Hepatitis-B, HIV, SARS, Contact diseases- Syphilis and Gonorrhoea.



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Semester–V A (Discipline Specific Elective)
IMMUNOLOGY AND MEDICAL MICROBIOLOGY**

Practical syllabus

Credits – 1

1. Determination of blood groups and Rh typing.
2. Estimation of hemoglobin content of human blood
3. Preparation of blood smear and different blood cell count
 - i) RBC count
 - ii) WBC count
4. Differential staining of WBC by Leishman's stain
5. Widal-slide agglutination test
6. RPR card test for syphilis
7. Tridot test
8. Antibiotic sensitivity testing – disc diffusion method.
9. Parasites – Malarial parasite, *Entamoeba* (study of permanent slides)
10. Isolation and Identification of medically important bacteria by cultural, microscopic and biochemical tests.

References:

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 Wiley-Blackwell Scientific Publication, Oxford.
3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
4. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
5. Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinburgh.
6. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
7. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
8. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier
9. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education
10. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition.



**B. Sc (CBCS) Industrial Microbiology – III Year
Semester–V B (Discipline Specific Elective)
AGRICULTURAL MICROBIALOLOGY**

Theory syllabus

Credits – 4

UNIT - I

1. Physical and chemical characteristics of soil. suitability of soil for agriculture, soil chemistry, humus formation, soil fertility, micro/macronutrients,
2. Rhizosphere and phyllosphere, frequency/density and abundance of soil microbes, biological significance of soil enzymes.
3. Microbe–Microbe Interactions: Mutualism, Synergism, Commensalism, Competition, Amensalism, Parasitism, and Predation.

UNIT - II

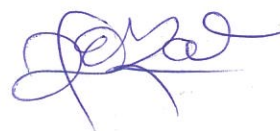
1. Plant growth-promoting microorganisms - mycorrhizae, rhizobia, Azospirillum, Azotobacter, cyanobacteria, Frankia and phosphate solubilizing microorganisms
2. Outlines of biological nitrogen fixation (symbiotic, non-symbiotic).
3. Biofertilizers: Different types, benefits and applications. Production and quality control in biofertilizers

UNIT - III

1. Concept of plant disease: definitions of disease, disease cycle & pathogenicity
2. Symptoms of plant diseases caused by fungi (groundnut rust and white rust of crucifers)
3. Symptoms of plant diseases caused by bacteria (angular leaf spot of cotton) and viruses (tomato leaf curl)

UNIT - IV

1. Principles of plant disease control. Chemical and Biological control of plant diseases.
2. Biopesticides – *Bacillus thuringiensis*, Nuclear polyhedrosis virus (NPV), *Trichoderma*.
3. Post harvest diseases and their control – microbial spoilage of fruits and vegetables



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AGRICULTURAL MICROBIALOLOGY**

Practical syllabus

Credits – 1

1. Analysis of soil - pH, moisture content, water holding capacity, percolation, capillary action
2. Isolation of microbes (bacteria & fungi) from soil (28.C & 45.C)
3. Isolation of microbes (bacteria & fungi) from rhizosphere and rhizoplane.
4. Isolation of *Rhizobium* from root nodules of legumes
5. Isolation of *Azotobacter/Azospirillum* from soil
6. Isolation of phosphate solubilizers from soil
7. Demonstration of Koch's postulates in fungal, bacterial and viral plant pathogens.
8. Study of important diseases of crop plants by cutting sections of infected plant material – *Cercospora* (Ground nut rust) and *Albugo* (White rust of crucifers)

References:

1. Subba Rao, N.S. (1995) Soil Microorganisms and plant growth, Oxford and IBH publishing Co. Pvt. Ltd.
2. Paul, E.A. and Clark. F.E. (1989). Soil Microbiology and Biochemistry. Academic pres New York.
3. Subba Rao, N.S. (1995). Biofertilizers in Agriculture and Forestry. 3rd Edition. Oxford and IBH publication Co. Pvt. Ltd., New Delhi.
4. Atlas RM and Bartha R. (2000). Microbial Ecology: Fundamentals & Applications. 4th edition. Benjamin/Cummings Science Publishing, USA.
5. Madigan MT, Martinko JM and Parker J. (2014). Brock Biology of Microorganisms. 14th edition. Pearson/ Benjamin Cummings.
6. Mehrotra, R.S. Plant Pathology
7. Singh, R.S. Plant diseases

