



BHARATI VIDYAPEETH'S
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DEPARTMENT OF MICROBIOLOGY
B.Sc. Microbiology

***** Program Outcome *****

1. To promote understanding of basic and advanced concepts in microbiology and expose the students to various emerging areas of Microbiology.
2. To expose the students to different processes used in industries and in research field and prepare the students to accept the challenges in life sciences.
3. To develop skills in students that are required in diverse areas such as medical, industrial, environment, genetics, agriculture, food and others.
4. To demonstrate key practical skills/competencies in working with microbes for study and use in the laboratory as well as outside, including the use of good microbiological practices.
5. To become competent enough to use microbiology knowledge and skills to analyze problems involving microbes, articulate these with peers/ team members, and undertake remedial measures/studies etc.
6. To develop a broader perspective of the discipline of microbiology to enable him to identify challenging societal problems and plan his professional career to develop innovative solutions for such problems.

***** Program specific Outcome *****

1. To acquire present and updated knowledge of the microbiology which is applicable in many areas such as medical, industrial, environment, genetics, agriculture, food and others.
2. To understand the working principles and applications various equipment's in the microbiology laboratory.
3. To perform different important tests like Ame's test, enzyme assay, antibiotic production.
4. To study various mutants and the process of DNA separation by electrophoresis.
5. To determine physical and chemical composition of soil and isolate agriculturally significant organisms such as plant pathogens and biofertilizers.
6. To study fermentative production and estimation of citric acid, amylase and wine.

*****Course Outcomes*****

B.Sc. -I Microbiology Semester- I and II	
Course	Outcomes
Course I (DSC A 25) A introduction to Microbiology	<ol style="list-style-type: none"> 1. To develop a good knowledge of the development of the discipline of Microbiology and the contributions made by prominent scientists in this field. 2. To develop a very good understanding of the characteristics of different types of microorganisms, methods to organize/classify these into and basic tools to study these in the laboratory. 3. To explain the useful and harmful activities of the microorganisms and scope of different branches of Microbiology. 4. To describe characteristics of bacterial cells, cell organelles and various appendages like capsules, flagella or Pilli.
Course II (DSC A 26) Basic techniques in Microbiology	<ol style="list-style-type: none"> 1. To study the staining techniques for the observation of bacteria and bacterial cell components. 2. To study the working principle, handling and use of microscopes for the study of microorganisms. 3. To understand the principles of sterilization and disinfection of culture media, glassware and plastic ware and other objects to be used for microbiological work. 4. Study basic instruments to be used in microbiology.
Course III (DSC B 25) Bacteriology	<ol style="list-style-type: none"> 1. To describe the nutritional requirements of bacteria and other microbes that grow under extreme environments. 2. To understand the basic laboratory experiments to isolate, cultivate and differentiate bacteria. 3. To study the preservation of bacteria in the laboratory. 4. To study pure culture techniques.
Course IV (DSC B 26) Microbial Biochemistry	<ol style="list-style-type: none"> 1. To develop a very good understanding of various biomolecules which are required for development and functioning of a bacterial cell. 2. To develop the knowledge of how the carbohydrates make the structural and functional components such as energy generation and as storage food molecules for the bacterial cells. 3. To make well conversant about multifarious structures and functions of proteins, enzymes, lipids and nucleic acids. 4. To differentiate the concepts of aerobic and anaerobic respiration and how these are manifested in the form of different metabolic pathways in microorganisms.
Practical Course Paper I and II Introduction to	<ol style="list-style-type: none"> 1. To understand the basic techniques in Microbiology laboratory. 2. To study the working principle, handling and use of compound microscope for the study of microorganisms. 3. To understand the working principles and applications various equipment's in

Microbiology and Basic Techniques in Microbiology Learning Objectives	Microbiology laboratory. 4. To study the preparation, sterilization and use of various culture media.
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B.Sc. -II Microbiology Semester- III and IV

Course	Outcomes
Paper V C-9-DSC- 5: Microbial Physiology & Metabolism	<ol style="list-style-type: none"> 1. To make the students to learn concepts of microbial physiology. 2. To develop a good understanding regarding effect of environmental factors on growth of microorganisms 3. To understand the mechanism of transport across microbial cell membrane. 4. To clear the basic concept of microbial metabolism.
Paper VI C9-DSC- 6: Applied Microbiology	<ol style="list-style-type: none"> 1. To develop the knowledge regarding air microflora and its role and analysis. 2. To study water microbiology, water analysis and its purification and disinfection. 3. To study milk microbiology and quality control of milk. 4. To learn the basic understanding of industrial microbiology
Paper VII C-5-: DSC-7: Microbial Genetics & Molecular Biology	<ol style="list-style-type: none"> 1. To learn the basic concepts of Microbial genetics. 2. To gain knowledge regarding types of mutation. 3. To demonstrate the model of gene transfer in bacteria. 4. To gain the knowledge about DNA repair and Lac operon.
Paper VIII C5: DSC-8: Basics in Medical Microbiology & Immunology	<ol style="list-style-type: none"> 1. To learn about basic concept of medical microbiology. 2. To make aware students about disease. 3. To understand the defence mechanism of vertebrate body. 4. To learn about concept of antigen and antibody.
Practical Course III	<ol style="list-style-type: none"> 1. To understand basic techniques in special staining. 2. To study the biochemical characteristics of different microorganisms. 3. To study the effect of environmental factors of microorganisms
Practical Course IV	<ol style="list-style-type: none"> 1. To study the techniques of bacteriology analysis of water. 2. To understand the primary screening techniques of industrially important microorganisms. 3. To study isolation and identification of pathogens.

B.Sc. -III Microbiology Semester- V and VI

Course	Outcomes
Course XIII DSE F49: Microbial Genetics	<ol style="list-style-type: none"> 1. To understand the basic concepts of bacterial genome, organization of genome and mechanism of gene expression. 2. To study the concept of mutation, its type and detection mutants. 3. To study genetic complementation- Cis-trans test. 4. To understand the techniques in molecular biology such as – DNA sequencing, DNA finger printing and PCR. The study Genetic Engineering, its tools, techniques and application.
Course XIV DSE F50: Microbial Biochemistry	<ol style="list-style-type: none"> 1. To study enzymes with its properties, structure, specificity and action of enzyme. 2. To study purification of enzyme. 3. To understand assay of enzyme and immobilization of enzyme. 4. To study microbial metabolism and assimilation of Carbon, Nitrogen and Sulphur. The study biosynthesis of different biomolecules.
Course XV DSE F51: Environmental Microbiology	<ol style="list-style-type: none"> 1. To know the characteristics of liquid and solid wastes. 2. To know how to treat the industrial waste generated from various industries. 3. To know the biological safety. 4. To study Bioremediation and its application in various fields.

Practical Courses

Course	Outcomes
Practical – I (Virology and Microbial Genetics)	<ol style="list-style-type: none"> 1. To study isolation of coliphage from sewage sample and observe the plaques. 2. To understand effect of U. V. light on bacteria and plot the graph with respect to bacterial growth. 3. To study the process of DNA isolation and observe DNA fibres. 4. To study isolation of streptomycin resistant mutant with gradient plate technique.
Practical – II (Food and Industrial Microbiology)	<ol style="list-style-type: none"> 1. To study the assay of amylase by DNSA method. 2. To study assay of Vitamin B12 /Penicillin and observe zone of stimulation surrounding the solution. 3. To understand the basic steps in wine production and examine the pH, color and alcohol content. 4. To study isolation of lactic acid bacteria from fermented food.

<p>Practical – III (Agricultural and Environmental Microbiology)</p>	<ol style="list-style-type: none"> 1. To study isolation of <i>Azotobacter</i> / <i>Rhizobium</i> / <i>Xanthomonas</i> /PSB from soil/samples and its importance in soil. 2. To determine the Biological Oxygen Demand of industrial wastes and understand its importance. 3. To estimate Calcium and Magnesium from soil and understand its importance in soil. 4. To determine Chemical Oxygen Demand of industrial wastes and understand its importance.
<p>Practical – IV (Medical Microbiology)</p>	<ol style="list-style-type: none"> 1. To study human pathogenic organisms isolates from clinical sample. 2. To determine minimum inhibitory concentration (MIC) of pathogenic organisms. 3. To perform serological tests for malaria and typhoid. 4. To understand clinical significance of haematological tests such as haemoglobin, PCV, total and differential count of blood cells.