

DEPARTMENT OF MICROBIOLOGY

PROGRAMME OUTCOME, PROGRAMME SPECIFIC OUTCOME, COURSE OUTCOME, LEARNING OUTCOME AND COURSE OBJECTIVE

BSc - MICROBIOLOGY	
PROGRAMME OUTCOME	<ul style="list-style-type: none">➤ Students will be able to communicate scientific information effectively, especially relating to microbiological organisms, and the roles of microbial organisms in ecosystem function and health-related issues➤ Students will be able to collect, analyse and interpret scientific data, including developing a familiarity with microbiology laboratory techniques and safety procedures➤ Students will be able to apply the scientific method as a demonstration that they understand its application furthering our knowledge of the microbial world➤ Students will be able to describe fundamental principles of biology e.g., central dogma, diversity of life, inheritance and how these principles relate to microorganisms➤ Students will appreciate the biological diversity of microbial forms, and appreciate that this diversity results from evolutionary processes➤ Students will gain familiarity with the unique role of microbes play in genetic modification technologies (i.e., creation of GMOs, industrial applications, gene therapy, etc.)➤ Students will gain familiarity with the role of microbes in human disease, the role of microbes in issues of international health, and the human immune response to microbial infection➤ Students will gain familiarity with the role of microbes in the context of ecosystem function (e.g., microbial ecology, microbiome, etc.)➤ A course emphasizes on distribution, morphology and physiology of microorganisms in addition to skills in aseptic procedures, isolation and identification.

	<ul style="list-style-type: none"> ➤ This course also includes entry level training covering Microbial physiology and Prokaryotic genetics, Molecular biology and recombinant DNA technology, immunology, medical microbiology, food and dairy microbiology, Microbial taxonomy, epidemiology, agricultural & soil microbiology and environmental microbiology.
PROGRAMME SPECIFIC OUTCOME	<ul style="list-style-type: none"> ➤ Research activities they would be able to take up in the field of Microbiology, Genetic engineering, Nanotechnology, Clinical trials etc ➤ Graduating students can pursue career in Clinical Trials, Pathology and Microbiology laboratories, Pharmaceutical industries, Dairy industry, Food manufacturing industry, Water analysis and purification industry etc
COURSE OUTCOMES	
SEMESTER I:MBP 101 BASIC MICROBIOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ To learn scope and applications of Microbiology in various fields. ➤ To learn theory in microscopy and their handling techniques ➤ To learn the principle of various specialized microscopes like Dark field microscope, Phase contrast microscope, Fluorescent microscope, Electron microscope etc. ➤ To study Photomicrography. ➤ To learn staining procedures like Grams staining, Endospore staining, Cell wall staining etc ➤ Know various physical and chemical means of sterilization ➤ To study Antibiotics and chemotherapeutic agents.
MBP 102 BASIC MICROBIOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ To understand safety measures in laboratory ➤ To get acquainted with the instruments used in microbiology laboratory ➤ Master aseptic techniques and be able to perform routine culture handling tasks safely and effectively ➤ Demonstrate practical skills in microscopy and their handling techniques and staining procedures like Grams staining, Endospore staining, Cell wall staining etc

SEMESTER II: MBP 201 MICROBIAL TAXONOMY AND CULTURE TECHNIQUES (THEORY)	<ul style="list-style-type: none"> ➤ Understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes ➤ Understand the structural similarities and differences among various physiological groups of bacteria/archaea ➤ Know various Culture media and their applications ➤ Know General bacteriology and microbial techniques for isolation of pure cultures of bacteria, and fungi ➤ Understand the viral classification, structure, reproduction and significance of viruses ➤ Know the methods used in studying viruses. ➤ To study Properties, classification, reproduction and significance of major groups of fungi. ➤ To learn the nutritional requirements, growth, multiplication and cultivation of bacteria.
MBP 202 MICROBIAL TAXONOMY AND CULTURE TECHNIQUES (PRACTICAL)	<ul style="list-style-type: none"> ➤ To learn preparation of media and culture techniques. ➤ To perform isolation and identification of Bacteria and Fungi from various sources like water and soil. ➤ To learn dark field microscopy and observation of live bacterial motility by hanging drop method. ➤ To learn Haemocytometry and Micrometry. ➤ To study Fungal, protozoal and Cyanobacterial forms.
SEMESTER III: MBP 301 MICROBIAL PHYSIOLOGY AND MICROBIAL GENETICS (THEORY)	<ul style="list-style-type: none"> ➤ Understanding the laws of thermodynamics, concepts of entropy, enthalpy and free energy changes and their application to biological systems. ➤ Conceptual knowledge of aerobic and anaerobic respiration and various intermediary mechanisms involved oxidative phosphorylation. ➤ Overview of major biomolecules –carbohydrates, lipids, proteins, amino acids, nucleic acids, classification, structure, function of the above mentioned biomolecules ➤ Discuss the biosynthesis and the degradation pathways involved. ➤ Conceptual knowledge of properties, structure, function of enzymes, enzyme kinetics and their regulation. ➤ Know the terms and terminologies related to molecular biology and microbial ➤ Understand the properties, structure and function of genes in living organisms at the molecular level ➤ Have a conceptual knowledge about DNA as a genetic material, enzymology, and replication strategies ➤ Discuss the molecular mechanisms underlying mutations, detection of mutations and DNA damage

	<ul style="list-style-type: none"> and repair mechanisms ➤ Explain the concept of recombination- Transformation, Transduction and Conjugation. ➤ To understand the concept of transposition
SEMESTER III: MBP 302 MICROBIAL PHYSIOLOGY AND MICROBIAL GENETICS (PRACTICAL)	<ul style="list-style-type: none"> ➤ To perform various biochemical tests for the identification and classification of microorganisms. ➤ To learn the growth curve patterns both in fungal and bacterial category. ➤ To perform the quantification of Sugar and Protein in unknown samples. ➤ To learn the effect of pH and temperature on various bacterial forms. ➤ To understand Genetic recombination in bacteria.
SEMESTER IV: MBP 401 MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ Explain the significance of central dogma of gene action ➤ Understand the molecular mechanisms involved in transcription and translation ➤ Describe the importance of genetic code and wobble hypothesis ➤ Handle and independently work on lab protocols involving molecular techniques ➤ To study various tools ,gene cloning vectors in rDNA technology ➤ To know invitro construction of rDNA molecule and Transformation into target cells. ➤ To understand application of genetic engineering In various fields
SEMESTER IV: MBP 402 MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ To learn preparation of Phosphate and Citrate buffers. ➤ To learn estimation of DNA and RNA in unknown samples. ➤ To learn antibiotic sensitivity and antibiotic resistance. ➤ To learn basic techniques in genetic engineering and recombinant DNA technology like In vitro ligation, Restriction digestion and Plasmid isolation.
SEMESTER V: PAPER 5: MBP 501 AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ Appreciate the diversity of microorganism and microbial communities inhabiting a multitude of habitats and occupying a wide range of ecological habitats. ➤ Learn the occurrence, abundance and distribution of microorganism in the environment and their role in the environment and also learn different methods for their detection and characterization ➤ Competently explain various aspects of environmental microbiology and microbial ecology and to become familiar with current research in environmental microbiology. ➤ Understand various biogeochemical cycles – Carbon,

	<p>Nitrogen, Phosphorus cycles etc. and microbes involved.</p> <ul style="list-style-type: none"> ➤ To understand mechanism of nitrogen fixation by both symbiotic and non symbiotic bacteria. ➤ Understand various plant microbes interactions especially rhizosphere, phyllosphere and mycorrhizae and their applications especially the biofertilizers and their production techniques. ➤ Understand the basic principles of environment microbiology and be able to apply these principles to understanding and solving environmental problems – waste water treatment and bioremediation ➤ Know the Microorganisms responsible for water pollution especially Water-borne pathogenic microorganisms and their transmission. ➤ Comprehend the various methods to determine the sanitary quality of water and sewage treatment methods employed in waste water treatment. ➤ To study various techniques for trapping air borne microbes. ➤ To learn about various important plant pathogens- Bacterial, Viral, Fungal and Mycoplasma diseases.
<p>SEMESTER V: PAPER 5: MBP 502 AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY (PRACTICAL)</p>	<ul style="list-style-type: none"> ➤ Isolation, identification and enumeration of Bacteria and Fungi from Rhizosphere soil. ➤ Study of Rhizobium from nodules. ➤ Isolation and identification of various forms of Actinomycetes. ➤ Study of Antagonism and plant pathogens. ➤ Study of air borne micro organisms. ➤ Determination of water quality by coliform test and BOD test. ➤ Study of soil fungal forms.
<p>SEMESTER V: PAPER 6: MBP 503 FOOD AND DAIRY MICROBIOLOGY (THEORY)</p>	<ul style="list-style-type: none"> ➤ Understand the beneficial role of microorganisms in fermented foods and in food processing and the microbiology of different types of fermented dairy products ➤ Understand the significance and activities of microorganisms in food and role of intrinsic and extrinsic factors on growth and survival of microorganisms in foods. ➤ Know the spoilage mechanisms in foods and thus identify methods to control deterioration and spoilage ➤ Recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods. ➤ Learn various methods for their isolation, detection and identification of microorganisms in food and employ in industries

	<ul style="list-style-type: none"> ➤ Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation ➤ Understand of the basis of food safety regulations ➤ Study of microbes as Food- Single cell protein and Single cell oil. ➤ To study various microflora in milk, sources of microbial contamination of milk. ➤ Microbial analysis and preservation of milk and its products
<p>SEMESTER V: PAPER 6: MBP 504 FOOD AND DAIRY MICROBIOLOGY (PRACTICAL)</p>	<ul style="list-style-type: none"> ➤ Isolation and identification of micro organisms infected fruits, vegetables, curd, and idly batter. ➤ Bacterial examination of milk by DMC, SPC and MBRT. ➤ Estimation of fat and lactose from given milk samples. ➤ Production and detection of Afalttoxins. ➤ Study of plant pathogens. ➤ Production of yoghurt.
<p>SEMESTER VI: MBP 601PAPER 7: IMMUNOLOGY AND MEDICAL MICROBIOLOGY (THEORY)</p>	<ul style="list-style-type: none"> ➤ This course provides learning opportunities in the basic principles of medical microbiology and infectious disease. ➤ It covers the role of the human body's normal microflora. ➤ The course provides the conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause disease in the human body. ➤ It also provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases. ➤ Explain the methods of microorganisms control, e.g. chemotherapy & vaccines. Solve problems in the context of this understanding. ➤ To understand types of immunity, cells and organs involved in immune system and various immune responses. ➤ To have the basic knowledge of Antigens, Antibodies and Antigen antibody responses. ➤ To study various Bacterial, Viral, Protozoan and Fungal diseases.
<p>SEMESTER VI: MBP 602 PAPER 7: IMMUNOLOGY AND MEDICAL MICROBIOLOGY (PRACTICAL)</p>	<ul style="list-style-type: none"> ➤ To Isolate and identification of normal microflora using various culture media. ➤ To learn Analysis of urine – Estimation of urine sugar and urine protein. ➤ To understand Blood grouping and differential counting of WBC. ➤ To learn Various diagnostic tests like ODD, RID,

	<p>VDRL, WIDAL and Dot ELISA.</p> <ul style="list-style-type: none"> ➤ Study of pathogens
<p>SEMESTER VI: PAPER 8: MBP 603 INDUSTRIAL MICROBIOLOGY AND MICROBIAL TECHNOLOGY (THEORY)</p>	<ul style="list-style-type: none"> ➤ Get equipped with a theoretical and practical understanding of industrial microbiology ➤ Appreciate how microbiology is applied in manufacture of industrial products ➤ Know how to isolate and improve the strains of microorganisms of industrial importance ➤ Know about design of bioreactors, factors affecting growth and production, heat transfer, oxygen transfer ➤ Understand the rationale in medium formulation & design for microbial fermentation, sterilization of medium and air ➤ Appreciate the different types of fermentation processes ➤ Comprehend the techniques and the underlying principles in downstream processing ➤ To study immobilization of enzymes and cells. ➤ To understand the industrial production of various products. ➤ To know mushroom cultivation
<p>SEMESTER VI: PAPER 8: MBP 604 INDUSTRIAL MICROBIOLOGY AND MICROBIAL TECHNOLOGY (PRACTICAL)</p>	<ul style="list-style-type: none"> ➤ To learn production and estimation of various industrially important microbial products like alcohol, citric acid, amylase enzyme, lactic acid etc ➤ To learn mushroom cultivation. ➤ To learn about various fermenters.

LEARNING OUTCOME

<p>SEMESTER I:MBP 101 BASIC MICROBIOLOGY (THEORY)</p>	<ul style="list-style-type: none"> ➤ Understanding of basic history , scope and contributions of major scientists towards the field of microbiology ➤ Acquaintances with the principle, construction and applications of various light and electron microscopes. ➤ Learning of basics of various microbial staining techniques. ➤ Understanding the principle and applications of various physical and chemical sterilization techniques relevant in microbiology laboratory.
<p>MBP 102 BASIC MICROBIOLOGY (PRACTICAL)</p>	<ul style="list-style-type: none"> ➤ Familiarity in handling the instruments like microscope along with basic and analytical instruments in the laboratory. ➤ Ability to identify bacteria with respect to morphology and staining.

	<ul style="list-style-type: none"> ➤ Would know all aseptic techniques required in the laboratory
SEMESTER II: MBP 201 MICROBIAL TAXONOMY AND CULTURE TECHNIQUES (THEORY)	<ul style="list-style-type: none"> ➤ Deep insight into Bacterial, Fungal and Viral properties, structure and classification with type studies. ➤ Knowledge about various bacterial and fungal culture media, isolation and identification of microbes and maintenance of pure culture. ➤ Knowledge about various nutritional requirements (both physical and chemical), along with microbial growth kinetics.
MBP 202 MICROBIAL TAXONOMY AND CULTURE TECHNIQUES (PRACTICAL)	<ul style="list-style-type: none"> ➤ Ability to prepare fungal and bacterial media. ➤ Ability to isolate and identify bacteria and fungal forms from water and soil by various isolation techniques. ➤ To measure as well as count various microbial cells.
SEMESTER III: MBP 301 MICROBIAL PHYSIOLOGY AND MICROBIAL GENETICS (THEORY)	<ul style="list-style-type: none"> ➤ Knowledge about classification, properties and significance of various biomolecules along with study of basic enzymology. ➤ Total insight into various anabolic and catabolic processes which include aerobic and anaerobic respiration, fermentation, Photosynthesis and chemolithotrophy. ➤ Overall knowledge of Structure, replication of DNA, Genetic recombination, mutation and transposition processes.
SEMESTER III: MBP 302 MICROBIAL PHYSIOLOGY AND MICROBIAL GENETICS (PRACTICAL)	<ul style="list-style-type: none"> ➤ Ability to plot growth curve of bacteria and fungi. ➤ To identify and classify the bacteria based on the biochemical characteristics. ➤ To be able to quantify Glucose and protein concentration in any solution or extract.
SEMESTER IV: MBP 401 MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ Complete understanding of Central dogma of molecular biology i.e. transcription and translation of prokaryotes. ➤ Learning Operon concept as a regulatory mechanism in Bacteria. ➤ Overall knowledge about genetic engineering and gene cloning experiment. ➤ Learning molecular techniques and applications in genetic engineering.
SEMESTER IV: MBP 402 MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ Ability to prepare buffers for recombinant DNA technology experiments with accuracy in using pH meter. ➤ Quantitative assessment of DNA and RNA from given unknown source. ➤ Independent assessment of MIC of any antimicrobial

	<p>agent.</p> <ul style="list-style-type: none"> ➤ Hands on experience of conducting basic rDNA technology experiments.
<p>SEMESTER V: PAPER 5: MBP 501 AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY (THEORY)</p>	<ul style="list-style-type: none"> ➤ Understanding various aspects of Soil organisms and their interactions. ➤ Overall role of Microbes in Agriculture including usefulness (Nitrogen fixing, Biofertilizers and biopesticides) and Harmfulness (Plant pathogens) ➤ Understanding the role of microbes in both air and water. ➤ To be able to assess various methods of trapping air borne organisms and their spores. ➤ To have an overall picture of pure drinking water and various municipal water treatment.
<p>SEMESTER V: PAPER 5: MBP 502 AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY (PRACTICAL)</p>	<ul style="list-style-type: none"> ➤ Ability to isolate, identify and quantify the Bacteria and fungi in soil and understand the antagonism and antibiotic production from various organisms. ➤ To be able to perform tests to assess the quality of water from different sources. ➤ To have the ability to isolate various bacteria and fungi from various indoor and outdoor environments.
<p>SEMESTER V: PAPER 6: MBP 503 FOOD AND DAIRY MICROBIOLOGY (THEORY)</p>	<ul style="list-style-type: none"> ➤ To gain deep knowledge of relationship between microbes and food. ➤ To understand the role of microbes in food contamination, spoilage and food borne pathogens and their assessment and food preservation. ➤ To have an understanding of milk and microbial spoilage of milk. ➤ Various milk organisms and their biochemical functions in milk. ➤ Total understanding of various preservation techniques and fermentations in milk. ➤ Deep insight about the production of various fermented milk products.
<p>SEMESTER V: PAPER 6: MBP 504 FOOD AND DAIRY MICROBIOLOGY (PRACTICAL)</p>	<ul style="list-style-type: none"> ➤ To be able assess the quality of food sample and the microbial load. ➤ Understanding composition and quality of milk. ➤ To be able to perform all major milk assessment tests along with fat and lactose estimation.
<p>SEMESTER VI: MBP 601 PAPER 7: IMMUNOLOGY AND MEDICAL MICROBIOLOGY (THEORY)</p>	<ul style="list-style-type: none"> ➤ Basic concepts of immunology like immunity, Antigen, Antibody, immune system, immune responses are well understood. ➤ Overall view of Ag-Ab reactions, Hypersensitivity reactions, vaccines and compliment system is well understood. ➤ Concepts of Medical microbiology are introduced. ➤ Major Bacterial, viral, fungal and protozoan human

	diseases are studied.
SEMESTER VI: MBP 602 PAPER 7: IMMUNOLOGY AND MEDICAL MICROBIOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ Isolation and identification of bacteria from various clinical samples is made familiar with. ➤ Basic blood examinations like blood grouping and differential counting of WBC is taught. ➤ Various laboratory diagnostic techniques including WIDAL, VDRL, ODD, RID AND ELISA are understood.
SEMESTER VI: PAPER 8: MBP 603 INDUSTRIAL MICROBIOLOGY AND MICROBIAL TECHNOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ Theoretical understanding of industrial upstream and down stream processing. ➤ Understanding various aspects of Industrial fermentation processes. ➤ To specifically study the production mechanisms of some important specific industrially important products. ➤ To understand recombinant vaccine and hormone production.
SEMESTER VI: PAPER 8: MBP 604 INDUSTRIAL MICROBIOLOGY AND MICROBIAL TECHNOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ To be able to produce and assess wine from grapes. ➤ Specific production and activity assessment of enzyme from various organisms with various substrates. ➤ Specific production and estimation of percentage of Citric acid from various sources and various organisms and their analysis. ➤ To perform mushroom cultivation.

COURSE OBJECTIVE

SEMESTER I:MBP 101 BASIC MICROBIOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ To give the fundamentals of microbiology along with scientist contributions to the field. ➤ Principle, construction and applications of various microscopes are covered. ➤ Total aseptic techniques along with chemotherapeutic agents are well studied.
MBP 102 BASIC MICROBIOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ Handling of light microscope with basic microbial staining techniques are covered. ➤ Aseptic methods are well understood along with usage of instruments.
SEMESTER II: MBP 201 MICROBIAL TAXONOMY AND CULTURE TECHNIQUES (THEORY)	<ul style="list-style-type: none"> ➤ Is to teach Properties, classification and type studies of Viruses, Bacteria, Fungi, Cyanoabacteria and Protozoa. ➤ Is to teach various preparation of culture media and culture techniques along with growth aspects.
MBP 202 MICROBIAL	<ul style="list-style-type: none"> ➤ Isolation and identification of microbes by various

TAXONOMY AND CULTURE TECHNIQUES (PRACTICAL)	<p>techniques and from various sources.</p> <ul style="list-style-type: none"> ➤ Counting and measuring of microbial cells and their spores.
SEMESTER III: MBP 301 MICROBIAL PHYSIOLOGY AND MICROBIAL GENETICS (THEORY)	<ul style="list-style-type: none"> ➤ To teach Biomolecules, enzymology along with total microbial metabolic processes i.e. catabolic and anabolic processes. ➤ To cover Microbial DNA replication, its structure and various recombination processes along with mutation and transposition.
SEMESTER III: MBP 302 MICROBIAL PHYSIOLOGY AND MICROBIAL GENETICS (PRACTICAL)	<ul style="list-style-type: none"> ➤ Estimation of reducing sugar and protein in given solution. ➤ To teach students to identify bacteria based on the biochemical characteristics
SEMESTER IV: MBP 401 MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ Teaching of Microbial transcription and translation along with operon concept as a gene regulatory mechanism in prokaryotes. ➤ To impart basic knowledge of genetic engineering experiment with molecular techniques and applications.
SEMESTER IV: MBP 402 MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ To teach DNA and RNA estimations. ➤ To teach the usage of pH meter for the preparation of buffer of specific pH ➤ To understand antimicrobial evaluation of an antibiotic
SEMESTER V: PAPER 5: MBP 501 AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ Various aspects of role of microorganisms in the field of Soil, Water and Air. ➤ Impact of microbes on Agriculture.
SEMESTER V: PAPER 5: MBP 502 AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ To teach isolation and identification of microbes from soil, water and air. ➤ To assess the quality of air and water by various methods.
SEMESTER V: PAPER 6: MBP 503 FOOD AND DAIRY MICROBIOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ To teach the role of microbes in food spoilage and causing food borne illness and food preservation techniques also microbes as food. ➤ To teach various organisms in milk and their role in fermentation, spoilage and preparation of fermented products along with preservation of milk and milk products
SEMESTER V: PAPER 6: MBP 504 FOOD AND DAIRY MICROBIOLOGY	<ul style="list-style-type: none"> ➤ To teach assessment of many types of food by finding the presence various microbes and mycotoxins.

(PRACTICAL)	<ul style="list-style-type: none"> ➤ To teach examination of fat and lactose percentage of milk along with milk quality checking by various methods.
SEMESTER VI: MBP 601 PAPER 7: IMMUNOLOGY AND MEDICAL MICROBIOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ To teach basic immune system and its functioning which includes the understanding of immunity, Antigen, antibody, antigen antibody reactions, immune cells, immune organs, immune response, compliment system, vaccines and hypersensitivity reactions. ➤ To teach various bacterial, fungal, viral and protozoan diseases which covers pathogen, identification and cultivation of pathogen, antigenic properties, disease, symptoms, pathogenicity, pathogenesis, diagnosis, treatment and prevention of diseases.
SEMESTER VI: MBP 602 PAPER 7: IMMUNOLOGY AND MEDICAL MICROBIOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ To teach isolation and identification of bacteria from various samples. ➤ To understand urine sugar, protein and cfu analysis. ➤ To learn blood grouping along with many diagnostic techniques including ODD, RID, ELISA, WIDAL, VDRL etc..
SEMESTER VI: PAPER 8: MBP 603 INDUSTRIAL MICROBIOLOGY AND MICROBIAL TECHNOLOGY (THEORY)	<ul style="list-style-type: none"> ➤ To teach the industrially important microbes and their cultivation. ➤ To teach about various types of fermenters and upstream and downstream processes. ➤ To teach various microbial productions specifically like alcohol, organic acid, antibiotic, hormone, vitamin and enzyme productions. ➤ To teach cell and enzyme immobilizations and mushroom cultivation.
SEMESTER VI: PAPER 8: MBP 604 INDUSTRIAL MICROBIOLOGY AND MICROBIAL TECHNOLOGY (PRACTICAL)	<ul style="list-style-type: none"> ➤ To teach the cultivation and estimation of citric acid, lactic acid and amylase with various strains of microbes. ➤ To teach white oyster mushroom cultivation. ➤ To teach wine production and biogas production.