DEPARTMENT OF MICROBIOLOGY

B. SC. MICROBIOLOGY

Program Objective (PO)

PO1: Deliver comprehensive knowledge and understanding of basic concepts, theories and principles in the field of science.

PO2: Self-equipped to engage in independent and life-long learning in the broadest context of socio-cultural and technological changes.

PO3: Enrich learners with subject-related and transferable skills related with job trades and employment opportunities MODULE.

PO4: Equip learners to demonstrate their own work and to investigate their awareness in relation to the wider research field.

PO5: Understand the issues of environmental contexts and sustainable development.

PO6: Adequate training in the application of digital knowledge at workplace and for higher education/research.

PO7: Commit to professional ethics and responsibilities of the science practices

Program Specific Objective (PSO)

PSO1: Students will get trained in pure microbiological sciences.

PSO2: They will get introduced to the concepts of application and research in microbiology.

PSO3: The sense of scientific responsibilities, social and environment awareness will be inculcated in them.

PSO4: The students can build-up a progressive and successful career after doing the course.

COURSE OUTCOMES

F. Y. B. SC. MICROBIOLOGY

MB 111: Introduction to Microbial World

CO1: Insights about historical developments in the field of Microbiology.

CO2: Introduce the expanse of microbial world.

CO3: Know about various branches of Microbiology.

CO4: Study of classification of microorganisms.

CO5: Study the morphological and cultural characteristics of microorganism.

CO6: Implication of microorganisms to immune system higher organisms.

CO7: Exploitation of microorganisms for the benefit of mankind.

CO8: Exploring the chemical basis of microbial world.

CO9: Introduction to nomenclature of microorganisms.

MB 112: Basic Techniques in Microbiology

CO1: Introduction to microscopy and different microscopes.

CO2: Study of staining methods for visualisation of microorganism.

CO3: Study and application of sterilisation and disinfection.

MB 113: Practical Course based on theory paper I and II

CO1: Introduction to use of various instruments and devices and glassware's to be used in a microbiological laboratory.

CO2: Practical applications of staining method for identification of microorganisms.

CO3: Handling of microscopes to observe and assess the microorganisms.

MB 121: Bacterial Cell and Biochemistry

CO1: Study of biochemistry of bacteria and their biochemical characteristics.

CO2: Introduction to detailed structure of bacterial cell and its components

MB 122: Microbial cultivation and growth

CO1: Introduction to study of microbial cultivation techniques.

CO2: Introduction to different microbiological growth media to grow microorganism in laboratory.

MB 123: Practical Course based on theory paper I and II

CO1: Study of preparation of artificial media and their practical implications in exploring the microorganism.

CO2: Application of different cultural techniques using diverse growth media.

CO3: Study of normal flora of skin.

CO4: Practical assessment of effect of various physical and chemical paraments on growth of microorganisms.

S. Y. B. SC. MICROBIOLOGY

MB – 211: Bacterial Systematics and Physiology

CO1: Introduction to bacterial systematics.

CO2: Study of microbial physiology.

CO3: Insights to enzymology and their importance in microbial world.

MB – 212: Industrial and Soil Microbiology

CO1: Introduction to industrial microbiology.

CO2: Study of soil microbiology and its importance in agriculture sector.

CO3: Study of brief introduction of microbial interactions with one another to the host.

MB – 221: Bacterial Genetics

CO1: Introduction to hereditary molecules in living organisms.

CO2: Study of DNA replication and its expression.

CO3: Introduction to mutations and plasmid genetics.

MB – 222: Air and Water Microbiology

CO1: Introduction to air & water microbiology.

CO2: Insights about microbiological aspects in assessing and controlling the air and water pollution.

MB – 223: Practical Course Based on MB 211, 212, 221, 222

CO1: Demonstration to the generation time in bacteria through experimentation.

CO2: Study of measurements of cell dimension by micrometry using all the objectives.

CO3: Introduction to bacteriological tests for the determination of potability, BOD, total solids and total suspended solids of water.

CO4: Studies on primary screening of industrially important organisms for the production of industrially important products.

CO5: Introduction to working principles of various industries through visits and understanding the use of microorganisms for controlling the pollutions and exploit them for the production of commercially important products.

T. Y. B. SC. MICROBIOLOGY

MB – 351: Medical Microbiology - I

CO1: Introduction to various infectious disorders associated with human body systems.

CO2: Study of epidemiological implications for understanding and controlling of epidemics and pandemics.

CO3: Study of different human bacterial pathogens by studying their classification and biochemical characters, antigenic structure, viability characteristics, pathogenicity, pathogenesis, symptoms, laboratory diagnosis, epidemiology, prophylaxis and chemotherapies used to manage their infections.

MB – 361: Medical Microbiology – II

CO1: Introduction to chemotherapy.

CO2: Study of antimicrobial agents and their mode of action on bacteria, fungi, viruses and protozoa.

CO3: Study of mechanism of drug resistance among pathogens.

CO4: Introduction to cultivation of viruses.

CO5: Study of human, animal viruses, fungal and protozoal pathogens with respect to their classification and biochemical characters, antigenic structure, viability characteristics, pathogenicity, pathogenesis, symptoms, laboratory diagnosis, epidemiology, prophylaxis and chemotherapies used to manage their infections.

MB – 352: Immunology – I

CO1: Introduction to organs of immune system, innate immunity, antigen and immunoglobulins and their importance in the immune system.

CO2: Study of antigen-antibody interactions, major histocompatibility complex.

CO3: Insights regarding the transplantation and immunity and hybridoma technology and monoclonal antibodies and their applications in human welfare and diagnostic procedures.

MB – 362: Immunology – II

CO1: Introduction to cytokines, adaptive / acquired immunity and their role in immune responses.

CO2: Insights about unusual behaviour of immune responses through study of hypersensitivity reactions, autoimmunity and immunodeficiencies.

MB – 353: Enzymology

CO1: Study of principles of enzymology and enzyme purification techniques.

CO2: Introduction to enzyme kinetics and its role in metabolism.

CO3: Insights to enzyme immobilisation techniques.

MB – 363: Metabolism

CO1: Introduction to bacterial metabolism and their bioenergetics.

CO2: Study of metabolic pathways and autotrophy.

CO3: Insights of biosynthesis, biodegradation and photosynthesis by bacteria.

MB – 354: Genetics

CO1: Introduction to DNA replication in prokaryotes and eukaryotes and their expression systems.

CO2: Insights about gene transfer and mapping techniques.

MB – 364: Molecular Biology

CO1: Study of genetic recombination and bacteriophage genetics.

CO2: Introduction to DNA damage and its repair mechanisms.

CO3: Practical applications of genetical engineering and generating the recombinant DNA molecule.

MB – 355: Fermentation Technology – I

CO1: Introduction to strain improvement and media optimisation.

CO2: Study of scale modulation techniques.

CO3: Introduction to downstream processing and quality assurance of fermentation products.

CO4: Introduction to fermentation economics.

MB – 365: Fermentation Technology – II

CO1: Introduction to solid state fermentation and submerged fermentations.

CO2: Study of large-scale production of enzymes, steroids, biomass-based products, milk products, vaccines, immune sera and modern trends in microbial production.

MB – 356: Agricultural Microbiology

CO1: Introduction to plant pathology and disease control.

CO2: Study microorganisms in sustainable agriculture and tools in plant genetic engineering.

MB – 366: Food Microbiology

CO1: Introduction to food preservation and foodborne diseases.

CO2: Concept of prebiotic and probiotic and fermented food.

CO3: Insights to food sanitation and regulatory authorities.

MB – 357: Practical Course – I Diagnostic Microbiology and Immunology

CO1: Study of physical, chemical and microscopic examination of clinical samples.

CO2: Introduction to the isolation, identification of following certain human pathogens from clinical samples.

CO3: Study of agglutination tests and their applications in diagnostic procedures.

CO4: Concept of epidemiological survey.

CO5: Study of haematology and hemogram for the diagnosis of diseases.

MB – 367: Practical Course – I Diagnostic Microbiology and Immunology

CO1: Study of permanent slides of certain microbial pathogens.

CO2: Introduction to the isolation and identification of yeast and fungal pathogens.

CO3: Study of antibiotic sensitivity testing of the bacterial pathogens.

CO4: Studies on immunohematology, immunochromatography and immunoprecipitation test and their application in the diagnostic purposes.

CO5: Visit to blood bank to study blood banking, transfusion reactions and build up the awareness regarding the blood donation.

MB – 358: Practical Course II Enzymology and Genetics

CO1: Studies on determination of absorption spectra and molar extinction co-efficient of two different dyes by colorimetry /spectrophotometry.

CO2: Introduction to qualitative analysis of proteins and carbohydrates using flow charts.

CO3: Studies on buffers preparation and pH meter calibration.

CO4: Study of paper chromatography.

CO5: Introduction to Extraction and quantitative estimation of total carbohydrate and proteins from natural sample.

CO6: Insights to the isolation and quantification DNA from a bacterium.

CO7: Studies on bacterial conjugation.

CO8: Study of chromosome staining.

MB – 368: Practical Course II Metabolism and Molecular Biology

CO1: Introduction to clinical biochemistry.

CO2: Studies on enzyme production, purification, quantification and immobilization.

CO3: Insights to the enrichment, isolation and enumeration of bacteriophages.

CO4: Concept of isolation of plasmid DNA and agarose gel electrophoresis.

CO5: Study of mitotic cell division from onion root tips.

CO6: Visit to a biotechnology / biochemistry institute.

MB – 359: Practical Course-III Fermentation Technology and Agricultural Microbiology

CO1: Study of sterility testing of pharmaceuticals.

CO2: Introduction to minimum inhibitory concentration and minimum bactericidal concentration of antibacterial compounds (MIC and MBC).

CO3: Study of antibiotic and growth factor assay.

CO4: Insights to the isolation and identification of few fungal pathogens.

CO5: Studies on collection of plant disease specimens and study of symptoms.

CO6: Study on isolation of PGPR with phosphate solubilization potential/Vesicular Arbuscular Mycorrhiza (VAM).

CO7: Introduction to the validation of commercial formulations of bioinoculants based on BIS standards and pot studies to check effect of bioinoculants on plant growth.

MB – 369: Practical Course-III Fermentation Technology and Agricultural Microbiology

CO1: Introduction to the lab scale production of ethanol and citric acid.

CO2: Study of solid-state fermentation for production of any one fermentation product (Trichoderma spp. / mushrooms / enzymes).

CO3: Study of isolation and identification of probiotic microflora from natural sources or any commercial formulation.

CO4: Study of SOPs for pharmaceutical industry.

CO5: Introduction to the aflatoxin detection.

CO6: Insights to the determination of TDP, TDT, TDR and D values.

CO7: Study of HACCP guidelines for food industry.

CO8: Visit to any food industry or a fermentation industry.

MB – 3510 Marine Microbiology

CO1: Introduction to marine ecology and sampling.

CO2: Study of marine microbes, role in bioremediation and bioprospecting.

MB – 3511 Dairy Microbiology

CO1: Introduction to dairy microbiology, microflora and milkborne pathogens.

CO2: Studies on dairy processing techniques and naturally occurring preservatives.

CO3: Study of milk spoilage.

CO4: Microbiological aspects of quality control and quality assurance in production of milk and milk products.

MB – 3610 Waste Management

CO1: Introduction to liquid waste management.

CO2: Studies on solid waste management and hazardous waste.

MB – 3611 Nano-biotechnology

CO1: Introduction to Nano-biotechnology.

CO2: Study of microbial mediated metallic nanoparticles synthesis.

CO3: Introduction to characterization techniques for nanomaterials.

CO4: Insights to applications of nanoparticles.