Maratha Vidya Prasarak Samaj's

G.M.D. Arts, B.W. Commerce and Science College, Sinnar.

DEPARTMENT OF MICROBIOLOGY

B.Sc. Microbiology

Programme Outcomes (POs)

The programme outcomes that the department presently adapts to future graduates are as follows:

PO-1: **Microbiology knowledge**: Graduates will acquire microbiology specific knowledge including molecular biology, immunology and rDNA technology coupled with hands on skills and leadership skills for a successful career.

PO-2: **Problem analysis**: Graduates will be able to analyse, solve and troubleshoot problems in implementation of microbiological protocols.

PO-3: **Design/development of solutions**: Graduates will develop creative thinking and cooperate with each other to solve problems in the field of microbiology.

PO-4: **Conduct investigations of complex problems**: Graduates will acquire practical skills – which help in planning and designing protocols to validate hypothesis and execute experimental techniques independently as well as assimilate, analyse and interpret subsequent data.

PO-5: **Modern tool usage and communication**: Graduates will effectively be able to manage resources and time using ICT and computer enabled devices and accomplishes ability to understand and communicate all ideas effectively.

PO-6: Environment sustainability and Ethics: Graduates will get adequate knowledge to use information and implement solutions for environmental protection and remediation. Graduates will be aware of their role and responsibility in handling and use of microbes including genetically modified microorganisms.

PO-7: **Lifelong learning**: Graduates will carry on learning and adapting in a world of constantly evolving technology.

Programme Specific Outcomes (PSOs)

The overall outcome of graduates specific to B.Sc. Microbiology programme as follows:

PSO1: **Microbiology skill**: The ability to understand the basic concepts related to the relevant fields of microbiology which will enable them to analyse and develop solutions to microbiology related problems.

PSO2: **Microbiology related employability skills:** The ability to use the acquired hands-on skills in microbiology, molecular biology, immunology, medical microbiology and screening for useful biomolecules within employment areas.

PSO3: **Successful Career and Entrepreneurship:** The ability to gainfully become an entrepreneur by using microorganisms to produce biofertilizers, mushrooms and pharmaceutically important biomolecules as well as using practical hands-on training to become employed in diagnostic, industrial, pharmaceutical, food and research and development laboratories

Course Outcomes

F.Y.B.Sc. Microbiology

MB-111 Paper I: Introduction to Microbiology

CO 1: Students will be able to define Microbiology and Microorganisms.

CO 2: They will be able to identify different types of microorganisms.

CO 3: They will be able to describe the importance and applications of microbiology

CO 4: They will be able to memorise and recite the names of microorganisms with genus and species

MB-112 Paper II: Basic techniques in Microbiology

CO 1: Students will be able to define and state the principles various techniques in microbiology.

CO 2: They will be able to describe individual technique in detail.

CO 3: Students will be able to name and list the growth requirements of micro-organisms.

MB-121 Bacterial cell and biochemistry

CO1: Students will be able to define and state the principles about bacterial cell and its biochemistry.

CO2: They will be able to describe genetic material of microorganisms.

CO3: They will able to define biochemical characterisations of components of microorganism e.g., carbohydrates, lipids, proteins and nucleic acid.

MB-122 Microbial cultivation and growth

CO1: Students will be trained with techniques about how to cultivate microorganisms.

CO2: They will be able to describe solid and liquid medium for the growth of microorganism.

CO3: They will be able to aware with instruments and glassware's related with microbial cultivation.

MB-113 and 123 Practical's

CO 1: Students will be trained to techniques in microbiology like staining, cultivation of microorganisms

CO 2: They will be able to label the different parts of instruments like incubator, Microscope, Autoclave etc.

They will be able to identify types of microorganisms with the help of microscope

S.Y.B.Sc. Microbiology

MB 211 paper I: Medical Microbiology and Immunology

CO 1: Students will be able to organize diseases with respect to system.

CO 2: They will be able to categories disease causing organisms like bacterial, fungal and viral etc.

CO 3: Students will be able to define epidemiology.

CO 4: Students will be able to define the term of Medical and immunology.

CO 5: They will be able to list out components of immune system and describe them in detail.

CO 6: They will be able to distinguish between humoral and cell specific immunity and innate and adaptive immunity.

MB 212: paper II Bacterial physiology and Fermentation Technology

CO 1: Students will be able to restate the importance of microorganisms in Industry.

CO 2: They will be able to give examples of industrially important micro-organisms and their applications.

CO 3: They will be able to explain process of Fermentation.

CO 4: They will be able to distinguish between the types of fermentations.

CO 5: They will be able to illustrate and label different parts of fermenters.

CO 6: They will be able to summarise the role of microorganisms in agriculture.

CO 7: They will be able to inter relate the microorganisms and elemental cycles in nature.

MB 221: Bacterial Genetics

CO 1: Students will be able to summarise the development of genetics.

CO 2: They will be able to paraphrase the concept of gene.

CO 3: They will be able to interpret the central dogma of molecular biology

CO 4: They will be able to explain the cellular processes like DNA replication, transcription and translation.

CO 5: They will be able to inter relate the cause of adaptation, evolution and cancer with the change in genetic inheritance.

MB 222: Air, water and soil Microbiology

CO 1: Students will be able to explain both air and water micro flora.

CO 2: They will be able to distinguish between air water micro flora.

CO 3: They will be able to summarise different techniques to measure the air and water micro flora and interpret the results.

MB 212 and 223: Practical course

CO 1: Practical for the second year students will be less defined i.e. kept more flexible, designed to evolve project themes on environment, agriculture and pollution aspects and acquiring laboratory related skills. Practical at this level will also include application of biostatistics principles and computers for data analysis and interpretation, and introduction to scientific writing and report preparation. These aspects can be practiced better while carrying out the mini-projects.

T.Y.B.Sc. Microbiology:

MB 351 and 361: Medical Microbiology

CO 1: Students will be able to organize diseases with respect to system.

CO 2: They will be able to categories disease causing organisms like bacterial, fungal, viral etc.

CO 3: They will be able to match diseases and their causative agents.

CO 4: They will able to understand the role antibiotics in the irradiation of disease and resistance generate against them.

MB 354 and 364: Genetics and Molecular Biology

CO 1: Students will be able to extend their study from prokaryotic gene expression to eukaryotic gene expression.

CO 2: They will be able to describe and interpret various techniques of gene mapping and able to solve problems based on it.

CO 3: Students will be able to define recombinant DNA technology (RDT) and state their applications. Students will be able to explain the various steps in RDT.

MB 353 and 363: Enzymology and Metabolism

CO 1: Students will be able to extend their study in enzymology with respect to identification and purification of enzyme.

CO 2: They will be able to describe and generalize the role of co enzyme in enzyme catalysis.

CO 3: Students will be able to interrelate between anabolism and catabolism.

CO 4: Students will be able to elaborate their study about bioenergetics.

MB 352 and 363: Immunology

CO 1: Students will be able to define the term immunology.

CO 2: They will be able to list out components of immune system and describe them in detail.

CO 3: They will be able to distinguish between humoral and cell specific immunity and innate and adaptive immunity.

MB 355 and 365: Fermentation technology

CO 1: Students will be able to define fermentation.

CO 2: They will be able to describe process of industrial fermentation.

CO 3: They will be able to understand the role of bioreactor in fermentation.
Co 4: They will be able to explain industrial processes for various products by flow sheet diagram.

MB 356 and 366: Agricultural and Food Microbiology

CO 1: Students will be able to define and analyse the role microorganisms in dairy, food, and environment.

CO 2: They will be able to explain milk and food spoilage due to micro-organisms.

CO 3: They will be able to describe and apply process of food preservation.

MB 357 and 367: Clinical Microbiology (Practical course I)

CO 1: Students will be trained with various techniques in clinical Microbiology like isolation and identification of pathogen by classical and serological methods

MB 358 and 368: Biochemistry and molecular biology (Practical course II)

CO 1: Students will be trained in various biochemical techniques like chromatography, centrifugation, qualitative and quantitative analysis of biochemical biomolecules.

MB 359 and 369: Applied Microbiology (Practical course III)

CO 1: Students will be trained with various techniques carried out in industries like fermentation, food and dairy.

Skill enhancement course:

MB 3510: Marine Microbiology

CO 1: Students will be able to define and analyse the role microorganisms in marine environment.

CO 2: They will be able to describe sampling methods for marine water.

CO 3: They will be able to define marine microbes role in bioremediation and bio prospecting.

MB 3511: Dairy Microbiology

CO 1: Students will be able to define and analyse the role microorganisms related with dairy industry.

CO 2: Students will be able to aware with processing techniques and naturally occurring preservative for dairy industry.

MB 3610: Waste management

CO 1: Students will be able to learn basic concept of solid and liquid waste management.

CO 2: Students will be able to aware with how to reduce the environmental and health hazardous wastes.

CO 3: They will be able to describe role of microorganisms in waste management treatment.

MB 3611: Nano biotechnology

CO 1: Students will be able to learn the concept of Nano biotechnology.

CO 2: Students will be able to aware microbial mediated metallic nanoparticles synthesis.

CO 3: They will be able to describe principles and characterization techniques for nanomaterial.

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