

M.V.R. DEGREE COLLEGE
(UG And PG Courses)
 (Affiliated to Andhra University)
 An Institution of Priyadarshini Educational Academy
 NAAC ACCREDITED COLLEGE

Dr.V.Rama Rao, M.A.,Ph.D.,
 Secretary & Correspondent

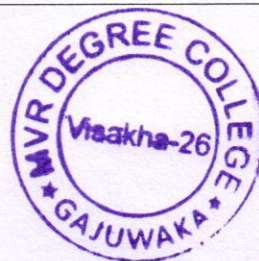
Dr.A.Balakrishna,M.Sc.,Ph.D.,
 Principal

DEPARTMENT OF MICROBIOLOGY

Bachelor of Science (B.Sc. MB BC BT)
 APSCHE, Revised Syllabus of Microbiology under CBCS Frame Work
 w.e.f 2015 – 16 (Revised in April, 2015)

Course Out Comes (COs) for Microbiology

CODE	TITLE OF THE PAPER	OUTCOMES
MBT-101 (TH)	INTRODUCTION TO MICROBIOLOGY AND MICROBIOLOGY AND MICROBIAL DIVERSITY	<p>CO1: The main objective of this course to know the students about contributions of scientists and to know the general characteristics of microbiology</p> <p>CO2: Students get the knowledge about general characteristics of different species and also study the TMV and HIV.</p> <p>CO3: The main objective of this course to know the students about</p> <p>the characteristics and classification of fungi, algae and protozoa and also the students aware of principles, instrumentation and handling of microscopy.</p> <p>CO4: Student understands about different staining techniques and also study the physical and chemical methods of sterilization.</p> <p>CO5: The main objective of this course is to understand the students and get the knowledge about the ultra-structure of bacterial cell and also study the economic importance of algae and fungi.</p>
MBT-101 (PR)	INTRODUCTION TO MICROBIOLOGY AND MICROBIOLOGY AND	<p>CO1: Student know about the Microbiology Laboratory practices and biosafety.</p>



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	MICROBIAL DIVERSITY	<p>CO2: Preparation of culture media for cultivation of bacteria and fungi.</p> <p>CO3: Microscopic observation of bacteria (Gram positive bacilli and cocci, Gram negative bacilli), Cyanobacteria, Algae and fungi.</p> <p>CO4: Isolation of pure cultures of bacteria by streaking method.</p> <p>CO5: Diagrammatic or Electron photomicrographic observation of TMV, HIV, T4 phage and adenovirus.</p>
MBT-201 (TH)	MICROBIAL BIOCHEMISTRY AND METABOLISM	<p>CO1: Describe the chemistry of carbohydrates, lipids, proteins and amino acids.</p> <p>CO2: Students to understand the study of principles and applications of colorimetry. Other instruments such as spectrophotometry, centrifugation and gel electrophoresis.</p> <p>CO3: The ability in classifying enzymes and also understand the mechanism of catalysis employed by the most well characterized enzymes.</p> <p>Explain how the enzyme activity is regulated and affected by temperature, pH and concentration.</p> <p>CO4: The main objective of this course is to understand the student and get the knowledge of Microbial nutrition and different medias and also concepts of microbial growth.</p> <p>CO5: Describe the metabolic pathways of aerobic and anaerobic photosynthesis in bacteria.</p>
MBT-201 (PR)	MICROBIAL BIOCHEMISTRY AND METABOLISM	<p>CO1: Qualitative analysis of Carbohydrates and Amino acids.</p> <p>CO2: Colorimetric estimation of DNA by</p>

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		<p>diphenylamine method.</p> <p>CO3: Paper chromatographic separation of sugars and amino acids.</p> <p>CO4: Estimation of CFU count by spread plate method/pour plate method.</p> <p>CO5: Factors affecting bacterial growth- pH, Temperature and Salts.</p>
<p>MBT:301 (TH)</p>	<p>MICROBIAL GENETICS AND MOLECULAR BIOLOGY</p>	<p>CO1: The main objective of this course to get the knowledge about genome organization about it concept by studying the structure of Nucleic acids, and replication of DNA by plasmids and transposons.</p> <p>CO2: Students get the knowledge about Mutation and Mutagen, difference between them and also, they will study of DNA damage repair mechanism and Genetic recombination in bacteria.</p> <p>CO3: Student understand the concept of Gene and types of RNA, Genetic code and Bacterial recombination.</p> <p>CO4: Student understand about the concept of Regulation of gene expression in bacteria.</p> <p>CO5: Student learn about the principles of Genetic engineering and also know the Gene cloning methods.</p>
<p>MBT:301 (PR)</p>	<p>MICROBIAL GENETICS AND MOLECULAR BIOLOGY</p>	<p>CO1: Study of different types of DNA and RNA using micrographs and model/schematic representations.</p> <p>CO2: Study of semi-conservative replication of DNA through micrographs/schematic representations.</p> <p>CO3: Student to estimation of DNA using UV spectrophotometer.</p> <p>CO4: Student to solve the problems related to DNA and RNA characteristics,</p>



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		Transcription and Translation.
MBT: 401 (TH)	IMMUNOLOGY AND MEDICAL MICROBIOLOGY	<p>CO1: Student understand about the Immunity, Organs and study the cells of the immune system.</p> <p>CO2: Student understand about antigens and antibody and their mechanisms-various Hybridization techniques.</p> <p>CO3: Student understand about host pathogen interaction, principles of diagnostic microbiology and laboratory diagnosis.</p> <p>CO4: Student get the knowledge about antibacterial, antifungal, antiviral substances.</p> <p>CO5: Student get the knowledge about Bacterial, Fungal, Protozoal, Viral diseases.</p>
MBT: 401 (PR)	IMMUNOLOGY AND MEDICAL MICROBIOLOGY	<p>CO1: Identification of human blood groups and also demonstrate the separate serum from the blood sample.</p> <p>CO2: Ability to acquire a knowledge about the study of laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, urease production and catalase tests.</p> <p>CO3: Study symptoms of the diseases with the help of photographs: Anthrax, Polio, Herpes, Chicken pox, HPV warts, Dermatormycosis (ring worms).</p> <p>CO4: Study of various stages of malarial parasites in RBCs using permanent mounts.</p>
MBT:501 (TH)	ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY	<p>CO1: Students get the knowledge about environmental, study of soil profile. Atmospheric- are microflora & also know the extinct habitats.</p> <p>CO2: Student get the knowledge about role of microorganisms in nutrient cycling, treatment and safety of drinking water.</p>

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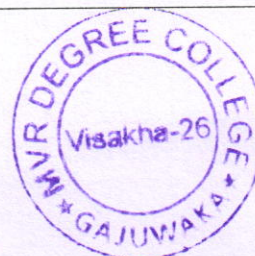
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		<p>CO3: Student learn about solid waste management, liquid waste management and sewage treatment.</p> <p>CO4: Student get the knowledge about plant growth microorganisms, nitrogen fixation and biofertilizers.</p> <p>CO5: Student get the knowledge about concept, symptoms caused by fungi, bacteria and viruses in plants.</p>
MBT:501 (PR)	ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY	<p>CO1: Analysis of soil- pH, Moisture content and water holding capacity.</p> <p>CO2: Study of air flora by Petri plate exposure method.</p> <p>CO3: Analysis of potable water: SCP, Presumptive, Confirmed and Completed test, determination of coli form count in water by MPN.</p> <p>CO4: Staining and observation of Vesicular Arbuscular Mycorrhizal (VAM) fungi.</p> <p>CO5: Observation of plant diseases of local importance- Citrus canker, Tikka disease of Groundnut, Bhindi yellow vein mosaic, Rusts, Smuts, Powdery mildews, Tomato leaf curl.</p>
MBT: 601 (TH)	MICROBIAL DIAGNOSIS IN HEALTH CLINICS	<p>CO1: Student get the knowledge about bacterial, viral, fungal and protozoan diseases of various human body system.</p> <p>CO2: Students learn about collection and precautions required of clinical samples.</p> <p>CO3: Students learn about the examination of staining of various samples.</p> <p>CO4: Students get the knowledge about hybridization techniques.</p> <p>CO5: Students learn about Disc diffusion method.</p>
MBT: 601 (PR)	MICROBIAL DIAGNOSIS IN HEALTH	<p>CO1: Collection transport and processing of clinical specimens(Blood, Urine, Stool and Sputum). Receipts, Labelling,</p>



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	CLINICS	<p>recording and dispatching clinical specimens.</p> <p>CO2: To isolate the bacteria in pure culture and Antibiotic sensitivity.</p> <p>CO3: Identification of common bacteria by studying their morphology, cultural character, Biochemical reactions, slide agglutination and other tests.</p> <p>CO4: Maintenance and preservation of stock culture.</p>
MBT 701 (TH)	FOOD AND INDUSTRIAL MICROBIOLOGY	<p>CO1: Students understand microbial growth in food spoilage of food- fruits, vegetables, milk, meat, egg,bread and food borne disease.</p> <p>CO2: Student get the knowledge about the principle of food preservation.</p> <p>CO3: Student understand microorganisms and its industrial importance.</p> <p>CO4: Student get knowledge about types of fermentation.</p> <p>CO5: Student get knowledge about microbial production of industrial products.</p>
MBR 701 (PR)	FOOD AND INDUSTRIAL MICROBIOLOGY	<p>CO1: Isolation of bacteria from vegetables</p> <p>CO2: Preparation of yogurt</p> <p>CO3: Qualitative analysis of milk</p> <p>CO4: Production of ethyl alcohol</p>
MBT- 702 (TH)	MICROBIAL BIOTECHNOLOGY	<p>CO1: Student get the knowledge about microbial Biotechnology and bacterial genetics.</p> <p>CO2: Student get the knowledge about plant, animal, microbial biomasses.</p> <p>CO3: Student learn about concepts of single cell protein, probiotics and microbial production of fuels and polymers.</p> <p>CO4: Student learn about expression of cloned genes in bacteria, yeast, plant and animal cells.</p> <p>CO5: Students learn about concept of</p>

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		genetically modified microorganisms, products their advantages and disadvantages.
MBP- 702 (PR)	MICROBIAL BIOTECHNOLOGY	CO1: Culturing of mushrooms. CO2: Isolation of yeast from grapes. CO3: Isolation of genomic DNA. CO4: Tissue culture.
MBT- 703 (TH)	MICROBIAL QUALITY CONTROL, INSTRUMENTATION AND BIOTECHNIQUES	CO1: Students obtain knowledge on QA, QC TVC and APC. CO2: obtain knowledge on GMP, GLP and sterilization techniques. CO3: will learn about culture media, physico chemical conditions CO4: learn about instruments used in QA and QC CO5: obtain knowledge on enumeration, MPN, MIC
MBT- 703 (PR)	MICROBIAL QUALITY CONTROL, INSTRUMENTATION AND BIOTECHNIQUES	CO1: Student get the knowledge about microorganisms of industrial importance. CO2: Student learn about the concepts of fermentation. CO3: Student get the knowledge about pharma and therapeutic enzymes. CO4: Student get the knowledge about industrial microorganisms. CO5: Student learn about bio reactors.
MBT- 801 (1) (PR)	INDUSTRIAL MICROBIOLOGY	CO1: student will learn about various industrial productions CO2: will obtain knowledge on industrial production process.
MBT- 801 (2) (TH)	FOOD MICROBIOLOGY	CO1: Students get the knowledge about microorganisms of food spoilage and their sources. CO2: Students learn about food preservation and microbial production of fermented products.



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		<p>CO3: Students learn about microbial production of distilled beverages.</p> <p>CO4: This course introduces to know the different food preservation methods and food processing process.</p> <p>CO5: To understand the study of History, and common properties of probiotics with examples and uses. Student learn about production of vitamins by using methods, process, recovery and assay.</p>
MBT- 801 (2) (PR)	FOOD MICROBIOLOGY	<p>CO1: Identification of pathogens from-formulation syrup.</p> <p>CO2: Identification of pathogens from canned food materials.</p> <p>CO3: Bioassay of vitamin-B12 and penicillin.</p> <p>CO4: Cultivation of edible mushrooms.</p>
MBT- 801 (3) (TH)	MANAGEMENT OF HUMAN MICROBIAL DISEASES	<p>CO1: The main objective of this course study of human microbial diseases caused by various species and also study the transmission, causative agents and symptoms of human microbial diseases.</p> <p>CO2: General account of epidemiology: principles of epidemiology, current epidemics (AIDS, nosocomial, acute respiratory syndromes).</p> <p>CO3: Identify the pathology of diseases caused by viruses- AIDS, Hepatitis, Influenzas, Rabies, Chikungunya and Polio virus- history, causative agent, pathogenesis, diagnosis, drugs and inhibitors.</p> <p>CO4: Students study the Harmful microbial interactions to Humans, and also study the bacterial pathogens, mechanism.</p> <p>CO5: Discuss Laboratory diagnosis of Common infective syndromes and parasitic manifestations. Epidemiological investigations to identify a disease,</p>

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		problems of drug resistance and drug sensitivity.
MBT- 801 (3) (PR)	MANAGEMENT OF HUMAN MICROBIAL DISEASES	<p>CO1: Ability to acquire a knowledge about microscopic examination of clinical samples- urine,stool,puss,sputum.</p> <p>CO2: To isolate and identify the following pathogens from clinical samples: <i>E.coli</i>, <i>Salmonella</i>, <i>Pseudomonas</i>.</p> <p>CO3: Demonstration of permanent slides of the following parasites.</p> <p>CO4:Immuno hematology: Blood group typing by slide test.</p>
MBT- 802 (1) (TH)	r-DNA TECHNOLOGY	<p>CO1: To study the Classification of restriction endonucleases and also this course introduces the molecular biology techniques, electrophoresis and blotting techniques.</p> <p>CO2: Have developed an understanding of Cutting and joining DNA by using different enzymes. Selection of transformed cells. Screening methods (Genetic marker and blue white screening).</p> <p>CO3: Students get the knowledge about Cloning vehicles- Plasmid, Bacteriophage, Construction of genomic and c DNA libraries.</p> <p>CO4: The main objective of this course to study the Methods of gene cloning and Methods of gene transfer.</p> <p>CO5: Students get the knowledge about Applications of recombinant DNA technology in Agriculture (Transgenic Plants) Medicine.</p>
MBT- 802 (1) (PR)	r-DNA TECHNOLOGY	<p>CO1: Student study the problem in Genetic engineering.</p> <p>CO2: Transformation of bacteria using plamid.</p> <p>CO3: Restriction digestion of DNA and its electrophoretic separation.</p> <p>CO4: Isolation of plasmid DNA.</p>



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		CO5: Demonstration of PCR.
MBT- 802 (2) (TH)	MICROBES IN SUSTAINABLE AGRICULTURE	<p>CO1: Students get the knowledge about the study of Soil Microbiology and also know the cycles and Biological nitrogen fixation.</p> <p>CO2: Students get the awareness about the benefits of different microorganisms in Agriculture.</p> <p>CO3: To understand the study of Germ theory disease, protection against infections, Applied areas of microbiology.</p> <p>CO4: Have acquired a detailed knowledge of Diseases caused by bacteria and fungi to various commercial and food crops.</p> <p>CO5: Study the importance of mycorrhizal inoculums, types of mycorrhizae associated plants.</p>
MBT- 802 (2) (PR)	MICROBES IN SUSTAINABLE AGRICULTURE	<p>CO1: Enumeration of bacteria, fungi and actinomycetes from soil and identification of rhizosphere microflora.</p> <p>CO2: To isolate the azotobacter from soil.</p> <p>CO3: Observation description of any three bacterial and fungal plant diseases.</p> <p>CO4: Staining and observation of VAM.</p> <p>CO5: Isolation of cellulose degrading organisms.</p>
MBT- 802 (3) (TH)	BIOFERTILIZERS AND BIOPESTIFCIDES	<p>CO1: General account of microbes used in biofertilizers for various crop plants and their advantages over chemical fertilizers. Student study the symbiotic nitrogen fixation.</p> <p>CO2: Student get the awareness of Frankia- Isolation, characteristics, Alder, Casuarina plants, non-leguminous crop symbiosis.</p> <p>CO3: To learn non-symbiotic nitrogen fixers and phosphate solubilizers: Free isolation, characteristics, mass inoculums,</p>

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		production and field application. CO4: Student understand the concept of Mycorrhizal biofertilizers and field applications. CO5: General account of microbes used as bio insecticides and their advantages over synthetic pesticides, <i>Bacillusthuringiensis</i> , production, field applications.
MBT- 802 (3) (PR)	BIOFERTILIZERS AND BIOPESTIFCIDES	CO1: Study of different bio pesticides, weedicides, inorganic and organic fertilizers. CO2: Soil testing, limiting and fertilizing and preparation of enriched farm yard manure. CO3: Study of composting methods and recycling of farm waste. CO4: Study of methods of green manuring. CO5: Isolation and cultivation of rhizobium from root nodules.
MBT- 803 (1) (TH)	BIOSTATISTICS AND BIOINFORMATICS	CO1: Students learn about the scope of bioinformatics and basic concepts, branches various biological data bases. CO2: To learn Biostatistics: probability and distribution and also determine the measures of central tendency. CO3: Student acquired a knowledge about the Computational phylogenetics- various applications. Philip software. Microarray, Bioinformatics – Experimental design & overview of data analysis. CO4: Student understand the study Overview of computer aided drug design. Searching sequence database using BLAST. Concept of genomics and proteomics. CO5: The main objective of this course Population and sampling test of



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		significance. Student t-test for small samples. Chi square test for analysis, correlation and regression.
MBT- 803 (1) (PR)	BIostatISTICS AND Bioinformatics	<p>CO1: Isolation of plasmid DNA from <i>E.coli</i> cells.</p> <p>CO2: Quantitative and Qualitative analysis of protein/DNA by using spectrophotometer.</p> <p>CO3: Demonstration of Southern hybridization.</p> <p>CO4: Use of software for sequence analysis of nucleotides and proteins.</p> <p>CO5: Problem related to t-test and chi-square test.</p>
MBT- 803 (2) (TH)	BioSAFETY AND Intellectual PROPERTY RIGHT	<p>CO1: Student idea to learn about the IPR (Parent, plant breeder's right). Trademarks, industrial design, trade secrets (or) undisclosed information integrated circuit designs.</p> <p>CO2: Patenting principles, international – standards and patent validity (neem and relaxins). Invention IPR issues of the Indian context.</p> <p>CO3: The main objective of this course Biotechnology and hunger- challenges for the Indian biotechnological research and industries.</p> <p>CO4: Student acquired a knowledge about the Bio safety management. Ethical implications of biotechnology product techniques, social and ethical implications of biological weapons.</p> <p>CO5: Copy right and rights related to copy right, patent claims, the legal decision – making process.</p> <p>International standards as per WHO, ISI, bio safety and validation.</p>

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MBT- 803 (2) (PR)	BIOSAFETY AND INTELLECTUAL PROPERTY RIGHT	<p>CO1: Study of components and design of a BSL-III laboratory.</p> <p>CO2: Filing applications for approval from bio safety committee.</p> <p>CO3: Study of steps of patenting process.</p> <p>CO4: Study of bio safety measures in pharmaceutical industry.</p> <p>CO5: Study on QA & QC parameters followed in R&D laboratory.</p>
MBT- 803 (3) (TH)	DRUG DESIGN AND DISCOERY	<p>CO1: Student study the History of Drug design, Current approaches and philosophies in drug design, Molecular mechanisms of diseases and drug action with examples.</p> <p>CO2: This course introduces the Sources of Drugs- Microbial drugs, Plants as a source of drugs. Expression of recombinant proteins in yeasts, animal cell culture system.</p> <p>CO3: The main objective of this course study the Drug development process-Impact of genomics and related technologies upon drug discovery: Gene chips, Proteomics, Structural genomics and Pharmacogenetics.</p> <p>CO4: Student learn about the vaccine preparation. Impact of genetic engineering on vaccine technology. Adjuvant technology and mode of action.</p> <p>CO5: Student get the knowledge about the Nucleic acid as drugs- Gene therapy: Basic approaches to gene therapy, Vectors used in gene therapy- Retravel vectors, Non-viral vectors.</p>
MBT- 803 (3)	DRUG DESIGN AND	<p>CO1: To isolate the antibiotic producing bacteria from soil samples.</p>



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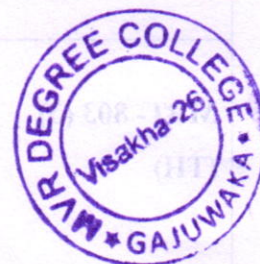
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(PR)	DISCOERY	CO2: Identification of antibacterial activity of actinomycetes and fungi. CO3: Assay of any one antibiotic (penicillin). CO4: Determination of MIC of any one antibiotic (penicillin and streptomycin). CO5: Visit to nearby pharmaceutical industry.
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