GEMS ARTS AND SCIENCE COLLEGE, RAMAPURAM

POST GRADUATE DEPARTMENT OF MICROBIOLOGY

PROGRAMME OUTCOMES (POs), PROGRAMME SPECIFIC OUTCOMES (PSOs), and COURSE OUTCOMES (COs)

PROGRAMME: BSc. MICROBIOLOGY

PROGRAMME OUTCOMES (POS)

PO1 Acquire knowledge about the fundamental principles and scientific theories related to various scientific phenomena in day-to-day life.

PO2 To develop communication skills and get expertise in scientific writing.

PO3 Acquire the skills in handling scientific instruments, planning and performing in laboratory experiments. Equip them with the skills to think creatively and draw logical inferences from the scientific experiments to draw the objective conclusions or provide new solutions to the problems. To make them Capable of working effectively in diverse teams in both classroom, laboratory and in industry and field-based situations.

PO4 To get an awareness of the impact of science on the environment and society.

PROGRAMME SPECIFIC OUTCOMES (PSOS)

PSO1 Gain integrated knowledge on different aspects of microbiology, biochemistry, biostatistics and computer applications bioinformatics and emerging worldwide microbiological technologies, issues, and perspectives.

PSO2 Acquire skills specific to microbiology and allied fields for converting information to knowledge through hypothesis, design, execution and analysis.

PSO3 Analysis of scientific issues across the spectrum of related disciplines.

PSO4 Enable the students to improve the quality of human lives in relation to the environment with the knowledge in microbiology.

PSO5 Capacity to develop, employ and integrate technical and professional skills as a member of a team upholding the essence of collaboration, cooperation, ethics and integrity.

COURSE OUTCOMES (COs)

SEMESTER I

COURSE CODE	PAPER NAME	CREDITS	COURSE OUTCOME
MBG1B01	GENERAL MICROBIOLOGY	3	**CO1**-Sketch the historical events in the developments of Microbiology as a discipline emphasizing the contributions of the scientists.
			CO2-Compare the difference between the basic cell types *viz,* Eukaryote, Prokaryote, Virus, Actinomycetes and Archaebacteria.
			CO3-Describe the ultra-structure of a bacterial cell helping to study the further biochemical and physiological reactions inside the cell
			CO4-Discuss various microscopes and compare the different types of light and electron Microscope
			CO5-Explain the various staining techniques and to distinguish their application in Microbiology
			CO6-Discuss the sterilization procedures and to implement it to maintain a hygienic environment

SEMESTER II

COURSE CODE	PAPER NAME	CREDITS	COURSE OUTCOME
MBG2B02	MICROBIAL PHYSIOLOGY AND TAXONOMY	3	**CO1**-Discuss the environmental and nutritional factors affecting the microbial growth and classify them according to these
			CO2-Describe the mechanism of nutrient transportation across the bacterial membranes
			CO3-Explain the preparation of various cultural

			media and to distinguish them for microbial cultivation
			CO4-Differentiate various cultural methods and preservation techniques
			CO5-Illustrate the reproduction systems and the growth phases of bacteria and bacteriophages
			CO6-Examine various methods for estimation of microbial cells
			CO7-Analyze the taxonomy of microorganisms through the comparative study of various criteria used and classify them into corresponding groups

SEMESTER III

COURSE CODE	PAPER NAME	CREDITS	COURSE OUTCOME
MBG3B03	ENVIRONMENTAL AND SANITATION MICROBIOLOGY	4	**CO1**-Describe the organisms in air with their sources and distribution
			CO2-Explain the methods of waste water treatment, air sampling , solid waste management, bioremediation and bioleaching
			CO3-Discuss the microbial distribution in aquatic environment with special emphasis on factors affecting them
			CO4-Compare the water purification procedures and the tests for the microbiological examination of water
			CO5-Explain air borne and water borne diseases with their mode of transmission
			CO6-Discuss the concept of xenobiotics and related environmental problems

SEMESTER IV

COURSE CODE	PAPER NAME	CREDITS	COURSE OUTCOME
MBG4B04	SOIL AND AGRICULTURAL MICROBIOLOGY	4	**CO1**-Recall different types of soils and soil properties
			CO2-Distinguish the different groups of microorganisms present in soil and the factors affecting their growth
			CO3-Describe the concept of ecosystem and its components and concept of biogeochemical cycles and N, S and P cycles
			CO4-Differentiate different types of biological interactions such as microbe-microbe, plant-microbe and animal-microbe
			CO5-Explain the symptoms, disease cycle and control measures of different bacterial,viral and fungal diseases of plants
			CO6-Discuss the potential of different microorganisms in agriculture as biofertilizers and biopesticides
MBG4B05(P)	MICROBIOLOGY PRACTICAL I	4	**CO1**-Familiarize with parts of a microscope and apply light Microscopy in microbiological studies
			CO2-Apply the skill of the staining for microscopic visualization
			CO3-Acquaint with common methods of sterilization and to apply the sterilization procedures in a microbiology laboratory and similar places where hygiene has to be maintained
			CO4-Prepare different types of media for the cultivation of microorganisms in a microbiological lab
			CO5-Determine the effect of various factors influencing the growth of microorganisms
			CO6-Demonstrate techniques for isolation and enumeration of microbes from various samples

SEMESTER V

COURSE CODE	PAPER NAME	CREDITS	COURSE OUTCOME
MBG5B06	INDUSTRIAL MICROBIOLOGY	4	**CO1**-Describe basic concepts of a fermentation process with various types
			CO2-Discuss the media formulations and their significance in fermentation process
			CO3-Explain different methods for screening, isolation, improvement of strain, upstream processing and downstream processing of industrially important microorganisms and products
			CO4-Compare various techniques used for the recovery of fermentation products
			CO5-Demonstrate industrial production of microbial metabolites.
			CO6-Discuss different intellectual property rights related to microbial products
MBG5B07	FOOD AND DAIRY MICROBIOLOGY	4	**CO1**-Memorize the types and importance of microbes that exist in different food items and understand different parameters affecting their growth in food
			CO2-Explain major methods to detect microbes in food, with special importance to contaminants
			CO3-Illustrate the physical and chemical properties of milk and types of microorganisms present in milk
			CO4-Differentiate different methods used for the microbiological examination of milk
			CO5-Acquire in-depth knowledge about microbial production of fermented dairy and non-dairy food products and understand the health benefits of SCP, probiotics and prebiotics
			CO6-Gain an insight to the microbial spoilage of different kinds of foods.
			CO7-Discuss major food borne diseases caused by different groups of microorganisms
			CO8-Explain preservation of food by various physical and chemical methods
			CO9-Discuss the concept of quality control in food, regulatory practices and policies
MBG5B08	IMMUNOLOGY	4	**CO1**-Explain the biological functions of various immune cells and organs
			CO2-Recognize the cellular coordination in the

			generation of immune responses
			CO3-Illustrate the types, structure and basic features of antigen and antibody
			CO4-Demonstrate the significance of MHC, C system and immunological tolerance
			CO5-Classify antigen-antibody reactions involved in diagnosis of infections
			CO7-Describe the types and mechanisms of hypersensitivity, autoimmunity and graft rejection reactions Discuss the causes, molecular mechanisms, immunological responses and treatment options of tumor development
MBG5B09	MEDICAL MICROBIOLOGY I	3	**CO1**-Explain the concept of infection, its types, sources and the mode of transmission of various diseases
			CO2-Discuss the methods for collection and transportation of clinical samples
			CO3-Compare the morphology, cultural and biochemical characteristics, pathogenesis, laboratory diagnosis, treatment and prophylaxis of various bacterial diseases

SEMESTER VI

COURSE CODE	PAPER NAME	CREDITS	COURSE OUTCOME
MBG6B10	GENETICS AND GENETIC ENGINEERING	4	**CO1**-Summarize the mendelian and non mendelian concepts inheritance
			CO2-Explain the concepts of linkage, crossing over and recombination
			CO3-Illustrate the cell cycle events and its regulation mechanisms in eukaryotes
			CO4-Demonstrate the recombination frequency as a tool of gene mapping in eukaryotes and gene transfer techniques as a tool in prokaryotes
			CO5-Describe the pathways of cell cycle and their regulation strategies adopted by eukaryotic cells
			CO6-Discuss the molecular mechanisms behind

			the programmed cell death and the inter-relation of death pathway with the cell cycle and immune response
			CO7-Explain the principle behind rDNA technology, DNA sequencing, PCR and their applications in biological sciences
			CO8-Discuss the development of GMOs and its potential risks and benefits on the environment
			CO9-Critical & ethical analysis of application r DNA technology in our society
MBG6B11	MEDICAL MICROBIOLOGY II	4	**CO1**-Discuss the important viral diseases including emerging viral diseases, with special emphasis on symptoms, pathogenesis, transmission and prophylaxis
			CO2-Analyze symptoms, pathogenesis, transmission, prophylaxis and control of important fungal diseases of humans including emerging fungal diseases
			CO3-Explain important protozoan diseases of humans such as malaria ,amoebiasis and helminth infections and infections caused by flagellates
			CO4-Compare different types of vaccines and their routes of administration
			CO5-Distinguish antibiotics classes, their mode of action and mechanism of antibiotic resistance
MBG6B12 (P)	MICROBIOLOGY PRACTICAL II	4	**CO1**-Apply the biochemical, microscopic and physiological properties of bacteria for the identification of unknown bacteria or clinically relevant bacteria in a patient sample
			CO2-Report variations observed in the blood cell count majorly for clinical or diagnostic purpose
			CO3-Perform various serological techniques routinely executed in clinical laboratories
MBG6B13 (P)	MICROBIOLOGY PRACTICAL III	3	**CO1**-Apply the knowledge of the learner for the preparation of various solutions and reagents in laboratories with their specific features
			CO2-To demonstrate various stages of mitosis in onion root tip
			CO3-Execute the extraction of DNA and RNA and confirm by performing electrophoresis
			CO4-Estimate the amount DNA and RNA in a

			solution
			CO5-Demonstrate the gene transfer experiments like conjugation and transformation
			CO6-Perform procedure for induction of beta galactosidase enzyme by means of artificial transformation
			CO7-Demonstrate the Restriction digestion reaction of various enzymes widely employed in rDNA technology
MBG6B14 (P)	MICROBIOLOGY PRACTICAL IV	3	**CO1**-Perform isolation and screening of industrially important microorganisms from soil
			CO2-Demonstrate the different fermentation processes-citric acid production, alcohol production and wine production
			CO3-Identify sterilization problems with suspended solids in media
			CO4-Compare various cell disruption techniques
			CO5-Perform cell disruption and salting out
			CO6-Perform enrichment of coir pith degraders, pellicle formation, and penicillin assay
			CO7-Analyze the aerobic mesophilic count of milk and microbial flora of fermented milk
			CO8-Evaluate the microbiological quality of milk by Methylene Blue Reductase test
MBG6B15 (E1)	CELL AND TISSUE CULTURE	2	**CO1**-Describe how a plant & animal cell culture lab should be designed and maintained
			CO2-Demonstrate the concept of tissue culture technique for plant regeneration and its application in developing plantlets of specific characteristics
			CO4-Describe methods to determine cell cytotoxicity which in turn can be used to validate drugs and cosmetics for their side effects (toxicity
			CO5-Discuss the basics of stem cells, their characterization and applications
MBG6B15 (E2)	MOLECULAR BIOLOGY	2	**CO1**-Demonstrate the structure, function and other basic features of DNA and RNA
			CO2-Analyze the organization of genetic material by means of proteins and topological properties.
			CO3-Conceptualize the theme of central dogma of molecular biology by discussing the events, enzymes and mechanisms of replication,

			transcription and translation
			CO4-Illustrate the gene expression regulation mechanisms in prokaryotes by means of lac and trp operons
MBG6B15 (E3)	BIOINSTRUMENTATION	2	**CO1**-Describe the principles and applications of various techniques in life sciences such as Spectrophotometer, pH Meter, Electrophoresis, NMR, Biosensors, Centrifugation, Chromatography and Radio Isotope techniques used in the isolation, purification and analysis of biomolecules
			CO2-Describe various Spectroscopic and Chromatographic techniques
			CO3-Characterize the given sample using bioanalytical techniques
			CO4-Apply the concepts of modern analytical and instrumental techniques relevant to quantitative measurements in life sciences