Dr. V. S. KRISHNA GOVT. DEGREE COLLEGE (AUTONOMOUS)

B. Sc. MICROBIOLOGY (CBCS) SYLLABUS (W.E.F 2021-22)
FIRST YEAR – SEMESTER – I

COURSE – 1: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

TOTAL HOURS: 60 **CREDITS: 4**

Course outcomes: Upon completion of the course, the student will be able to achieve the following outcomes:

CO I: Gain knowledge about growth of Microbiology discipline and prominent contributions of various scientists to the field of Microbiology.

CO II: Able to explain the useful and harmful activities of the microorganisms

CO III: Acquired knowledge about classification of living organisms by various methods

CO IV: Understand the principles that underlie sterilization of culture media, glassware and plastic ware to be used for microbiological work.

CO V: Apply the skills of sterilization for aseptic culturing and microscopy techniques for studying different types of microorganisms

CO VI: Perform experiments involving pure culture isolation, propagation and preservation of microorganism in the laboratory

CO VII: Understand the nutritional requirements of microorganisms and measure microbial growth by direct and indirect techniques

CO VIII: Identify various components of bacterial cells such as cell wall, cell membrane, capsule, pili, flagella and understand the nature and multiplication of plant and animal viruses

CO IX: Identify commonly available groups of microorganisms such as actinomycetes, spirochetes and chlamydia based on their characteristics

CO X: Understood the chemical nature of viruses, types of viruses infecting animals, plants and bacteria (bacteriophages) and their mechanism of multiplication.

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B.Sc. MICROBIOLOGY (CBCS) SYLLABUS (W.E.F 2021-22)
FIRST YEAR – SEMESTER- 2

COURSE – 2: MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY

TOTAL HOURS: 60 **CREDITS: 4**

Course outcomes: Upon completion of the course, the student will be able to achieve the following outcomes:

CO I: Develop an idea of how carbohydrates function as structural, energy generation and energy storage entities in living cells.

CO II: Discover how various classes of lipids are part of cell and body's structural, functional components and energy reserves.

CO III: Become aware of the multifarious function of proteins, understand various levels of protein structure and evaluate the relationship between structure and function.

CO IV: Understand the DNA structure and function and interpret how DNA.

CO V: Several separation techniques which may be required to be handled later as microbiologists.

CO VI: Describing the growth characteristics of the microorganisms capable of growing under unusual environmental condition of temperature, oxygen, and solute and water activity.

CO VII: Describing the growth characteristics of the microorganisms which require different nutrient for growth and the associated mechanisms of energy generation for their survival like autotrophs, heterotrophs, Chemolithoautotrophs etc.

CO VIII: Differentiating concepts of aerobic and anaerobic respiration and how these are manifested in the form of different metabolic pathways in microorganisms.

CO IX: Describe the nutritional requirements of bacteria for growth; developed knowledge and understanding that besides common bacteria there are several other microbes which grow under extreme environments.

CO X: Calculate generation time of growing bacteria.

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B. Sc MICROBIOLOGY (CBCS) SYLLABUS (W.E.F 2021 - 22)
SECOND YEAR – SEMESTER – III

COURSE – 3: MOLECULAR BIOLOGY AND MICROBIAL GENETICS

TOTAL HOURS: 60 **CREDITS: 4**

Course outcomes: Upon completion of the course, the student will be able to achieve the following outcomes.

CO I: Understand the differences in genomic organization of prokaryotes and eukaryotes and functions of extrachromosomal elements.

CO II: Apply the knowledge of DNA structure and replication to match different antibiotics with their mechanism of action against bacteria.

CO III: Apply the knowledge of transcription and translation to correlate the antibiotic with their mode of action against bacterial pathogens.

CO IV: Study the Genetic code and understand its salient properties and exceptions.

CO V: Apply the knowledge of mutation and mutagens to artificially induce mutations in laboratory.

CO VI: Appreciate the effect of mutagens on DNA damage and the natural DNA repair mechanisms in bacteria.

CO VII: Understand the concept of gene, gene expression and DNA recombination methods of bacteria.

CO VIII: Evaluate the relation between gene and protein through various hypothesis.

CO IX: Acquaint themselves with the knowledge of cistron and mechanisms of gene regulation in prokaryotes.

CO X: Familiarize themselves with positive vs negative regulation, inducible vs repressible operons.

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SECOND YEAR – SEMESTER- 4

COURSE – 4: IMMUNOLOGY AND MEDICAL MICROBIOLOGY

TOTAL HOURS: 60 **CREDITS: 4**

Course outcomes: Upon completion of the course, the student will be able to achieve the following outcomes:

CO I: Able to differentiate between innate vs adaptive immunity, active vs passive immunity and understand the contributions of the organs and cells in immune responses.

CO II: Identify the role of antigen presenting cells, lymphocytes, and phagocytic cells in immune responses.

CO III: Understand the mechanisms involved in initiation of specific immune responses and differentiate the humoral and cell mediated immune mechanisms.

CO IV: Display a comprehensive and practical understanding of basic immunological principles involved in research and clinical/ applied science.

CO V: Know about the normal microbial flora of human and learn about the characters, pathogenicity, lab diagnosis of bacteria pathogens.

CO VI: Learn cultural, biochemical, immunological and molecular diagnostic tests and assays against pathogens.

CO VII: Understand the principles of disease epidemiology, pathogenesis, diagnosis and treatment of different infectious diseases.

CO VIII: Gain knowledge about the basic information of microbial pathogens and protozoan parasites.

CO IX: An in-depth study of different antibiotics from the viewpoint of targets, resistance mechanisms and spectrum evaluation methods.

CO X: Explain the mechanisms and differences between primary and secondary responses and their relevance to vaccinations.

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SECOND YEAR – SEMESTER- 4

COURSE-5 FOOD AND INDUSTRIAL MICROBIOLOGY

TOTAL HOURS: 60 **CREDITS: 4**

Course outcomes: Upon completion of the course, the student will be able to achieve the following outcomes:

CO I: Understand food as a suitable habitat for growth of microorganisms.

CO II: Become aware of microbial characteristic desirable to the food industry and their roles in food production, food spoilage, and food-borne illnesses.

CO III: Explain the principles involved in microbial control, conventional and new methods of preserving foods, probiotics and useful microorganism in food.

CO IV: Well versed with nutritional benefits of varied microbe foods such as single cell proteins, mushrooms and probiotics.

CO V: Understand the economic importance of different categories of microbes to food, pharma and allied industries.

CO VI: Appreciate the importance of screening microorganisms producing primary and secondary metabolites with industrial and economic importance.

CO VII: Describe the principles and applications of batch and continuous fermentation processes.

CO VIII: Explain the procedures applied in purification of any industrial product from fermentation media.

CO IX: Describe the applications of microbial enzymes in manufacturing of detergents, textiles, leather, and mining applications.

CO X: List some of the important metabolites from microbial metabolism along with their applications.

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B.Sc. MICROBIOLOGY (CBCS) SYLLABUS (W.E.F 2021 - 22)
FINAL YEAR – SEMESTER- 5/6

COURSE-6A AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY

TOTAL HOURS: 60 **CREDITS: 4**

Course outcomes: Upon completion of the course, the student will be able to achieve the following outcomes:

CO I: Learn about the microbial groups involved in mineral recycling and soil fertility

CO II: To know the complex interaction between agriculture system and micro-organism.

CO III: Understand the beneficial activities of microbes in soil for plant growth promotion

CO IV: To introduce micro-organism in agricultural system for building a pathway for sustainable agriculture.

CO V: Study the types of diseases caused to the plants and their control in various manners.

CO VI: To understand the diseases pathogenesis in plants system for effective plant disease management.

CO VII: Explore soil, aquatic, atmospheric and extreme environments, and the microorganisms of that area.

CO VIII: Know the microbial analysis of drinking water and aeromicrobiology.

CO IX: Understand waste, disposal methods and methods of recycling and investigate the contaminants.

CO X: Know the different aspects of waste management and sewage Treatment systems, biosafety and environmental monitoring regulations.

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FINAL YEAR – SEMESTER- 5/6

COURSE-7A: CLINICAL MICROBIOLOGY

TOTAL HOURS: 60 **CREDITS: 4**

Course outcomes: Upon completion of the course, the student will be able to achieve the following outcomes:

CO I: Deep understanding of the disease cycles and their outbreaks

CO II: Gaining theoretical knowledge of most common disease-causing organisms.

CO III: Enumerating the methods and vehicles of disease transmission.

CO IV: Understanding the basics of Clinical laboratory protocols.

CO V: Systematic knowledge on the pathogenesis and laboratory diagnosis of diseases

CO VI: Developing insights into clinical practices and serological techniques.

CO VII: Gain knowledge on advanced techniques and diagnosis.

CO VIII: Identify the blood groups and estimate the concentration of Hemoglobin.

CO IX: Develop knowledge on antimicrobial sensitivity and resistance mechanism.

CO X: Perform antibiotic sensitivity tests of some antibiotics on few organisms.