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

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

<u>COURSE – 1: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY</u>

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.

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.

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.

B.Sc. MICROBIOLOGY (CBCS) SYLLABUS (W.E.F 2021 - 22) SECOND YEAR - <u>SEMESTER- 4</u>

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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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.

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

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.

Dr. V. S. KRISHNA GOVT. DEGREE COLLEGE (AUTONOMOUS) MADDILAPALEM, VISAKHAPATNAM B.Sc. MICROBIOLOGY (CBCS) SYLLABUS (W.E.F 2021 - 22) FINAL YEAR – <u>SEMESTER- 5/6</u>

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.