

Dr. V. S. KRISHNA GOVT. DEGREE COLLEGE (AUTONOMOUS)
MADDILAPALEM, VISAKHAPATNAM

B.Sc MICROBIOLOGY (CBCS) SYLLABUS (W.E.F 2020 - 21)
FIRST YEAR – SEMESTER – I
COURSE – 1 INTRODUCTORY MICROBIOLOGY AND MICROBIAL DIVERSITY

TOTAL HOURS: 60

CREDITS: 4

Course outcomes:At the conclusion of this course the students –

- CO 1 Have developed a good knowledge of the development of the discipline of Microbiology and the contributions made by prominent scientists in this field
- CO 2 Have developed a very good understanding of the characteristics of different types of microorganisms
- CO 3 Are able to explain the useful and harmful activities of the microorganisms
- CO 4 Describe characteristics of bacterial cells, cell organelles, cell wall composition and various appendages like capsules, flagella or pili
- CO 5 Understood what are viruses and the chemical nature of viruses, different types of viruses infecting animals, plants and bacteria (bacteriophages)
- CO 6 Identify commonly available fungi and algae and their characteristics
- CO 7 Are able to perform basic experiments to grow, study microorganisms and methods to preserve bacteria in the laboratory
- CO 8 Principles which underlie sterilization of culture media, glassware and plastic ware to be used for microbiological work
- CO 9 Handling and use of microscopes for the study of microorganisms which are among the basic skills expected from a practicing microbiologist. They also get introduced a variety of modifications in the microscopes for specialized viewing

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FIRST YEAR –SEMESTER- II
COURSE-2 MICROBIAL BIOCHEMISTRY & METABOLISM

TOTAL HOURS: 60

CREDITS: 4

Course outcomes: By the end of this course the students

- CO 1 Developed a very good understanding of various biomolecules which are required for development and functioning of a bacterial cell
- CO 2 Have developed how the carbohydrates make the structural and functional components such as energy generation and as storage food molecules for the bacterial cells
- CO 3 Well conversant about multifarious function of proteins, knowledge about lipids and nucleic acids
- CO 4 Principles of a number of analytical instruments which the students have to use during the study and also later as microbiologists for performing various laboratory manipulations
- CO 5 Several separation techniques which may be required to be handled later as microbiologists
- CO 6 Describing the growth characteristics of the microorganisms capable of growing under unusual environmental condition of temperature, oxygen, and solute and water activity
- CO 7 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 8 Differentiating concepts of aerobic and anaerobic respiration and how these are manifested in the form of different metabolic pathways in microorganisms
- CO 9 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 10 Calculate generation time of growing bacteria

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SECOND YEAR – SEMESTER- III

COURSE - 3 MICROBIAL GENETICS AND MOLECULAR BIOLOGY

TOTAL HOURS: 60 CREDITS: 4

Course outcomes: By the conclusion of this course, the students have –

- CO 1 Understood genome organization of model organisms namely *E. coli* and *Saccharomyces*
- CO 2 Developed a fairly good knowledge about the three well known mechanisms by which genetic material is transferred among the microorganisms namely transformation, transduction and conjugation
- CO 3 Are able to describe different types of the extrachromosomal elements or the plasmids; the nature of the transposable elements in the prokaryotic and the eukaryotic cells
- CO 4 Understood the central dogma – replication, transcription and translation
- CO 5 Developed knowledge on types of mutations, the molecular mechanisms that underlie mutations and their repair
- CO 6 Understood Genetic code and studied the salient features
- CO 7 Able to explain the Protein synthesis and expression of genes
- CO 8 Explain the principles and applications of genetic engineering
- CO 9 Hands on skills of isolation of genomic DNA from bacterial cells and its visualization by performing agarose gel electrophoresis
- CO 10 Are able to explain the working principles of Ultra centrifuge, Transilluminator and PCR

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SECOND YEAR – SEMESTER- IV

COURSE-4 IMMUNOLOGY AND MEDICAL MICROBIOLOGY

TOTAL HOURS: 60

CREDITS: 4

Course outcomes: By the conclusion of this course, the students clearly –

- CO 1 Conceptualized the protective role of the immune system of the host and developed an understanding of the basic components
- CO 2 Explain the cells and organs involved in the development of immune response
- CO 3 Knowledge on antigens, antibodies and their interactions
- CO 4 Understood the principles and applications of various antigen-antibody reactions
- CO 5 The mechanisms underlying the immune system and its response to pathogenic microorganisms
- CO 6 Understood the basic and general concepts of causation of disease by the pathogenic microorganisms and the various parameters of assessment of their severity including the broad categorization of the methods of diagnosis
- CO 7 Has acquired a fairly good understanding of normal microflora of human body, common diseases caused by bacteria, viruses and other microbes
- CO 8 Are able to conduct experiments for growing common bacteria in different microbiological media, antibiotic sensitivity determination and antigen antibody reaction
- CO 9 Identify blood groups, estimate hemoglobin levels and count the WBC
- CO 10 Identify bacteria from clinical samples and analyze antibiotic sensitivity of bacteria

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FINAL YEAR – SEMESTER- IV

COURSE-5 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

TOTAL HOURS: 60

CREDITS: 4

Course learning outcomes:By the completion of this course, the students –

- CO 1 Have developed a fairly good knowledge and understanding of different types of environments and habitats where microorganisms grow including soil, air, water and extreme environments.
- CO 2 Are able to identify the important role microorganisms play in maintaining healthy environment by degradation of solid/liquid wastes; how these activities of microorganisms are used in sewage treatment plants, production of activated sludge and functioning of septic tanks.
- CO 3 Have understood the significance of BOD/COD and various tests involving use of enumerating fecal *E.coli* for assessing quality of water.
- CO 4 Have developed the practical skills for conducting experiments to assess the BOD/COD of wastewaters and their interpretation; practically assess the portability of drinking water by the use of standard microbiological tests
- CO 5 Developed a clear understanding of the multifarious roles of microorganisms in soil, in association with plants and thus in the field of agriculture
- CO 6 Developed basic concepts of causation of diseases in plants by the different types of microorganisms namely bacterial, fungal and viral.
- CO 7 Knowledge of important plant diseases, their etiology, salient characteristics and control measures
- CO 8 Perform solid waste management and prepare compost with decomposable waste
- CO 9 Understood how the waste water could be converted into reusable water
- CO 10 Concept of biofertilizers and their applications in various fields