

**GOVERNMENT COLLEGE FOR WOMEN(AUTONOMOUS), MANDYA**

**DEPARTMENT of MICROBIOLOGY**

**Academic Year-2020-21**

**(Revised CBCS Scheme 2018-19 Onwards)**

**Criterion –II- Teaching - Learning and Evaluation**

**2.6 Teaching – Learning Process**

2.6. Student Performance and Learning Outcomes

2.6.1 Programme outcomes, programme Specific outcomes and Course outcomes for all programs offered by the institution are stated and displayed in website of the institution (to provide web link)

**Programme Specific Outcomes: Microbiology**

At the time of graduation, the students will be able to-

**PSO1:** Understand fundamental principles involved in Microbiology

**PSO2:** Acquire detail knowledge of microorganisms, their types and significance

**PSO3:** Understand metabolic and structural significance of bio-molecules

**PSO4:** Acquaint with concepts of Immunity, Antigen, Antibody and Immune system

**PSO5:** Understand importance and applications of various enzymes in replication transcription and translations

**PSO6:** Acquire detail knowledge of industrial production of enzymes, antibiotics and vitamins

## **Course Outcomes: Microbiology**

### **Semester-1**

#### **Paper I –Introduction to Microbiology and Microbial diversity**

At the end of the course, the students will be able to-

CO1: Identify distribution of microorganism in nature

CO2: Determine evolution of microbiology and their role in various biological processes

CO3: Classify Microorganisms into different category according to taxonomic ranks

CO4: Determine Biochemical properties of microorganisms

CO5: Calculate magnification, resolving power, depth of focus, numerical aperture of Microscope

CO6: Conceptualize microorganisms and their types, importance and Practical aspects

CO7: Distinguish between beneficial and harmful Microbes

CO8: Cultivate, observe and perform microscopic identification of bacteria, fungi and other microbes

CO9: Describe concept, methods and pattern of Sterilization and its practical applicability

CO10: Discuss role of Microorganisms in spreading diseases, usefulness in agriculture, environment and industrial sector

## **Semester-II**

### **Paper II- Microbial physiology and Molecular biology**

At the end of the course, the students will be able to-

- CO1: Describe enzyme as biocatalyst, its classification and mechanism of action
- CO2: Discuss metabolic role of coenzymes
- CO3: Give industrial applications of free and immobilized enzyme
- CO4: Explain bacterial anabolic-catabolic pathways and their regulation
- CO5: Discuss modes of energy yielding metabolism, microbial fermentation and its significance
- CO6: Determine factor affecting enzyme activity, overall enzyme kinetics viz.  $K_m$ ,  $V_{max}$ ,  $K_{cat}$
- CO7: Prepare buffers, reagents and stock solutions
- CO8: Discuss handling and applications of different DNA and RNA modifying enzymes
- CO9: Elaborate techniques used for DNA transformation in host cells
- CO10: Describe design of various vectors used for plants, animals and microorganisms and their modification strategies
- CO11: Design cloning strategies for various applications
- CO12: Differentiate transformed and non-transformed colonies

## **Semester III**

### **Paper-III Microbial Genetics and Recombinant DNA technology**

At the end of the course, the students will be able to-

- CO1: Describe different structural parts & its arrangement of Microbial cells

- CO2: Classify bacteria on nutritional requirements
- CO3: Determine Bacterial growth curve
- CO4: Calculate mathematics of bacterial growth curve
- CO5: Describe mode of nutrient uptake by bacteria
- CO6: Differentiate gene expression pattern between microorganisms and eukaryotes
- CO7: Discuss importance and applications of different genes (structural genes, functional genes etc)
- CO8: Discuss importance and applications of various enzymes in the processes viz. replication transcription and translations etc
- CO9: Describe various types of RNA and their role during translation, tRNA activations etc
- CO10: Discuss mutation, its types and related effects like loss of function and gain of functions etc
- CO11: Explain re-combinations- transduction, conjugation with types and transformations etc
- CO12: Elaborate techniques used for DNA transformation in host cells
- CO13: Describe design of various vectors used for plants, animals and microorganisms and their modification strategies
- CO14: Design cloning strategies for various applications
- CO15: Differentiate transformed and non-transformed colonies

## **Semester IV**

### **Paper-IV-Environmental and Agricultural Microbiology**

At the end of the course, the students will be able to-

- CO1: Determine sources of Air, Water and Soil pollution and their effects
- CO2: Describe processes involved in purification of sewage and portable water
- CO3: Determine Air sampling techniques and its effectiveness
- CO4: Classify Enterobacter by various Biochemical tests: IMViC, MPN, Elevated temperature test
- CO5: Calculate BOD, COD, Chlorine in water
- CO6: Discuss relationship between soil microorganisms, Role of bio-fertilizers
- CO7: Describe various biogeochemical cycles
- CO8: know that soil is good media for microbes
- CO9: soil fertility and quality is dependent on soil microorganisms
- CO10: discuss different soil microorganisms
- CO11: Application of microorganisms in agriculture
- CO12: Understand the uses of microorganisms as bio fertilizers and biocontrol agents

**SEMESTER-V**  
**Paper VII- Food and Industrial Microbiology**

At the end of the course, the students will be able to-

- CO1: Describe composition of milk, associated microorganism and Milk Sterilization
- CO2: Discuss Food and Microorganisms, source of food contamination and food preservation
- CO3: Describe Food born disease and Intoxication and Pathogen associated with

food poisoning

CO4: Discuss mechanism of preparation of fermented foods and probiotics with the help of microorganisms

CO5: Elaborate various aspects of industrial technology related to Microbiology

CO6: Screen industrially important strains

CO7: State and explain principles of fermenter design and computer assisted fermentation control

CO8: Discuss fermentation process and downstream processing

CO9: Formulate media, aspects of raw material used, methods of strain improvement

CO10: Describe industrial production of enzyme, antibiotics, amino acids and vitamins

CO11: Produce, purify and estimate various products, like enzymes, ethanol, acids, and antibiotics with the help of microbes

### **V SEM SEC- Microbiological analysis of air and water**

At the end of the course, the students will be able to-

CO1: Know the microflora of air and water

CO2: Collect the water samples to study various parameters

CO3: Understand the different methods to control microbes of water

### **Paper VII-Immunology and Medical microbiology**

At the end of the course, the students will be able to-

CO1: Explain concept of Immunity, Antigen, Antibody, Immune system

- CO2: Describe structure, Classes, biological activity and gene Organization of antibodies and their diversity
- CO3: Rationalize Expression of Ig genes, Monoclonal antibody (Chimeric Antibody and Humanized Antibody) and its formation and applications
- CO4: Describe Lymphocyte (T and B cell) Activation and Regulation, Effector Mechanism, Complement System: Activation and its Regulation
- CO5: Discuss Diagnostic application of immunology: Practical aspects of Antigen-Antibody Interaction: Precipitation and Agglutination
- CO6: Perform Blood grouping, isolation of bacterial Antigen and Ag-Ab reactions
- CO7: Determine mode of entry, infection, symptoms, Laboratory diagnosis and treatment for Bacterial, fungal, Protozoan infections
- CO8: Describe life cycle, pathogenesis, laboratory diagnosis of HIV, Oncogenic viruses
- CO9: Determine nutrients for cultivation of pathogenic bacteria
- CO10: Identify epidemiology of general bacterial, fungal, protozoan infections
- CO11: Identify normal micro-flora of humans CO6: Determine antibiotic resistance by Bacteria.

### **VI SEM SEC- Management of Human microbial diseases**

At the end of the course, the students will be able to-

- CO1: List the different human diseases
- CO2: Discuss various microbial diseases of human
- CO3: Able to manage or treat human microbial diseases

