

## **B.Sc. Microbiology**

### **Programme Specific Outcomes**

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**

#### **F.Y. B. Sc. Semester I**

##### **Paper I – Fundamentals of Microbiology**

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

## **Paper II- Microbial Techniques and General Microbiology**

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

CO1: Conceptualize microorganisms and their types, importance and Practical aspects

CO2: Distinguish between beneficial and harmful Microbes

CO3: Cultivate, observe and perform microscopic identification of bacteria, fungi and other microbes

CO4: Describe concept, methods and pattern of Sterilization and its practical applicability

CO5: Discuss role of Microorganisms in spreading diseases, usefulness in agriculture, environment and industrial sector

## **Semester II**

### **Paper-IV Cytology and general Microbiology**

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: Describe Bacterial photosynthesis

CO6: Discuss advances in Microbiology

CO7: Determine shape, size and structure of bacteria by various staining procedures

### **Paper V- Basic Biochemistry**

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

CO1: Describe structures, functions and classification of carbohydrates, proteins, amino acids, lipids, nucleic acids

CO2: Discuss metabolic and structural significance of bio-molecules

CO3: Describe functional groups and biochemical interactions present in bio-molecules

CO4: Explain concept of pH, buffer, titration curve and pKa value

CO5: Explain concept of enzyme, physicochemical factors contributing to enzyme activity

CO6: Discuss nutrients uptake of microbes, anaerobic respiration and photosynthesis

**S.Y. B. Sc.**

**Semester III**

### **Paper VII- Environmental 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

### **Paper VIII-Immunology**

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

## **Semester IV**

### **Paper XI-Applied 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

### **Paper XII-Clinical Microbiology**

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

CO1: Determine mode of entry, infection, symptoms, Laboratory diagnosis and treatment for Bacterial, fungal, Protozoan infections

CO2: Describe life cycle, pathogenesis, laboratory diagnosis of HIV, Oncogenic viruses

CO3: Determine nutrients for cultivation of pathogenic bacteria

CO4: Identify epidemiology of general bacterial, fungal, protozoan infections

CO5: Identify normal micro-flora of humans CO6: Determine antibiotic resistance by Bacteria

**T.Y. B. Sc.**

**Semester V**

### **Paper XV-Microbial Genetics**

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

CO1: Differentiate gene expression pattern between microorganisms and eukaryotes

CO2: Discuss importance and applications of different genes (structural genes, functional genes etc)

CO3: Discuss importance and applications of various enzymes in the processes viz. replication transcription and translations etc

CO4: Describe various types of RNA and their role during translation, tRNA activations etc

CO5: Discuss mutation, its types and related effects like loss of function and gain of functions etc

CO6: Explain re-combinations- transduction, conjugation with types and transformations etc

### **Paper XVI-Microbial Metabolism**

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

C01: 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

C06: Determine factor affecting enzyme activity, overall enzyme kinetics viz.  $K_m$ ,  $V_{max}$ ,  $K_{cat}$

C07: Prepare buffers, reagents and stock solutions

## Semester VI

### **Paper XIX-Recombinant DNA Technology**

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

CO1: Discuss handling and applications of different DNA and RNA modifying enzymes

CO2: Elaborate techniques used for DNA transformation in host cells

CO3: Describe design of various vectors used for plants, animals and microorganisms and their modification strategies

CO4: Design cloning strategies for various applications

CO5: Differentiate transformed and non-transformed colonies

### **Paper XX-Industrial Microbiology**

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

CO1: Elaborate various aspects of industrial technology related to Microbiology

CO2: Screen industrially important strains

CO3: State and explain principles of fermenter design and computer assisted fermentation control

CO4: Discuss fermentation process and downstream processing

CO5: Formulate media, aspects of raw material used, methods of strain improvement

CO6: Describe industrial production of enzyme, antibiotics, amino acids and vitamins

CO7: Produce, purify and estimate various products, like enzymes, ethanol, acids, and antibiotics with the help of microbes

---