

# Sarvajanik University

## Ph.D. Syllabus For Entrance Examination

**Subject: Microbiology**

**Faculty: Science**

### **Unit:1 Microbial diversity**

Prokaryotic and Eukaryotic microbial cell structures, Characteristics, Habitat, Nutrition, Reproduction and Importance of Fungi, Water and Slime molds, Algae, Protozoa; History of virology, Position of viruses in biological spectrum Characteristics and Cultivation of bacteriophages, plant viruses, animal virus. Extremophiles.

### **Unit:2 Taxonomy Microorganisms:**

Taxonomy and classification; taxonomic ranks; Morphological, cultural and molecular identification; Bergy's manual past and present

### **Unit:3 Microbial physiology**

Bioenergetics and metabolism, Glucolysis and metabolism; Symbiotic Nitrogen Fixation; anaerobic microbial metabolism; adaptation physiology; biochemistry of extremophiles

### **Unit:4 Genetics**

Replication, transcription, transduction, plasmid, r-DNA technology, mutation, genetic code, gene regulation, recombination and repair, cloning in eukaryotic microorganisms, DNA fingerprinting, gene therapy, Principle and applications of genomics, proteomics, metagenomics.

### **Unit:5 Enzyme**

Structure, mechanisms of enzyme action, metalloenzymes, investigation of active site structure, kinetics of enzyme catalysed reaction, enzyme inhibition kinetics, kinetics of multi-substrate enzyme catalysed reaction

### **Unit:6 Immunology and Clinical microbiology**

Classifications of Antibodies, Characteristics of Ag; Ag x Ab reactions; MHC; T & B cell receptor; Attachment and entry of microorganisms into the body, encounter with the phagocytic cell; spread of microbes through the body; microbial strategies in relation to the immune response host and virus factors involved in pathogenesis.

### **Unit:7 Environmental microbiology**

Microbial ecology and interactions; waste water treatment; biodegradation and bioremediation of pesticides, dyes and xenotic compounds; microbial transformation of heavy metals and bioleaching; biodesulfurization, biodeterioration; biofuels

### **Unit:8 Fermentation technology & Pharmaceutical microbiology**

Screening and strain improvement, preservation of industrially improved strain, media design, industrial sterilization, types of fermentative process, fermentation economics, bioreactor design, mass transfer, bioprocess monitoring, industrial production of antibiotics; organic acids, amino acids, enzymes; microbial production of cheese, yogurt, wine. Microbiological assay, monitoring microbiological quality, microbiological aspects of pharmaceutical processing, microbiological auditing.

### **Unit:9 Bioanalytical techniques and instrumentation**

pH meters, chromatographic techniques, centrifugation, PCR, Electrophoretic techniques, spectroscopic and XRD, biosensors, blotting procedures, Gene Sequencers

### **Unit: 10 Bioinformatics**

databases: biological; nucleotide; protein; structure database; sequence based database search, multiple sequence alignments, phylogeny, secondary structure prediction, protein modelling, molecular docking, drug design.