

ST JOSEPH'S UNIVERSITY, BENGALURU
SCHOOL OF LIFE SCIENCES
DEPARTMENT OF MICROBIOLOGY

MSc Microbiology Entrance Examination

QUESTION PAPER PATTERN: MULTIPLE CHOICE QUESTIONS (60 x 1 = 60 marks)

EXAM DURATION: 1 HOUR

ENTRANCE EXAM SYLLABUS:

- 1. Basic microbiology, microbiological techniques and Microbial diversity**
- 2. Microbial biochemistry and analytical techniques**
- 3. Microbial physiology, growth and control of microorganisms**
- 4. Microbial Genetics and Molecular Biology**
- 5. Immunology and Medical Microbiology**
- 6. Agricultural and Environmental Microbiology**
- 7. Food and Fermentation Technology**
- 8. Microbial technology**

1. Basic microbiology, microbiological techniques and Microbial diversity

History of Microbiology

General Characteristics of Microorganisms

Introduction to prokaryotic and eukaryotic cells

Bacteriology

Phycology

Mycology

Virology

Protozoology

Infectious particles

Microbiological techniques

Staining Techniques, Sterilization techniques

Microbial Diversity

Microbial ecology, Microbial associations

2. Microbial biochemistry and analytical techniques

Biomolecules:

Amino acids and Peptides, Proteins, Nucleic acids, Vitamins, Carbohydrates, Lipids

Enzymology

Introduction to enzymes, Classification, Enzyme kinetics (Michelis Menten Equation)

Factors influencing enzyme activity, co-enzymes and co-factors, Mechanisms of enzyme regulation

Analytical techniques

Chromatography, Centrifugation, Electrophoresis

3. Microbial physiology, growth and control of microorganisms

Microbial nutrition, growth and maintenance

Nutritional requirements

Factors affecting growth- Bacterial growth curve

Preservation and maintenance techniques

Bioenergetics and Carbohydrate Metabolism

Antibiotics

Types and Mode of action of Antibiotics

Mechanisms of resistance to antibiotics

4. Microbial Genetics and Molecular Biology

General structure of DNA and Forms of DNA (A, B, Z and H)

Structure and types of RNA

Genetic organization in prokaryotes and eukaryotes

DNA replication in prokaryotes

Mutations, DNA repair

Transposition in prokaryotes

Gene transfer mechanisms in bacteria

Central dogma of molecular biology

Transcription in prokaryotes

Translation in prokaryotes

Regulation of gene expression in prokaryotes: Operon concept and Lac operon

5. Immunology and Medical Microbiology

Innate immunity and acquired immunity

Antigens

Immunoglobulins

Antigen antibody reactions

Monoclonal antibodies and applications

Cells and organs of the immune system

Immune response

Complement system

Hypersensitivity

Major histocompatibility complex

Transplantation immunology

Vaccines

Medical Microbiology

Infection – types, sources, transmission methods, mechanisms of pathogenesis

Common pathogens and infections - *Salmonella*, *Staphylococcus*, *Mycobacterium tuberculosis*, *Plasmodium*, *Entamoeba*, *Candida*, Aspergillosis and Hepatitis B.



6. Agricultural and Environmental Microbiology

Agricultural Microbiology

Diversity of soil flora

Biogeochemical cycles

Plant pathology

Bioinoculants

Biopesticides

Environmental Microbiology

Air Microbiology

Microflora of air

Air sampling

Air Sanitation and Air-Borne Infections

Water microbiology

Analysis of water

Waste water & municipal water treatment method

Water borne pathogens and diseases

Bioremediation and biodegradation

Bioremediation and waste management

7. Food and Fermentation Technology

Food and Dairy Microbiology

Food spoilage

Food preservation

Microbial food infection and poisoning

Pasteurization of milk

Contamination sources and spoilage

Milk products

Fermentation Technology

Industrially important microorganisms

Fermenter: Basic structure, construction and types

Culture collection and Types of Culture Collection Centres

Down-stream processing techniques

8. Microbial technology

r-DNA technology- Restriction enzymes, Ligases and other DNA modifying enzymes

Gene cloning vectors

Polymerase chain reaction (PCR) and its applications

Transformation and DNA transfer techniques

Transgenic plants and GMOs