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