

Syllabus for entrance exam of M Phil and Ph.D in Microbiology

PART - A

Unit I

Components of Research Problem, Various Steps in Scientific Research, Types of Research- Basic and Applied research. Hypotheses, Research Design- Survey Research, Case Study Research, semi experimental and Experimental research. Data Collection, Sources of Data, Primary Data, Secondary Data. Questionnaire. Sampling methods. Sampling Errors

Unit II

Measures of Central tendency and distribution – mean, median, mode, range, standard deviation, variance. Basic principles of probability theory, Normal distribution, statistical inference – Types of errors and levels of significance. Comparison of variance (F-test), small sample test, t-test for comparison of means, Chi square test. Correlation and Linear regression.

Unit III

Methods of sterilization, Microbiological media, Preservation and maintenance of microbial cultures. Containment. Microscopic and biochemical identification, staining methods. Bacterial growth kinetics. Metabolic diversities, Growth measurement methods. Factors affecting growth. Cultivation of aerobes and anaerobes.

Unit IV

Microscopy. Centrifugation techniques- Analytical and preparative. Chromatography- Principles and applications of paper and thin layer chromatography, column, Ion exchange, gas chromatography, affinity chromatography, gel permeation chromatography, FPLC and HPLC. Principles and types of electrophoretic separation.

PART - B

Unit I

Morphology and ultrastructure of microorganisms. Fermented foods, single cell proteins, Contamination and spoilage of food. Biofertilizers, Biopesticides and Biological control. Microbial interactions, kinetics, Microbial community, r and k strategies, Extremophiles. Design and types of fermentors, upstream and downstream processing.

Unit II

Carbohydrates, Lipids, proteins, nucleic acids – Classification, chemistry, properties and functions. Metabolism of carbohydrates, amino acids, Lipid, purine and pyrimidine nucleotides. Enzymes : classification, nomenclature, assay & kinetics. Factors affecting enzyme reaction. Ribozymes and abzymes. Enzyme inhibitors, competitive and noncompetitive inhibition. Enzyme purification.

Unit III

Innate immunity, adaptive immunity. Humoral and cell-mediated immunity. .Antigens & antibody, Ag-Ab reactions. The complement system. Major Histocompatibility Complex (MHC), Human leucocyte antigen (HLA) restriction. Hypersensitive reactions, Autoimmunity. Immunodeficiency diseases, MABs.; Immunization. Major infectious diseases. Antimicrobial agents, new emerging pathogens

Unit IV

Microbial genetics- genome organisation, DNA structure function, mutations and repairs, recombination in bacteria. Recombinant DNA technology, Blotting techniques. PCR. Cloning vectors. Genomic / gene libraries. DNA sequencing methods. Restriction mapping. Microarrays. Transgenic organisms. Gene therapy. Bioethics.

Department of Microbiology
Model Question Paper for Ph.D. Entrance Examination in Microbiology

Note: 1. Answer all questions
2. All questions carry equal marks.

1. The step in the flow of genetic information wherein DNA is copied into mRNA is called ()
a) Transduction b) transcription c) translocation d) replication
2. Allosteric enzyme – name was proposed by ()
a) Buchner b) Monod J Et al c) Weber d) Gerhart
3. Negative interaction is exemplified by which of the following. ()
a) Symbiosis b) Cooperation c) Competition d) Mutualism
4. The oldest eukaryotic organisms are considered to be ()
a) diplomonads like Giardia b) fungi c) archaea d) animals
5. The idea of selective toxicity was first proposed by ()
a) Antony van Leeuwenhoek b) Paul Ehrlich c) Louis Pasteur d) Alexander Fleming
6. Which of the following organelles contain DNA, divides and possesses some degree of autonomy? ()
a) Golgi apparatus b) Ribosome c) Chloroplast d) Peroxisomes
7. An outbreak of sepsis caused by *Staphylococcus aureus* has occurred in the newborn nursery. As a investigator, according to your knowledge of the normal flora, what is the most likely source of the organism? ()
a) Nose b) Throat c) Colon d) Vagina
8. The type of antibodies present in colostrum, saliva & tears is----- ()

a) IgE b) IgD c) IgG d) IgM

9. In aqueous solution the 5 to 6 membered monosaccharide can form --
----- structure.

a) Ring b) elliptical c) Triangle d) oval

10. The father of immunization was

()

a) Louis Pasteur b) Edward Jenner c) Salk d) Sabin

