

## Ph.D. Entrance Test Microbiology

**General Microbiology:** Introduction- Historical background and scope and impact of microbes on human affairs. Difference between Eubacteria, Archaeobacteria and Eukaryotes, Pure culture technique, sterilization technique, Principles of Microbial growth & microbial nutrition, classification of Bacteria, Viruses, General Characteristics, Morphology, classification of plant animal and bacterial viruses, cultivation of virus. Control of Microorganism of Physical & Chemical agents, Microbial Ecology, Role of Microorganisms in foods, agriculture, environment and industry.

**Biochemical and Biophysical technique:** Microscopic Technique, Chromatography Techniques, Gel Electrophoresis Techniques, Spectroscopic Techniques etc. HPLC, GLC, NMR etc. Hybridization technique, Gene expression studies (Real Time PCR, Micro arrays & Gene chips), Sequencing (DNA and Amplification of gene, Nucleic acid techniques in diagnostic microbiology, Microarray technology.

**Introduction to bio molecular, Microbial physiology and Microbial genetics :-** structure of atoms, molecules and chemical bonds, Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins), stabilizing interaction, glycolysis, oxidative phosphorylation, Principles of catalysis enzymes and enzyme kinetics. Membrane structure and function, structure of model membrane, lipid bilayer, and membrane protein diffusion, osmosis, ion channels, active transport, ion pumps, structural organization and function of intracellular organelles, Concept of gene and genome, Regulation of gene expression in prokaryotes and eukaryotes. Organization of genes and chromosomes, Operon structure of chromatin and chromosomes, transposons, oxidative stress, regulation of cell cycle, Mutation and repair.

**Advance in Microbial Molecular Biology:** Molecular evolution, molecular biology of nif, genes site directed mutagenesis.

**Advance in Industrial Microbiology:** Recombinant DNA Technology for genetics improvement. Metabolic engineering recent advances in production of antibiotics, pharmaceutical/Recombinant products, Industrial production of enzymes, Biofuels, Industrial solvents, Organic acids, Biopesticides, Biofertilizers, Biodegradable plastics, SCP, Beer, Wine etc. Products of non-microbial origin produced by genetically engineered microorganism. Applications of immunological principles (vaccine, diagnostics) Bioremediation, Biosensors, Microbial fermentation and production of small and macromolecules. Microorganisms important in foods, Food spoilage, Food preservation, Food borne illness, Food Toxins, Fermented Foods, HACCP, Hurdle technology, Conventional and New methods for detection of microorganisms in foods, Bacteriocins in foods.

**Protein Engineering:** - Concept and Methods, Site directed mutagenesis, Active site mapping, Nature of the active site. Identification of functional groups at the active site. Immobilized enzymes – methods and application. Bioinformatics : Importance & scope of Bioinformatics, world wide web as a tool, Bioinformatics institutes and databases, Bioinformatics Tools, Bioinformatics training & limitation.

Bio-business and Bio-safety, Biotechnology for developing countries and IPR.

**Environment Biotechnology:** (A brief account) Energy management, Bioremediation, restoration of degraded lands and conservation of biodiversity.

Recent advance in the field of Medical Microbiology.

