BHARATHIAR UNIVERSITY – COIMBATORE – 641 046
M.PHIL/Ph.D – MICROBIOLOGY
PAPER – I RESEARCH METHODOLOGY
(effective from the academic year 2006-2007 and onwards)

Unit – I

pH measurements – buffers -- electrodes. Dialysis and ultrafiltration. Measurement of protein and carbohydrate solutions. DNA and RNA estimation.

Unit – II

Chromatography – Thin layer chromatography – Gas chromatography – Column chromatography – Ion exchange chromatography – Gel exclusion chromatography – HPLC – Affinity chromatography and Immunoadsorption. Electophoresis: Polyacrylamide gel electrophoresis (PAGE) – Nucleic acid and sequencing gels – Agarose gel electrophoresis – Two dimentional electrophoresis –Pulsed Field Gel Electrophoresis (PFGE) isoelectric focusing – Gel documentation. Blotting – Western, Southern and Northern blots.

Unit – III

Microscopy – Light microscope – Compound microscope – Dark field microscope – Phase contrast microscope – Normaski microscope – Confocal microscopy – Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM).

Unit – IV

Colorimetry – ultraviolet – visible spectrophotometry – principles, instrumentation – applications. Fluorescence spectrophotometry. Centrifugation – principles – instrumentation for centrifuges – bench top – high speed – ultracentrifuges – applications. Preservation of microbial cultures and industrially important microbial cultures. Growth kinetics, calculation of generation time.

Unit – V

Molecular Research procedures – Preparation of total cell DNA – Plasmid DNA – bacteriophage DNA. DNA sequencing techniques – PCR – Restriction analysis. Hybridization – mutagenesis – recombination – conjugation – transformation – transduction. Cell distruption. Immunization – Monoclonal antibodies – antigen and antibody development.

Reference:

Boyer, R.F.1993. Modern experimental Biochemistry. The Benjamin/ Cummings Publishing Co.
Wilson, K and J.Walker. 1995. Practical Biochemistry. Principles.
Glick, B.R and J. J. Pasternak. 1994. Molecular Biotechnology, ASM Press, Washington.

BHARATHIAR UNIVERSITY : COIMBATORE – 641 046
M.PHIL/Ph.D. MICROBIOLOGY
PAPER II GENERAL MICROBIOLOGY
(effective from the academic year 2006 – 2007 onwards)

Unit I

History of Microbiology, microbial groups and their taxonomic position, in relation to other living organisms. Microscopy light microscope UV, Fluorescent & phase contrast, Electron Microscopes, prokaryotes & eukaryotes. Classification & nomenclature of bacteria, structure, morphology and reproduction of bacteria, fungi, yeast, algae, protozoa, mycoplasma, rickettsiae. Viruses - structure & life cycle of bacteriophage. Microbial growth-physical conditions required for bacterial growth. Ecosystems - concepts, structure & function of major ecosystems. Types - terrestrial, aquatic, marine. Nutrient cycles, General organization of invertebrate phyla & chordate classes.

Unit II

Structure and function of cell organelles. Enzymes and factors affecting enzymatic reactions. Fundamentals of bioenergetics, glycolysis, Krebs cycle, oxidative phosphorylation, Anaerobic respiration, fermentation. Structure and functions of DNA and RNA. Genetic code, protein synthesis, mutations. Genetic recombination methods in bacteria-transformation transduction and conjugation. Mendelian Genetics, Basics of Molecular Genetics, Genetic Engineering and recombinant DNA technology.

Unit III

Bacterial Infections-Staphylococcus, Streptococcus, Corynebacteria, Phnemococcus. Major viral infections-Polio, Measles, influenza, Hepatitis, Rabies, Herpes, and AIDS. Bactericidal and Bacteriostatic agents. General account of immunity, antigens and antibodies, classification of immunoglobulin. Types of antigen and antibody reactions. Active and passive immunity. Vaccines and their applications.

Unit IV

Microbes in industry-Screening, Strain development, raw material for production, media, types of production media, Microbial production of Industrial alcohol, Amino acids, Vitamins. Fermented foods, food spoilage and food preservation, nitrogen fixation, nitrification and denitrification. Microbial examination of Milk and water. Pasteurization.

Unit V

Positive and negative roles of microbes in environment. Potability of water – Microbial assessments of water quality – water purifications - Major water borne diseases and their control measures. Biopesticides. Biodeterioration of paper, leather, wood, textiles metal corrosions. Biofertilizers, Single cell proteins.

Reference

Lansing.M.Prescott., John.P.Harley and Donald.A.Klein. 1999. Microbiology. 4th edition.WCB. McGraw – Hill.

Atlas,R.M.1997. Principles of Microbiology. Second edition.WCB. McGraw - Hill.

Atlas, R.M and Bartha, R.1957. Microbial ecology Fundamentals and Applications. Fourth edition. An Imprint of Adiision Wesley Longman Inc.

Brown T.A. 1995. Gene cloning- An Introduction. 3rd ed.

Old R.W and Primrose S.B 1995. principles of gene manipulation- An introduction to genetic engineering. 5th ed.

Jawetz, E, Melnic, J.K, and Adelberg, E.A. 1998. Review of medical Microbiology, Lange Medical Publications, U.S.A.