

SRI KRISHNADEVARAYA UNIVERSITY :: ANANTAPUR

DEPARTMENT OF MICROBIOLOGY

Part I : M.Phil./Ph.D. WRITTEN EXAMINATION

Syllabus for Paper I: RESEARCH METHODOLOGY

Microscopy - Phase contrast, fluorescent and electron microscopy (SEM, TEM). Preparation of biological samples for microscopy.

Basic principles and applications of the following biophysical and biochemical techniques:

Buffers - acids, bases, ionization. Preparations of buffers. Measurement of pH. Standard hydrogen electrode, reference electrode, calomel electrode and silver-silver chloride electrode, COD and BOD.

Chromatography - Adsorption, partition, ion-exchange, gel filtration, affinity chromatography based techniques: Paper, TLC, GLC, HPLC, FPLC.

Electrophoresis - Paper, gel (starch, agarose, acrylamide). Disc, slab, 2-directional, gradient electrophoretic techniques. Pulse-field and capillary electrophoresis.

Blotting techniques: Western blotting, Southern blotting, Northern blotting. Electro-elution of biomolecules from gel/paper.

Centrifugation techniques - RPM, RCF, Svedberg coefficient, Differential, rate-zonal, and equilibrium density centrifugation. Isolation of cells, subcellular organelles and macromolecules.

Spectroscopic techniques - Visible, UV, IR, NMR and atomic absorption spectrophotometry, Turbidometry, nephelometry, fluorimetry, flame photometry.

X-Ray diffraction - X-Ray diffraction and X-Ray crystallography of biomolecules.

Isotope techniques - Stable and radioactive isotopes, nature and types of radio activity, decay reaction, decay units, detection and measurement of radioactivity (GM, scintillation, Gamma-ray counter, Cerenkov radiation and autoradiography). Biological uses and effects of radiation, mass spectrometry.

Immuno-chemical techniques - Production of monoclonal and polyclonal antibodies. Functions of adjuvants and haptens. Immunoprecipitin reactions, immunoelectrophoresis and serum electrophoresis. Labelled antibody-based techniques - RIA, ELISA and fluorescent antibody technique. Flow cytometry and complement fixation test.

Recombinant DNA Technology: Construction of genomic and cDNA libraries, Screening for recombinant clones, PCR based diagnosis, Sanger's, and Maxam and Gilbert's methods for sequencing, method for recombinant vaccine production.

Elements of biostatistics - Collection and presentation of data, tests of significance, analysis of variance and experimental design.