DEPARTMENT OF BIOTECHNOLOGY

Syllabus for Ph.D Pre qualifying examination

Paper 1 – RESEARCH METHODOLOGY

1. Histochemistry: Immunochemistry, tissue preparation, wax embedding, processing of microtome and cryostat sections. localization of metabolite: proteins, nucleic acids, enzymes.
2. Microbial Techniques: pure culture techniques,. Enrichment techniques, replica plating cultivation of anaerobic microorganisms, maintenance of microbial culture, establishment maintenance and application of animal cell culture.
3. Principles and application of various instruments and techniques: colorimetry, U.V- visible spectrophotometry, HPLC, FPLC, centrifuges, transilluminator, thermo cycler, sonicator, vacuum concentrator, CO_2 incubator, ELISA reader, DNA sequencer
4. Chromatographic techniques: paper chromatography, TLC, column chromatography, molecular sieving , ion exchange, affinity chromatography, gas chromatography and HPLC
5. Electrophoretic techniques: polyacrylamide and agarose gel electrophoresis, capillary electrophoresis,2 D electrophoresis, disc gel electrophoresis, pulse field electrophoresis, Rocket gel, RID, isoelectric focusing
6. Radio activity: Decay and measurement of radio activity, Geiger- Muller counter, liquid scintillation counter, autoradiography, radio immune assay. Application of isotope techniques in Biological systems
7. Protein isolation, purification, amino acid sequencing, antibody generation, poly clonal and monoclonal
8. Application of Bioinformatics in proteomics and genomics e.g. sequence data and genome data analysis

Reference Books

1. Modern experimental Biochemistry – Rodney Boyer third edn.

2. Principles and Techniques of practical Biochemistry – K.Wilson and J.Walker

3. An introduction to Practical Biochemistry – D.T.Plummer third edn

4. Molecular cloning – A Laboratory manual vol I,II& III. Sambrrok and Russel 2001

5. Short protocols in Molecular Biology – Ausbel et al

6. Plant Tissue Culture – Theory and Practice – S.S.Bhojwani and M.K.Razdan

7. Biochemisrty-Donald Voet and Judith G.Voet,John Wiley and sons Inc

Model queston paper for Ph.D Pre- qualifying examination

Paper I : Research Methodology

Time : 3 hr

Maximum Marks : 70

Answer any five questions. All questions carry equal marks

1. How would you explain tissue preparation followed by Immunohistochemistry technique to localize cell surface markers.
2. Explain the method of isolation and maintenance of bacterial pure culture.
3. Comment on the principle and mechanism of the following equipments

   a) Thermocycler b) UV visible spectrometer c) HPLC d) Affinity chromatography.
4. Compare and contrast the poly Acrylamide and Agarose gel electrophoresis.
5. Explain the methods of purification monoclonal antibody.
6. Discuss mainly used radioactive molecules mainly used both in prokaryotic and eukaryotic experimental system.
7. Comment on the Bioinformatics tools for analysis of genomic data.

(5 x 14 = 70)