

## MAHARAJA GANGA SINGH UNIVERSITY, BIKANER

### Ph. D. COURSE WORK IN ZOOLOGY

1. Killing and Fixation, Collection and preservation: of biological samples.
2. PAS, Metachromasia and Feulgen Staining techniques.
3. Different types of microscopes: Phase contrast, Fluorescence, Polarizing and Electron microscopes TEM and SEM. Microscopic techniques: Visualization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etch and freeze-fracture methods for EM, image processing methods in microscopy.
4. Different types of microtomes: Rocking, Rotary, Freezing microtomes. Cryotechniques (Freeze drying and freeze substitution), Fresh and fixed frozen sections and Ultratome.
5. Centrifuges, High speed centrifuge, Ultracentrifuge.
6. pH Meter.
7. Colorimeter, Spectrophotometer and Flame photometer.
8. Balance types: Electric and Electronic balance.
9. Electrophoresis: Principles of Electrophoresis types of electrophoresis, paper and gel electrophoresis and their comparison. Blotting techniques.
10. Chromatography: Principles of chromatography, types of chromatography, TLC, two dimensional and column chromatography, GC, HPLC.
11. Electrophysiological Equipment: Kymographic equipment and Oscilloscope. Patch clamp.
12. Photomicrography.
13. Radiation: Types of radiations, Principles of Autoradiography; Scintillation and Gamma counter.
14. Principles and working system of audiovisual equipments.
15. Use of computers in Life Science, Fundamentals of Computer architecture. Computational methods: Nucleic acid and protein sequence databases; data mining methods for sequence analysis, web-based tools for sequence searches, motif analysis and presentation.
16. Histochemical and immunotechniques: Antibody generation, detection of molecules using ELISA, RIA, western blot, immunoprecipitation, flow cytometry and immunofluorescence microscopy, detection of molecules in living cells, *in situ* localization by techniques such as FISH and GISH.
17. Statistical Methods: Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and normal): sampling distribution; difference between parametric and non-parametric statistics; confidence interval, errors; level of significance; regression and correlation; t-test; analysis of variance;  $\chi^2$  test; basic introduction to Multivariate statistics, etc.