

## **M.Phil., DEGREE (ZOOLOGY)**

### **Programme code SZOO 71**

#### **COURSE – I: PAPER I: RESEARCH METHODOLOGY**

##### **Unit – I. Principles and Applications:**

Microscopy – Principles, construction and biological use of Phase contrast, Fluorescence, Transmission and Scanning Electron Microscopes., Centrifuge – Low, High and Ultra centrifuge and refrigerated centrifuges.

##### **Unit – II. Histology and Histochemical Methods**

Histological Preparation of Tissues for Light and Electron Microscope, Histology – kinds of fixatives – Characteristics of fixatives: dyes and their mode of action – Staining, Mounting of tissues – detailed schedule for making permanent slides of microtome sections.

##### **UNIT – III. Colorimetry and Spectrophotometry**

**Colorimetry:** Principles and application of colorimeters-spectrophotometer-flame photometer-U.V. Spectrophotometer, Atomic Absorption Spectrophotometer and G.M.Counters.

**Unit – IV. pH Meters:** Glass electrode, calomel electrode-construction and working principles-types of pH meters.

**Monometry:** Types of monometers - Warburg monometer-biological use of monometers.

##### **Unit – V. Scientific writing and Thesis writing:**

Scientific Writing – Choosing the problem for Research – Source of Information of methods of literature collection of review. Preparation of Index Card, Preparation of scientific manuscript, Thesis Writing – Proof correction – Impact Factor – Citation Index – H – Index.

##### **References:**

1. Anderson, Durston and Polle. 1970, Thesis and Assignment writing. Wiley Eastern Ltd.
2. Bajpai, P.K. 2010. Biological Instrumentations and Methodology (Tools and Techniques of Biology) S. Chad and Company Ltd. New Delhi.
3. Culling, C.P.A 1974. Hand book of Histopathological and Histochemical Techniques. Butterworths, London.
4. Kothari, C.R. IInd Edition (2004). Research Methodology, Methods and Techniques. New Age International (P) Ltd, Publishers, New Delhi.
5. Jenod H. Zar (1999). Biostatistical analysis by, Prentice Hall International, Inc. Press, London.
6. Kothori, C.R, 1989. Research Methodology – Methods and Techniques. Wiley Eastern Ltd.
7. Khandpur, R.S. (1990) Handbook of Biomedical Instrumentation, Tata McGraw-Hill Publishing Company Ltd., New Delhi, India.
8. Slayter, R.J, 2000. Radioisotopes in biology – a practical approach. IRL Press, Oxford.

## **COURSE – II: PAPER - II - ADVANCED TECHNIQUES IN ZOOLOGY**

### **UNIT – I Electrophoresis and Chromatography**

Production of polyclonal and monoclonal antibodies – precipitin reactions and preparation of precipitin curve – immunodiffusion, radial immunodiffusion, double immunodiffusion-immunoelectrophoresis- rocket electrophoresis – haemagglutination – bacterial agglutination – passive agglutination - agglutination inhibition – radio immunoassay enzyme linked immunosorbent assay – elispot assay – immuno precipitation – immuno fluorescence.

### **UNIT – II Blotting techniques and PCR**

DNA, RNA and protein separation techniques-Southern blotting, Northern blotting and Western blotting techniques, polymerase chain reaction, Construction of Genomic Library, Flow Cytometry , Fluorescence *in-situ* hybridization(FISH).

### **UNIT – III IVF and Vaccine production**

Cryopreservation – Manipulation of reproduction in animal – Transgenic animals – applications of molecular markers – Human welfare – Techniques used in vaccine production. Method and applications of DNA fingerprinting, Bioethics.

### **UNIT- IV Cell culture techniques**

Animal cell culture: Importance of Serum and Serum Free Media. Culturing and Sub Culturing of Animal Cells. In Vitro Transformation of Animal Cells, Primary and Secondary established cell lines, cloning of Animal cells, cell Line Preservation, cell line characterization, Manipulation of cultured cells, Passing cells, Stem Cell culture, Hematopoiesis embryonic stem cell culture, Measurement of cell death and cell viability.

### **UNIT – V Nanobiotechnology**

Synthesis, properties & characterization of nanomaterials – Nanomaterials and biosystem interaction – Applications of nanobiotechnology in early medical diagnostics, drug targeting & drug delivery.

### **References**

1. Paul Robinson.J 1993, Handbook of Flow Cytometry Methods, Willey-Liss New York
2. Shanmugam. S., 2010, Nanotechnology, MJP publishers, Chennai,
3. Dubey.R.C. 2009, A Text book of Biotechnology, S.Chand & Co., New Delhi.
4. Subbiah Balaji. 2010,Nanotechnology, MJP publishers, Chennai,
5. Goldsby,R.A., Kindt.T.J., Osborne, B.A., and Kuby, J. 2003, Immunology,5<sup>th</sup> Ed. W.H.Freeman and Company, New York.
6. Bajpai, P.K. 2010, Biological Instrumentations and Methodology (Tools and Techniques of Biology) S.Chand and Company Ltd., New Delhi
7. Khandpur, R.S. 1990 Handbook of Biomedical Instrumentation, Tata McGraw-Hill Publishing Company Ltd., New Delhi, India.
8. Sambrook, J and Rossell D.W. 2007, Molecular Cloning: A Laboratory Manual, 3<sup>rd</sup> Edition, Vol. 1,2,3:, Churchill Press
9. Bronzino.j.D, 2006, Tissue Engineering and Artificial Organs, Taylor & Francis Group, LLC
10. David Reisner.E, 2009, Bionanotechnology-Global Prospects, Taylor & Francis Group, LLC