

**SHIVAJI UNIVERSITY, KOLHAPUR****(Implemented from June, 2005)****M. Phil. ZOOLOGY**Paper I – **Research Methodology. (Compulsory)****CONTENTS**

<b>Sr. No.</b>	<b>Chapters</b>
01	<b>An Insight into Research.</b> 1. What is Research? 2. Objectives of Research. 3. Significance of Research. 4. Research Techniques. 5. Finding Research Materials. 6. Scientific Writings. 7. History of Scientific Writing
02	<b>Organization of Research paper.</b> 1. Title of Research Paper. 2. Authors and Address. 3. Acknowledgement. 4. Writing Abstract. 5. Writing Introduction. 6. Writing Materials and Methods. 7. Writing Results. 8. Writing Discussion 9. Writing References.
03	<b>Tables and Illustrations in Research Paper.</b>
04	<b>Dealing with Publishers.</b> 1. Submission of Reprints. 2. Ordering of Reprints.
05	<b>Writing a Review Paper</b>
06	<b>Writing a Thesis</b>
07	<b>Presentation of a Scientific Paper/ Document.</b> 1. Conference Report. 2. Oral Presentation. 3. Poster Presentation. 4. AudioVisual Aids in Oral Presentation.

08	<b>Some cautions in the Usage of English.</b>
09	<b>Using Numbers and SI Units.</b>
10	<b>Biostatistics.</b> <ol style="list-style-type: none"> <li>1. Samples and Population.</li> <li>2. Statistics and Parameters.</li> <li>3. Random Sampling.</li> <li>4. Statistical Inference.</li> <li>5. Testing Hypothesis.</li> <li>6. Estimation.</li> <li>7. Measurement of Central Tendencies.</li> <li>8. Measures of Variations.</li> <li>9. Correlation.</li> <li>10. Regression.</li> <li>11. Testing Significance: Student 't' test, Chi Square test.</li> </ol>
11	<b>Studying Techniques.</b> <ol style="list-style-type: none"> <li>1. General Studying Techniques.</li> <li>2. Note Making.</li> <li>3. Reading.</li> <li>4. Memorizing.</li> <li>5. Swotting.</li> <li>6. Be positive,.</li> <li>7. Make Time.</li> <li>8. Pre-examination Timetable.</li> <li>9. Final Run up to Examination.</li> </ol>
12	<b>Some useful Tables.</b> <ol style="list-style-type: none"> <li>1. Multiples and Sub Multiples.</li> <li>2. International System of Units (SI Units.)</li> <li>3. Probability Table.</li> <li>4. Percentage points of <math>X^2</math> distribution table.</li> <li>5. Percentage points of the 't' distribution table.</li> </ol>

..1..

**M. Phil Zoology**  
(Introduced from June, 2005)  
**Paper No. II (Compulsory)**  
**Recent Advances in Zoology**

- 1) The development of Animal form.**
  - i) Ontogeny
  - ii) Morphology
  - iii) Evolution
- 2) Chemical signalling in the body.**
  - i) Signalling molecules and their control.
  - ii) Target Cells.
  - iii) Response to signals.
  - iv) Extrensic signal.
- 3) Reproductive technologies.**
  - i) Gametogenesis in economically important invertebrates, vertebrates, collection, cryopreservation of gametes and embryos.
  - ii) In vitro fertilization.
  - iii) Immunocontraception.
  - iv) Production of transgenic animals.
- 4) Bioinformatics.**
  - i) Perspectives on Computers and operating system.
  - ii) The internet and the biologist.
  - iii) Phylogenic analysis.
  - iv) Genome information.
- 5) Medical Zoology.**
  - i) Brief introduction to pathogenic microbes.
    - a) Viruses, Rickettsiae, Spirochetes and bacteria.
  - ii) Pathogenic protozoans.  
Entamoeba, Trypanosoma, Leishmania, Giardia, Trichomonas, Plasmodium
  - iii) Pathogenic helminths.  
Fasciolopsis, Schistosomia, Echinococcus, Ancylostoma Trichinella, Wuchereria, Oxyuris.
  - iv) Arthropods as a direct agents.
- 6) Biotechnology.**
  - i) Enzymology of Genetic engineering.
  - ii) Cloning Vehicles.
  - iii) Analysis and expression of cloned genes in host cell.
  - iv) Gene libraries.
  - v) Changing genes.

..2..

- vi) Application and impact of recomb - DNA technology.
  - vii) Ethical issues and biosafety regulation.
- 7) Recent techniques in Zoology.**
- i) Chromatographic Separation (TLC to HPLC).
  - ii) Remote sensing technique.
  - iii) X-Ray Crystallography.
  - iv) Immunoassays & immunocytological techniques.
  - v) Computer aided techniques to data analysis and presentation.
  - vi) Cryotechniques.
  - vii) Electroncryo, Confocal and Scanning Electron Microscopy.
- 8) Enzymic protective Mechanisms in the body.**
- i) Blood clotting.
  - ii) Protection against ingested foreign chemicals.
  - iii) Protection of the body against its own proteases.
  - iv) Protection against reactive oxygen species.
- 9) i) Recent Advances in Silkworm rearing**
- a) Chowki rearing b) Late age rearing.
  - ii) Integrated pest management technology.
  - iii) Insect endocrinology.
    - a) Structure of endocrine glands.
    - b) Functions of insect hormone.
  - iv) Insect vectors & their control.
- 10) Aquaculture.**
- i) Philosophy and history of aquaculture.
  - ii) Different aquaculture practices in the world.
  - iii) Aquaculture in India, its potential and future.
  - iv) Economics of aquaculture in India.
  - v) Problems of aquaculture.
- 11) Applied Limnology – Measurement.**
- i) Case studies of take Washington, Lake Tahose, Shagawa Lake.
  - ii) Case studies of Thames River, Nile River, Ganga river.
  - iii) Nutrient diversion, weed control.
  - iv) Management of water bodies.

..3..

**M. Phil Zoology**  
**Paper No. III (Elective Paper)**  
**Cell Biology**

- 1) Compartmental diversity within the cell and its maintenance.**
  - i) Molecular mechanisms of vesicular transport.
  - ii) Maintenance of compartment identity.
- 2) Bioenergetics:**
  - i) Cellular metabolisms.
  - ii) Energy transformations.
- 3) Ionic basis of membrane excitability.**
  - i) Ionic channels.
  - ii) Electrical properties of membrane.
- 4) Signal transduction pathways in cell.**
  - i) G-proteins
  - ii) Cyclic AMP.
  - iii) Ca<sup>+2</sup> as messenger.
  - iv) Protein kinases.
- 5) Garbage disposal unit inside the cell.**
  - i) Lysosomes.
  - ii) Peroxisomes.
- 6) Molecular Motors.**
  - i) P - loop N TPase superfamily
  - ii) Myosins.
  - iii) Kinesin & Dynein.
  - iv) A rotary motor (in bacteria).
- 7) Control of gene expression.**
  - i) Organization of gene.
  - ii) Role of gene regulatory proteins.
  - iii) Role of DNA-binding. Proteins.
  - iv) Chromatin structure & control of gene expression.
- 8) Cell and Defence.**
  - i) Cellular basis of immunity.
  - ii) SER and Biotransformations.(Biotics & xenobiotics)
- 9) Cell renewal:**
  - i) By simple duplication.
  - ii) By stem cells.
  - iii) By pluripotent stem cells.
- 10) Cell death.**
  - i) Apoptosis Type I
  - ii) Apoptosis Type II

..4..

**11) Evolution of cellular organization of life.**

- i) First form of life.
- ii) RNA world.
- iii) DNA world.
- iv) Prokaryotic & Eukaryotic cellular evolution.

**12) Genomics and Evolution.**

- i) Principles of genome annotation.
- ii) Evolution of macromolecular sequences.
- iii) Building phylogenetic trees.
- iv) Phylogenetics, cladistics and ontology.

**13) Proteomics and Drug designing.**

- i) Conceptual models of protein structure.
- ii) Three dimensional structure classification and protein function.
- iii) Structural alignment.
- iv) Pharminformatics & drug designing.

..5..

**M. Phil Zoology  
Paper No. III (Elective Paper)  
General Physiology**

- 1) Digestion and absorption of carbohydrates.**
- 2) Composition and functions of body fluids.**
- 3) Control mechanism of respiration.**
- 4) Ultra structure of nephron and mechanism of urine formation.**
- 5) Patterns of nitrogen excretion in animals.**
- 6) Structural basis of muscle contraction.**
- 7) Membrane excitability and sensory transduction.**
- 8) Environment and sexual periodicity.**
- 9) Hormonal regulation of gametogenesis in male & female.**
- 10) In-vitro fertilization and embryo transport (IVF/ET).**
- 11) Physiological adaptations to different environments.**

..6..

**M. Phil Zoology**  
**Paper No. III (Elective paper)**  
**Environmental Biology**

**1) Population Ecology:**

- i) Properties of Population – Density, Natality, Mortality.
- ii) Population age distribution.
- iii) Population growth.
- iv) Cyclic Oscillations in Population.
- v) Carrying Capacity of Population.
- vi) Environmental resistance.

**2) Wildlife:**

- i) Causes of threatening the wildlife.
- ii) Wildlife distribution in India.
- iii) Endangered fauna from India.
- iv) Protected areas – National Parks, Sanctuaries & Biosphere reserves.
- v) Wildlife protection Act 1972.
- vi) Wildlife management techniques.
- vii) Special wildlife conservation projects- Project tiger, Crocodile breeding project, Musk deer breeding project & Gier lion sanctuary project.

**3) Natural Resources:**

- i) Classification of resources.
- ii) Need of conservation of natural resources.
- iii) Renewable natural resources – Water, Fishery, Wildlife, Forest & Grass lands.
- iv) Non-renewable natural resources – Top Soil, Land, Mineral resources.
- v) Conservation of water resources.

**4) Human Ecology:**

- i) Man and his environment.
- ii) Humans impact on nature.
- iii) Degradation of environment due to – Mining, Industries, Agriculture & Urbanization.
- iv) Environmental problems – Global warming, Eutrophication.
- v) Socio-economic aspects of environmental problems.

**5) Limnology:**

- i) Types of aquatic ecosystems – Fresh water & Marine water.
- ii) Zonation in marine ecosystem – Littoral, Limnetic & Profendal zones.
- iii) Physico-chemical parameters of aquatic ecosystem – pH, Temperature, Dissolved Oxygen, Dissolved Carbondioxide, Nitrates, Phosphates & Hardness.
- iv) Planktons forms – Freshwater & marine water.
- v) Conservation of aquatic ecosystems.

..7..

**6) Biodiversity:**

- i) Introduction – Species diversity, Genetic diversity & Ecosystemic diversity.
- ii) Economic importance of biodiversity.
- iii) Priorities of biodiversity conservation.
- iv) Need of biodiversity conservation.
- v) Conservation of biodiversity.
- vi) Biodiversity hot spot from India.
- vii) Conventions on biodiversity.

**7) Toxicology:**

- i) Toxicity evaluation methods.
- ii) Bioaccumulation and biomagnification of pollutants in aquatic ecosystem.
- iii) Resistance development in organisms to pollutants.

**8) Limiting Factors:**

- i) Lebig's law of minimum.
- ii) Shelford's law of tolerance.
- iii) Combined concept of limiting factors.
- iv) Limiting factors – Radiation, Water, Temperature, Gases, Soil biogenic salts, Fire, Anthropogenic factors.

**9) Environmental Education & Sustainable Development:**

- i) Formal education system.
- ii) Non-formal education systems.
- iii) Importance of environmental education in solving environmental problems.
- iv) Role of NGO in minimising environmental crises.
- v) Concept of sustainable development.
- vi) Resource conservation & sustainability.
- vii) Sustainable use of natural resources.

...8..

**M. Phil Zoology**  
**Paper No. III (Elective Paper)**  
**Entomology**

- 1) Natural determinants of growth and metamorphosis.**
- 2) Insect behaviour and physiological interpretations:**
  - i) Mating
  - ii) Ovipositor
  - iii) Parental care.
- 3) Genetic control of insect pests and recent advances.**
- 4) Pheromonal and hormonal pest control of insect pest.**
- 5) Components of Biological pest control.**
  - i) Biodiversity of Biocontrol agents: parasitoids & predators.
  - ii) Biology & habitat of BCA.
  - iii) Mass production of BCA.
  - iv) Utilization of BCA in Biological pest control.
- 6) Components of Microbiol control.-**

Biodiversity, Mass production, Utilization of Microbiol control agents in pest control. And environmental manipulations and cultural practices of pest control.
- 7) Crop resistance to pest insects – pest suppression by harmonious, coordinated and fortuitous biological means.**
- 8) Molecular endocrinology and development in insects.**
- 9) Haemolymph proteins of insects and six specific proteins of insects.**
- 10) Industrial Entomology :**
  - i) Sericulture – Commercial cocoon production.
  - ii) Agriculture – Modern methods of beeking.
  - iii) Lat culture.
  - iv) Insect as human food.
  - v) Forensic Entomology.
- 11) Insect hormones & pheromones:**

Chemistry & functions of hormones & pheromones.
- 12) Bioluminescence in insects:**

Light producing organ & biochemistry of Light production.
- 13) Insect development :**

Embryonic & post embryonic developments – biochemical & physiological basis.
- 14) Insect parasitism & Insect host parasite relation and Insect host plant interaction.**

..9..

### **Reference Books:**

1. Agrochemicals and pest management – T.V. Sathe – 2003.
2. Molecular Entomology – J.H. Law – 1987.
3. The principles of insect physiology – U.B. wiggles worth.
4. Biological insect pest suppression. Coppel & Martins – 1971.
5. Insect pest predators – Sathe & Bhosale – 2001.
6. Insect predators and pest management – Patil & Sathe – 2003.
7. Biological pest control – Sathe & Bhoje – 2000.
8. Indian pest parasitoids – Sathe et al. 2003.
9. FAO Manual on sericulture. Vol. No.2
10. Introduction to Sericulture By Gang & Cheety.
11. Text book Applied Entomology vol.No.2 By K.P. Srivastava.
12. Physiology of Insecta vol. 1 to 5. Ed. By Morris Rockstein.
13. Comprehensive Insect Physiology, Biochemistry & Pharmacology vol. 1 to 12 Ed. By Kerkut & Gilbert.
14. Modern Entomology By D.B. Tembhare.
15. Entomology By Gillot,C.
16. Imms General Text book of Entomology Ed. By Richards & Davis.

..10..

**M. Phil Zoology**  
**Paper No. III (Elective Paper)**  
**Aquaculture & Fisheries**

- 1) Freshwater Resources and their Conservation.**
  - i) Proper use of freshwater resources.
  - ii) Restoration of freshwater ecosystem.
  - iii) Large man-made lakes: Present controversy in India.
  - iv) Management of ponds & Village tanks.
- 2) Lakes and Reservoirs-**
  - i) Important physico-chemical processes.
  - ii) Evolution of ecosystem.
- 3) Eutrophication of aquatic systems.**
  - i) Causes, consequences and control.
  - ii) Important parameters & indicators.
  - iii) Eutrophication of flowing waters.
- 4) i) Potential of fishing and fish production in the freshwaters.**
  - ii) Role of fish in human nutrition.
- 5) Freshwater fisheries:**
  - i) Riverine fisheries of India.
  - ii) Reservoir fisheries and its potential in India.
  - iii) Craft and gears used in inland fisheries.
  - iv) Extension program and Fishermens co-operative societies.
- 6) i) Riverine fisheries and pollution problems.**
  - ii) Biological monitoring of pollutants in aquatic ecosystems.
- 7) i) Fisheries resources of large lakes and reservoirs.**
  - ii) Management and conservation.
- 8) Aquaculture:**
  - i) Recent advances in Inland Fisheries developments in India.
  - ii) Polyculture of Indian and Exotic carps.
  - iii) Culture techniques for freshwater prawns.
  - iv) Culture of brackishwater finfish and shellfish and their economics.
  - v) Aquaculture: Marketing and Economics in India.
- 9) Major capture fisheries & their potential in India.**
  - i) Coastal fishery.
  - ii) Off shore fishery.
  - iii) Crustacean fishery.
  - iv) Molluscan fishery.

K:\eback\newsyllabus\science\M.Phil.Zoology\Revision of M.Phil.Syll.doc

PATIL AP

BIRJE SR/ JC