

Ph.D. Course Work 2012

Sub : Zoology

Important points to be noted:

- Duration of Course Work : One Semester (6 Months)
- Total Marks : 200 (Four papers 50 Marks Each)
- Passing marks will be: 40 %.
- Duration of Examination: 2 Hrs. for each paper

Paper I: Research Methodology : 50 Marks

Paper II: Subject paper -I : 50 Marks

Paper III : Subject paper – II : 50 Marks

Paper IV: Review of literature : 50 Marks

Subject Course Work: 100 Marks (2 Hrs.)

- Examination will be held at the end of the Semester.
- Total Lecture Hour (periods) for Paper II (elective units): 60 (sixty).

Scheme of Examination of Pre-Ph.D. (Course Work) Examination

Paper No.	Nomenclature of the Paper	Internal Assessment	Theory (Written Exam)	Max. Marks	Lectures (One hour per lecture)
Paper I	Research Methodology	-	50	50	42
Paper II (Subject)	Subject Paper – I	-	50	50	25
Paper III (Subject)	Subject Paper – II	-	50	50	25
Paper IV	Review of Literature	50	-	50	60

Paper No.	Nomenclature of the Paper	Internal Assessment	Theory (Written Exam)	Max. Marks	Lectures (One hour per lecture)
Paper I	Research Methodology	-	50	50	42

Paper-I – Research Methodology

Unit - 1

1. **Introduction to Research Methodology:** Meaning, Objectives, Significance, Types
2. **Research Problem:** Definition, testing and procedures

Unit-2

1. **Hypothesis:** Definition, testing and procedures
2. **Research Design/Plan:** Meaning, need and features, Basic principle of experimental signs

Unit-3

1. **Data collection/data analysis:** Tools for data collection
2. **Statistical Applications:** Mean, Median, Mode, Mean Deviation & Standard deviation, Correlation and Regression, Probability distributions ,chi square test, z test, t test, two sample t test, paired-t test

Unit- 4

1. **Report Writing:** Types of Reports, Research Report Format, Referencing, Bibliography, Appendices
2. **Computer Applications:** Fundamentals of Computers, Operating systems, use of software (MS-Office, SPSS)

Unit-5

1. **Safety and safety measures:** Introduction, safety of individuals/laboratory/community/environment
2. **Code of Ethics/ethics of research/good laboratory practices:** IPR and record keeping/archives

References:

1. Methodology of Research in Social Sciences by O. R. Krishnaswamy and M. Rangnatham Himalaya publication House, 2005, ISBN: 8184880936
2. Research Methodology: Methods and Techniques by C. R. Kothari, New Age International Publishers, ISBN:81-224-1522-9
3. Statistical Methods for Research Workers by Fisher R. A., Cosmo Publications, New Delhi ISBN:81-307-0128-6
4. Design and Analysis of Experiments by Montgomery D.C. (2001), John Wiley, ISBN: 0471260088
5. SPSS online manual
6. MINITAB online manual

Paper No.	Nomenclature of the Paper	Internal Assessment	Theory (Written Exam)	Max. Marks	Lectures (One hour per lecture)
Paper II (Subject)	Subject Paper – I	-	50	50	25

PAPER II

Unit I-

Killing and Fixation, Collection and Preservation of Biological samples; Metachromasia, PAS, and Feulgen Staining Techniques, Collection and Maintenance of Embryos

Unit II

Different types of microscope (Light microscope, Compound microscope, dark field microscope, Phase contrast microscope, Normaski microscope, Confocal microscopy, Transmission electron microscopy (TEM) and scanning electron microscopy (SEM)), Cells sorting flow cytometry, Inverted microscope, Stereoscopic microscope. Processing methods in Microscopy

Unit III

Different types of Microtomes; Rocking, Rotary, Freezing microtome, Cryo-techniques, Ultra tomes

Unit IV

Centrifuges, High speed Centrifuges, Ultra Centrifuges. pH meters.

Unit V

Colorimeters, Spectrophotometer and Flame Photometer

Balance Types; Electric and Electronic Balance

Paper No.	Nomenclature of the Paper	Internal Assessment	Theory (Written Exam)	Max. Marks	Lectures (One hour per lecture)
Paper III (Subject)	Subject Paper – II	-	50	50	25

PAPER III

Unit I

Chromatography techniques, Principles and different types (Affinity chromatography, Ion-exchange chromatography, Gel-exclusion chromatography, Gas chromatography, HPLC, TLC, Paper chromatography), Isolation of natural products (extraction, purifications and separation). Electrophoretic techniques, Iso-electrofocusing, 2D-gel, 2DIE.

Unit II

Electrophysiological equipments; Kymographic equipment and Oscilloscope, Patch clamp, Photomicrography.

Unit III

Radiation; Types of radiations, principles of autoradiography, scintillation and Gamma counter. Principles and working system of audio visual equipments.

Unit IV

Use of computers in Life science, Fundamental of computer architecture, computational methods, nucleic acid and protein sequence database, Web-based tools for sequence searches, Motif analysis and presentation.

Unit V

Histo-chemical and Immuno-techniques; Antibody generation, detection of molecules using ELISA, RIA, Western blot, Immuno-precipitation and Immuno-fluorescence microscopy, detection of molecules in living cells.

Paper No.	Nomenclature of the Paper	Internal Assessment	Theory (Written Exam)	Max. Marks	Lectures (One hour per lecture)
Paper IV	Review of Literature	50	-	50	60

PAPER – IV

Review of literature.