

# Syllabus of Pre-Ph. D. Course Work

## PAPER-I

### **1. RESEARCH METHODOLOGY AND COMPUTER APPLICATIONS**

This course is common for doctoral research students of all the subjects in science faculty.

#### **UNIT –I**

Basic principles of research, objectives of research, importance, types of research : basic and applied, selection of a research topic and problem, assessment of current status of topic chosen, literature survey and reference collection, formulation of Hypothesis, research designs, sampling designs, ethics in research, code of ethics, fabrication of data, plagiarism, animals, use of animals animal ethics and related laws (only for Zoology) Bio safety regulations in biological research (for life science only)

#### **UNIT –II**

Types and sources of data, collection methods, primary data, secondary data, analysis for specific type of data, tabulation and graphical representation, central tendency, dispersion, skewness, correlation, regression, Chi-square test, t and f tests, ANOVA-one-way and Two-way, important.

#### **UNIT- III**

Significance of Report writing, different steps in writing Report and research papers, layout of the Research Report, oral and written presentation of research (abstract/synopsis) mechanics of writing a Research Report, precautions for writing research reports, conclusions, Impact factor and citation index.

#### **UNIT-IV**

Computer and Internet : Networking, different LAN and WAN connections, connection to a network, web Browsers, Internet Security, Web Search Engine, MS word, Handling Graphics, Tables and Charts, converting a word document into various formats like-Text, rich Text, Word perfect, HTML, PDF etc. MS Power Point: creating slide show with animations, creating a blank presentation, auto layout, power point screen, screen layout and views, insert a new slide, applying design template, changing slide layout, reordering and hiding slides, slide show and editing custom slide.

Data analysis and display: facilities in MS Excel for data analysis and display, other data display software's, case study: origin, software for scientific and statistical analysis: case studies: SPSS database: creating a database

- Research Methodology methods and techniques by C.R. Kothari, second revised edition
- Research Methodology a step by step for beginners by Ranjit Kumar
- Research Methodology a step by step for beginners by Ranjit Kumar
- Statistical Methods SP Gupta
- Research Design, Qualitative, Quantitative and mixed methods approaches by W. Creswell, third edition
- Information Communication Technology by Tim Shortis
- Handbook of Communication and Social Interaction Skills by John O Green, Brant Raney Burleson

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## PAPER -II

### 2. ADVANCED ZOOLOGY

- UNIT- I            Immunology**
- (a) Cells of immune system: lymphoid organs (thymus, bone marrow, lymph nodes, spleen; MHC complex (HLA class-I, HLA class-II, HLA class-III molecules)
  - (b) Mechanism and Genetic basis of immune responses, phagocyte, humoral cell mediated and combined immunodeficiencies.
- UNIT- II            Genetic Engineering**
- (a) Principles and methods of genetic engineering; application in health, agriculture and industry; transgenic animals; primary culture, cell lines, cell clones, micro-propagation embryogenesis; somatic hybridization; IVF-in vitro fertilization and embryo transfer.
  - (b) Recombinant DNA technology in prokaryotes and eukaryotes.
- UNIT- III           Molecular Biology**
- (a) Vectors and advances in gene therapy; safety assurances; methods of DNA analysis; diagnosing infectious diseases, identifying genetic disease.
  - (b) DNA fingerprinting, genetic identification, use of technology in anthropological studies.
- UNIT- IV           Instrumentation and Techniques**
- (a) Microscopy, camera Lucida, Electrophoresis, Calorimeter and Spectrophotometer, PCR, ELISA, Centrifugation.
  - (b) Fixation and sectioning of tissue, embryos and cells; Immunohistochemistry; Immunofluorescence; Histochemical staining; RIA; Southern, Western and Northern Blotting.
- UNIT- V            Guidelines for Bio-safety, Functioning of Institutional Bio-safety committee, Institutional Animal Ethics Committee and Institutional Ethical Committee, CPCSEA guidelines for Animal experimentation, DBT guidelines for Bio-safety practices**

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