

(Common Pre-Ph.D paper for all Ph.D/M.Phil students admitted from 2018-19 onwards)

## (R -18) RESEARCH METHODOLOGY

**Unit I:** Meaning, Objectives and Motivation in Research: Types of Research, Research Approaches, Research Process, validity and Reliability in Research.

Research Design: Features of Good Design, Types of Research Design, Basic Principles of Experimental Design.

**Unit II:** Sampling Design: Steps in Sampling Design, Characteristics of a Good Sample Design, Random Samples and Random Sampling Design.

Measurement and Scaling Techniques: Errors in Measurement, Tests of Sound Measurement, Scaling and Scale Construction Techniques, Forecasting Techniques, Time Series Analysis, Interpolation and Extrapolation.

**Unit III:** Methods of Data Collection: Primary Data, Questionnaire and Interviews, Collection of Secondary Data, Cases and Schedules.

Professional Attitude and Goals, Concept of Excellence, Ethics in Science and Engineering, Some Famous Frauds in Science (Case Studies).

**Unit IV:** Correlation and Regression analysis, Methods of Least Squares, Regression Vs. Correlation, Correlation Vs. Determination, Types of Correlation and their Specific Applications.

Statistical Interference: Tests of Hypothesis, Parametric Vs Non-Parametric tests, Procedure for Testing Hypothesis, Use of Statistical Techniques for Testing Hypothesis, Sampling Distribution, Sampling Theory Chi-Square Test, Analysis of Variance and Covariance, Multivariable Analysis.

**Unit V:** Interpretation of Data and Report Writing, Layout of a Research Paper, Techniques of Interpretation.

Making Scientific Presentation at Conference and Popular Lectures to Semi Technical Audience, Participating in Public Debates on Scientific Issues

### **Books:**

1. Research Methodology: Methods and Techniques - C R Kothari, 2<sup>nd</sup> Edition, New Age International Publishers.
2. Research Methodology and Statistical Tools – P. Narayana Reddy and G.V.R.K.Acharyulu, 1<sup>st</sup> edition, Excel Books, New Delhi, 2008.
3. Statistical Methods – S. P. Gupta, S. Chand & Sons, New Delhi, 2005.