

## **Paper – I**

### **Philosophy of Research Methodology**

Objective of the paper is to familiarize the scholars with the a) approach to research and its design; b) role of methodology; and c) philosophical, theoretical, ideological and originality interface with research in general and empirical research in particular.

#### **I. Concepts**

Definition of Research, Characteristics of Research, Types of Research – Applications/Objectives/Enquiry mode, Paradigms of Research, Eight Step Research Procedure->Formulating Problem, Conceptualizing Design, Assumptions and Limitations of Problem Definition.

#### **II. Problem Definition**

Literature Review, Sources of Literature, Maintain Literature data using Endnote2, Determining referencing procedure, For the Problem area to be identified, study efforts of past researchers and determine the anticipated variables to be studied. Determine the approach being developed is unique. Problem Formulation, Identifying variables to be studied, determine the scope, limitations and or assumptions, Justify basis for assumption, Formulate time plan for achieving targeted problem solution.

#### **III. Research Design:**

Definition Research Design and its Functions, Research Instrumentation, Availability, Training, Theoretical Conceptualization, Setting up of experiments, understanding instrumentation characteristics, focusing on the information processing with output results. Examples: DSC, SEM, FTIR etc., Data Collection Forms, Validity, Reliability of Data, Calibrating Instruments. Analytical Techniques associated with the problem formulations, Software tools required for analytical problem definition and obtaining solution.

#### **IV. Data Analysis**

Representation of size Analysis Data, Mean, Mode, Median, Data Skew ness, Histograms, Frequency Polygons and Frequency Curves, Cumulative Frequency Curve, Characteristics of Frequency Curve, Functions of Random Variables, Discrete Probability Distributions, Continuous Probability Distributions, Standard Normal Distribution, Processing Data for Editing, Coding, Developing framework for quantitative analysis, Displaying Data Histogram, Bar Chart, Stacked Bar Chart, Frequency Polygon, Pie Chart, Scatter gram. Mathematical Modelling, Statistical Modelling, Data Mining to perform predictive testing of measurable parameters of research. Measurement and scaling techniques., Use of tools like Matlab, Excel, Minitab etc.

#### **V. Testing of Hypothesis**

Parametric and Non Parametric Hypothesis, Continuous Probability Distributions, Standard Normal Distribution, Confidence Intervals, Chi-Square Tests and Multivariate

Analysis, Analysis of Variances. Use of Matlab, Excel or other tools for analysis and result interpretation, Bartlett's test, Cochran's test for testing Hypothesis, Regression Analysis, Experimental Design.

## **VI. Review Research**

Presenting research outcome at conferences and submitting papers to Journals, Identifying Journal publication procedures, Compiling Reports using Latex.

Presenting Research Proposal to Internal Committee Experts, Determination of shortfalls in achieving targeted objectives, Identifying Problems and re describing final objectives, Determining Time Plan.

Recommended Books:

- i. Research Methodology – A Step by Step Guide for Beginners by Ranjit Kumar, Sage Publication
- ii. Research Methodology – Methods and Techniques by C. R. Kothari, New Age International
- iii. Standard Probability and Statistics tables and formulae - DANIEL ZWILLINGER Rensselaer Polytechnic Institute, Troy, New York, STEPHEN KOKOSKA, Bloomsburg University, Bloomsburg, Pennsylvania, CHAPMAN & HALL/CRC Press.