

Research Methodology

Course Code: **MCA-249****L T C**Course Name: **Research Methodology****3 1 4****INSTRUCTIONS TO THE PAPER SETTERS:**

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of the candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to following:-

1. Fundamentals of Experiment Design and Statistics.
2. Reading and Analyzing Research Papers.
3. Data Processing.
4. Paper Writing and Citation Management.
5. Oral Presentations.

PRE-REQUISITES:

Basic Statistics and Basic Applied Mathematics

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Identify how Research is done in Computer Science to improve Individual Research Productivity.	BTL3	PO1, PO2, PO3, PO4
CO2	Discover the types of Experiments and Measurements possible in Research.	BTL4	PO1, PO2, PO3, PO4, PO5, PO6, PO10
CO3	Analyze the fundamental concepts of Sampling and Data Analysis.	BTL4	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO10
CO4	Develop appropriate Technical Writing Skills.	BTL6	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11

UNIT – I**No. of Hours: 12****Chapter / Book Reference: TB1 [Chapters 1-3,9]**

Fundamentals of Research: Introduction to Research, Meaning, Objectives and Significance, Types of Research, Research Methods versus Methodology, Research

Process, Criteria of good research, Research problems, Necessity of defining the problem, Technique involved in defining the problem, Design and Development Research Methods, Meaning of Research Design, Need for Research Design, Features of a Good Design, Different Research Designs, Basic principles of Experimental Designs, Ethics in Research, Formulation of Research Title, development of criteria based Research Proposal, Problem Identification & Formulation, Research Question, Investigation Question, Measurement Issue, Questionnaire Design, Features of a Good Questionnaire.

Hypothesis: Definition, Qualities of a good Hypothesis, Null Hypothesis & Alternative Hypothesis. Hypothesis Testing –Logic & Importance.

UNIT – II

No. of Hours: 10

Chapter / Book Reference: TB1 [Chapter 5]

Methods of Data Collection: Methods of Primary and Secondary Data Collection.

Metrics: Throughput, Latency, Overhead, Reliability, Precision, Recall, Running Time, Accuracy, Latency, Discomfort.

Measurement and Scaling: Concept of Measurement–what is measured? Measurement Scales, Problems in Measurement in Research - Validity and Reliability. Levels of Measurement - Nominal, Ordinal, Interval, Ratio.

UNIT – III

No. of Hours: 12

Chapter / Book Reference: TB1 [Chapters 4, 8, 10]

Sampling: Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample –Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the Sample –Practical considerations in Sampling and Sample size.

Data Analysis: Data Preparation-Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis-Cross tabulations and Chi-square test including Testing Hypothesis of Association.

UNIT – IV

No. of Hours: 10

Chapter / Book Reference: TB1 [Chapter 14]

Technical Writing using LATEX: Scientific Writing: Significance of report writing, Structured and Components of Report Writing, Types of Report: Research Papers, Thesis, Research Project Reports, Introduction to technical writing using LATEX.

Citation Management with Zotero/Mendeley: Fundamentals of Citations, Citation Styles, Managing Citations and Bibliography in a Report.

TEXT BOOKS:

- TB1. C. R. Kothari, "Research Methodology Methods & Techniques", New Age International Publisher, 4th Edition, 2019.
- TB2. Leslie Lamport, "LaTeX: A Document Preparation System", Pearson Education, 2nd Edition, 2006.
- TB3. Deepak Chawla, Neena Sondhi, "Research Methodology: Concepts and Cases" Vikas Publications, 2nd Edition, 2016.

REFERENCE BOOKS:

- RB1. Goddard W. and Melville S., Research Methodology-An Introduction, Juta and