



General Scheme Structure for Doctor of Philosophy (Batch admitted in Academic Session 2024-25 onwards)

Scheme of Evaluation

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Exam.	Duration of Exam.
				Theory Block				Practical Block			L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment											
1.	25100001	MC	Research Methodology and Ethics [#]	20	20	30	30	-	-	100	3	1	-	4	Face to Face	PP	2 Hrs
2.	13100001	DC	Course-1 (Traditional)	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
3.	13100002	MOOC	Course-2 (NPTEL)*	20	20	30	30	-	-	100	2	1	-	3	Online	MCQ	2 Hrs
4.	13100003	DLC	Departmental Lab	-	-	-	-	70	30	100	-	-	4	2	Experimental	AO	2 Hrs
5.	13100004		Open Seminar	-	-	-	-	70	30	100	-	-	2	1	Interactive	SO	-
Total Minimum 12 Credits for the student admitted after PG and Minimum of 24 credits for the students admitted directly after B.Tech. degree																	

[#] Research Methodology and Ethics: Mandatory course for all

*Course(s) can be offered through NPTEL

This scheme of evaluation shall continue for next semester till the minimum requirement of credits are earned by the student within the maximum permissible time

Abbreviations Used

L	Lecture
T	Tutorial
P	Practical
DLC	Departmental Laboratory Courses
MOOC	Massive Open Online Course
MC	Mandatory Course



RESEARCH METHODOLOGY AND ETHICS (25100001) (Common for all the branches)

OBJECTIVES:

The main objective of this course is to address the issues inherent in selecting a research problem and discuss the techniques and tools to be employed in completing a research project. This will also enable the students to prepare report writing and framing research proposals with the philosophy of research and ethics, research integrity, and publication ethics, indexing and citation databases, open access publication, research metrics.

Introduction to Research Methodology: Meaning of Research, Objectives of Research, Motivations in Research, types of Research, Research Approaches. Significance of Research, Research Methods v/s Methodology, Scientific Methods, Research Process, Criteria of Good Research. Define the Research Problem: Concept and need of Research problem, Identification of Research problem, defining and delimiting Research problem.

Research Design: Problem Definition, variables, research design concepts. Literature survey and review, Research design process, Errors in research. Data Collection and Representation: Primary Data Secondary Data, Data Presentation. Processing and Analysis of Data.

Data Collection: Collections of Primary Data, Collection of Data through questionnaire and Schedules, other Observation Interview Methods, Collection of Secondary Data, Selection of appropriate method for data collection, Case Study, Focus Group Discussion, Techniques of developing research tools, viz. Questionnaire and rating scales etc. Reliability and validity of Research tools,

Descriptive Statistics: Measurement Scales, Sources of error in measurement, Measures of central Tendency (Mean, Median, Modes), Measures of dispersion (Range, Mean Deviation, Standard Deviation), Moments, Moments Generating Function, Graphical representation of Data, Measures of Asymmetry (Skewness), Kurtosis, Correlation and Regression, and Curve fitting.

Sampling Methods and Distributions: Sampling Methods, Sampling Distribution of mean, Sampling Distributions of Variance. Testing of Hypotheses-1: Basic Concepts Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Type I and Type II errors. Important Parametric Tests, Limitations of the Tests of Hypothesis, Chi-square Test, Non-Parametric Tests. Analysis of Variance components (ANOVA) for fixed effect model: Total, treatment and error of squares. Degrees of freedom, Confidence interval, some special distribution.

Report Writing: Pre writing considerations. Thesis writing, Formats of report writing, Formats of publications in Research journals. Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing. Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Report Format, Typing Instructions, Oral Presentation Literature review software.

Philosophy and Theory of Ethics:

Nature, scope and Meaning of Ethics. Role of judgment in ethics, Ethics with respect to science and research-Intellectual honesty and research integrity-Scientific, Conduct and Plagiarism. Redundant Publications: duplicate and overlapping publications. Publication ethics: definition introduction and Importance-Best practices/standards setting initiatives and guidelines. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types Violation of publication ethics, authorship and contributor ship-Identification of publication misconduct, complaints and appeals, Vanity Publications,

Reference Books:

1. C.R. Kothari: Research Methodology Methods and Techniques (Second Revised Edition), New Age. International Publication.
2. R. Panneerselvam, Research Methodology, PHI.
3. Ranjit Kumar, Research Methodology: a step-by-step guide for beginners, SAGE Publication Ltd.
4. Douglas C. Montgomery, Design and Analysis of Experiments, Wiley India, Fifth edition.
5. Douglas C. Montgomery and George C Runger: Applied Statistics & Probability for Engineers (Wiley India), Third edition.
6. K N Krishnaswamy, Appalyer Sivakumar and M Mathirattian: Research Methodology: Integration of Principles, Methods and Techniques (Pearson Education, New Delhi).

