RESEARCH METHODOLOGY

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – III

Course Code	:	23CSE5204	**Credits**	:	01
Hours / Week	:	01 Hours	**Total Hours**	:	13 Hours
L–T–P–J	:	1–0–0–0			

Course Learning Objectives:

This Course will enable students to:

1. Develop a comprehensive understanding of the research process, including problem formulation, hypothesis development, data collection, analysis, and interpretation.
2. Learn how to identify and select appropriate research topics or questions based on relevance and feasibility.
3. Develop the ability to conduct a thorough literature review to understand the existing body of knowledge on a research topic and identify gaps in the literature.
4. Learn how to design research studies, including selecting appropriate research methods (qualitative, quantitative, mixed methods), sampling techniques, and data collection instruments.
5. Acquire skills in data collection, including surveys, interviews, observations, and the use of archival or secondary data source.
6. Gain proficiency in data analysis techniques relevant to the research methods chosen, including statistical analysis, content analysis, thematic analysis, or other appropriate methods.
7. Differentiate between quantitative and qualitative research approaches and demonstrate proficiency in both, depending on the research context.
8. Understand the principles and techniques of hypothesis testing and can apply them effectively in various research and analytical contexts.
9. Ability to effectively analyze data, draw meaningful conclusions, and communicate their findings clearly and professionally.

Teaching-Learning Process (General Instructions)

These are sample new pedagogical methods, where teacher can use to accelerate the attainment of the various course outcomes.

1. ***Lecture method*** means it includes not only traditional lecture method, but different *type of teaching methods* may be adopted to develop the course outcomes.
2. ***Interactive Teaching:*** *Adopt the* ***Active learning*** that includes brainstorming, discussing, group work, focused listening, formulating questions, notetaking, annotating, and roleplaying.
3. Show ***Video/animation*** films to explain functioning of various concepts.
4. Encourage ***Collaborative*** (Group Learning) Learning in the class.
5. To make ***Critical thinking***, ask at least three Higher order Thinking questions in the class.
6. Adopt ***Problem Based Learning***, which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
7. Show the ***different ways to solve*** the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every ***concept can be applied to the real world*** - and when that's possible, it helps improve the students' understanding.

UNIT – I: Research Methodology: An Introduction	**02 Hours**

Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process,

Defining the Research Problem: What is a Research Problem? Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration.

UNIT – II: Research Design	**03 Hours**

Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs

Sampling Design: Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample? Random Sample from an Infinite Universe Complex Random Sampling Designs

UNIT – III: Methods of Data Collection	**03 Hours**

Collection of Primary Data, Observation Method 96 Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules

Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection. **Processing and Analysis of Data:** Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness)
UNIT – IV: Testing Hypothesis **03 Hours**
What is a Hypothesis? Basic Concepts Concerning Testing of Hypotheses ,Procedure for Hypothesis Testing ,Flow Diagram for Hypothesis Testing , Measuring the Power of a Hypothesis Test ,Tests of Hypotheses ,Important Parametric Tests ,Hypothesis Testing of Means ,Hypothesis Testing for Differences between Means, Hypothesis Testing for Comparing Two Related Samples ,Hypothesis Testing of Proportions ,Hypothesis Testing for Difference between Proportions ,Hypothesis Testing for Comparing a Variance to Some Hypothesized Population Variance, Testing the Equality of Variances of Two Normal Populations, Hypothesis Testing of Correlation Coefficients ,Limitations of the Tests of Hypothesis.
UNIT – V: Interpretation and Report Writing **02 Hours**
Meaning of Interpretation, Why Interpretation? Technique of Interpretation: Precaution in Interpretation, Significance of Report Writing Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports

Course Outcome	Description	Bloom's Taxonomy Level
At the end of the course the student will be able to:		
1	**Demonstrate the deep understanding of** fundamental concepts of research, its purpose, types, and processes.	L2
2	**Identify & Explore** various types of research designs, measurement & Scaling techniques.	L2
3	**Compare and contrast** various data collection, processing and analysis techniques used in conducting research.	L4
4	**Formulate, test, and interpret** hypotheses using various parametric and non-parametric statistical techniques like chi-square test.	L4
5	**Interpret** research findings accurately and present them effectively in written reports.	L4

Table: Mapping Levels of COs to POs / PSOs

Cos	Program Outcomes (POs)												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	1				3	1	2		2		
CO2	3	2	2					3	1	2		2		
CO3	3	2	2	1				3	1	2		2		
CO4	3	2	2	1				3	1	2		2		
CO5	3	2	2	1				3	1	2		2		

3: Substantial (High) **2: Moderate (Medium)** **1: Poor (Low)**

TEXT BOOK:

1. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International.

REFERENCE BOOKS:

1. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.
2. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
3. Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.

E-Resources:

1. https://youtu.be/E2gGF1rburw?si=5JvyrezmAR8dXhfk
2. https://youtu.be/lfWlbjl1zzU?si=Yrgy84DPEUJeEJrC
3. https://youtu.be/E2gGF1rburw

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