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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 50049**

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JAN. / FEB. 2026  
First Semester  
Computer Science and Engineering  
P23CS103 – RESEARCH METHODOLOGY AND IPR  
(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Distinguish between research approach and research methodology with respect to their purpose in systematic inquiry.	2	K2	CO1
2.	Justify why the criteria of good research are essential for achieving research validity and reliability.	2	K2	CO1
3.	Outline the primary difference between Quantitative and Qualitative data in the context of measurement.	2	K2	CO2
4.	State the four main types of Measurement Scales used in research.	2	K1	CO2
5.	Summarize the importance of handling Missing Values during the Data Preparation process.	2	K2	CO3
6.	Appraise the significance of error minimization in measurement to ensure reliability of data.	2	K2	CO3
7.	Differentiate between a Null Hypothesis and an Alternative Hypothesis.	2	K2	CO4
8.	Critique the implications of improper data coding and transformation in statistical analysis.	2	K2	CO4
9.	Interpret the role of Type I and Type II errors in hypothesis testing decisions.	2	K2	CO5
10.	What is the significance of a Geographical Indication as a type of Intellectual Property Right?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	A government innovation cell aims to promote research that solves rural community challenges such as water scarcity and waste management. Formulate a research plan by identifying objectives, selecting an appropriate research type, and justifying a suitable methodology to ensure impactful outcomes.	13	K2	CO1
	(OR)			
b)	Analyze various types of research fundamental, applied, exploratory, and descriptive and their role in solving industrial or social problems. Illustrate with suitable examples specifically in interdisciplinary domains.	13	K2	CO1
12. a)	A marketing company plans to investigate consumer satisfaction levels toward eco-friendly packaging. Develop a research design detailing data collection techniques, sampling framework, and appropriate measurement scales. Justify the reliability and validity of the proposed design.	13	K2	CO2
	(OR)			
b)	A data analytics firm is planning to study user behavior on an E-commerce site. Propose a suitable research design and evaluate the features of a good research design. Explain the basic principles of experimental design, variables involved, and justify the measurement scales to be used for data collection in social science research.	13	K2	CO2
13. a)	A data analytics researcher encounters inconsistent data from multiple IoT sensors in a smart agriculture project. Propose a systematic approach for data collection like experiments, surveys, and observations, data cleaning methods that ensures analytical accuracy, data quality and reproducibility of results with reliability.	13	K3	CO3
	(OR)			
b)	A researcher collects large survey data from multiple regions and faces missing values and outliers. Describe the data preparation process, techniques to handle missing data, and the role of descriptive statistics in analyzing cleaned data.	13	K3	CO3
14. a)	Evaluate the different types of hypothesis tests used for means, proportions, and variances. Discuss the significance of p-value and chi-square tests in business research with relevant examples.	13	K3	CO4

(OR)

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|     | b) A pharmaceutical company claims its new drug reduces recovery time by 20% compared to existing drugs. Formulate the null and alternative hypotheses, select an appropriate statistical test, and explain how the results would influence the company's report writing and decision-making process.  | 13 | K3 | CO4 |
| 15. | a) An inventor has developed a unique, complex algorithm for real-time traffic management, a new graphical user interface for a mobile app, and a catchy jingle for an advertisement. Propose the most appropriate type of Intellectual Property Right (IPR) protection for each of these three creations, algorithm, GUI, jingle. Justify your selection for each with respect to the Nature of Intellectual Property and the specific protection offered by Patents, Designs, Trademarks, and Copyright. | 13 | K2 | CO5 |

(OR)

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|--|--|----|----|-----|
|  | b) A university research group develops a unique e-learning content platform that automatically generates multimedia study materials from research papers. Examine the procedures and legal framework to secure copyright protection for their work. Evaluate how authorship, ownership, moral rights, and licensing terms such as Creative Commons and open access influence academic publishing and collaborative research in the IT domain. | 13 | K2 | CO5 |
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### PART – C

(1 x 15 = 15 Marks)

- | Q.No.  | Questions  | Marks | KL | CO  |
|--------|--|-------|----|-----|
| 16. a) | A manufacturing company collects data on machine performance before and after a process optimization initiative. The management wants to validate if the improvement is statistically significant. Design a complete hypothesis testing framework including data assumptions, choice of test, decision rule, and interpretation. Outline the process of reporting the results as a professional research report. | 15    | K2 | CO5 |

(OR)

- b) An Indian university research team has invented a biodegradable polymer for eco-friendly packaging with high tensile strength and rapid decomposition. As the research lead, design a national patent-protection strategy to secure the innovation under the Indian Patent Act (1970). 15 K3 CO4
- i. Explain the prior-art search and criteria for novelty, outline the patent-filing stages from provisional to grant, and discuss ownership rights among inventors and the institution.
  - ii. Recommend suitable commercialization approaches such as licensing or technology transfer, emphasizing ethical use and sustainable industry impact.
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