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Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET University)



B. Tech (Fifth Semester - Regular) Examinations, November – 2024

22BMEOE35001– Research Methodology

(Mechanical Engineering)

Time: 3 hrs

Maximum: 70 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

| | CO # | Blooms Level |
|-------------------------------------------------------------------------------------------|------|--------------|
| a. Explain the difference between qualitative and quantitative research. | CO1 | K1 |
| b. Describe the purpose and importance of data classification in research. | CO1 | K2 |
| c. Define measures of central tendency. How does standard deviation differ from variance? | CO3 | K3 |
| d. Differentiate between null and alternative hypotheses. | CO3 | K2 |
| e. Why is the structure and organization of a research report important? | CO4 | K2 |

PART – B

(15 x 4 = 60 Marks)

Answer **ALL** the questions

| | Marks | CO # | Blooms Level |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------------|
| 2. a. Explain the objectives of conducting research. Analyze the relationship between literature review and research problem definition. | 4+4 | CO1 | K2 |
| b. If, during a literature review, you find that your selected problem has already been addressed comprehensively, how would you proceed? Explain with suitable examples. | 7 | CO1 | K4 |
| (OR) | | | |
| c. Explain how a literature review contributes to understanding the research context. Differentiate between theoretical and practical motivations for conducting research. | 4+4 | CO1 | K3 |
| d. Demonstrate how to formulate a research problem from a broad topic area. | 7 | CO1 | K2 |
| 3.a. Analyze the strengths and weaknesses of using secondary data. How would you judge the reliability of data collected through online surveys? | 4+4 | CO2 | K4 |
| b. Explain the concept of data transcription and its significances in research. | 7 | CO2 | K3 |
| (OR) | | | |
| c. How would you evaluate the effectiveness of your research design? Explain with suitable example. | 7 | CO2 | K3 |
| d. Describe the purpose and importance of data classification, including different classification methods. | 8 | CO2 | K4 |
| 4.a. A researcher collected data on the number of hours students studied in a week. The data set includes: 10, 12, 15, 10, 18, 10, 20, 25, 15, and 30 hours. Calculate the mean, median, and mode of the data set. Explain the difference between Type I and Type II errors in hypothesis testing. | 5+3 | CO3 | K4 |
| b. Given the following data on advertising expenses (in thousands of rupees) and sales revenue (in thousands of rupees) for a retail store: (X,Y)=(5,20),(10,25),(15,30),(20,35),(25,45) Calculate the regression equation | 7 | CO3 | K4 |

of sales revenue (Y) on advertising expenses (X). Using the regression equation, predict the sales revenue if the advertising expense is increased to 30 thousand rupees.

(OR)

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|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| c. | The data below shows the relationship between hours studied (X) and test scores (Y): X = [1, 2, 3, 4, 5], Y = [50, 55, 60, 65, 70]. Find the equation of the regression line. | 3+5 | CO3 | K4 |
| d. | Differentiate between simple regression analysis and multiple regression analysis. A sample of 7 students has scores: [45, 50, 55, 60, 70, 80, 85]. Calculate the variance and standard deviation. | 4+3 | CO3 | K4 |
| 5.a. | Why is it important to avoid plagiarism in research? How does a technical report differ from other types of reports? Explain with suitable example. | 2+6 | CO4 | K4 |
| b. | What are the ethical considerations regarding the impact of research on society? How does the University Grants Commission (UGC) contribute to research in Indian institutions? | 3+4 | CO4 | K4 |

(OR)

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|----|---------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| c. | How does plagiarism detection software work? write the function of the Department of Science and Technology (DST) in India? | 8 | CO4 | K4 |
| d. | What is the definition of research ethics? Explain the role of All India Council for Technical Education (AICTE) in research funding? | 3+4 | CO4 | K4 |

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