Code No: 155GJ **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, March - 2024
DESIGN AND ANALYSIS OF EXPERIMENTS
(Computer Science and Design)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a) What are the key elements of a successful experimentation strategy? [2]
b) Explain how factors, levels, and interactions are defined and manipulated in experimental studies. [3]
c) Define the Latin Square Design. [2]
d) What is the rationale behind using blocks in the RCBD? [3]
e) Define confounding in factorial experiments. [2]
f) Discuss the basic principles behind 2k factorial experiments. [3]
g) Explain the concept of confounded asymmetrical factorials. [2]
h) What distinguishes asymmetrical factorial designs from symmetrical ones? [3]
i) What are the main components of Response Surface Methodology? [2]
j) Describe the process of analyzing response surface data. [3]

PART – B

(50 Marks)

2.a) Explain role of experimentation in rapid scientific progress in detail.
b) Discuss the contributions of key figures such as Ronald Fisher and George Box to the field of experimental design. [5+5]

OR

3.a) Explain in detail historical perspective of experimental approaches.
b) Explain principles of experimentation and discuss various steps in experimentation with an example. [5+5]

4.a) Outline the steps involved in statistical analysis of data from an RCBD experiment.
b) What are the key assumptions underlying the analysis? [6+4]

OR

5.a) Discuss the structure and organization of a Graeco-Latin Square experiment.
b) What are the advantages of using a Graeco-Latin Square design? [6+4]

6.a) Discuss the extension of factorial experiments to factors at three levels.
b) Explain the challenges and considerations involved in conducting experiments with factors at three levels. [5+5]

OR

7.a) Discuss the process of analyzing factorial experiments and interpreting the results.
b) Explain the concept of fractional factorials and their role in efficiently exploring large experimental spaces. [5+5]

8.a) Discuss the characteristics and advantages of asymmetrical factorial designs compared to regular factorial designs.

b) Explain the factors influencing the choice of asymmetrical designs in experimental settings. [5+5]

OR

9. Explain how researchers address issues such as confounding, efficiency, and balance when designing asymmetrical factorial experiments. [10]

10.a) Discuss in detail applications of Response Surface Methodology.

b) Explain the principles and techniques used to construct incomplete block designs. [5+5]

OR

11. How can you achieve optimum values with Response Surface Methodology? Explain with suitable example. [10]

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