Code No: 155GJ **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, August/September - 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 do you understand by the sample size determination?	[2]
b)	Why is experimentation necessary despite the availability of simulation?	[3]
c)	List the disadvantages of a randomized complete block diagram.	[2]
d)	What is the least squares estimation of parameters?	[3]
e)	Define the principal block.	[2]
f)	What do you understand by generalized interaction?	[3]
g)	Define homogeneous fractional factorial design.	[2]
h)	List the characteristics of factorial design.	[3]
i)	What do you mean by resolvable design?	[2]
j)	When is a block design said to be efficiency balanced?	[3]

PART – B

(50 Marks)

2.a) Explain the significance of randomization, replication, and blocking in ensuring reliable experimental results.
b) Discuss factors that influence statistical power and strategies to enhance it in experimental design. [5+5]

OR

3.a) Give a brief history of statistical design, highlighting key milestones and contributions.
b) Give examples of typical applications of experimental design in the agriculture field. [5+5]

4.a) Describe the statistical analysis procedure for the randomized complete block design.
b) What are the strategies for handling missing data, the use of blocking factors, and considerations for increasing the efficiency of the design? [5+5]

OR

5.a) Discuss methods for checking the adequacy of the model in the context of the randomized complete block design.
b) Discuss the Latin square design structures, advantages, and typical applications. [5+5]

6.a) Explain how factorial designs are structured and their advantages in experimental settings, and give a hypothetical example to show their application.

b) Compare factorial experiments with factors at two levels and experiments with factors at three levels. [5+5]

OR

7.a) Explain why confounding is used and its implications for experimental design, and give a practical example to demonstrate how confounded designs can be constructed and analyzed.

b) Discuss the role of analysis of variance in case of confounded effects. [5+5]

8.a) Discuss the principle of confounding in fractional factorial experiments.

b) Explain how confounding is used in the construction of asymmetrical factorial designs and its implications for the analysis of experimental results. [5+5]

OR

9.a) Explain the methods for analyzing balanced confounded experiments in fractional factorial designs.

b) Explain the construction and analysis of partially confounded experiments in fractional factorial designs. [5+5]

10.a) Discuss the statistical analysis of Balanced Incomplete Block Designs (BIBD).

b) Explain how to set up the ANOVA table for BIBD, interpret the sources of variation, and outline the assumptions underlying the analysis. [5+5]

OR

11.a) Explain the concept of Response Surface Methodology (RSM) in experimental design.

b) Discuss the purpose of using RSM and its advantages, and provide an example to illustrate how RSM is applied to optimize responses in experimental studies. [5+5]

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