

Duration: 3 hours

Max Marks: 80

Note: Attempt **any 4** questions

Figures to the right indicate full marks

Assume data wherever required and mention it clearly

**Q1**

**Explain any four of the following**

- a. Write briefly guide lines for designing an experiment
- b. General  $2^k$  Two level factorial Design and analysis
- c. Linear Regression Models
- d. The One-Half Fraction of the  $2^k$  Design
- e. Statistical aspects of conducting tests

**20**

**Q2**

- (i) A farmer wishes to test the effects of four different fertilizers A,B,C & D on the yield of wheat. In order to eliminate sources of error due to variability in soil fertility, he uses the fertilizers in a Latin Square arrangement as indicated in the table, where the number indicates yields in kilograms per unit area. Perform an analysis of variance to determine if there is a significant difference between the fertilizers at a) 0.05 and b) 0.01 levels of significance

A 180	C 210	D 250	B 110
D 220	B 120	A 150	C 190
B 150	A 200	C 230	D 240
C 220	D 210	B 100	A 170

**10**

- (ii) Explain the following experimental design

- (a) Complete randomization (b) Randomized blocks (c) Latin squares (d) Graeco-latin Squares

**10**

- (i) Explain Confidence Intervals in Multiple Regression with usual notations

**10**

**Q3**

- (ii)

A	48	49	50	49
B	47	49	48	48
C	49	51	50	50

**10**

The above table shows the yields in bushels per acre of a certain variety of wheat grown in a particular type of soil treated with chemicals A,B and C . Find (a) the mean yields for the different treatments, (b) the grand mean for all treatments, (c) the yield variation (d) the variation between treatments (e) the variation within the treatments

**Q4**

- (i) Explain Regression model diagnostics for Designing Experiments

**10**

Table shows the respective  $x$  and  $y$  of a sample of 8 variables and their dependent variables  
Construct the (a) Scatter diagram (b) find the least-square regression line of  $y$  on  $x$

(ii)

10

$x$	260	263	232	237	245	284	276	272
$Y$	110	113	100	102	105	122	118	116

**Q5**

a. Explain Typical Applications of Experimental Design

10

b. Explain in detail Response Surface Methodology

10

**Q6**

Write short notes on (Any Two)

(i) Explain Analysis Methods of Taguchi's method in DOE

10

(ii) Explain A Single Replicate of the  $2^k$  Design

10

(iii) Explain Testing for lack of fit in linear regression model

10

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