

PC-1025/MJ

F-9/2051

DESIGN ANALYSIS OF EXPERIMENTS

Paper – CSM-365

(Semester–VI)

Time : Three Hours]

[Maximum Marks : 30

Note : Attempt *two* questions each from Section A and B
Section C will be compulsory.

SECTION – A

- I. Develop the procedure to test the general linear hypothesis based on a linear model, stating clearly the assumptions.
- II. Outline the various steps in carrying out the analysis of variance of a two-way classified data with one observation per cell.
- III. A manufacturing company has purchased three new machines of different makes and wishes to determine whether one of them is faster than the others in producing a certain output. Five, hourly production figures are observed at random from each machine and the results are given in the following table :

Machine 1	25	30	36	38	31
Machine 2	31	39	38	42	35
Machine 3	24	30	28	25	28

Use the ANOVA technique and determine whether the machine are significantly different in their mean speeds at 5% level of significance. Use the tabulated value $F(2, 12)$ at 5% level of significance is 3.88.

- IV. Explain the principles of replication and local control.
(2×4=8)

SECTION – B

- V. When is a randomized block design used? Write the model for the analysis of it and prepare the ANOVA table.
- VI. Describe the procedure of testing factorial effects A, B and AB in 2^2 experiment.
- VII. Compare the efficiencies of Completely Randomized design and randomized block design.
- VIII. A farmer wishes to test the effect of four different fertilizers (A, B, C and 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 shown in

table, where the numbers indicate yields in bushels per unit area. Perform an analysis of variance to determine whether there is a difference between the fertilizers at 0.05 significance level. Use tabulated value of F (3, 6) at 0.05 level of significance is 8.94.

Row	Column			
	I	II	III	IV
I	A 18	C 21	D 25	B 11
II	D 22	B 12	A 15	C 19
III	B 15	A 20	C 23	D 24
IV	C 22	D 21	B 10	A 17

(2×4=8)

SECTION – C

IX. Attempt all the questions :

- Define Latin Square design with example.
- Write a short note on the fixed effect model.
- Explain the concept of linear model.
- Give *two* advantages of completely randomized design.
- State the mathematical model used in analysis of variance for a two-way classification.
- What do you mean by Factorial experiment?
- What are the basic assumptions made in analysis of variance? (7×2=14)