

M.Sc. (Ag.) Semester -II Examination 2015

Course : STAT 551 (Experimental Designs)

Time : Three Hours

Full Marks : 50

Questions are of value as indicated in the margin.

Answer any **five** questions.

1. Under what circumstances would you choose CRD, RBD and LSD. Also compare these designs in respect to layout plan, replication, randomization, and local control. 3+7=10
2. (a) Give the method of calculating sum of squares for the observations of a C.R.D. with k treatments and i^{th} treatment being replicated r_i times.
(b) Prove that the main effect A, B and interaction A B are orthogonal contrast. 5+5=10
3. (a) Explain split plot design. What are the situations in which this design is used?
(b) Complete the following ANOVA table by giving procedures :

Sources of variation	d.f	S.S.	M.S.
Replication	-	18.09	6.03
Date of sowing (D)	-	24.12	-
Error (a)	6	-	3
Variety (V)	-	-	-
D×V	8	-	3.03
Error (b)	-	72.00	-
Total	-	188.61	

4+6=10

4. What is strip plot design? When it is used? An experiment was conducted in strip plot design consisted p levels of horizontal factor A, q levels of vertical factor B replicated r times. Give the step by step procedures for calculating the sum of squares for each source of variation with all necessary tables and ANOVA table. 2+1+7=10
5. (a) Explain the concept of factorial experiment and write its advantages and disadvantages. Write down the statistical model for a two factor factorial experiment with a levels of factor A, b levels of factor B respectively laid out in CRD with r replications.
(b) Give Yates' method of analysis of data of 2^3 factorial experiment. 4+2+4=10
6. (a) What effects are measured in factorial experiments? Write the set of orthogonal contrasts for main effects and interactions in 2^2 factorial.
(b) What are the uses of analysis of covariance? Explain the method of analysis of covariance in case of R.B.D. 2+2+2+4=10
7. (a) Explain response surface. Define physical optimum and economic optimum.
(b) The equation of response curve giving relation between output factor Y and input factor X is

$$Y = 10.24 + 40.5X - 27.5X^2$$

Determine the physical optimum value of X. If the price of Y is Rs. 6/- per unit and cost of X is Rs. 21/- per unit, find economic optimum value of X. 2+2+3+3=10