PG Odd Semester (CBCS) Exam., December—2016

STATISTICS

(3rd Semester)

Course No. : STSCC–301

(Design and Analysis of Experiments)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* What is a linear model? What are fixed and random effect models which are considered in the analysis of variance technique? 2+5=7

(b) Give the complete statistical analysis of analysis of variance (AOV) for two-way classification. 7

2. *(a)* Define the following terms : 1½×4=6

(i) Treatment

(ii) Experimental unit

(iii) Experimental error

(iv) Yields

(b) Give in detail the statistical analysis of analysis of covariance (AOCOV) for two-way classification of the data. 8

UNIT—II

3. *(a)* When are two contrasts said to be orthogonal? Discuss briefly the application of AOV and regression analysis. 1+6=7

(b) Use the technique of AOV for testing the linear multiple regression model. 7

4. *(a)* Describe the Friedman's test for two-way AOV by ranks. 7

(b) Following are the speeds (in kmph) of cars on four different types (road conditions) of free ways. Using some non-parametric methods test if the road conditions differ with respect to average speed :

Type I	*Type II*	*Type III*	*Type IV*
77	90	46	69
70	73	54	76
63	71	60	79
84	91	70	81
96	93	74	83
81	86	40	89
88	85	49	65
75	79	58	72
92	95	80	
82			
94			

Table value of χ^2_{01} for 3 degrees of freedom is 4·541. 7

UNIT—III

5. *(a)* What do you mean by completely randomized design (CRD)? Give the complete statistical analysis of CRD. Also discuss the advantages and disadvantages of CRD. 2+5+3=10

(b) Obtain the formula for estimating a single missing value of a p p Latin square design (LSD). 4

6. *(a)* How is the efficiency of a design measured? Derive the expression to measure the efficiency of randomized block design (RBD) over completely randomized design (CRD). 3+4=7

(b) Write short notes on the following : 3+4=7

(i) Missing plot technique

(ii) Latin square design (LSD) with examples

UNIT—IV

7. *(a)* Give in detail the analysis of a 2^3-experiment conducted in RBD with r-replication. 8

(b) Briefly describe the types of confounding. 6

8. *(a)* State clearly the advantages and disadvantages of factorial experiment (FE). 5

(b) What is fractional factorial design? Also discuss the uses of these designs. Explain one-half fraction of the 2^k design with k 3. 1½+1½+6=9

UNIT—V

9. Give the complete analysis of interblock analysis and recovery of interblock information in balanced incomplete block design (BIBD). 14

10. *(a)* Define BIBD. Prove that

$$(v \quad 1) \quad r(k \quad 1)$$

Also interpret on this result. 2+4=6

(b) What are the advantages and disadvantages of split-plot design? Give the layout and statistical analysis of split-plot design. 3+5=8

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