**Submission deadline :30 August 2013**

**B.Sc. CSIT  Second semester DWIT**

**Statistics II (Design)**

1.Describe basic principles of experimental design.

2.Explain the terms with examples; Experiment , Treatments , Experimental units , Blocks ,Experimental error ,Precision

3.What do you mean by CRD? Write down it’s advantages and disadvantages.

4.What do you mean by RBD? Write down it’s advantages and disadvantages.

5.What do you mean by LSD? Write down it’s advantages and disadvantages.

6.Differentiate between CRD and RBD.

7.Differentiate between RBD and LSD.

8.What do you mean by LSD? Write and explain the statistical model for mxm LSD. Give the statistical analysis of mxm LSD with one observation per cell.

9.What do you mean by RBD? Write and explain the statistical model for RBD. Give the  statistical analysis of RBD with one observation per cell.

10.What do you mean by CRD? Write and explain the statistical model for CRD. Give the statistical analysis of CRD with one observation per cell.

11.Derive the expression for a  missing observation in LSD. Describe  analysis process after computing the missing observation.

12. Derive the expression for a missing observation in RBD. Describe analysis process after computing the missing observation.

13.Carry out ANOVA of the following design

|  |  |  |  |
| --- | --- | --- | --- |
| A    12 | C   19 | B   10 | D    8 |
| C    18 | B    12 | D    6 | A    7 |
| B    22 | D    10 | A     5 | C     21 |
| D    12 | A    7 | C    27 | B    17 |

14.Carry out ANOVA for following design

|  |  |  |
| --- | --- | --- |
| A       10 | B       15 | C       20 |
| B        25 | C        10 | A        15 |
| C        25 | A       20 | B        15 |

Also  calculate the efficiency of the design over i)RBD ii)CRD

15. Carry out ANOVA of following

|  |  |  |  |
| --- | --- | --- | --- |
| A    10 | B     5 | A      20 | C     15 |
| B      6 | A      15 | C       11 | B       10 |
| C       22 | B      12 | C      18 | A      16 |

16. Carry out ANOVA for following design

|  |  |  |  |
| --- | --- | --- | --- |
| A       8 | C        10 | A        6 | B       10 |
| C       12 | B       8 | B        9 | A        8 |
| B        10 | A         8 | C        10 | C        9 |

Also calculate the relative efficiency of the design with respect to CRD.

17.Estimate the missing value and then carry out the ANOVA

|  |  |  |  |
| --- | --- | --- | --- |
| P       19 | R      29 | P     23 | Q      33 |
| Q      26 | P      ? | Q       27 | R       26 |
| R      21 | Q      28 | R       22 | P        26 |

18. Estimate the missing value and then carry out the ANOVA

|  |  |  |  |
| --- | --- | --- | --- |
| A      12 | C      19 | B       10 | D        8 |
| C        18 | B        12 | D          6 | A       ? |
| B         22 | D        10 | A         5 | C        21 |
| D         12 | A         7 | C         27 | B        17 |

19.Fill in the blanks  in the following analysis of variance table of L.S.D.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source of Variation | d.f. | S.S. | M.S.S. | F |
| Rows | ? | 72 | ? | 2 |
| Columns | ? | ? | 36 | ? |
| Treatments | ? | 180 | ? | ? |
| Error | 6 | ? | 12 |  |
| Total | ? | ? |  |  |

20. Complete the following table for analysis of variance of a Latin Square Design

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source of variation | Degree of freedom | Sum of squares | Mean square | F |
| Columns | 5 | ? | ? | ? |
| Rows | ? | 4.2 | ? | ? |
| Treatments | ? | ? | 2.43 | ? |
| Error | ? | ? | 0.65 |  |
| Total | ? | 39.65 |  |  |

The columns as representing schools , the rows as classes , the treatments as methods of teaching and the observations as grades based on 100 points. Test the hypothesis that the treatment effects are equal to zero.

21.Consider the partially completed ANOVA table below. Complete the ANOVA table and answer the followings. What design was employed? How many treatments were compared? How many observations were analyzed? At 0.05 level of significance , can one conclude that the treatments have different effects? Why?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source of variation | Sum of Square | Degree of freedom | Mean Square | F |
| Treatments | 231.5 | 2 | ? | ? |
| Blocks | ? | 7 | ? | ? |
| Error | 573.75 | ? | ? |  |
| Total | 903.75 | 23 |  |  |

22.Describe the lay out and break up of the sum of squares for a Latin Square Design. What are different hypothesis that are tested in Latin Square Design.

23.Explain the assumptions underlying the analysis of the results of LSD.

24.Clearly state the restrictions that are being imposed on the number of treatments  and number of replications in CRD , RBD and LSD.

25.Write down statistical model for LSD and explain it. Also write down ANOVA table for it.

26.Write down the layout of RBD. What assumptions are required for analysis of the RBD?

27.What do you mean by relative efficiency? Derive the expression to measure the efficiency of LSD over RBD.

28.Derive the expression to measure the efficiency of RBD over CRD? State  assumptions used in the derivation.

29.Derive the expression to measure the efficiency of LSD over CRD.

30.Write down the lay out of CRD with it’s assumptions ?Also write down the  effect model and ANOVA table.

31. Differentiate between CRD and LSD.

32.From the following ANOVA table of RBD , determine it’s efficiency with respect to CRD.

|  |  |  |  |
| --- | --- | --- | --- |
| Source | D.F. | S.S. | M.S.S. |
| Between Blocks | 5 | 21.55 | 4.31 |
| Between Treatments | 3 | 15.66 | 5.22 |
| Error | 15 | 12.3 | 0.82 |
| Total | 23 | 49.51 |  |

33. From the following ANOVA table of LSD , determine it’s efficiency i)with respect to CRD ii) with respect to RBD when columns are taken as blocks iii) with respect to RBD when rows are taken as blocks.

|  |  |  |  |
| --- | --- | --- | --- |
| Source of variation | Degree of freedom | Sum of squares | Mean sum of squares |
| Rows | 3 | 259.5375 | 86.4375 |
| Columns | 3 | 155.2725 | 51.7575 |
| Treatments | 3 | 1372.1225 | 457.3742 |
| Error | 6 | 156.3700 | 26.0616 |
| Total | 15 | 1943.0775 |  |