17P264 (Pages: 2) Name…….

Reg. No……..

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, MAY 2018

(Regular/Supplementary/Improvement)

(CUCSS - PG)

(Statistics)

CC15P ST2 C09 - DESIGN AND ANALYSIS OF EXPERIMENTS

(2015 Admission onwards)

Time: Three Hours Maximum: 36 Weightage

PART A

Answer ***all*** questions. Each question carries 1 weightage.

1. Define linear hypothesis.
2. Explain the role of local control in design of experiments.
3. Write a short note on model adequacy checking.
4. Give an example of a Graeco Latin square design.
5. Write a short note on efficiency of Latin square designs.
6. Distinguish between orthogonal and non-orthogonal data.
7. Define Partially Balanced Incomplete Block Design with two associate classes.
8. State four parametric relations in BIBD.
9. State the connection of Youden square with Latin square design.
10. Explain the concept of blocking in a factorial design.
11. Obtain the main effects and interaction effects of a 2^2 factorial design.
12. Write a short note on split plot designs.

(12 x 1 = 12 Weightage)

PART B

Answer any ***eight*** questions. Each question carries 2 weightage.

13. Discuss the regression approach to the analysis of variance.
14. State and prove a necessary and sufficient condition for the estimability of a parametric function.
15. Let the model equation be $y_1 = 2\alpha_1 + 3\alpha_2 + e_1$, $y_2 = 3\alpha_1 + 4\alpha_2 + e_2$, $y_3 = 4\alpha_1 + 5\alpha_2 + e_3$. Find the best estimates of α_1 and α_2.
16. Derive the expression for the expected value of mean squares in RBD.

17. Derive the analysis of Latin Square Design.
18. If a single observation is missing in Randomized Block Design, estimate the missing value.
19. Construct a Balanced Incomplete Block Design with $v=16, b=20, k=4, r=5$ and $\lambda=1$.
20. Write a short note on inter block analysis of Balanced Incomplete Block Design.
21. Explain how different blocks in Lattice Design are formed.
22. Distinguish between symmetrical and asymmetrical factorial experiments. Give an example for each.
23. Construct a $\frac{1}{4}$ replicate of a 2^6 factorial design. Give the aliases of main effects and two factor interactions.
24. Describe the analysis of a 3^2 factorial design.

(8 x 2 = 16 Weightage)

PART C

Answer any ***two*** questions. Each question carries 4 weightage.

25. For the model $y_1=\theta_1+\theta_2+e_1$, $y_2=\theta_1+\theta_3+e_2$, $y_3=\theta_1+\theta_2+e_3$, show that $c_1\theta_1+c_2\theta_2+c_3\theta_3$ is estimable if $c_1=c_2+c_3$. Obtain the best estimate of $\theta_1+2\theta_2-\theta_3$ if e_i are independent $N(0,\sigma^2)$ variables. What is the variance of the estimate?
26. Develop the analysis of covariance for Randomized Block Design with one concomitant variable stating clearly the assumptions.
27. What is meant by Balanced Incomplete Block Design? In a BIBD prove that the number of blocks can never be less than the number of treatments.
28. A 2^4 factorial experiment is conducted in Randomized Block Design. The block size is 8 and the effect confounded is ABCD. Describe the analysis if it is replicated 4 times.

(2 x 4 = 8 Weightage)

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