C 83652 (Pages : 2) Name.....31.....

Reg. No.....

SECOND SEMESTER M.Sc. DEGREE (CUCSS) EXAMINATION, JUNE 2015

Statistics

ST 2C 09—DESIGN AND ANALYSIS OF EXPERIMENTS

(2013 Admissions)

Time : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *questions.*
Weightage 1 *for each question.*

1. What is a linear model ?
2. What is a linear contrast ?
3. What do you mean by local control ?
4. Define : Estimation space.
5. Explain if completely randomised design is a balanced design.
6. What is a concomitant variable ?
7. Indicate some situations where completely randomised design is preferred over other designs.
8. One has to select a Graeco-Latin square design with atleast 12 degrees of freedom for error. Then how many treatments shall be included in the design ?
9. Explain : incidence matrix of a design.
10. In a BIBD it is given that $k = 4 = r$, $v = 7$. Determine the value of λ.
11. Explain : complete confounding.
12. Distinguish between symmetrical and asymmetrical factorial designs.

(12 × 1 = 12 weightage)

Part B

Answer any **eight** *questions.*
Weightage 2 *for each question.*

13. In a linear set up $(Y, A\theta, \sigma^2 I)$, derive a necessary and sufficient condition for a parametric function $b'\theta$ to be estimable.

14. In a linear model $(Y, A\theta, \sigma^2 I)$, show that the best estimate of any estimable parametric function $b'\theta$ is $b'\hat{\theta}$ where $\hat{\theta}$ is any solution of $A'A\theta = A'Y$.

Turn over

15. Describe Scheffe's procedure to construct confidence intervals for all possible contrasts am treatment means.

16. Write a note on model adequacy checking.

17. In a randomised block design with a single concomitant variable obtain the least-squares estir of the regression co-efficient of the concomitant variable.

18. Write down the plan of a BIBD with parameters $v = 5$, $b = 10$, $k = 3$, $r = 6$, $\lambda = 3$ and outline analysis of the design.

19. With usual notations for a BIBD prove that $b \geq v + r - k$.

20. Define Lattice design and write down the plan of this design with suitable parameters of your choice.

21. In a randomised block design with b-blocks and t-treatments, an observation in the i^{th} block for j^{th} treatment is missing. Estimate the missing value.

22. Write down the advantages and disadvantages of a factorial design when compared with des with non-factorial types of treatments.

23. Describe the effect components of a 2^3 – design into seven mutually orthogonal contrasts.

24. Outline the analysis of a split plot design with r-blocks, α main plot treatments and β such treatments.

(8 × 2 = 16 weigh

Part C

Answer any **two** *questions.*
Weightage 4 *for each question.*

25. Describe the analysis of a Latin square design with a single concomitant variable.

26. In a Graeco-Latin square design, one observation is missing. Derive :

    (i) The estimate of the missing value.

    (ii) Bias involved in the treatment sum of squares due to estimation of the missing valu

    (iii) SE of difference between two treatment means in which one treatment mean involve missing value which has been replaced by the estimated value.

    (iv) The analysis of variance test for testing the homogenity of treatment means.

27. Define PBIBD and derive the analysis of PBIBD with only two associate classes.

28. Write down the confounded arrangement of a 3^3 design by confounding the interactions AB BC^2 into the blocks. Identify other interactions if any which get confounded in your arrange

    Hence analyse the design if there are two replications of the same type of arrangement treatments.

(2 × 4 = 8 weigh