Reg. No ..... Name **25U466**

B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2025

SEMESTER 4 : STATISTICS FOR COMPUTER APPLICATION

COURSE : **19U4CRCST05 : SAMPLE SURVEY ANALYSIS AND DESIGN OF EXPERIMENTS**

(For Regular 2023 Admission and Improvement/Supplementary 2022/2021/2020/2019 Admissions)

Time : Three Hours Max. Marks: 75

(Use of Scientific calculator and statistical tables are permitted)

PART A

(Each question carries 1 mark. Maximum marks from this part is 10)

1. What is cost function?
2. What is the gain in precision of proportional allocation over SRS?
3. Give an example for simple random sampling.
4. In CRD with four treatments, each replicated 5 times, degrees of freedom of the error sum of squares is?
5. In CRD with 5 treatments, each replicated 4 times, degrees of freedom of the error sum of squares is?
6. Show that in SRSWOR ,the probability of selecting each sample is 1/N.
7. What is a drawback of CRD?
8. A design with provision for the elimination of two sources of variability is?
9. Define standard error?
10. The mean square is the sum of squares divided by?
11. What is meant by Neyman allocation?
12. What is RBD?

PART B

(Each question carries 3 marks. Maximum marks from this part is 15)

13. Explain the procedure of systematic sampling.
14. Mention the situation where sampling method can be used in statistical surveys.
15. For a KxK LSD, how many latin squares can be generated?
16. What is an uncontrollable factor?
17. Why is stratified sampling is known as restricted sampling?
18. In one-way ANOVA with a total number of observations is 15 with 5 treatments then total degrees of freedom is?
19. What are the merits of LSD?

PART C

(Each question carries 5 marks. Maximum marks from this part is 20)

20. The following table gives the yields (in kg.) of three varieties of wheat from some sample plots. Examine whether the three varieties are significantly different as far as the yield are concerned.

varieties	Yields (in kgs)
A	6 7 5
B	9 10 11
C	5 6 4

21. Explain the terms: sampling frame,sampling error and sampling fraction.

22. The effects of four types of graphite coater on light-box readings are to be studied. Since reading will differ from day to day observations are taken on each of the four types every day.The results are as follows:

DAY	GRAPHITE COATER TYPE			
1	4	4.8	5	4.6
2	4.8	5	5.2	4.6
3	4	4.8	5.6	5

Analyse using RBD to test the claim that all of the graphite coater produces same average light-box readings.

23. Find the variance of population total in stratified sampling.

24. Distinguish between census and sample methods.

25. Obtain the expression for the expectation of mean sum of squares due to error for CRD.

PART D

(Each question carries 10 marks. Maximum marks from this part is 30)

26. Four methods of blending penicillin were compared in a randomised block design. The blocks are blends of raw materials. Construct the ANOVA table. Are there differences between the methods? Use 5 % level of significance.

	METHOD			
	A	B	C	D
BLEND				
1	89	88	97	94
2	84	77	92	79
3	81	87	87	85
4	87	92	89	84
5	79	81	80	88

27. The yield of a chemical process, expressed in percentage of the theoretical maximum, is measured with each of two catalysts, A, B, and with no catalyst (Control: C). Five observations are made under each condition. Making the usual assumptions for an analysis of variance, test the hypothesis that there is no difference in mean yield between the three conditions. Use the 5% level of significance.

Catalyst A	Catalyst B	Control C
79.2	81.5	74.8
80.1	80.7	76.5
77.4	80.5	74.7
77.6	81.7	74.8
77.8	80.6	74.9

28. Derive the expression for variance of the estimator of population mean under proportional allocation and Neyman allocation.

29. What is SRS? Derive the variance for SRSWR and SRSWOR.