B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2024
SEMESTER 4 - STATISTICS FOR COMPUTER APPLICATION
COURSE : **19U4CRCST05 - SAMPLE SURVEY ANALYSIS AND DESIGN OF EXPERIMENTS**
(For Regular - 2022 Admission and Improvement / Supplementary - 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 the relative gain in precision of optimum allocation over SRS?
2. Write the confidence interval for population total if n<50 in SRS.
3. Distinguish between population and sample.
4. Who developed ANOVA?
5. What is the relative gain in precision of proportional allocation over SRS?
6. In RBD with 4 treatments applied on 16 experimental units, the error degrees of freedom will be?
7. What are the applications of ANOVA technique?
8. What is the model used in RBD?
9. State whether the following statements are true or false.
   i)The random error component in the model of a design of experiment is assumed to follow a normal distribution.
   ii) For LSD the number rows and columns will be the same**.**
10. A student wanted to test whether there was a difference in the mean daily hours of study for students living in four different dormitories. She selected a random sample of 50 students from each of the four dormitories. What is the null hypothesis for this situation?
11. What is proportional allocation?
12. Which sampling is known as multi stage sampling?

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

13. What is orthogonal LSD?
14. What are the factors responsible for size of a sample?
15. Define the following terms:
    i)Experimental units
    ii)Treatment
16. A sample of 30 students is to be drawn from a population consisting of 300 students belonging to two colleges of strength 200 and 100 respectively. What are the sample sizes to be selected from each population if sampling is done by the stratified proportional allocation method.
17. Mention the situation where sampling method can be used in statistical surveys.
18. Give a drawback of LSD.
19. In one-way ANOVA, given SSB = 2580, SSE =1656, k = 4, n = 20 then the value of F is?

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

20. Define stratified sampling? Explain different types of stratified sampling?

21. Explain three way ANOVA.

22. Derive the expression for variance in SRSWOR.

23. 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.

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

25. Four treatments for fever blisters were randomly assigned to 20 patients. The data below shows for each treatment ,the number of days from initial appearance of the blister until healing is complete.

Treatment	Number of days				
A	5	8	7	7	8
B	4	6	6	3	5
C	6	4	4	5	4
D	7	4	6	6	5

Test the hypothesis at 5% level of significance that there is no difference between the four treatments with respect to the mean time of healing.

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

26. A population consists of 6 labours getting daily wages Rs.13, 11,14,12,16 & 15 . Show that sample mean is an unbiased estimate of the population mean by considering sample of size 2 from this population(SRSWOR).

27. Show that if $1/N_h$ is ignored relative to unity $Vopt \leq Vprop \leq Vran$

28. The number of pounds lost by 16 different athletes who were each randomly assigned to one of four weight loss treatments. Use the data below and analyse using CRD to test for the difference between the four treatments.

Supplement A	Supplement B	Supplement C	Supplement D
1	3	10	8
4	6	11	3
2	7	14	2
3	4	8	5

29. In an experiment to investigate the warping of copper plates , the two Factors studied were the temperature and the copper content of the plates. The response variable was a measure of the amount of warping. The resultant data are as follows:

Temperature(oC)	Copper content(%)			
	40	60	80	100
50	17	19	23	29
75	12	15	18	27
100	14	19	22	30
125	17	20	22	30

Analyse for the significant effects.