Reg. No. : ....

Name : ....

Fourth Semester B.Sc. Degree Examination, May 2021

First Degree Programme Under CBCSS

Statistics

Complementary Course for Mathematics

ST 1431.1 : TESTING OF HYPOTHESES AND ANALYSIS OF VARIANCE

(2015-17 Admission)

Time : 3 Hours

Max. Marks : 80

Instructions: Scientific calculator and statistical table are permitted.

SECTION – A

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

1. Define a statistical test.

2. What do you mean by the best critical region?

3. Define the power of a test.

4. Define simple and composite hypotheses.

5. How do you decide a test to be one tailed or two tailed?

6. What are large sample tests?

7. What are the assumptions of a t-test?

8. What do you mean by degrees of freedom?

9. Define Analysis of variance.

10. What are the assumptions in Analysis of variance?

SECTION – B

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

11. Distinguish between the level of significance and the p value of a test procedure.

12. The continuous r.v X has the pdf $f(x; \theta) = \frac{1}{\theta}; 0 \leq x \leq \theta = 0$, otherwise.

    It is desired to test the hypothesis $H_0 : \theta = 1$ vs $H_1 : \theta = 2$, using a single observation X. Here $X \geq 0.95$ is used as the critical region. Evaluate the probabilities of Type I and Type II errors and power of the test.

13. What do you mean by most powerful test?

14. What is the procedure for carrying out a statistical test?

15. Discuss the importance of Normal distribution in testing of hypotheses.

16. What are the conditions to be satisfied to apply a Chi-square test for goodness of fit?

17. Explain a contingency table.

18. Define an F statistic. What are its uses?

19. A sample of 100 students is taken with heights having a S.D of 10cm. The mean height of the sample was found to be 168.8 cm. Can we accept the assumption that the mean height of the students is 170 cms?

20. Discuss the various steps involved in the analysis of variance in the one-way classification.

21. Fill in the blanks of the following ANOVA table.

Source	d.f	SS	MSS	F
Between	2	–	5	
Within	–	14	–	–
Total S.S	9	–		

22. How is the ANOVA different from a students t test?

SECTION – C

Answer **any six** questions. **Each** question carries **4** marks.

23. State the Neyman-Pearson lemma and give its relevance.

24. A sample of 400 observations were taken from a population with S.D.15. If the mean of the sample is 27, test whether the hypothesis that the population mean is less than 24.

25. Give the procedure for testing the equality of means of two normal populations when the population variances are known.

26. A manufacturer of dry cells claimed that the life of their cells is 24.0 hours. A sample of 10 cells had mean life of 22.5 hours with a S.D 3.0 hours. On the basis of this information test whether the claim is valid or not.

27. When do you use a paired t-test and how to apply it?

28. How can you test the hypothesis regarding a specified proportion in a Binomial population?

29. Write the procedure for carrying out a chi-square test of goodness of fit.

30. Test whether the following figures provide the evidence of the effectiveness on inoculation.

	Attacked	Not attacked	Total
Inoculated	120	80	200
Not Inoculated	180	420	600
Total	300	500	800

31. Write the layout of a two-way Analysis of Variance.

(6 × 4 = 24 Marks)

L – 2470

SECTION – D

Answer **any two** questions. **Each** question carries **15** marks.

32. Two samples from two Normal populations are shown below. Test whether the two populations have the same variance.

    Sample I   60   65   71   74   76   82   85   87
    Sample II 61   66   67   85   78   63   85   86   88   91

33. Write the procedure for the Chi-square test of homogeneity of several populations with the help of the concerned general frequency table.

34. A survey of 320 families with 5 children revealed the following distribution. Fit a Binomial distribution and test the goodness of fit.

No.of Boys	5	4	3	2	1	0
No.of Girls	0	1	2	3	4	5
No.of families	14	56	110	88	40	12

35. A company wishes to test whether its three salesmen A,B and C tend to make sales of the same size or whether they differ in their selling ability as measured by the average size of their sales. During the last week, there have been 14 sale calls: A made 5 calls, B made 4 calls and C made 5 calls. Following are their weekly sales in (hundreds of Rs).

    A   3   4   3   5   0
    B   6   3   3   4   0
    C   7   3   4   6   5

Perform the Analysis of variance and comment your conclusions.

(2 × 15 = 30 Marks)