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J – 1189

Reg. No. : .....

Name : .....

**Fourth Semester B.Sc. Degree Examination, March 2020**

**First Degree Programme under CBCSS**

**Complementary Course for mathematics**

**ST 1431.1- TESTING OF HYPOTHESIS AND ANALYSIS OF VARIANCE**

**(2014 – 17 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer all questions. Each question carries 1 mark.

1. What is a null hypothesis?
2. Define power of a test.
3. What do you mean by p – value?
4. Give an example for a composite hypothesis.
5. Give a test statistic following students t distribution.
6. Give one situation where F test can be used.
7. What do you mean by two tailed test?
8. What is uniformly most powerful test?
9. Give the two factor ANOVA model.
10. What do you mean by assignable causes?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

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

11. What is statistical hypothesis? Give an example.
12. Distinguish between acceptance region and critical region.
13. What are the major assumptions of ANOVA?
14. State Neyman Pearson Lemma.
15. What is the role of standard error in testing of hypothesis?
16. What are the two types of errors involved in a statistical test?
17. How is the d.f. of the Chi-square for goodness of fit determined?
18. Mention the test statistic and critical region for testing the value of population mean using small samples.
19. Explain what do you mean by testing of homogeneity.
20. A sample of 50 observations were taken from a population with s.d 300. If the mean of the sample is 2200, test the hypothesis that the mean of the population is greater than 2000.
21. Explain random causes affecting variations in observations with example.
22. If 60 out of a group of 1000 insured persons died within a year examine whether the assumption that only less than 4% are likely to die within a year is justifiable.

(8 × 2 = 16)

## SECTION – C

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

23. Explain small sample tests and large tests. Distinguish between their applicational roles with illustration.
24. Distinguish between one way and two way classifications to test the equality of population means.
25. Random samples of sizes 500 and 400 are found to have means 11.5 and 10.9 respectively. Can the samples be regarded as random samples drawn from the same population whose s.d. is 5?
26. If  $x \geq 1$  is the critical region for testing  $\theta = 2$  against the alternative  $\theta = 1$  on the basis of a single observation from the population with p.d.f.  $f(x) = \theta e^{-\theta x}$ ,  $0 \leq x \leq \infty$ . Obtain the probability of type 1 error.
27. Explain briefly the procedure followed in the testing of statistical hypothesis.
28. Sample of sizes 10 and 18 are taken from two normal populations gave s.d.'s 14 and 20 respectively. Test the hypothesis that the samples have come from populations with the same s.d.
29. A random sample of size 16 has 53 as the mean and the sum of squares of the deviations taken from the mean is 150. Can the sample be regarded as arisen from the population with mean 56.
30. Obtain the most power test of size  $\alpha$  for testing  $H_0: \theta = \theta_0$  against  $H_1: \theta = \theta_1$  where  $\theta_1 > \theta_0$  if the population follows  $N(\theta, 2)$ .
31. The standard deviation of the scores of 10 candidates in an examination is 3.5. Is their justification in the belief that the s.d of the population is less than 3?

(6 × 4 = 24 Marks)



## SECTION – D

Answer **any two** questions, each one carries **15** marks.

32. (a) Explain how the  $\chi^2$  distribution may be used to test goodness of fit.
- (b) Explain the Chi square test of independence of two attributes. Obtain the formula for testing the independence of two attributes using a 2x2 table where the observed frequencies are a,b,c and d respectively.
33. (a) Explain in detail the use of t statistic in two different situations of testing hypothesis.
- (b) Three women take an advanced typing course in order to increase their speed. Before the course their rates are 40,42 and 40 words per minute. After the course their speeds are 45, 50 and 42 respectively. Is the course effective?
34. (a) How do you test the hypothesis of equality of proportions of successes in two binominal distributions?
- (b) A sample of 200 boys who passed S.S.L.C. examination are found to have mean marks 50 with s.d. 5 for English. The mean marks of 100 girls was found to be 48 with s.d. 4. Does this indicate any significant difference between the abilities of boys and girls assuming the s.d. the same. ( $\alpha = 0.05$ ).
35. Explain in detail the one way ANOVA giving the assumptions, model and layout.

(2 × 15 = 30 Marks)