FOURTH SEMESTER B.Voc. DEGREE EXAMINATION, APRIL 2021

(Regular/Supplementary/Improvement)

ST3 C03

STATISTICAL INFERENCES AND APPLICATIONS

(Information Technology–Core Course)

(2018 Admission onwards)

Time: Three Hours   Maximum: 80 Marks

PART A

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

1. The mean of a chi-square random variable with "10" degrees of freedom is ……..…..

2. Standard error (SE) is the ……..….. of a statistics.

3. Any measured quantity of a statistical population is called ……..…..

4. The probability of rejecting a null hypothesis when it is true is known as ……..…..

5. The large sample test for testing mean of a normal population when the population standard deviation is known is based upon ……..….. distribution.

6. The rejection region in testing of hypothesis is termed as ……..…..

7. If $F \sim F(4, 2)$ d.f, then the distribution of $\frac{1}{F}$ is ……….…..

8. The ratio between - two independent chi-square random variables - which is divided by its corresponding degrees of freedom is follows ……..….. distribution

9. The choice of one-tailed test and two-tailed test depends upon ……..….. hypothesis

10. The distribution related to the Testing the goodness of fit and the independence of attributes is ……..…..

(10 × 1 = 10 Marks)

PART B

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

11. Define parameter and write two examples.

12. Define t-distribution.

13. Explain the term "Statistical inference"

14. Define likelihood function.

15. What is null hypothesis and alternate hypothesis?

16. Explain type ll error.

17. If $H_0 : \mu = 72$ & $H_1 : \mu \neq 72$ the calculated test statistics is $z = 2.9$ for testing the population mean at 5% level of significance (from standard normal table $Z_\alpha = 1.96$), then the result is, we ……..…. the null hypothesis.

18. What is: (a) degrees of freedom (b) attribute

19. Two samples of sizes 25 and 29 are independently drawn from two normal populations, where the unknown variances are assumed to be equal. The number of degrees of freedom for the equal-variances t-test statistic is:

20. Explain the term 'test Statistic' with example.

21. Explain a Methods of Estimation.

22. State Neymann – Pearson lemma.

(8 × 2 = 16 Marks)

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

23. Suppose that in a random sample of 400 persons, 180 supports GST. Is it implies the proportion of supports and non supporters are same at $\alpha = 0.05$?

24. Find the m.g.f. of chi-square distribution

25. Construct a 95% confidence interval for the normal population mean, with a known σ

26. Test whether there is any significant difference due to the area – for the number of girls and boys coming to study at the college. $\alpha = 0.05$

	Girls	Boys
Urban	800	500
Rural	450	250

27. Write the method of testing the equality of variances of two populations.

28. What is the relation with chi-square for t and F?

29. Derive the sampling distribution of mean of samples from a normal population.

30. Explain the procedure of testing the goodness of fit of a distribution.

31. Explain the Student's t-test with the assumptions of the test

(6 × 4 = 24 Marks)

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

32. Describe the procedure to test the equality of means of normal populations $N(\mu_1, \sigma_1)$ and $N(\mu_2, \sigma_2)$

   For: case 1. σ_1 & σ_2 are known

   case 2. σ_1 & σ_2 are unknown & both sample size is small

33. What are the desirable properties of a good estimator? Explain with examples.

34. (a) Define α, β and power of the test.

   (b) If $x \geq 1$, is the critical region for testing $H_0 : \theta = 2$ against $H_1 : \theta = 1$, on the basis of single item from the population $f(x) = \theta e^{-\theta x}, 0 \leq x < \infty$. Obtain α, β and Power.

35. a) Describe the procedure of Paired t-test.

   b) The random sample of marks of a general examination (out of 10marks) of students from B.Sc. mathematics and B.Sc. Statistics are:

B.Sc. Mathematics	10	9	7	5	7	
B.Sc. Statistics	4	8	9	4	10	9

   Is it implies that the mean marks of both degrees are same at $\alpha = 0.05$

(2 × 15 = 30 Marks)

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