23U418S (Pages: 2) Name: ……………………………

Reg. No: …………………..….

FOURTH SEMESTER B.Voc. DEGREE EXAMINATION, APRIL 2025

(Information Technology)

CC18U GEC4 ST11 – STATISTICAL INFERENCE AND APPLICATIONS

(2018 to 2020 Admissions – Supplementary/Improvement)

Time: Three Hours Maximum: 80 Marks

PART A

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

1. Any measurable function of the sample values is called ---------
2. The mode of student's 't' distribution is ---------
3. M.G.F of a Chi square random variable with 12 degrees of freedom is ---------
4. The standard error is --------- of a statistic.
5. If $Z \sim N(0,1)$, then Z^2 follows …………. distribution.
6. The ratio of two independent chi-square variates follows --------- distribution
7. Range of variation of F distribution is ---------
8. Accept H_0 when H_1 is true is called ---------
9. The test for equality of variances of two normal populations is based upon --------- distribution.
10. Fisher-Neymann factorization theorem is used for finding --------- estimator.

(10 × 1 = 10 Marks)

PART B

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

11. Give examples for parameter and statistic.
12. Define Type 1 error.
13. Define sampling distribution.
14. Identify relationship between the mean and variance of chi-square distribution.
15. What is the relation between F and t?
16. What is interval estimation?
17. State Neymann Pearson lemma.
18. Define power of the test.
19. Which is the test statistic used to test the mean of a population when standard deviation is known and sample size is large?
20. Define Student's t-distribution.
21. Find the maximum likelihood estimator of the following distribution

$$f(x) = \theta e^{-\theta x}, x \geq 0; \theta \geq 0.$$

22. What do you mean by large sample tests?

(8 × 2 = 16 Marks)

PART C

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

23. Explain the method of moments.
24. The means of two random samples of sizes 1000 and 2000 are 67.5 and 68.0 inches respectively. If the standard deviations of the samples are 4.5 and 3.8 respectively, examine whether means of the respective populations are significantly different.
25. Derive the sampling distribution of mean of samples from a normal population.
26. If X and Y are two independent chi-square variates with n_1 and n_2 degrees of freedom respectively, then show that X+Y follows a chi-square distribution with $n_1 + n_2$ degrees of freedom.
27. If t is a consistent estimator of θ, then show that t^2 is also a consistent estimator of θ^2.
28. Explain the method of constructing 95% confidence interval for the proportion 'p' of possessing a characteristic in a population.
29. If $f(x) = \theta e^{-\theta x}, x \geq 0; \theta \geq 0$ and H_0: $\theta = 1$ against H_1: $\theta = 2$. Find power of the test based on a single observation which rejects H_0: where $X > 2$.
30. Thirteen observations taken from a normal population are 126,132, 113, 143, 126, 135 141, 137, 134, 133, 138, 129, 142. Based on this can we conclude that the population mean is greater than 125.
31. Define critical region and size of a test.

(6 × 4 = 24 Marks)

PART D

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

32. Explain the desirable properties of a good estimator.
33. Describe the steps involved in testing of hypothesis.
34. (a) Two sample of people consisting of 100 carpenters and 80 masons have average daily wages 950.34 and 945.65 with standard deviations 16.24 and 13.15 respectively. Examine whether the average daily wage of carpenters is greater than that of masons at 5% level of significance.

    (b) Describe the procedure of paired t-test.
35. Explain the test for independence of attributes.

(2 × 15 = 30 Marks)

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