69

D5BEM2005 (PAGES 2) Reg.no:.....

Name: .....

FIFTH SEMESTER B. Sc. DEGREE EXAMINATION, NOVEMBER 2022

ECONOMICS & MATHEMATICS (DOUBLE MAIN)

GDMT5B08T: STATISTICAL INFERENCE

Time: 2 ½ Hours **Maximum Marks: 80**

SECTION A: Answer the following questions. Each carries 2 marks.

(Ceiling 25 Marks)

1. Distinguish between simple random sample with and without replacement.
2. Define the term 'sampling frame'?
3. Distinguish between a 'parameter' and a 'statistic'.
4. What is meant by suffficient statistic?
5. Define completeness of an estimator.
6. Define minimum variance unbiased estimator.
7. Why MLE is better than moment estimators?
8. What is meant by 'confidence level? Give an example.
9. Distinguish between simple and composite hypothesis.
10. Define the term 'Best Critical Region'
11. What is the difference between level of significance and p - value.
12. Explain the term 'degrees of freedom' with an example.
13. State Neymann – Pearson Lemma.
14. Distinguish between parametric and non parametric tests.
15. Define F – statistic. Show that the product of lower and upper quartiles of $F_{2,2}$ is 1.

SECTION B: Answer the following questions. Each carries 5 marks.

(Ceiling 35 Marks)

16. Distinguish between stratified sampling and systematic sampling.
17. Explain sampling from an infinite population. How it differs from a finite population.
18. Show that uniformly minimum variance unbiased estimator of a parametric function is unique.
19. If $f(x) = (\beta + 1)x^{\beta}$, $0 \leq x \leq 1 : \beta + 1 > 0$, find the maximum likelihood estimator of β.
20. State the concept of confidence interval. How do you construct the same for the variance of a normal disribution?

(PTO)

21. Suppose X → B (1, p). To test H_o: Þ = $^1/_4$ against H_1: Þ = $^3/_4$, we take a sample of 4 observations and reject H_o if we get 4 successes. Compute level of significance and power of the test.

22. Height of 10 boys is 70, 67, 62, 68, 61, 68, 70, 74, 64, 64 and 66 inches. Do this support the hypothesis that the mean height is > 64.

23. Distinguish between large sample and small sample tests with suitable examples.

SECTION C: Answer any two questions. Each carries 10 marks.

24. State and prove Cramer – Rao inequality. Let $(x_1, x_2 \ldots\ldots x_n)$ be a random sample from a normal population with unknown mean μ but known variance σ^2, find the Cramer – Rao lower bound for μ.

25. Derive the likelihood ratio test for testing $H_o : \mu = 0$ against $H_1 : \mu \neq 0$ in a normal distribution N(μ, 1). Further show that this test is unbiased and consistent.

26. What are the assumptions of ANOVA test? The following data refers to a varietal trial. Perform an ANOVA test.

Variety	Yeild (kg/ plot)			
A	0.5	0.7	0.3	0.4
B	0.6	0.2	0.9	
C	1.2	1.6		
D	0.9	0.3	0.4	

27. What are the advantages of non–parametric test over parametric tests?
Explain Mann-Whitney U– test.

(2 × 10 = 20 Marks)