QP CODE: 24803040

24803040

Reg No : ....

Name : ....

INTEGRATED MSC DEGREE EXAMINATION, MAY 2024

Seventh Semester

INTEGRATED MSC BASIC SCIENCE-STATISTICS

CORE - IST7CR04 - STATISTICAL INFERENCE I

2020 Admission Onwards

FDB94FC9

Time: 3 Hours | Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Write an example for the situation where unbiased estimator do not exist.
2. State factorization criteria for sufficiency
3. Define curved exponential families.
4. Define uniformly minimum variance unbiased estimate.
5. What dou you meant by Blackwellisation?
6. Define Minimum Variance unbiased Estimator.
7. Write down the equation for finding the variance of maximum Likelihood estimator.
8. Write any few propertyies of M,M.E.'s.
9. Define confidence interval.
10. Define a decision function.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Explian the term unbiasedness.
12. Distinquish between Marginal and joint Consistency.

13. Let $x_1, x_2, ..., x_n$ be iid random variables with common variance σ^2. Also,let $a_1, a_2, ..., a_n$ be real numbers such that $\sum a_i = 1$ and let $S = \sum_{i=1}^{n} a_i x_i$. Then Prove that the variance of S is least if we choose $a_i = 1/n$.

14. If M is a minimal sufficient statistic which is complete and there exists an unbiased estimator T of $g(\theta)$, then there exists a unique UMVUE of $g(\theta)$ which is given by $E(T|M)$. Prove it

15. A random sample of size n is drawn from a normal population N(u,σ^2). Estimate u by the method of maximum likelihood.

16. What modification in minimum -chi square method of estimaton gives rise to the method of modified minimum chi- square?

17. Let X follows B(n,p) and $\pi(p) = 1$ for 0 < p < 1 be the prior distribution.Find posterior distribution.

18. Let X follows B(n,p) and $\pi(p) = 1$ for 0 < p < 1 be the prior distribution.Find the bayes estimator.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19.
1. Define the property completeness.
2. Check whether the following family of p.d.f.s of X is complete

   a) X be N(0,θ).
   b) X is U(0,θ), θ>0

20. State and prove Chapman-Robbins Inequality.

21.
1. Briefly explain the method of moments for estimating the parameters.
2. A random variable X takes the values 0,1,2 with respective probabilities $\frac{\theta}{4N} + \frac{1}{2}(1 - \frac{\theta}{N})$, $\frac{\theta}{2N} + \frac{\alpha}{2}(1 - \frac{\theta}{N})$, and $\frac{\theta}{4N} + \frac{(1-\alpha)}{2}(1 - \frac{\theta}{N})$ where N is a known number and α,θ are unknown parameters. If 75 independent observations on X yielded the values 0,1,2 with frequencies 27,38,10 respectively, estimate θ and α by the method of moments

22. Consider the problem of estimation of a parameter $\theta \in \Theta \subseteq R$ with respect to the quadratic loss function $L(\theta, \delta) = (\theta - \delta)^2$. Show that the bayers solution is $\delta(x) = E(\theta / X = x)$.

(2×5=10 weightage)