B.Sc. DEGREE EXAMINATION, APRIL 2018.

II YEAR IV SEMESTER

Core Major - Paper VII - STATISTICAL INFERENCE - I

Time : 3 Hours Max. Marks : 60

SECTION A – (10 × 1 = 10 marks)

(Q. No. 1-12)Answer any *TEN* questions

1. Define point estimation.
2. What are the properties of estimator?
3. Define unbiased estimator.
4. Define sufficiently of an estimator.
5. Write down the properties of MLE.
6. What are the various methods of estimation?
7. Define interval estimation.
8. State the 95% confidence interval for single proportion.
9. What is the difference between confidence interval and confidence limit?
10. State the assumption of Student's t - test.
11. State the relation between F and χ2 distribution.
12. Define F distribution.

SECTION B – (5 × 4 = 20 marks)

(Q. No. 13-19)Answer any *FIVE* questions

1. Define consistency.
2. State Neyman Factorization theorem.
3. If $T\_{1}$ is a Minimum Variance Unbiased estimator for θ and $T\_{2}$ is any other unbiased estimator, prove that no linear combination of $T\_{1}$ and $T\_{2}$ is a Minimum Variance Unbiased estimator.
4. Let $x\_{1},x\_{2},…,x\_{n}$ be a random sample from uniform population on [0,θ]. Find a sufficient statistics for θ.
5. State the regularity conditions for Cramer - Reo inequality.
6. Obtain 100(1 - α)% confidence interval for the parameter θ (mean) of the normal distribution.
7. Define Type I error and Type II error.

SECTION C – (3 × 10 = 30 marks)

(Q. No. 20-24)Answer any *THREE* questions

1. A random sample $(X\_{1},X\_{2},…X\_{5})$ of size 5 from a normal population with unknown mean μ. Consider the following estimators to estimate

(a) $t\_{1}=\frac{X\_{1}+X\_{2}+x\_{3}+X\_{4}+X\_{5}}{5}$(b) $t\_{2}=\frac{X\_{1}+X\_{2}}{2}+X\_{3}$ (c)$t\_{3}=\frac{2X\_{1}+X\_{2}+λX\_{3}}{3}$

Where λ is such that $t\_{3}$ is an unbiased estimator.

(i) Find λ.

(ii)Are $t\_{1}$and $t\_{2}$ unbiased? (P.T.O.)

(iii) State giving reasons, the estimator which is the best among$t\_{1}$, $t\_{2}$and$t\_{3}$.

1. State and prove Rao-Blackwell theorem.
2. For random sampling from Normal population $N(μ,σ^{2})$, find the maximum likelihood estimates for

(i) $μ when σ^{2}known$ (ii) $σ^{2}$when $μ$ is known (iii) simultaneous estimation of $μ $and $σ^{2}$

1. Derive the confidence limits for the parameter of Poisson distribution.
2. Write down the procedure for testing the mean when

(i) the sample comes from a large population and

(ii) the sample comes from a small population.