



25805006

QP CODE: 25805006

Reg No :

Name :

INTEGRATED MSC DEGREE EXAMINATION, NOVEMBER 2025

Third Semester

INTEGRATED MSC BASIC SCIENCE-STATISTICS

CORE - IST3CR02 - ESTIMATION THEORY

2020 Admission Onwards

30D49765

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. How does standard error occurs?
2. What are the commonly used sampling distributions?
3. Define t-distribution.
4. What are the methods of point estimation?
5. Why is consistency important in statistics?
6. Define Robustness.
7. How do you find the minimum variance of an estimator?
8. Define the process Method of least squares.
9. Write down the confidence interval for the difference of proportion.
10. Write down the confidence interval for the variance of normal population with mean is known.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. If X is the random variable following F-distribution with (n_1, n_2) degrees of freedom then prove that $\frac{1}{X}$ follows $F(n_2, n_1)$.
12. Derive the cumulative distribution for the largest order statistic.





13. Show that for Poisson distribution $P(\lambda)$, \bar{X} is the minimum variance estimator of λ .
14. i) Which are the desirable properties of a good estimator? Explain the terms.
ii) Explain MVUE.
15. Show that for the rectangular distribution, $f(x) = \frac{1}{\theta} ; 0 \leq x \leq \theta$, the MLE for θ is the largest number of the sample.
16. Elaborate Bayesian Estimation Procedure.
17. Obtain the interval estimate for the differences of two population means of normal population when variances are known (small sample).
18. i) Write down the confidence interval for the ratio of two variances of normal populations.
ii) A study has been made to compare the nicotine contents of two brands of cigarettes. Ten cigarettes of Brand A had an average nicotine content of 3.1 milligrams with a standard deviation of 0.5 milligram, while eight cigarettes of Brand B had an average nicotine content of 2.7 milligrams with a standard deviation of 0.7 milligram. Assume that the two sets of data are independent random samples from normal populations, find a 98% confidence interval for $\frac{\sigma_1^2}{\sigma_2^2}$.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight **5** each.

19. i) Define sampling distributions.
ii) Derive the sampling distribution of sample variance.
20. i) If S^2 is the variance of a random sample from an infinite population with finite variance σ^2 , then show that $E(S^2) = \sigma^2$.
ii) If t is a sufficient estimator of θ , then prove that any one-one function of t is also sufficient for θ .
21. i) Explain the method of moments.
ii) Estimate μ and σ^2 by the method of moments for $N(\mu, \sigma)$.
22. i) Obtain the confidence interval for mean of normal population when variance is known and n is small.
ii) A paint manufacturer wants to determine the average drying time of a new interior wall paint. If for 12 test areas of equal size he obtained a mean drying time of 66.3 minutes and a standard deviation of 8.4 minutes, construct a 95% confidence interval for true mean μ .

(2×5=10 weightage)

