

2021

STATISTICS— GENERAL

Paper : GE/CC-3

(Introduction to Statistical Inference)

Full Marks : 50

*The questions are of equal value.**The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*1. Answer **any five** questions:

2×5

- (a) If X_1, X_2, X_3 are *i. i. d.* $N(0,1)$ variates, write down the p.d.f of $T = \frac{\sqrt{2}X_1}{\sqrt{X_2^2 + X_3^2}}$
- (b) Distinguish between estimator and estimate.
- (c) In a Bernoulli distribution with parameter p , $H_0: p = \frac{1}{3}$ is rejected if more than 3 heads are obtained out of 5 throws of a coin. Find the probability of Type I error.
- (d) For a one-way ANOVA, find an unbiased estimator of the error variance.
- (e) Let (X_1, X_2, \dots, X_n) be a random sample from $N(\mu, 1)$ population. Find the maximum likelihood estimate of μ .
- (f) Write one disadvantage of a CRD.
- (g) What is a BLUE?
- (h) Define power of a test.

2. Answer **any two** questions:

5×2

- (a) If X_1 and X_2 are independently distributed Poisson random variables with parameters λ_1 and λ_2 respectively, obtain the distribution of $X_1 + X_2$.
- (b) If (X_1, X_2, \dots, X_n) is a random sample from normal population $N(\theta, 1)$, show that $\bar{X}^2 - \frac{1}{n}$ is an unbiased estimator of θ^2 .
- (c) Derive the distribution of the different sums of squares involved in a one-way classified data.

3. Answer **any three** questions:

10×3

- (a) Suppose (X_1, X_2, \dots, X_n) be a random sample from $N(\mu, \sigma^2)$ distribution. Derive the maximum likelihood estimators of μ and σ^2 . Also examine the consistency of the sample mean as an estimator of μ . 6+4
- (b) Describe a suitable test for testing $H_0: \mu_1 = \mu_2$ against all possible alternatives for two independent normal populations $N(\mu_1, 3^2)$ and $N(\mu_2, 4^2)$. Also find a 95% confidence interval for $\mu_1 - \mu_2$. 10

Please Turn Over

- (c) If X_1, X_2, X_3, X_4 are independent random variables each distributed as normal with zero mean and variance 4. Find the distributions of 5+5
- (i) $X_1 + X_2$
 - (ii) $\frac{X_1^2 + X_4^2}{X_2^2 + X_3^2}$
- (d) Briefly describe the analysis of variance technique for analyzing a two-way classified data with only one observation in each cell. Clearly state all the assumptions. 10
- (e) (i) Discuss any one of the basic principles of design of experiment.
- (ii) Give the layout of an RBD. 5+5
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