2022

STATISTICS — GENERAL

Paper : GE/CC-3

(Introduction to Statistical Inference)

Full Marks : 50

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) Distinguish between a parameter and a statistic.

   (b) If θ is a parameter and T is an estimator such that $E(T) = \dfrac{\theta}{4}$, suggest an unbiased estimator of θ.

   (c) If X_i, i = 1(1)4, are i.i.d. N(0, 1) variates, then write down the p.d.f. of $T = \dfrac{\sqrt{3}X_3}{\sqrt{X_4^2 + X_2^2 + X_1^2}}$.

   (d) Give an example of a biased estimator.

   (e) Distinguish between simple and composite hypotheses.

   (f) For a two-way classified data with one observation per cell, write down the first two columns of the ANOVA table.

   (g) Name the three basic principles of designs of experiments.

   (h) State two advantages of using an RBD.

2. Answer *any two* questions :

   (a) Describe the method of moments. On the basis of a random sample from N(μ, σ²) population find the estimates of μ and σ² by the method of moments. 2+3

   (b) Draw some rough sketches of τ, t, χ^2 and F distributions. Discuss about the similarities and differences in your sketches. 5

   (c) For a Randomised Block Design (RBD) write down the appropriate model. State the null and alternative hypotheses. Write down the ANOVA table for an RBD. 2+1+2

3. Answer *any three* questions :

   (a) Describe the test procedure for testing the null hypothesis Ho : μ = μ_0 on the basis of a random sample drawn from N(μ, σ²) where σ is unknown. Also find the 100 (1 – α)% confidence interval for μ. 6+4

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(b) (i) Define the following : Type I error, Type II error, level of significance, power, null hypothesis.

    (ii) Describe the test procedure for the equality of two population proportions.   5+5

(c) (i) Distinguish between an estimator and an estimate with an example.

    (ii) What is a sign test? Describe its two applications.   2+(3+5)

(d) Describe the ANOVA technique for a one-way classified data.   10

(e) Compare the CRD and RBD by stating their layouts, advantages and disadvantages.   10

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