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H.P.A.S. (Main)—2011

STATISTICS

Paper II

Time : 3 Hours

Maximum Marks : 150

Note :— Attempt Question No. 1 which is compulsory and four questions from the rest, in all five. All questions carry equal marks.

1. (a) In testing of hypotheses problem, explain critical region, size of a test and the power of a test.
- (b) Obtain the test of significance of the variance of a normal distribution.
- (c) Distinguish between sampling and non-sampling errors.

P.T.O.

2. (a) If $x \geq 1$ is the critical region for testing $H_0 : \theta = 2$ against the alternative $H_0 : \theta = 1$ on the basis of a single observation x from the distribution :

$$f(x, \theta) = \theta e^{-\theta x} \quad (0 \leq x \leq \theta)$$

obtain the values of type I and II errors.

- (b) Eleven pairs of observations from a bivariate normal distribution have value of the sample correlation coefficient 0.6. Test for the significance of this value :

$$[t \text{ on } 9 \text{ d.f.} = 2.26].$$

3. (a) State Neyman-Pearson Lemma and give its use in finding best test for a simple hypothesis against a simple alternative.

- (b) Construct a likelihood ratio test for $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 \neq \sigma_0^2$ in a normal distribution $N(\mu, \sigma^2)$.
4. (a) Distinguish between parametric and non-parametric tests. What are latter's advantages ?
- (b) Explain the Mann-Whitney test.
5. (a) Briefly describe the advantages of sampling over complete enumeration.
- (b) What are proportional and optimum allocations in stratified random sampling ? Compare their efficiencies.
6. (a) Write a note on the ratio method of estimation.
- (b) Write a note on systematic sampling.

7. (a) Explain the principles of replication and local control in design of experiments.
- (b) Explain :
- (i) underlying assumptions and
- (ii) interaction in analysis of variance.
8. (a) Explain the analysis of a Latin Square design.
- (b) In a $\gamma \times \gamma$ Latin square design, describe how a missing plot is estimated.