

Statistics for Decision Making – II

Back Paper Examination

Full Marks: 50 Time : 3 hrs

Answer any 5 questions

1. i) What is meant by Statistical Inference? Distinguish between point estimation and interval estimation.

ii) Suppose X_1, X_2, \dots, X_n are independent and identically distributed and follow $N(\mu, \sigma^2)$ distribution. Find the estimators of the parameters using method of moments.

(2+3+5)

2. i) State and prove Rao Blackwellization theorem.

ii) Let X_1, X_2, \dots, X_n be a random sample from a Gamma distribution with pdf

$$f(x) = \frac{\alpha^p}{\Gamma(p)} e^{-\alpha x} x^{p-1} \text{ if } x > 0$$

Find the joint sufficient statistics for α and p .

(5+5)

3. Define i) alternative hypothesis, ii) critical region, iii) Type I and Type II error.

(3+3+4)

4. The following data shows mistake per page in a book. Does the data follow Poisson distribution?

Mistakes per page	0	1	2	3
No. of pages	211	90	19	5

Pmf of Poisson distribution is $P(x) = \frac{e^{-\lambda} \lambda^x}{x!}, x = 0, 1, 2, \dots, \lambda > 0$

Consider at $\alpha = 0.05, \chi^2_3 = 7.815, \chi^2_2 = 5.991, \chi^2_1 = 3.841$

(10)

5. State and prove Neyman – Pearson Lemma.

(10)

6. Production of sugar (in quintals) in 3 machines are given below. Analyse the data and check whether the production varies over selection of machine or not.

Machine I: 2.0, 2.2, 1.7

Machine II: 1.8, 2.2, 2.0

Machine III: 3.0, 2.8, 3.2

Consider $F_{0.05, 2, 6} = 5.14, t_{0.05, 6} = 1.943$

(10)