

2 0 2 1

(July)

STATISTICS

(Elective/Honours)

(Probability Distributions and
Statistical Inference)

[STEH-2(TH)]

Marks : 56

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. Derive Poisson distribution as a limiting form of binomial distribution. Hence, find β_1 and β_2 of the distribution. (Notations have their usual meanings). 12
2. (a) Define a geometric distribution. 2
(b) Let X be a discrete random variable having geometric distribution with parameter p . Obtain its mean and variance. 4

- (c) State and prove the reproductive property of the Poisson distribution. Show that the mean and variance of this distribution are equal. 6

UNIT—II

3. (a) Obtain the mode, median and moment generating function of normal distribution. 9
(b) Write briefly the importance of normal distribution. 2
4. (a) Let X and Y be independent standard normal variates. Obtain the m.g.f. of XY . 5
(b) Write short notes on the following : 6
(i) $Q-Q$ plot
(ii) $P-P$ plot

UNIT—III

5. (a) What do you mean by sampling distribution and distribution of functions of random variables? 3
(b) What is chi-square variate? Show that the sum of independent chi-square variates is also chi-square variate. 4
(c) Write a brief note on 'goodness of fit' and 'chi-square probability curve'. 4

(3)

6. (a) State and prove Chebyshev's inequality. 2+4
(b) Define the following : 5
(i) F -distribution
(ii) Student's t statistic

UNIT—IV

7. Define the following : 5+3+3=11
(a) Likelihood function and method of maximum likelihood and its properties
(b) Method of moments
(c) Minimum variance unbiased estimation and its properties
8. (a) Define minimum variance unbiased estimator. If T_1 is an MVUE of $\gamma(\theta)$ and T_2 is any other unbiased estimator of $\gamma(\theta)$ with efficiency $e < 1$, then prove that no unbiased linear combination of T_1 and T_2 can be an MVUE of $\gamma(\theta)$. 2+5
(b) What do you mean by confidence interval and confidence limits? 4

(4)

UNIT—V

9. (a) What is 'hypothesis testing'? What do you mean by one-tailed and two-tailed tests? 3
(b) Write a note on p -values. 4
(c) Write briefly the procedure for testing of hypothesis. 4
10. (a) Explain clearly the assumptions involved in the ' t -test' for testing the significance of the difference between the two sample means. 5
(b) Write a note on ' t -test' for testing the significance of an observed correlation and regression coefficient. 6
