Exam. Code: 0003
Sub. Code: 0245

1128

Bachelor of Arts (General), 3rd Semester

Statistics

Paper - 201: Statistical Inference

Time allowed: 3 Hours **Max. Marks: 65**

Note: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions each from Unit – I and Unit - II.

0-0-0

I. Attempt the following questions:-

a) Define unbiased and consistent estimator.
b) Define sample proportion. Obtain its standard error.
c) Give an example of an estimator which is consistent but not unbiased.
d) Explain Type – I and Type-II errors.
e) Define a maximum likelihood estimator
f) Distinguish between level of significance and p-value. (6 × 2)
g) Define a consistent estimator (1)

UNIT – I

II. a) Let $X_1, \ldots, X_n$ be independent random variables such that X_i follows Poisson distribution with parameter $\lambda i, c = 1, \ldots, n$. Obtain the sampling distribution of: $Y = \sum_{i=1}^{n} x_i$

b) State the uses of the result that sample mean and sample variance of a random sample from a normal distribution are independently distributed. (9,4)

III. a) Define an F-Statistic. Derive its probability density function.

b) What are the applications of F-test? (9,4)

IV. Let $X_1, \ldots., X_n$ be a random sample from:-

i) Poisson distribution with parameter λ. Find maximum likelihood estimator of λ.

ii) Binomial distribution with parameters N and P. Find maximum likelihood estimator of P. (6,7)

V. a) Define a chi-square random variable. Derive its probability mass function.

b) What are the applications of chi-square statistic? (9,4)

UNIT – II

VI. Let $X_1, \ldots. X_N$ be a random sample from a binomial distribution with parameters n and p. Explain a large sample test for testing a hypothetical value of p. Also construct 100 (1-∝) % confidence interval for p. (13)

VII. a) Define a goodness of fit problem. Discuss chi-square test of goodness of fit.

b) Explain a test for testing the independence of two attributes each at two levels. Also explain the Yate's correction. (6,7)

VIII. Let $X_1, \ldots. X_m$ and $Y_1, \ldots. Y_n$ be random samples from $N\left(\mu_1, \sigma_1^2\right)$ and $N\left(\mu_2, \sigma_1^2\right)$. Propose a test for testing H_0: $\mu_1 = \mu_2$ against all the three types of alternatives when σ_1^2 is unknown. Also construct 100 (1-∝) percent confidence interval for the difference $\mu_1 - \mu_2$. (13)

IX. a) Explain a test for testing the significance of sample correlation coefficient.

b) Discuss a large sample test for testing the hypothetical value of population correlation coefficient. (6,7)

0-0-0