Exam.Code:0003
Sub. Code: 0245

1129

B.A./B.Sc. (General) Third Semester
Statistics
Paper – 201: Statistical Inference

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

***NOTE**: Attempt <u>five</u> questions in all, including Question No. I which is compulsory and selecting two questions from each Section.*

x-x-x

Q.1. Answer the following:-

(i) What is the difference between parameter and statistic?
(ii) Discuss unbiasedness of an estimator
(iii) Moment generating function of Poisson distribution
(iv) Probability mass function of Binomial distribution
(v) How will you construct two-sided alternative hypothesis?
(vi) Define Type-I error
(vii) Explain the uses of Central limit theorem. **(2,2,2,1,1,1,2,2)**

SECTION-I

Q.2 (a) Explain the concept of unbiasedness of an estimator with the help of an example.

(b) Let $x_1,\ldots,x_n$ be a random sample from a binomial distribution with parameters 'n' and 'p'. Find the sufficient statistic for 'p'..

(6½, 6½)

Q.3 (a) Define the method of maximum likelihood. Obtain maximum likelihood estimators for μ and σ^2 if sampling is from a normal population i.e $N(\mu, \sigma^2)$, both μ and σ^2 are unknown.

(b) Define Chi-square distribution and also obtain the test statistic for $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 \neq \sigma_0^2$.

(6½, 6½)

Q.4 (a) Prove that sum of independent Poisson random variates is also a Poisson variate.

(b) Given a random sample $x_1,\ldots,x_n$ from a $N(\mu, \sigma^2)$ distribution, examine unbiasedess and consistency of

(i) $\bar{x}$ for μ

ii) $\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2$ for σ^2 **(6½, 6½)**

Q.5 (a) Describe the independence of sample mean and sample variance, if sampling is from $N(\mu, \sigma^2)$.

(b) Define t- distribution and its properties.

(6½, 6½)

SECTION-II

Q.6 (a) Define

(i) Null and Alternative hypothesis.
(ii) Type II error
(iii) Critical region and level of significance.

(b) Develop a test procedure for testing

$H_0 : \mu_1 = \mu_2$ against $H_1 : \mu_1 \neq \mu_2$

when the two normal populations are independent and their variance are equal but known.

(6½, 6½)

Q.7 (a) Discuss the test procedure for testing

$H_0 : \sigma_1^2 = \sigma_2^2$ against $H_1 : \sigma_1^2 \neq \sigma_2^2$

when μ_1, μ_2 are unknown. Also obtain 100 (1-α)% C.I. for σ_1^2 / σ_2^2.

(b) Fisher's Z- transformation and its uses.

(6½, 6½)

Q.8 (a) Develop a test procedure for testing equality of two population proportions. Also obtain the expression for 100(1-α) % confidence intervals for P_1-P_2.

(b) Define Yate's correction and procedure of its implementation?

(6½, 6½)

Q.9 Write short note on any two of the following:

(a) Use of central limit theorem for testing and interval estimation of a single mean.
(b) Chi-square test of goodness of fit.
(c) Testing of difference of two population means in case of small samples, when the two populations are distributed normally.

(6½, 6½)

x-x-x