SS – 352

III Semester B.Sc. Examination, November/December 2018
(CBCS) (Fresh) (2018 – 19 and Onwards)
STATISTICS – III
Statistical Inference – I

Time : 3 Hours   Max. Marks : 70

Instructions : *1) Answer **any ten** sub-divisions from Section **A** and **any five** questions from Section **B.***
*2) Scientific calculators are **permitted.***

SECTION – A **(20 Marks)**

I. Answer **any ten** sub-divisions from the following : **(10×2=20)**

1) a) What is standard error ? Write the standard error of sample mean.

b) Explain with an example location – scale family of distributions.

c) Distinguish between parameter and statistic with an example.

d) Define asymptotic unbiased estimator. Give an example.

e) Define sufficiency.

f) Define Minimum Variance Unbiased Estimator (MVUE).

g) State the properties of moment estimators.

h) What is interval estimation ? Explain.

i) Write $(1 - \alpha)$ 100% confidence interval (C.I.) for binomial proportion P.

j) Write $(1 - \alpha)$ 100% confidence interval population mean μ, when sampling is from $N(\mu, \sigma_0^2)$.

k) Explain simulation.

l) Mention the advantages of simulation.

SECTION – B **(50 Marks)**

II. Answer **any five** questions from the following : **(5×10=50)**

2) a) Obtain sampling distribution of sample mean $\overline{x}$, when the random sample of size 'n' is drawn from normal $N(\mu, \sigma_0^2)$ distribution.

b) State and prove additive property of chi-square distribution. **(5+5)**

P.T.O.

3) a) Show that t-distribution is symmetrical about mean.

b) Obtain mean and variance of F-distribution. **(4+6)**

4) a) Show that, with usual notations, $S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(X_i - \bar{X})^2$ is both unbiased and consistent estimator of the population variance σ^2.

b) Define Mean Square Error (MSE) with usual notations, show that $MSE(T) = V(T) + (Bias)^2$. **(7+3)**

5) a) State and prove sufficient condition for consistency.

b) Let $X_1, X_2, X_3, \ldots, X_n$ is a random sample of size 'n' from $N(\mu, \sigma^2)$ distribution. Show that sample mean is more efficient than sample median. **(4+6)**

6) a) State Neyman factorization theorem. Obtain sufficient statistic for λ in Poisson $P(\lambda)$ distribution.

b) A random sample $(X_1, X_2, \ldots, X_n)$ of size 'n' is drawn from $N(0, \sigma^2)$ distribution. Examine whether $\sum_{i=1}^{n}\frac{X_i^2}{n}$ is a MVB estimator of σ^2. **(5+5)**

7) a) Explain Maximum Likelihood Estimator (MLE). Obtain MLE of P in binomial B(N, P) distribution (N is known).

b) Obtain moment estimator of μ and σ^2 in normal $N(\mu, \sigma^2)$ distribution. **(5+5)**

8) a) Obtain $(1 - \alpha)$ 100% CI for the difference of two binomial population proportions $(P_1 - P_2)$.

b) Obtain $(1 - \alpha)$ 100% CI for the population variance σ^2 when (i) μ is known (ii) μ is unknown when the sample is drawn from $N(\mu, \sigma^2)$ distribution. **(4+6)**

9) a) Describe the method of generating a random sample from exponential distribution.

b) Explain the method of generating random samples from $N(\mu, \sigma^2)$ distribution. **(5+5)**
