Undergraduate Examination, 2018
Semester-III (CBCS)
Statistics
Generic Elective Course (GEC-3)
Basics of Statistical Inference

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin

Answer **any four** questions

1. Let $X_1, X_2, \cdots, X_n$ be a random sample from a Normal distribution with mean μ and variance σ^2.

   (a) Find the maximum likelihood estimator of μ. 4

   (b) Find the maximum likelihood estimator of σ^2 when μ is unknown. 6

2. (a) Write down the difination of an unbiased estimator? Is it unique? Justify your answer with an example. 5

   (b) Let X_1, X_2, X_3 be a random sample from a Poisson distribution with parameter λ. If
   $$T_1 = \frac{X_1 + 2X_2 + 3X_3}{6}, \; T_2 = \frac{X_1 + X_2 + X_3}{3}$$
   then show that T_1 and T_2 are unbiased estimator of λ. Find the variance of T_1 and T_2 and state which one is better. 5

3. (a) What is method of moment estimator? Give an example where more than one method of moment estimator exists. 5

   (b) Let $X_1, X_2, \cdots, X_n$ be a random sample from a Binomial distribution with parameter n and p. Find the method of moment estimator of p. 6

4. What is type-I error and type-II error in testing of hypothesis. State the Neyman Peareson lemma. Find the critical region for the test $H_0 : \mu = \mu_0$ aganist $H_1 : \mu > \mu_0$, when $X_1, X_2, \cdots, X_n$ be a random sample from a Normal distribution with mean μ and variance 1. 10

5. What do you mean by analysis of variance? Write down the analysis of one way analysis of variance under fixed effect model. 10

6. Write down the definition of the following: $(5 * 2 = 10)$

   (a) Population (b) Sample (c) Statistic (d) Likelihood function

   (e) Critical region