

**MBB College**  
**Department of Statistics**  
**Assignments for 3<sup>rd</sup> Semester (General Course) - 2018**

**Answer the following questions**

1. What do you understand by Point Estimation? Define the following terms and give one example for each:

- (i) Consistent Estimator
- (ii) Unbiased Estimator
- (iii) Efficient Estimator

2. For the geometric distribution,  $P(x) = p(1-p)^{x-1}$ ; ( $x = 1, 2, 3, \dots$ ),  $0 < p < 1$ ; Obtain an unbiased estimator of  $1/p$ .

3. If  $X_1, X_2, \dots, X_n$  is a random sample of size  $n$  from  $N(\mu, \sigma^2)$ , where  $\mu$  is known and if

$$T = \sum_{i=1}^n |X_i - \mu| = \sigma \sqrt{2/\pi}$$

examine if  $T$  is unbiased for  $\sigma$ . If not, obtain an unbiased estimator of  $\sigma$ .

4. State the Cramer-Rao inequality. Define MVB Estimator.

5. A random sample  $X_1, X_2, \dots, X_n$  is taken from a normal population with mean zero and

variance  $\sigma^2$ . Examine if  $\sum_{i=1}^n X_i^2/n$  is an MVB estimator of  $\sigma^2$ .

6. Describe the maximum likelihood method of estimation and discuss its properties.

7. Find the likelihood function for a random sample of size  $n$  from each of the following populations:

- (i)  $N(\mu, \sigma^2)$
- (ii)  $b(n, p)$
- (iii)  $Poisson(m)$
- (iv)  $Uniform(a, b)$

8. Obtain the MLE of  $\theta$  in the following cases:

- (i)  $f(x) = \theta^x(1-\theta)^{1-x}$ ;  $x = 0, 1$ ;  $0 \leq \theta \leq 1$
- (ii)  $f(x) = 1/\theta \exp(-x/\theta)$ ;  $x \geq 0$ ,  $\theta > 0$
- (iii)  $f(x) = {}^n C_x \theta^x(1-\theta)^{n-x}$ ;  $x = 0, 1, 2, \dots, n$ ;  $0 \leq \theta \leq 1$

9. Obtain the MLEs of  $\mu$  and  $\sigma^2$  in case of a random sample of size  $n$  from a  $N(\mu, \sigma^2)$  population.

10. Write a short-note on “Method of Moments” for estimation of population parameters.