PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2017
(Fourth Semester)

Branch – **STATISTICS**

STATISTICAL INFERENCE - I

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 2 = 20)

1 Define unbiased estimator.

2 Define minimum variance unbiased estimator.

3 Write the sufficient condition for an estimator to be consistent.

4 Write any two properties of maximum likelihood estimation.

5 Write the statement of Neyman's factorization theorem.

6 Define the principle of MLE.

7 Define posterior distribution.

8 When can one use a non-parametric test?

9 Mention the assumption for statistical test.

10 Define a "run".

SECTION - B (25 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a If $x_1, x_2, \ldots, x_n$ is a random sample from a normal population N (μ, 1). Show that $t = \frac{1}{n}\sum_{i=1}^{n} x_i^2$, is an unbiased estimator of $\mu^2 + 1$.

OR

b Let $X_1 \rightarrow X_n$ be a random sample from B(1, P). Show the $\overset{-2}{x}$ is a consistent estimator of p^2.

12 a Define a sufficient estimator and give an example.

OR

b State and establish a sufficient condition for consistency of an estimator.

13 a Describe the method of moments. Find method of moments estimator of the normal parameters μ and σ.

OR

b Check whether or not maximum likelihood estimator is unique.

14 a Obtain 100(1-α)% C.I for σ^2 when θ is known in normal distribution.

OR

b Obtain 95% confidence limits (for large sample) for the parameter θ of the poisson distribution.

15 a i) Distinguish between parametric and non-parametric test.
ii) State the basic assumption made in non-parametric test.

OR

b Explain sign test for one sample.

Cont ...

SECTION - C (30 Marks)

Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 Listing the regularity condition, state and prove Cramer Rao inequality.

17 State and prove Rao – Blackwell theorem.

18 a Explain Maximum likelihood estimator.

b Find the MLE of θ in the poisson population given by $f(x,\theta) = \frac{-e^{\theta}\theta^{x}}{x!}$; $x = 0, 1, 2, \ldots$; $0 \le \theta \le \infty$, based on a random sample of size n and also the variance of the estimator.

19 Construct the $100(1-\alpha)\%$ confidence interval for the ratio of variances T_2^2 / T_1^2 of two independent normal population with unknown means.

20 Describe Man- Whitney U-test in detail.

Z-Z-Z END