10 a   Explain the procedure of median test.

OR

   b   Write a short note on the chi-square test for goodness of fit.

SECTION -C (30 Marks)
Answer ALL questions
ALL questions carry **EQUAL** Marks   (5 x 6 = 30)

11 a   Examine the sufficient conditions for consistency.

OR

   b   State and prove Cramer-Rao inequality.

12 a   Let $X_1, X_2, \ldots, X_n$ be a random sample from $N(\mu, \sigma^2)$. Find sufficient estimators for μ and σ^2.

OR

   b   Summarise the statement and proof of Rao Blackwell theorem.

13 a   In random sampling from normal population $N(\mu, \sigma^2)$, find the MLE for (a) μ when σ^2 is known (b) σ^2 when μ is known.

OR

   b   Let $X_1, X_2, \ldots, X_n$ denote random sample of size n from a uniform population with pdf: $f(x, \theta) = 1; \theta - \frac{1}{2} \le x \le \theta + \frac{1}{2}$, $-\infty < \theta < \infty$. Compute the MLE for θ.

14 a   Examine the Confidence interval for variance of the normal population.

OR

   b   Analyze the methods to find the confidence limits for the mean of difference of paired observations.

15 a   Describe the Mann-Whitney-Wilcoxon U-test.

OR

   b   The demand for a particular spare part in a factory was found to vary from day to day. In a sample study the following information was obtained:

Days	Mon	Tues	Wed	Thurs	Fri	Sat
No. of parts demanded	1124	1125	1110	1120	1126	1115

Test the hypothesis that the number of parts demanded does not depend on the day of the week. (Given: the values of chi-square significance at 5, 6, 7, d.f. are respectively 11.07, 12.59, 14.07 at the 5% level of significance.)

Z-Z-Z   END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2024
(Fourth Semester)

Branch – **STATISTICS**

STATISTICAL INFERENCE - I

Time: Three Hours   Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks   (5 x 1 = 5)

1   When $E(T_n) < \theta$ T_n then is said to be ____ biased.
    (i) Positively   (ii) independent
    (iii) Negatively   (iv) dependent

2   Let $X_1, X_2, \ldots, X_n$ be a random sample from $N(\mu, \sigma^2)$ then define a sufficient statistics for μ is ___.
    (i) $\sum_{i=1}^{n} x_i$ (ii) $\prod x_i$
    (iii) $\sum_{i=1}^{n} x_i^2$ (iv) $\bar{X}$

3   In random sampling from $N(\mu, \sigma^2)$, the M.L.E. for μ when σ^2 is known as ____.
    (i) $\sum_{i=1}^{n} x_i$ (ii) $\prod x_i$
    (iii) $\sum_{i=1}^{n} x_i^2$ (iv) $\bar{X}$

4   A ____ is a specific interval estimate of the parameter determined by using data obtained from a sample and by using the specific confidence level of the estimate.
    (i)   confidence interval   (ii) confidence level
    (iii) interval estimate   (iv) none of these

5   Median test is a statistical procedure for testing when two ____ ordered samples differ in their central tendencies.
    (i)   dependent   (ii) independent
    (iii) positively   (iv) negatively

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks   (5 x 3 = 15)

6   a   State and prove the invariance property of a consistent estimator.
                    OR
   b   Show that for Cauchy's distribution, not sample mean is a consistent estimator for the population mean.

7   a   Let $X_1, X_2, \ldots, X_n$ be a random sample from a uniform population on $[0, \theta]$. Bring out a sufficient estimator for θ.
                    OR
   b   Analyze the MVU estimator is unique or not.

8   a   Find the MLE for the parameter λ of a Poisson distribution based on a sample of size n.
                    OR
   b   State the properties of Maximum hikehihoud estimators.

9   a   Produce the Confidence interval for the mean of the normal population.
                    OR
   b   Describe prior and posterior distribution.