PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION JUNE 2018
(Third Semester)

Branch - STATISTICS

STATISTICAL INFERENCE -I

Time: 'Three Hours   Maximum: 75 Marks
Answer ALL questions
ALL questions carry EQUAL marks   (5 x 15 = 75)

1 a State the properties of point estimation.

  b Describe the following:
    (i) Consistency (ii) Sufficient statistics.
                              OR
  c State and prove the Factorization theorem.

  d Find joint sufficient statistics for (a, (3) based on a random sample drawn from Gamma (a, (3) distribution. Verify whether they are minimal sufficient also.

2 a State and prove Crammer - Rao inequality.

  b If T* is the minimum variance unbiased estimator and T is any other unbiased estimator of 0, what is the correlation co-efficient between T* and T?
                              OR
  c Prove that uniformly minimum variance unbiased estimator is unique,

  d State and prove Rao-BlackwelFs theorem.

.3 a Write a short note on modified minimum chi-square estimator.

  b Prove that the multinomial context, the minimum chi-square estimate and maximum likelihood estimate are asymptotically the same.
                              OR
  c Let X - N (p, $G\sim$), p e ^{S}R and $o\sim e$ (0,, oc) and the likelihood function is

    $$L(p, a^2jx) = (a^2)''' \exp \quad \frac{-M)^2}{2cf}$$

    f ind (i) Maximum likelihood estimator for p (a is $\overset{2}{known}$)
        (ii) Maximum likelihood estimator of $a\sim^{y}$ (p is known),

  d Describe the following: i) Asymptotic normality (ii) Asymptotic efficiency.

4   a Define exponential family of distribution and also explain location and scale family.

  b Describe the location invariant estimator.
                              OR
  c Elucidate the construction of statistical decision problem and taking decisions applying the minimax and Bayes approaches.

5   a Describe the different methods of finding the confidence intervals.

  b Construct the 100 (1 - a)% shortest length confidence interval for p based on a random sample drawn from the normal (p, a²) distribution, where a is unknown.
                              OR
  c Describe the following: (i) Confidence coefficient (ii) Upper confidence limit.