

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION MAY 2026
(Fourth Semester)**

Branch – STATISTICS

STATISTICAL INFERENCE - I

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	An estimator is said to be unbiased if (a) Its expected value equals the true parameter value (b) Its variance is minimum (c) It is consistent (d) It has zero bias	K1	CO1
	2	The Cramér–Rao Inequality provides a (a) Lower bound for bias (b) Lower bound for variance of unbiased estimators (c) Upper bound for efficiency (d) None of these	K2	CO1
2	3	The efficiency of an estimator is the ratio of (a) Variances of two estimators (b) CR lower bound to variance of estimator (c) Mean to variance (d) None of these	K1	CO1
	4	A statistic is sufficient if it (a) Has minimum variance (b) Contains all information about the parameter (c) Is unbiased (d) Is consistent	K2	CO2
3	5	The method of moments is based on (a) Sample variances (b) Equating sample and population moments (c) Likelihood maximization (d) None of these	K1	CO2
	6	The maximum likelihood estimator (MLE) maximizes (a) The sample mean (b) The probability density (c) The likelihood function (d) The posterior density	K2	CO2
4	7	A confidence interval provides (a) Probable range for sample values (b) Probable range for parameter values (c) Range for errors (d) Range for unbiasedness	K1	CO3
	8	For large samples, the confidence interval for mean (σ known) is based on (a) t distribution (b) Normal distribution (c) F distribution (d) χ^2 distribution	K2	CO3
5	9	The rth order statistic in a sample of size n is (a) rth smallest value (b) rth largest value (c) Mean value (d) Median	K1	CO4
	10	The range of order statistics is (a) $X_{(n)} - X_{(1)}$ (b) $X_{(1)} + X_{(n)}$ (c) $X_{(n)} / X_{(1)}$ (d) $X_{(n)} \times X_{(1)}$	K2	CO4

Cont...

SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Delineate about parameter estimation. State the characteristics of a good estimator.	K3	CO2
		(OR)		
	11.b.	Define unbiased estimator. S.T if T is on unbiased estimator for Q, T^2 is a biased estimator for Q^2 .		
2	12.a.	Define sufficiency. Obtain sufficient estimator for Q from a uniform population [O,Q].	K2	CO2
		(OR)		
	12.b.	If T_1 and T_2 are MVU estimators for $\gamma(Q)$; then $T_1 = T_2$ almost surely.		
3	13.a.	Explain the method of moments with an example.	K2	CO3
		(OR)		
	13.b.	Obtain the MLE of experimental distribution and hence find its variance.	K3	
4	14.a.	Write a short note on Bayesian estimation.	K3	CO3
		(OR)		
	14.b.	What is the confidence interval for population variance based on χ^2 distribution?	K2	CO1
5	15.a.	Compare Parametre and Non- Parameter tests.	K3	CO4
		(OR)		
	15.b.	Describe the procedure of sign for one and its samples.		

SECTION -C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Derive the Cramér–Rao Lower Bound for an unbiased estimator and discuss its implications.	K5	CO4
2	17	Derive the condition for sufficiency using Neyman's Factorization Theorem.	K3	CO3
3	18	Derive the MLE of the mean and variance of a normal distribution.	K2	CO2
4	19	Derive the confidence interval for F- distribution with its assumptions – Illustrate.	K5	CO4
5	20	Bring out the procedure of Wilcoxon's signed rank test.	K5	CO4

Z-Z-Z

END