

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2026
(Fourth Semester)
Branch - MATHEMATICS

MATHEMATICAL STATISTICS -II

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	Cramer-Rao inequality with regard to variance of an estimator provides _____ i) upper bound on the variance ii) lower bound on the variance iii) asymptotic variance of the estimator iv) simply variance	K1	CO1
	2	An estimator is said to be unbiased if i) Variance is zero ii) Expected value equals parameter iii) Sample size is large iv) It is consistent	K2	CO1
2	3	Method of moments equates i) Sample moments with population moments ii) Mean with variance iii) Variance with mean iv) None	K1	CO2
	4	Bias of an estimator can be i) positive ii) negative iii) either positive or negative iv) always zero	K2	CO2
3	5	Critical region is called as i) acceptance region ii) rejection region iii) maximum region iv) minimum region	K1	CO3
	6	Type II error is i) Reject H_0 when true ii) Accept H_0 when false iii) Reject H_1 when false iv) Reject H_1 when true	K2	CO3
4	7	t-test is used when i) Sample size large ii) Population variance unknown iii) Sample size small iv) Population variance known	K1	CO4
	8	Degrees of freedom for Paired t-test is i) n ii) n-1 iii) n+1 iv) n^2	K2	CO4
5	9	The smallest division of any experimental area is called i) Experimental material ii) Experimental unit iii) sample iv) replication	K1	CO5
	10	The Error df for LSD for t treatments is _____ i) $(t-1)(t-2)$ ii) $(t-1)$ iii) $(t-2)$ iv) $(t-1)^2$	K2	CO5

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.	State Cramer-Rao inequality and its regularity conditions.	K2	CO1
		(OR)		
	11.b.	Explain the concept of unbiasedness with an example.		

Cont...

Cont...				
2	12.a.	Explain the estimation procedure by the method of moments?	K3	CO2
	(OR)			
	12.b.	Write the procedure of MLE also state its properties.		
3	13.a.	Explain in detail the various steps involved in testing of hypotheses.	K2	CO3
	(OR)			
	13.b.	Write a note on i) Null hypothesis ii) Level of significance iii) Degrees of freedom		
4	14.a.	A random sample of 200 tins of coconut oil gave an average weight of 4.95 kgs with standard deviation of 0.21 kg. Do we accept the hypothesis of net weight 5 kg per tin at 1 % level?	K3	CO4
	(OR)			
	14.b.	What is chi-square test? Also state its applications.		
5	15.a.	Explain the basic principles of Design of Experiments.	K2	CO5
	(OR)			
	15.b.	Explain the analysis of Randomized Block Design.		

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	State and Prove Rao-Blackwell theorem.	K2	CO1																														
2	17	State and prove that MLE is asymptotically Normal.	K3	CO2																														
3	18	What is Hypothesis testing? Also explain i) Critical region ii) Power of a test	K2	CO3																														
4	19	The height of 10 males of a given locality are found to be 175, 168, 155, 170, 152, 170, 175, 160, 160 and 165 cms. Based on the sample of 10 items test the hypothesis that the mean height of males is 170 cms. (Table value : .26)	K3	CO4																														
5	20	An experiment was conducted to compare yield of four varieties of wheat in C.R.D. Number of replications for each treatment was 4. The yield per plot of different varieties is given below: <table border="1"> <thead> <tr> <th>Vareities</th><th colspan="4">Plot-Yeild (in Kg.)</th></tr> <tr> <th></th><th>1</th><th>2</th><th>3</th><th>4</th></tr> </thead> <tbody> <tr> <td>A</td><td>4</td><td>7</td><td>6</td><td>5</td></tr> <tr> <td>B</td><td>3</td><td>5</td><td>2</td><td>4</td></tr> <tr> <td>C</td><td>2</td><td>1</td><td>3</td><td>4</td></tr> <tr> <td>D</td><td>3</td><td>2</td><td>1</td><td>2</td></tr> </tbody> </table> Analyse the data and state your conclusions.	Vareities	Plot-Yeild (in Kg.)					1	2	3	4	A	4	7	6	5	B	3	5	2	4	C	2	1	3	4	D	3	2	1	2	K3	CO5
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A	4	7	6	5																														
B	3	5	2	4																														
C	2	1	3	4																														
D	3	2	1	2																														

Z-Z-Z END