22STP206N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2025
(Second Semester)

Branch - **STATISTICS**

DISTRIBUTION THEORY

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	A censored data point is a) A missing data point b) A completely observed value c) A data point known only up to a limit d) An outlier	K1	CO1
	2	The sum of independent Poisson-distributed random variables follows a a) Normal distribution b) Binomial distribution c) Poisson distribution d) Uniform distribution	K2	CO1
2	3	The F-distribution is commonly used in a) Hypothesis testing for means b) ANOVA and variance comparisons c) Linear regression d) Confidence interval estimation	K1	CO2
	4	The sample correlation coefficient 'r' ranges between a) 0 and 1 b) -1 and 1 c) -∞ and ∞ d) 0 and ∞	K1	CO2
3	5	A multivariate normal distribution is characterized by a) Mean vector and covariance matrix b) Mean and variance only c) Median and mode d) Probability mass function	K1	CO3
	6	Recall the usage of Mahalanobis distance. a) Measuring distances in correlated data b) Computing Euclidean distance c) Standardizing normal variables d) Testing equality of means	K2	CO3
4	7	The Wishart distribution is associated with a) Covariance matrices b) Regression coefficients c) Mean vectors d) Correlation matrices	K1	CO4
	8	The Hotelling's T^2 statistic is an extension of a) The t-test b) The F-test c) The chi-square test d) The Kolmogorov-Smirnov test	K2	CO4
5	9	Fisher's discriminant function maximizes a) The separation between groups b) The within-group variance c) The correlation coefficient d) The sample mean	K1	CO5
	10	Identify the significance of Principal Component Analysis. a) Reducing dimensionality b) Testing independence c) Regression analysis d) Time series forecasting	K2	CO5

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.	Derive the distribution function of Binomial distribution.	K2	CO1
		(OR)		
	11.b.	If X and Y are independent Poisson variates with means λ_1 and λ_2 respectively, find P(X + Y = K).		
2	12.a.	Describe Order Statistics with an example.	K3	CO2
		(OR)		
	12.b.	Write short notes on partial correlation coefficient and regression coefficient. Illustrate.		
3	13.a.	State the properties of Multivariate Normal Density Function.	K3	CO3
		(OR)		
	13.b.	Derive the Characteristics function of Multivariate Normal Distribution.		
4	14.a.	Describe Wishart matrix and its distribution.	K3	CO4
		(OR)		
	14.b.	Explain Mahalanobis distance and its significance.		
5	15.a.	Narrate in detail about Factor Analysis – Illustrate.	K3	CO5
		(OR)		
	15.b.	Summarize Canonical Correlation.		

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 probability mass function of Binomial distribution truncated at x = 0, 1.	K4	CO1
2	17	Explain the concept of χ^2distribution and describe its applications.	K3	CO2
3	18	Estimate the mean vector and the covariance matrix of a multivariate normal distribution.	K4	CO3
4	19	Derive the distribution of Hotelling's T^2 statistic.	K3	CO4
5	20	Write the procedure of finding first and second principal components.	K4	CO5

Z-Z-Z END