

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

**MSc DEGREE EXAMINATION DECEMBER 2024
(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	An observation is right censored at X if it is recorded at its observed value is _____ u a) <u b) >u c) =u d) 0	K1	CO1
	2	If X is a Poisson variate also the distribution of X is the sum of x+1 terms then the distribution function of poisson variate is a) Incomplete Beta distribution of 1 st kind b) Incomplete Beta distribution of 2 nd kind c) Incomplete gamma distribution d) Cauchy distribution.	K2	CO1
2	3	Let $F_r(x)$ $r = 1, 2, \dots, n$ denote the c.d.f of r^{th} order statistic then c.d.f of $F_n(x)$ of the smallest order statistic $X_{(n)}$ is given by a) $1-F(x)^n$ b) $F(x)^n$ c) $1-(1-F(x))^n$ d) $1-F(x)$	K1	CO2
	4	The ratio of two independent chi-square variates each divided by the corresponding degrees of freedom has a) non- central F distribution b) non-central t distribution c) central F distribution d) central t distribution	K2	CO2
3	5	In deriving the bivariate normal distribution the assumption regarding the regression of Y on X is a) linear b) non-linear c) quadratic d) exponential	K1	CO3
	6	The multivariate normal distribution is said to be singular if variance and covariance matrix is a) unit b) triangular c) singular d) non singular	K2	CO3
4	7	Whishart distribution is th generalized form of a) gamma distribution b) chisquare distribution c) t distribution d) none of the above	K1	CO4
	8	The test function of Hotelling T^2 is used to test the difference between a) sample mean vector and population mean b) sample mean and population mean c) two sample mean d) two sample variances	K2	CO4
5	9	_____ analysis is the techniques which is used to identify set of variable which has more influence on dependent variable. a) Discriminant b) Principal component c) Factor d) SEM	K1	CO5
	10	Canonical correlation is a technique which is used to identify the pairs of variable which has _____ magnitude of correlation coefficient. a) least b) high c) zero d) one	K2	CO5

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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.	If $X \sim B(n, p)$, right truncated Binomial distribution at $x=n$ then find its mean and variance.	K 2	CO1
		(OR)		
	11.b.	If X and Y are independent rectangular variate on (0,1) Find the p.d.f of i) $X+Y$ ii) $X-Y$		
2	12.a.	Derive cumulative function of a single order statistic.	K 2	CO2
		(OR)		
	12.b.	Let $X_1, X_2, X_3, \dots, X_n$ be a random sample from a population with continuous density. Show that $Y_1 = \min(X_1, X_2, X_3, \dots, X_n)$ is exponential with $n\lambda$ if and only if each X_i is exponentially distributed with parameter λ .		
3	13.a.	Derive the mean of multivariate normal distributions.	K 3	CO3
		(OR)		
	13.b.	Derive the distribution of linear function $y=cx$ of a multivariate normal distribution.		
4	14.a.	Derive the characteristic function of Whishart distribution.	K 2	CO4
		(OR)		
	14.b.	Establish Invariant of T^2 under linear transformation.		
5	15.a.	Explain Discriminant function.	K 4	CO5
		(OR)		
	15.b.	Explain Principal Component analysis.		

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 distribution function of a Binomial Variate.	K 2	CO1
2	17	Derive the probability density function of non-central χ^2 .	K 3	CO2
3	18	Derive the distribution of the quadratic function in Normal variates.	K 3	CO3
4	19	Explain Mahalanobis D^2 distribution and establish the relation between T^2 and D^2	K 3	CO4
5	20	Explain Canonical Correlations.	K 4	CO5

Z-Z-Z

END