22STU309N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch – **STATISTICS**

PROBABILITY DISTRIBUTIONS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Question No.	Questions	K Level	CO
1	Which distribution is a generalization of the Binomial distribution? a) Poisson Distribution b) Geometric Distribution c) Negative Binomial Distribution d) Bernoulli Distribution	K2	CO1
2	The moment generating function for which distribution is $e^{p(et-1)}$? a) Binomial Distribution b) Poisson Distribution c) Normal Distribution d) Beta Distribution	K2	CO2
3	The normal probability curve is also known as: a) Bell Curve b) Exponential Curve c) Rectangular Curve d) Gamma Curve	K2	CO1
4	Which distribution only takes integer values? a) Normal b) Multinomial c) Beta d) Gamma	K2	CO3
5	Which of the following is a continuous distribution? a) Binomial b) Poisson c) Normal d) Geometric	K2	CO1
6	Beta distribution is defined on the interval: a) $(0, \infty)$ b) $(-\infty, \infty)$ c) (0,1) d) $(-\infty,0)$	K2	CO1
7	The mean and variance of the Poisson distribution are: a) Mean = Variance = λ b) Mean = Variance = np c) Mean = p, Variance = np(1−p) d) Mean = np, Variance = λ	K1	CO3
8	Which is NOT a property of the exponential distribution? a) Memoryless property b) Defined for $x<0$ c) Mean = $1/\lambda$ d) Variance = $1/\lambda^2$	K2	CO3
9	Student's t-distribution is used for: a) Large sample inference b) Small sample inference c) non-parametric tests d) Population mean estimation only	K1	CO5
10	Which distribution models the number of failures before a success? a) Binomial b) Poisson c) Geometric d) Normal	K2	CO1

SECTION - B (35 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Derive the moment generating function for the Binomial distribution.	K2	CO1
	(OR)		
11.b.	Derive recurrence relation for the moments of Poisson distribution.		

Cont...

12.a.	Find the mean and variance of Negative Binomial distribution.	K2	CO2
	(OR)		
12.b.	State the importance properties of the Hypergeometric distribution.	K4	CO2
13.a.	Derive the characteristic function of the Normal distribution.	K2	CO3
	(OR)		
13.b.	Find the mean deviation about the mean for the Rectangular distribution.	K3	CO3
14.a.	Define Exponential distribution and its derive Mean and Variance.	K2	CO4
	(OR)		
14.b.	Derive the moments of Beta distribution of first and second kind.		
15.a.	State applications of Student's t and Chi-Square distributions in sampling.	K2	CO5
	(OR)		
15.b.	Discuss the relationship between F and Chi-square distributions.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Derive the constants of the Normal distribution. Also, state its properties.	K4	CO1
17	Show that Poisson distribution is a limiting form of the Binomial distribution.	K2	CO2
18	Derive Mean and Variance of Rectangular distribution and its properties.	K3	CO3
19	Derive Mean and Variance of Gamma distribution and its properties.	K2	CO4
20	Establish the relationship between t and Chi-Square distributions.	K2	CO5

Z-Z-Z END