LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

SECOND SEMESTER – **APRIL 2024**

UST 2501 – CONTINUOUS DISTRIBUTIONS

Date: 12-04-2024 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

	SECTION A – K1 (CO1)	
	Answer ALL the questions	**(10 x 1 = 10)**
1	**Define the following**	
a)	Stochastic Independence	
b)	Normal distribution	
c)	MGF of gamma distribution	
d)	Chi square distibution	
e)	Order statistics	
2	**Fill in the blanks**	
a)	For $f(x,y) = \begin{cases} \frac{1}{8}(6-x-y); & 0 \le x < 2, 2 \le y < 4 \\ 0, & \text{otherwise} \end{cases}$ find P(X<1 ∩ Y<3)	
b)	Linear combination of independent normal variates is a _____ variate.	
c)	If the parameter θ = 1, in an exponential distribution then variance _____ mean.	
d)	Chi square variate is the _____ of a standard normal variate with 1 degree of freedom.	
e)	Standard binomial variate tends to _____ _____ variate as n → ∞.	
	SECTION A – K2 (CO1)	
	Answer ALL the questions	**(10 x 1 = 10)**
3	**Match the following**	
a)	Rectangular Distribution -	λ
b)	If X and Y are independent standard normal variates then for U = X + Y, U ~ -	Cauchy
c)	Mean and Variance of gamma distribution γ(λ)is -	Uniform
d)	When v = 1 then student's t distribution reduces to -	Dependent
e)	The $X_{(r)}$'s of order statistics are -	N(0,2)
4	**True or False**	
a)	E(X)=E{E(X / Y)}	
b)	The value of $\beta_2 = 0$ for normal distribution.	
c)	Cauchy Distribution lacks memory.	
d)	F distribution is the ratio of two independent chi square variates divided by their respective degrees of freedom.	
e)	In order statistics $X_1, X_2, \ldots, X_n$, $X_{(n)}$ is the largest value.	
	SECTION B – K3 (CO2)	
	Answer any TWO of the following	**(2 x 10 = 20)**
5	Prove that Normal distribution as a Limiting form of Binomial distribution.	
6	Prove that a linear combination of independent normal variates is also a normal variate.	
7	Derive the m.g.f of one-parameter gamma distribution.	
8	Derive the mean and variance of chi-square distribution.	
	SECTION C – K4 (CO3)	
	Answer any TWO of the following	**(2 x 10 = 20)**

9	If X is uniformly distributed with mean 1 and variance 4/3, find P (X < 0).
10	State the properties of Normal Distribution.
11	Derive the MGF of Chi-Square distribution.
12	Derive the cumulative distribution function of a first order statistic and n^{th} order statistic.
	SECTION D – K5 (CO4)
	Answer any ONE of the following (1 x 20 = 20)
13	a) Given the joint pdf $$f(x,y) = \begin{cases} 6x^2y, 0 < x < 1, 0 < y < 1 \\ 0, \quad \text{otherwise} \end{cases}$$ Find $P(0 < X < \frac{3}{4}, \frac{1}{3} < Y < 2), P(X + Y < 1), P(X > Y)$ and $P(X < 1/Y < 2)$. b) Find the MGF of normal distribution.
14	a) Derive the MGF of Exponential distribution. b) Derive the MGF of Uniform distribution and hence obtain mean and variance.
	SECTION E– K6 (CO5)
	Answer any ONE of the following (1 x 20 = 20)
15	Derive the mean and variance of beta distribution of first kind.
16	State and prove the Lindeberg-Levy theorem.

$$$$$$$$$$$$$$$$$$