QP CODE: D2BST2401	**(Pages: 2)**	**Reg. No**	**: .....**
		Name	**: .....**

SECOND SEMESTER FYUGP EXAMINATION, APRIL 2025

MINOR COURSE

STA2MN101 : Probability Theory I

(Credits: 4)

Time: 2 Hours **Maximum Marks: 70**

Section A

Answer the following questions. Each carries 3 marks (Ceiling: 24 marks)

1.	What is a discrete random variable? Give two examples.	BL2	CO1
2.	Give any three properties of variance.	BL2	CO2
3.	What is meant by moment generating function of a random variable?	BL2	CO2
4.	Mean of an exponential random variable is 2/3. Give its p.d.f.	BL2	CO2
5.	Suppose $X \sim N(3, 3^2)$ and $Y \sim N(-2, 2^2)$ are independent. Find the distribution of $X + Y$.	BL3	CO3
6.	What is meant by simple correlation? Give example.	BL2	CO4
7.	If regression coefficients are 0.23 and 0.71, find coefficient of determination.	BL2	CO4
8.	A random sample of size 10 is taken from $N(5, 2^2)$, find the standard error of sample mean.	BL2	CO5
9.	State additive property of chi-square random variables.	BL2	CO5
10.	Suppose $X \sim F(2, 5)$, what is the distribution of $\frac{1}{X}$?	BL2	CO5

Section B

Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)

11.	If X follows a Poisson distribution such that $P(X = 2) = 9P(X = 6)$, find the mean and variance of X.	BL3	CO2, CO3
12.	Suppose $X \sim B(10, 0.4)$. Find $P(X \leq 4)$.	BL3	CO3
13.	An urn contains 6 white and 4 black balls. 3 balls are drawn with out replacement, what is the expected number of black balls that will be obtained ?	BL3	CO2

(PTO)

14.	Verify whether $f(x) = \frac{1}{2},\ -1 < x < 1$ is a probability distribution or not.	BL2	CO2
15.	If X is normally distributed with mean 15 and variance 16, find (i) $P(12 < X < 20)$ (ii) $P(X > 20)$.	BL3	CO3
16.	You are given the quadratic regression model: $y = 2x^2 - 3x + 5$. i) Predict the value of y when x=4. ii) What is the predicted value when x= −2.	BL3	CO4
17.	Give the standard error of sample mean of $N(\mu, \sigma^2)$. What are the uses of standard error?	BL2	CO4
18.	A sample of size 16 from a normal population has a mean of 50 and a standard deviation of 12. Assume the population mean is 55. Find the value of t statistic. Give its degrees of freedom.	BL3	CO5
	Section C		
	Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)		
19.	A bus arrives at a stop at a random time between 9:00 AM and 9:30 AM. Let X be the time (in minutes after 9:00 AM) you have to wait for the bus. i) What is the probability that the bus arrives within the first 10 minutes? ii) What is the probability that it arrives between 15 and 25 minutes? iii) Find the mean and variance of the waiting time.	BL3	CO3
20.	The two regression equations are $y = 10 + 3.5x$ and $x = 112 + 0.12y$. Find $\bar{x},\ \bar{y}$ and r.	BL3	CO4
	CO : Course Outcome		
	BL : Bloom's Taxonomy Levels (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)		