

QP CODE: D2BST2505		(Pages: 2)		Reg. No :	
				Name :	
SECOND SEMESTER FYUGP EXAMINATION, APRIL 2026					
(Regular/Improvement/Supplementary)					
Discipline Specific Core (DSC) Courses - Minor					
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.	Define probability distribution of a random variable.	BL2	CO1		
2.	Criticise the following statement "The mean of the Poisson distribution is 5 while its standard deviation is 4".	BL2	CO2, CO3		
3.	Define covariance of a random variable.	BL2	CO1, CO2		
4.	Obtain the expectation of rectangular distribution on $[a, b]$.	BL2	CO3		
5.	Write down the probability distribution of a normal random variable i) with mean 20 and standard deviation 4 ii) with mean 1 and variance 64.	BL3	CO3		
6.	What is meant by coefficient of determination?	BL1	CO4		
7.	What is the general form of a quadratic regression equation?	BL1	CO4		
8.	What are the key differences between the curve of t-distribution and the standard normal distribution?	BL2	CO5		
9.	How does the number of degrees of freedom affect the shape of the chi-square distribution?	BL2	CO5		
10.	What do you mean by sampling distribution?	BL2	CO5		
Section B					
Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)					
11.	A box contains six tickets. Two of the tickets carry a prize of ₹5 each and the other four a prize of ₹1 each. If three tickets are drawn what is the expected value of the prize?	BL3	CO2		
12.	What is meant by moment generating function? What are its properties?	BL1	CO1		
(PTO)					

13.	A coin is tossed 6 times. What is the probability of obtaining 4 or more heads?	BL3	CO3
14.	Check whether $f(x) = \frac{e^{-x/2}}{2}, x > 0$ is a probability density function.	BL2	CO2
15.	If a random variable X follows an exponential distribution with a parameter $\lambda = 4$, what is the probability that $X > 0.5$?	BL3	CO3
16.	From the following obtain r . $N = 12, \sum x = 30, \sum y = 5, \sum x^2 = 670, \sum y^2 = 285, \sum xy = 344.$	BL3	CO4
17.	"The sampling distribution of the sample mean form a normal population always follows a normal distribution" - do you agree with the statement? Why?	BL2	CO4
18.	Suppose X and Y are independent χ^2 random variables, obtain the distribution of $\frac{X}{Y}$.	BL2	CO5

Section C

Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)

19.	The heights of school children in a district are found to follow normal distribution with $\mu = 56$ and $\sigma = 10$. What percentage of children (a) exceed 68 inches (b) less than 40 inches (c) between 50 and 60 inches (d) Find the expected number of children in each group if there are 25000 students.	BL3	CO3									
20.	You are given the following data <table><tr><td></td><td>X</td><td>Y</td></tr><tr><td>Arithmetic Mean</td><td>36</td><td>85</td></tr><tr><td>Standard Deviation</td><td>11</td><td>8</td></tr></table> Correlation coefficient between x and y is 0.66. (i) Find the two regression equations. (ii) Estimate the value of x when y=75.		X	Y	Arithmetic Mean	36	85	Standard Deviation	11	8	BL3	CO4
	X	Y										
Arithmetic Mean	36	85										
Standard Deviation	11	8										

CO : Course Outcome

BL : Bloom's Taxonomy Levels (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)