Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – May / June 2026

Date: 22-05-2026 **Time:** 09:30am – 12:30pm

School: SOCSE	**Program:** B.Tech.	
Course Code: MAT2402	**Course Name:** PROBABILITY AND STATISTICS	
Semester: II	**Max Marks:** 100	**Weightage:** 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	12	14	10	24	30	10

Instructions:

(i) Read all questions carefully and answer accordingly.
(ii) Do not write anything on the question paper other than roll number.
(iii) Statistical tables may be used for calculation.

Part A

Answer ALL the Questions. Each question carries 2 marks. **10Q x 2M = 20M**

1	If A and B are two mutually exclusive events of a random experiment and $P(not\ A) = 0.45, P(A\ U\ B) = 0.65$, then determine $P(B)$.	2 Marks	L2	CO1
2	Given that X has a normal distribution with mean 200 units and variance 1600 units, determine the probability that X assumes a value greater than 240.	2 Marks	L2	CO2
3	Suppose a machine has an average failure rate of 6 failures per hour. The time between failures follows an exponential distribution with $\lambda = 6$. Determine mean and variance.	2 Marks	L2	CO2
4	Identify the mode and mean for the data: 18, 15, 12, 18, 20, 18, 15, 17, 18, 10.	2 Marks	L2	CO4
5	Identify the 2^{nd} and 3^{rd} quartiles for the data: 26, 27, 25, 20, 15, 30, 34, 28, 25.	2 Marks	L2	CO4
6	Define null and alternative hypothesis.	2 Marks	L1	CO5
7	Define parameters and statistics.	2 Marks	L1	CO5
8	Define type I and type II errors.	2 Marks	L1	CO5
9	Define one-tailed test.	2 Marks	L1	CO5
10	Define sample and sampling.	2 Marks	L1	CO5

Part B

Answer the Questions. **8Q x 10M = 80M**

11	In a class of 50 students: 28 opted for NCC, 30 opted for NSS, and 18 opted for both NCC and NSS. If a student is selected at random, calculate the following: i) The probability that the student opted for NCC or NSS. ii) The probability that the student opted for NCC by knowing that the same student opted for NSS iii) The probability that the student opted for NCC but not NSS. iv) The probability that the student opted for NSS but not NCC. v) The probability that the student opted for exactly one of them.	10 Marks	L3	CO1
	Or			
12	A university bought 45%, 25% and 30% of computers from HCL, Wipro and IBM respectively. Suppose that 2% of the computers from HCL, 3% of the computers from Wipro and 1% of the computers from IBM are found to be defective. Given a randomly chosen computer is defective. Apply Baye's theorem to calculate the probability that it is made by (i) HCL (ii) Wipro (iii) IBM?	10 Marks	L3	CO1

13	A random variable X has the following probability function: X: 0, 1, 2, 3, 4, 5, 6, 7 $P(X)$: 0, K, $2K$, $2K$, $3K$, K^2, $2K^2$, $7K^2+K$ Calculate the values of (i) $\boldsymbol{K}$, (ii) Probability distribution of $\boldsymbol{X}$, (iii) $\boldsymbol{P(X<6)}$ ***and*** $\boldsymbol{P(X\geq 6)}$, (iv) The mean, and (v) Variance.	10 Marks	L3	CO2
	Or			
14	The probability that a person reacts to the newly manufactured vaccine against a pandemic is 0.002. If 4000 people are treated with the vaccine, find the probability that: (i) no one will react to the vaccine (ii) exactly 1 person will react to the vaccine (iii) at least 3 people will react to the vaccine (iv) at most 2 people will react to the vaccine	10 Marks	L3	CO2

15	Calculate the value of $\boldsymbol{y}$ at $\boldsymbol{x=11}$ by fitting an exponential curve of the form $\boldsymbol{y=ae^{bx}}$ for the following data: x: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 y: 52.5, 58.7, 65, 70.2, 75.4, 81.1, 87.2, 95.5, 102.2, 108.4	10 Marks	L3	CO3
	Or			
16	Calculate the value of y at $x=8$ by fitting the best possible curve of the form $y=a+bx+cx^2$ for the following data: x: 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6 y: 18, 17.8, 17.5, 17, 15.8, 14.8, 13.3, 11.7, 9	10 Marks	L3	CO3

17	The scores of two golfers ***A*** and ***B*** in 12 rounds are given below. $Player\ A$: 74, 75, 78, 72, 78, 77, 79, 81, 79, 76, 72, 71 $Player\ B$: 87, 84, 80, 88, 89, 85, 86, 82, 82, 79, 86, 80 Determine that: (i) Who is the better player? (ii) Who is the more consistent player?	10 Marks	L3	CO4
	Or			
18	Calculate the Karl Pearson's coefficient of correlation between the marks secured by 10 students in Statistics and Physics (out of 25 marks). Determine the nature of the association prevalent between the scores in the two courses. Marks in Statistics: 18, 17, 23, 22, 21, 20, 19, 19, 20, 21 Marks in Physics: 16, 12, 20, 15, 22, 15, 11, 14, 19, 16	10 Marks	L3	CO4

19	Determine the two regression equations from the following data: x: 65, 50, 55, 65, 55, 70, 65, 70, 55, 70 y: 85, 74, 76, 90, 85, 87, 94, 98, 81, 91	10 Marks	L3	CO4
	Or			
20	Determine the two regression equations from the following data: x: 95, 77, 80, 100, 97, 70, 50, 80, 92, 84, 93, 91 y: 42, 33, 33, 45, 39, 36, 32, 41, 40, 38, 45, 47	10 Marks	L3	CO4

21	a	A dice is thrown 9000 times and a throw of 3 or 4 is observed 3240 times. Apply proportional test to show that the dice cannot be regarded as an unbiased.	4 Marks	L3	CO5
	b	In two large populations, there are 30%, and 25% respectively of fair-haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations?	6 Marks	L3	CO5
		Or			
22	a	The average marks scored by 32 boys is 72 with a S.D. of 8. While that for 36 girls is 70 with a S.D. of 6. Does this indicate that the boys perform better than girls at level of significance 0.05?	6 Marks	L3	CO5
	b	An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level significance.	4 Marks	L3	CO5

23	The following data relate to the marks obtained by 11 students in 2 tests; one held at the beginning of a year and the other at the end of the year after intensive coaching. Test 1: 21, 25, 18, 26, 15, 16, 21, 23, 26, 16, 28 Test 2: 23, 22, 28, 24, 21, 24, 28, 21, 17, 25, 24 Apply the t-test to check whether the students have benefited from coaching?	10 Marks	L3	CO5
	Or			
24	Below are given the gain in weights (in lbs) of pigs fed on two diets A and B.	10 Marks	L3	CO5

	Diet A	25	32	30	34	24	14	32	24	30	31	35	25	-	-	-			
	Diet B	44	34	22	10	47	31	40	30	32	35	18	21	35	29	22			

Apply t-test to check, if the two diets differ significantly as regards their effect on increase in weight.

25	The following table gives for a sample of married women, the level of education and the marriage adjustment score:	10 Marks	L3	CO6

		Marriage adjustment				
		Very low	Low	High	Very high	Total
Level of Education	College	24	97	62	58	241
	High school	22	28	30	41	121
	Middle school	32	10	11	20	73
	Total	78	135	103	119	435

Apply the chi-square test to check the relation between level of education and the marriage adjustment score of married women.

Or

26	The following figures show the distribution of digits in numbers chosen at random from a telephone directory.	10 Marks	L3	CO6

Digits	0	1	2	3	4	5	6	7	8	9
frequency	1026	1107	997	966	1075	933	1107	972	964	853

Apply the chi-square test to check whether the digits may be taken to occur equally frequently in the directory at 5% level of significance?