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PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations - March 2026

Date: 12- 03- 2026

Time: 11.45am to 01.15pm

School: SOCSE	Program: B.Tech.	
Course Code: MAT2402	Course Name: Probability and Statistics	
Semester: II	Max Marks: 50	Weightage: 25%

CO - Levels	C01	C02
Marks	18	32

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks.

5Q x 2M = 10M

1	If $12P_r = 1320$ then determine r .	2 Marks	L2	C01
2	Define an exhaustive event with an example.	2 Marks	L1	C01
3	Find the number of ways of selecting 4 English, 3 Telugu, and 2 Hindi books out of 7 English, 6 Telugu, and 5 Hindi books.	2 Marks	L2	C01
4	Define conditional probability of independent events.	2 Marks	L1	C01
5	Define normal and standard normal distributions.	2 Marks	L1	C02

Part B

Answer the Questions.

Total Marks 40M

6	a	For married couples living in a certain suburb, the probability that the husband will vote on a bond referendum is 0.21, the probability that the wife will vote on the referendum is 0.28, and the probability that both will vote is 0.15. What is the probability that (i) at least one member of a married couple will vote? (ii) a wife will vote, given that her husband will vote? (ii) a husband will vote, given that his wife will vote?	6 Marks	L3	C01
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	b	From a pack of cards, 1 is accidentally dropped. (i) Find the chance that it will be either a queen or a heart. (ii) Find the chance that it will be either a King or a diamond.	4 Marks	L3	CO1
Or					
7	a	A consulting firm rents cars from three agencies such that 20% from agency X, 30% from agency Y and 50% from agency Z. 90% of the cars from X, 80% of the cars from Y and 95% of the cars from Z are in good condition. If a car is in good condition, what is the probability that it has come from (i) agency X (ii) agency Y (iii) agency Z?	7 Marks	L3	CO1
	b	The probability of a student passing in science is $\frac{4}{5}$ and that student passing in both science and maths is $\frac{1}{2}$. What is the probability of that student passing in maths knowing that he passed in science?	3 Marks	L3	CO1

8	A discrete random variable X is defined as follows:		10 Marks	L3	CO2												
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>X</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>$P(X = x)$</td> <td>K</td> <td>$2K$</td> <td>$3K$</td> <td>$4K$</td> <td>$3K$</td> <td>$2K$</td> <td>K</td> </tr> </table>				X	-3	-2	-1	0	1	2	3	$P(X = x)$	K	$2K$	$3K$
X	-3	-2	-1	0	1	2	3										
$P(X = x)$	K	$2K$	$3K$	$4K$	$3K$	$2K$	K										
	Evaluate the following: (i) The value of K . (ii) The probability distribution of X . (iii) $P(-1 \leq X \leq 3)$. (iv) $E(X)$. (v) $Var(X)$.																
Or																	
9	A continuous random variable X has probability density function (p.d.f.)		10 Marks	L3	CO2												
		$f(x) = \begin{cases} kx^2, & 0 \leq x \leq 3 \\ 0, & \text{otherwise} \end{cases}$															
	Determine (i) The constant k . (ii) $P(X \leq 2)$. (iii) $P(0 \leq X \leq 1)$. (iv) Mean and (v) Variance of X .																

10	It has been observed that 2 out of 10 bulbs manufactured by a company are defective. (i) Construct a suitable mathematical model, which represents the number of defective bulbs manufactured by the company out of a total of n bulbs. (ii) If a box of 10 bulbs is selected, what is the probability that at most 3 are defective? (iii) If a box containing 10 bulbs is selected, what is the probability that more than 7 are defective? (iv) If 50 bulbs each are picked up, what is the expected mean number of defective bulbs?		10 Marks	L3	CO2
Or					
11	a	It has been observed that 10 drops of water trickle every 5 minutes from a leaking pipe. What is the probability that in 5 minutes	6 Marks	L3	CO2

		(i) exactly 6 drops of water trickle (ii) at most 2 drops of water trickle (iii) at least 2 drops of water trickle?			
	b	If 5% of the electric bulbs manufactured by a company are defective, use Poisson distribution to find the probability that in a sample of 100 bulbs (i) none is defective. (ii) 5 bulbs will be defective.	4 Marks	L3	CO2

12	a	The average monthly sales of 'Reliable Computers' are 2500 units with a standard deviation of 100 units. The sales are found to be normally distributed over months. What are the chances that the sales during a particular month will be (i) at most 2400 units (ii) at least 2400 units (iii) between 2450 to 2550 units (Given that $P(Z \leq 0.5) = 0.6915$, $P(Z \leq 1) = 0.8413$).	5 Marks	L3	CO2
	b	Let X be an exponentially distributed random variable with rate parameter $\lambda = 1.2$. Determine (i) $P(X \geq 0.5)$, (ii) $P(1 \leq X \leq 2)$, (iii) Mean and Variance.	5 Marks	L3	CO2

Or

13	a	Scores on the GMAT are normally distributed with a mean of 525 and standard deviation of 10. What is the probability that an individual scores (i) at least 500 on the GMAT (ii) at most 500 on the GMAT (iii) between 522 and 528 on the GMAT. (Given that $P(Z \leq 2.5) = 0.99479$, $P(Z \leq 0.3) = 0.99865$).	5 Marks	L3	CO2
	b	In a certain town, the duration of a shower (in minutes) follows an exponential distribution with a mean of 5 minutes. Determine the probability that: (i) the shower will last for 10 minutes or more. (ii) the shower will last for less than 10 minutes. (iii) the shower will last between 10 and 12 minutes.	5 Marks	L3	CO2

******* BEST WISHES *******