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Vellore Institute of Technology

Continuous Assessment Test I – September 2023

Programme	:	MCA		Semester	:	Fall 2023-2024
Course Title	:	Probability and Statistics		Code	:	PMAT501L
				Slot	:	E1+TE1
Faculty	:	Dr. Saroj Kumar Dash		Class No.	:	CH2023240101711
Time	:	90 Minutes		Max. Marks	:	50

Answer ALL the Questions (5x10 = 50)

Q.No.	Sub. Sec.	Question Description	Marks
1.		A and B are two events in a sample space. Given that $P(A) = 0.4$ and $P(A \cup B) = 0.7$. (i) Find the probability that neither A nor B occurs. (ii) Find the value of $P(B)$ for which A and B are mutually exclusive. (iii) Find the value of $P(B)$ for which A and B are independent.	[3+3+4]
2.		It is observed that 50% of mails are spam. There is a software that filters spam mail before reaching the inbox with the accuracy of 99% and chances of tagging a non-spam mail as spam mail is 5%. If a certain mail is tagged as spam then find the probability that it is not a spam mail.	[10]
3.	a)	For two events A and B, we have $P(\overline{A \cup B}) = 1/6$, $P(A \cap B) = 1/4$ and $P(A) = 3/4$. Prove or disprove that events are independent but not equally likely.	[5]
	b)	Three terminals on an on-line computer system are attached to a communication line to the central computer system. The probability that any terminal is ready to transmit is 95%. Let X be the number of ready terminals at any point of time. Draw the graph of the cumulative distribution function (CDF) of the random variable X.	[5]
4		An interactive system consists of 10 terminals that are connected to the central computer. At any time, each terminal is ready to transmit with probability 0.7, independently of other terminals. (i) Find the probability that exactly 8 terminals are ready to transmit at 12 noon. (ii) Find the probability that at least 8 terminals are ready to transmit at 12 noon.	[5+5]
5.		Mass-produced computer RAMs are packed in boxes of 1000. It is believed that 1 of the RAMs in 2000 on average is substandard. (i) What is the probability that a box contains exactly 2 defective RAMs. (ii) What is the probability that a box contains at most 2 defective RAMs.	[5+5]

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