


		Reg. No.:	
		Name :	
<div style="text-align: center;">  <div style="display: inline-block; vertical-align: middle;"> <h1 style="margin: 0;">VIT[®]</h1> <p style="margin: 0;">Vellore Institute of Technology (Deemed to be University under section 3 of UGC Act, 1956)</p> </div> </div>			
Continuous Assessment Test I – January 2023			
Programme	: B.Tech (ECE)	Semester	: WS 2022-23
Course	: Random Processes	Code	: BECE207L
		Class Nbr	: CH2022235000473 CH2022235000475 CH2022235000477 CH2022235000480 CH2022235000482
Faculty	: Thiripurasundari D Ralph Samuel Thangaraj Chandrasekaran N Jeetashree Aparajeeta Kalaivanan K	Slot	: B1+TB1
Time	: 90 Minutes	Max. Marks	: 50
Answer <u>ALL</u> the questions			
Q.No.	Sub. Sec.	Questions	Marks
1.		<p>The joint Probability Mass Function (PMF) of two discrete random variables X and Y is given as follows:</p> $P_{XY}(x, y) = \begin{cases} \frac{1}{10} & ; x = 1, y = 1 \\ \frac{3}{10} & ; x = 1, y = 2 \\ \frac{2}{5} & ; x = 2, y = 1 \\ k & ; x = 2, y = 2 \end{cases}$ <p>Determine the following:</p> <p>(a) The value of k</p> <p>(b) Marginal PMF of X</p> <p>(c) Marginal PMF of Y</p> <p>(d) The conditional PMF of X given Y</p> <p>(e) The conditional PMF of Y given X</p>	10
2.		<p>Two random variables X and Y have the joint PDF given by</p> $F_{XY}(x, y) = \begin{cases} ke^{-(2x+3y)} & x \geq 0, y \geq 0 \\ 0 & otherwise \end{cases}$ <p>Determine the following:</p> <p>(i) The value of k</p> <p>(ii) The marginal PDFs of X and Y</p> <p>(iii) $P[X < 1, Y < 0.5]$</p>	10

3.	Let X denotes a random variable representing the message being transmitted on a communication channel and Y denotes the random variable depicting the noise that is added to the transmitted signal. If the noise is independent of the transmitted signal, compute the probability density function of the received data when the pdf of the message is $4e^{-8x}$; $x \geq 0$ and pdf of the noise is $4e^{-2y}$; $y \geq 0$.	10
4.	Two random variables X and Y are defined by $\bar{X} = 0$, $\bar{Y} = -2$, $\overline{X^2} = 3$, $\overline{Y^2} = 5$, $R_{XY} = -1$. Two new random variables W and V are $W = 3X - 2Y$ $V = -X + Y$ Find \bar{W} , \bar{V} , $\overline{W^2}$, $\overline{V^2}$, R_{WV}	10
5.	Find all the second order moment and central moments for the density function $f_{x,y}(x, y) = 4e^{-2(x+y)}u(x)u(y)$	10

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