



VIT

Vellore Institute of Technology

SCHOOL OF ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2025-2026

REG.NO.: RABEC0531

SLOT: A2+TA2

Programme Name & Branch : B.Tech (ECE)
Course Code and Course Name : BECE207L - Random processes
Faculty Name(s) : Dr. RAMACHANDRA REDDY; Dr. CHRISTOPHER CLEMENT J; Dr. KALAIVANI S; Dr. MALAYA KUMAR HOTA; Dr. HARIHARAN S; Dr. ASHISH P; Dr. HEMANTA KUMAR SAHU; Dr. MUGELAN RK
Class Number(s) : VL2025260500725, 0729, 0731, 0741, 0737, 6507, 0723, 0744
Date of Examination : 27- JAN - 2026
Exam Duration : 90 minutes
Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyze, 5 - Evaluate, 6 - Create)
- Course Outcomes
CO-1: Compute the moments using probability density functions of multiple random variables.
CO-2: Compute the probability density functions of multiple random variables using transformation techniques.

Q. No	Question	M	CO	BL
1.	Assume that a person's savings can be considered as a random variable with a probability function defined by the distribution $F(x)$ as, $F(x) = \begin{cases} \frac{1}{2}e^{x/40} & \text{for } x < 0 \\ 1 - \frac{1}{2}e^{-x/40} & \text{for } x \geq 0 \end{cases}$ a). Find the pdf $f(x)$ b). What is the probability that the savings made by the man would be (i) > 40, (ii) < 40, and (iii) between -40 and $+40$	10	1	3
2.	If the joint distribution function of two random variables X and Y is $F_{X,Y}(x, y) = 1 - e^{-3x} - e^{-4y} + e^{-(3x+4y)}; \quad x \geq 0 \text{ and } y \geq 0$ Using the above joint distribution function, Find the marginal distributions $F_X(x)$ and $F_Y(y)$. Also, determine the joint density function $f_{X,Y}(x, y)$ and marginal density functions $f_X(x)$ and $f_Y(y)$.	10	1	3
3.	Let X be a random variable with uniform density function defined between (0,1) and Y be another random variable with uniform density function between (0,2).	10	1	3



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✓	Find the range of random variable Z and the density function of a random variable $Z = X - Y$, If X and Y are independent of each other.		
4.	Two random variables X_1 and X_2 have the joint characteristic function $\varphi_{X_1, X_2}(\omega_1, \omega_2) = [(1 - 2j\omega_1 - 4j\omega_2 + 8\omega_1\omega_2)]^{-N/2}, N > 0$. Find the covariance between X_1 and X_2 .	10	2
5.	If X and Y are two independent exponential random variables with same parameter λ , find the joint density function $f_{UV}(u, v)$, where $U = X + Y$ and $V = X - Y$. Also find whether U and V are statistically independent. [Hint: $f_X(x) = \lambda e^{-\lambda x} u(x)$]	10	2
