PVP 23

Code: 23BS1304

II B.Tech - I Semester – Regular Examinations - DECEMBER 2024

PROBABILITY THEORY AND STOCHASTIC PROCESS

(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	Define probability with an example.	L1	CO1
1.b)	Define a Mutually Exclusive Event with an example.	L1	CO1
1.c)	Briefly explain about Moment Generating Function	L2	CO2
1.d)	State Chebychev’s Inequality.	L2	CO2
1.e)	Explain about marginal density function.	L2	CO3
1.f)	Explain any two properties of Expectations	L2	CO3
1.g)	Define Stationary Random Process.	L1	CO4
1.h)	Define LTI System.	L1	CO4
1.i)	Explain Power Spectral Density.	L2	CO5
1.j)	What is Noise Margin?	L2	CO5

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	When two dice are thrown determine the probability of the following events i. A={Sum=7} ii. B={8<Sum≤11} iii. C= {10<Sum} iv. P(B∩C) v. Find if the events B and C are independent or not.		L3	CO1	10 M
OR					
3	Discuss the following probability distribution and density functions of the following random variables: (i) Binomial distribution (ii) Gaussian distribution (iii) Uniform distribution. (iv) Rayleigh distribution.		L2	CO1	10 M
UNIT-II					
4		Explain about Moments about its origin and Moments about its mean.	L2	CO2	10 M
OR					
5		Find the Mean using the Moment Generating function for the Uniform Random Variable.	L3	CO2	10 M

UNIT-III					
6	Given the function $f_{X,Y}(x,y) = \begin{cases} b(x+y)^2; & -2 < x < 2, -3 < y < 3 \\ 0 \quad ; & elsewhere \end{cases}$ (a) Find the constant b such that this is a valid density function. (b) Determine the marginal density functions.		L3	CO3	10 M
OR					
7	a)	Explain about Central limit Theorem for unequal and equal distributions.	L2	CO3	5 M
	b)	Explain about "jointly Gaussian random variables".	L2	CO3	5 M
UNIT-IV					
8	Explain about first order, second order, wide-sense and strict sense stationary random process.		L2	CO4	10 M
OR					
9	a)	Explain about mean-ergodic random process.	L2	CO4	5 M
	b)	If x (t) is a stationary random process having mean = 3 and auto correlation function : $R_{XX}(\tau) = 9 + 2e^{-\|\tau\|}$. Find the mean square and variance of the random variable.	L4	CO4	5 M
UNIT-V					
10	Derive a relationship between power spectral density and Auto correlation function.		L3	CO4	10 M
OR					

11	a)	The power spectral density of a stationary. random process is given by $S_{xx}(\omega) = A$; $-K \leq \omega \leq K$ $= 0$; otherwise Find the auto correlation function.	L4	CO4	5 M
	b)	Explain briefly about different types of noise.	L2	CO5	5 M