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SRM Institute of Science and Technology College of Engineering and Technology SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu Academic Year: 2023-2024 (EVEN) C1-Slot SET-A

Date: 24/04/2024

Duration: 1 hr 40 Minutes.

	t: FT-IV rse Code & Title: 21MAB203T-Probability and Stochastic r/Sem: II/IV	Processes Di	ax.			50					s (PC))		
	At the end of this course, learners will be able to:	Learning Bloom's Level	1	2	3	4	5	6	7	8	9	10	11	12
	Se Outromes (CO)	4 N	3	3	1									
CO2	Evaluate the characteristics of discrete and continuous random variables Explain the model and analyze systems using two-dimensional random variables	4	3	3	n	E 440	2							
CO3	Classify limit theorems and evaluate upper bounds using various inequalities	4	3	3										
CO4	Analyze the characteristics of random processes	4	3	3					1000	116				
CO5	Examine problems in spectral density functions and linear time-invariant systems	4	3	3						9				

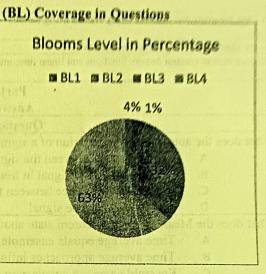
Part-A $(1 \times 4 = 4 \text{ Marks})$

	Answer ALL the Questions				
Q. No	Question	Marks	BL	CO	PO
1.	What does the autocorrelation function of a signal measure?	1	1	4	1,2
	A. The similarity between the signal and its delayed version			All the second	
1	B. The energy of the signal in frequency domain	andre and the			
	C. The phase difference between the signal and its Fourier transform				
	D. The linearity of the signal	and the same of		100	
2.	What does the Mean Ergodic Theorem state about the time average of a random process?	1	1	4	1,2
	A. Time average equals ensemble average.	107			
	B. Time average approaches infinity.	496 - 1960			
	C. Ensemble average equals zero.		Iller I		Maria de
	D. Ensemble average approaches infinity.				
3.	The mean square value of a WSS process is equal to the total area under the graph of	1	1	5	1,2
7.4	A. Auto correlation B. Cross Correlation			17. 43	86
	C. Spectral density D. Cross Power spectral Density				
4.	Which of the following is not a valid power spectral density function	1	2	5	1,2
	A. $\frac{1}{(1+\omega^2)^2}$ B. $\frac{4}{\omega^2+4}$		0		
	$C_{\nu} = \frac{\omega^2}{D_{\nu}}$				
L	$\omega^4 + 5\omega^2 + 9$ ω^2				76 7

Q.No	Part – B (8 x 2 = 16 Marks) Answer any two questions	Mar ks	BL	СО	PO
5.	If $X(t) = Y \cos t + Z \sin t$ for all t where Y and Z are	8	4.	4	1,2
	independent binary RVs, each of which assumes the values -1 and $+2$ with probabilities $\frac{2}{3}$ and $\frac{1}{3}$ respectively, prove that $\{X(t)\}$	1			
	is wide-sense stationary.				
6.	A linear time invariant system has an impulse response $h(t) =$	8	4	5	1,2
	$e^{-\beta t}U(t)$, where U(t) is the unit step function. Find the power spectral density of the output Y(t) corresponding to the input X(t).	\$	7. 5. 740.	11/2/23-	
7(i).	Find the variance of the stationary process $\{X(t)\}\$, whose ACF is given by $R(\tau) = \frac{25\tau^2 + 36}{6.25\tau^2 + 4}$	4	3	4	1,2
7(ii).	Find the average power of the process $S_{XX}(\omega) = \frac{1}{4+\omega^2}$	4	3	5	1,2

	Part C (15 x 2 = 30 Marks) Answer any two question				
8.	Given a RV Y with characteristic function $\phi(\omega) = E\{e^{i\omega Y}\} = E\{\cos \omega Y + i \sin \omega Y\}$ and a random process defined by $X(t) = \cos(\lambda t + Y)$, show that $\{X(t)\}$ is stationary in the wide sense if $\phi(1) = \phi(2) = 0$.	15	1	1 31	1,2
9.	Find the mean square value of the process $S(\omega) = \frac{\omega^2 + 9}{\omega^4 + 5\omega^2 + 4}$	15	4	5	1,2
10(i).	If $\{X(t)\}\$ is a WSS process with autocorrelation $R(\tau) = Ae^{-\alpha \tau }$ determine the second order moment of the RV $X(8) - X(5)$.	8	1/8 %	4	1/2
10(ii).	The power spectral density function of a zero mean WSS process $\{X(t)\}\$ is given by $S_{XX}(\omega) = \begin{cases} \pi, & \omega < 1 \\ 0, & elsewhere \end{cases}$. Find $R(\tau)$	7	3	4	1,2

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions CO COVERAGE IN PERCENTAGE 60 50 30 20 C01 C02 C03 C04 C05



Name of the Student:

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Q. No	СО	Marks Obtained	Total
1	2	The second secon	
2	2	A PART OF THE PART	
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03	101 Tale 1	Part- B (8*2= 16 Marks)	(A) (1 - 7 (10))
5	2	The state of the s	11/19/1/19/
6	3	THE SHARM CONTRACTOR	
7(i)	2	The state of the s	a of the AV Statement was become
7(ii)	3		
		Part- C (15*2= 30 Marks)	BING TO BUILDING THE STREET THE
8	2		
9	3		Application of the second seco
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10(ii)	3	THE PARTY OF THE P	A COMPANY OF THE PARTY OF THE P

Evaluation Sheet

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