Q.P. Code: 16EC404 **R16**

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations Nov/Dec 2018

RANDOM SIGNAL & STOCHASTIC PROCESSES

(ECE)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 **a** State and Prove Baye's theorem. 5M

b Determine probabilities of Correct and Error Transmission of symbols for an elementary binary symmetric channel by assuming your own values? 7M

OR

2 **a** State all the properties of Probability Density Function (PDF)? 4M

A random variable has PDF $f_X(x)$ = a $e^{-|b|x}$ Where 'a' & 'b' are constant.

b i) Find relation between 'a' and 'b'?. ii) Find and plot Cumulative Distribution Function (CDF)? 8M

UNIT-II

3 **a** Prove that PDF of sum of two random variable is equal to linear convolution between marginal PDFs. 5M

b The joint PDF between random variables 'X' & 'Y' is given by

$$f_{x,y}(x,y) = \begin{cases} b(x+y)^2 ; -2 < x < 2 \text{and} -3 < y < 3 \\ 0 \quad ; \text{elsewhere} \end{cases}$$ 7M

i) Find constant 'b'?

ii) Find marginal PDFs $f_X(x)$ and $f_Y(y)$?

OR

4 **a** Write the expression and explain the importance of following statistical parameters. 6M

i) Mean square value ii) Variance iii) Correlation

b Find the Covariance between two random variables Y_1 = X Cosθ + Y Sinθ and Y_2= -X Sinθ + Y Cosθ ? 6M

UNIT-III

5 **a** Discuss about following random process 4M

i) Wide Sense Stationary (WSS) ii) Ergodic

b A random process X(t) = at+b, where 'b' is constant and 'a' is random variable which is uniformly distributed between -2 to +2. Find following statistical parameters of random process i) Mean value ii) Mean square value iii) Correlation and iv) Is X(t) WSS random process. 8M

OR

6 **a** State any 'THREE' properties of Auto Correlation Function (ACF). 6M

b ACF of random process X(t) is given by $R_{XX}(\tau) = \frac{(4\tau^2+100)}{(\tau^2+4)}$. 6M

Find i) Average value ii) AC Power iii) Total power of random process

UNIT-IV

7	**a**	Derive the expression for Power Spectral Density (PSD).	6M
	b	Find Power of random process X(t) whose PSD is given by $S_{XX}(\omega) = \frac{3}{(49+\omega^2)^4}$?	6M

OR

8	**a**	State and prove any 'THREE' properties of Cross PSD.	6M
	b	Find and plot PSD of random process X(t) whose ACF is given by $R_{XX}(\tau) = e^{-2\alpha\|\tau\|}$?	6M

UNIT-V

9	**a**	Output of any LTI system is equal to linear convolution of input and impulse response of system. Justify	4M
	b	Find the Mean value & ACF response of LTI system?	8M

OR

10	**a**	Explain about following random process i)Band pass ii) Band limited and iii) Narrow band	9M
	b	Find rms band width of random process whose PSD is given $S_{XX}(\omega) = \frac{2}{(1+\frac{\omega^2}{4})^2}$?	3M

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