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

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations Nov/Dec 2019

RANDOM SIGNAL AND STOCHASTIC PROCESSES

(Electronics & Communication Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1 **a** Define the following with examples. **7M**
i. Sample space ii. Event iii. Mutually exclusive events. iv. Independent events.

b Two cards are drawn from a 52 –card deck (the first is not replaced). **5M**
i) Given that first card is a queen, what is the probability that the second is also a Queen.
ii) Repeat part (i) but replace the first card with a queen and the second card with a 7.

OR

2 **a** Explain about Joint and Conditional probability and also state the properties of Joint and Conditional probability. **6M**

b i) Write axioms of probability. **6M**
ii) Explain probability as a relative frequency.

UNIT-II

3 **a** Explain Covariance and Correlation coefficients. **6M**

b Discuss about Joint characteristic function and its properties. **6M**

OR

4 **a** Define Expected value of a function of two random variables. **6M**

b Explain about Joint moment generating functions? And its properties. **6M**

UNIT-III

5 **a** Define first order, second, wide-sense and strict sense stationary process. **5M**

b Prove the following **7M**
i) $|R_{XX}(\tau)| \leq R_{XX}(0)$ ii) $R_{XX}(-\tau) = R_{XX}(\tau)$ iii) $R_{XX}(0) = E[x^2(t)]$

OR

6 **a** Write a short note on ergodic random processes. **5M**

b Determine whether the random process $X(t)=A\cos(\omega_0 t+\theta)$ is wide sense stationary or not. Where A, ω_0 are constants and θ is a uniformly distributed random variable on the Interval $(0,2\pi)$. **7M**

UNIT-IV

7 **a** State and prove properties of PDS. **6M**

b The PSD of X(t) is given by **6M**
$S_{XX}(\omega)=1+\omega^2$ for $|\omega| <1$
0 otherwise
Find the Autocorrelation function.

OR

8 **a** Derive the relation between Autocorrelation function and Power spectral density spectrum. **6M**

b Find the PSD of stationary random process for which the autocorrelation function is **6M**
$R_{XX}(\tau) = 6e^{-\alpha|\tau|}$

UNIT-V

9	**a**	Calculate the mean of the system response Y (t).	**6M**
	b	If X(t) is a differentiable WSS random process and Y(t)=dX(t)/dt, find an expression for $S_{YY}(\omega)$.	**6M**
		OR	
10	**a**	Write a short note on Band Pass random process.	**6M**
	b	Derive the expression for Autocorrelation function of response of an LTI system.	**6M**

*** END ***