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

Question Paper Code: 34024

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Electronics and Communication Engineering

01UMA424 - PROBABILITY AND RANDOM PROCESSES

(Regulation 2013)

Duration: One hour　　　　　　　　　　　　Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The probability of impossible event is
   (a) 1　　(b) 0　　(c) 2　　(d) 0.5

2. In which probability distribution, Variance and Mean are equal?
   (a) Binomial　　(b) Poisson　　(c) Geometric　　(d) None of these

3. If two random variables X and Y are independent, then covariance is
   (a) θ　　(b) 1　　(c) 0　　(d) λ

4. If $X=Y$ then correlation coefficient between them is
   (a) 0　　(b) ∞　　(c) 1　　(d) ± 1

5. Every Strongly stationary process of order 2 is a
   (a) Orthogonal process　　(b) Stationary Process
   (c) WSS Process　　(d) None of these

6. If both T and S are discrete, then the random process is called
   (a) stationary　　(b) discrete random sequence
   (c) random process　　(d) Poisson process

7. Autocorrelation function is an ___________ function.

(a) odd
(b) even
(c) neither Even nor odd
(d) stationary

8. If $R_{xy}(\tau) = \mu_X \times \mu_Y$ then *X(t)* and *Y(t)* are called

(a) Independent
(b) Orthogonal
(c) Stationary
(d) none of these

9. Which of the following system is Causal?

(a) *y(t)=x(t+a)*
(b) *y(t)= x(t-a)*
(c) *(t)= a x(t+a)*
(d) *y(t)= x(t) – x(t-a)*

10. Colouted Noise means a noise that is

(a) white
(b) not white
(c) coloured
(d) none of these

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. A random variable *X* has the following probability distribution:

x	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
P(x)	*0*	*k*	*2k*	*3k*	*3k*	k^2	$2k^2$	$7k^2 + k$

Find (i) the value of k, (ii) $P(1.5 < X < 4.5 / X > 2)$ and (iii) the smallest value of λ for which $P(X \leq \lambda) > \frac{1}{2}$. (8)

12. X is a normal random variable with mean 1 and variance 4. Find the density function of Y where $Y = 2X^2 + 1$. (8)

13. Discuss the stationarity of the random process $X(t) = A\cos(\omega_0 t + \theta)$ if A and ω_0 are constants and θ is uniformly distributed random variable in $(0, 2\pi)$. (8)

14. State and Prove Wiener-Khintchine theorem, and hence find the power Spectral density of a WSS process *X(t)* which has an autocorrelation

$$R_{xx}(\tau) = A_0\left[1 - \frac{|\tau|}{T}\right], \quad -T \leq \tau \leq T. \quad (8)$$

15. Given the power spectral density of the continuous process, $\frac{\omega^2 + 2}{\omega^4 + 13\omega^2 + 36}$.

Find the mean square value of the process. (8)

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