UNIT - III
RANDOM PROCESSES-TEMPORAL CHARACTERISTICS

1. A random process is defined as X (t) = A. cos (ωt+θ), where θ, ω are constants and A is a random variable. Then X(t) is stationary if
   a. E(A)=2
   b. E(A)=0
   c. A is a Gaussian with non zero mean
   d. A is a Rayleigh with non zero mean

2. A random process is defined as A cos (ω_0t+θ), where θ is a random variable over (-Π, Π). Then second moment of the process is
   a. 0
   b. ½
   c. ¼
   d. 1

3. For the random process X(t)=A cos (ωt) where ω is a constant and a is a uniform random variable over (0,1), the mean square value is
   a. 1/3
   b. 1/3 cos(ωt)
   c. 1/3 $\cos^2$(ωt)
   d. 1/9

4. A stationary random process X(t) is periodic with period 2T. its auto correlation function is
   a. A non periodic
   b. Periodic with period T
   c. Periodic with period 2T
   d. Periodic with period T/2

5. Consider a random process X (t) defined as Acos (ωt) + Bsin(ωt) where ω is constant and A, B are random variables which of the following is a condition for its stationary?
   a. E(A)≠0; E(B)≠0
   b. Both A and b should be independent
   c. E(A)=0; E(B)=0

d. $E(AB)\neq 0$

6. Two WSS processes X(t) and Y(t) are jointly wide sense stationary if?..
   a. $E(X(t).Y(t))=E(X(t)).E(Y(t))$
   b. $Cov(X(t).Y(t))=var(X(t)).var(Y(t))$
   c. $R_{XY}(t, t+\tau)=R_{xy}(\tau)$
   d. E(X(t))=constant & E(Y(t))=constant
7. For the random processes $X(t)= A \cos(\omega t+\theta)$ & $Y(t)=A. \sin(\omega t+\theta)$, where A and w are constants and is a uniform random variable over $(0,2\Pi)$,
   a. $R_{XY}(\tau)=R_{YX}(\tau)$
   b. $R_{YX}(\tau)= R_{XY}(-\tau)$
   c. $R_{XY}(\tau)=-R_{YX}(\tau)$
   d. $R_{XY}(-\tau)=-R_{YX}(\tau)$
8. X (t) is a Gaussian process with mean =2 and auto correlation function 5. $E^{-0.2|\tau|}$. Then the variance of the random variable X(2) is
   a. 21
   b. 25
   c. 4
   d. 1
9. X (t) is a random process defined as $X(t)=\cos\Omega t$, where Ω is a uniform random variable over $(0, w_0)$. Then the mean of X(t) is zero at t=___
   a. $3\Pi/2w_0$
   b. Π/w_0
   c. $\Pi/2w_0$
   d. $\Pi/4w_0$
10. For an ergodic process,

a. Mean is necessarily zero

b. Mean square value is infinity

c. Mean square value is independent of time

d. All time averages are zero

11. A random process is a random variable that is a function of_____

    a. Time

    b. Temperature

    c. Both

    d. None

12. A random process is said to be independent , if $f_{XY}(x,y_1:t_1,t_2) \neq f_X(x_1:t_1).f_Y(y_1:t_2)$ is
    a. True
    b. False
    c. Both
    d. None
13. A stationary random process X(t) will have its ____properties not affected by a shift in time
    a. Mathematical
    b. Normal
    c. Statistical
    d. None
14. All strict sense stationary (SSS) process are WSS it is_____
    a. True
    b. False
    c. Both
    d. None
15. If all the statistical properties of X(t) are not affected by time shift, it is referred as_____
    a. SSS
    b. WSS
    c. Both
    d. None

16. _____averages are computed by considering all the sample functions.
    a. Time
    b. Ensemble
    c. Both
    d. None

17. A random process X (t) is said to be ergodic or ergodic in mean sense, if its statistical average is _____ to its time.
    a. Equal

b. Not equal
c. Both
d. None

18. $R_{XX}(\tau +\_ T)=R_{XX}(\tau)$ then it is_____
    a. Periodic
    b. Non periodic
    c. Both
    d. None

19. $R_{XY}(\tau)$=_____
    a. $R_{YX}(\tau)$
    b. $R_{YX}(-\tau)$
    c. $R_{XX}(\tau)$
    d. None

20. Correlation coefficient $\rho_{XX}(t_1,t_2)$=_____

    a.$C_{XY}(t_1,T_2)/(C_{XX}(t_1,t_1))^{1/2}.(C_{XX}(t_2,t_2))^{1/2}$

    b. $C_{XX}(t_1,t_2)/(C_{XY}(t_1,t_1))^{1/2}.(C_{XY}(t_2,t_2))^{1/2}$

    c. $C_{XX}(t_1,t_2)/(C_{XX}(t_1,t_1))^{1/2}.(C_{XX}(t_2,t_2))^{1/2}$

    d. none

1. b	2. b	3. c	4. c	5. c
6. c	7. b	8. d	9. b	10. c
11. a	12. b	13. c	14. a	15. c
16. b	17. a	18. a	19. b	20. c

ANSWERS: