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College of Engineering & Technology

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Department of Electronics and Communication Engineering**EC8491 – Communication Theory****Unit III - MCQ Bank**

- Let X be a random variable with probability distribution function $f(x) = 0.2$ for $|x| < 1$
 $= 0.1$ for $1 < |x| < 4$
 $= 0$ otherwise
The probability $P(0.5 < x < 5)$ is _____
 - 0.3
 - 0.5
 - 0.4**
 - 0.8
- $E(XY) = E(X)E(Y)$ if x and y are independent.
 - True**
 - False
- If E denotes the expectation the variance of a random variable X is denoted as?
 - $(E(X))^2$
 - $E(X^2) - (E(X))^2$**
 - $E(X^2)$
 - $2E(X)$
- X is a variate between 0 and 3. The value of $E(X^2)$ is _____
 - 8
 - 7
 - 27
 - 9**

5. The random variables X and Y have variances 0.2 and 0.5 respectively. Let $Z = 5X - 2Y$. The variance of Z is?
- (a) 3
 - (b) 4
 - (c) 5
 - (d) 7**
6. Which of the following mentioned standard Probability density functions is applicable to discrete Random Variables?
- (a) Gaussian Distribution
 - (b) Poisson Distribution**
 - (c) Rayleigh Distribution
 - (d) Exponential Distribution
7. What is the area under a conditional Cumulative density function?
- (a) 0
 - (b) Infinity
 - (c) 1**
 - (d) Changes with CDF
8. When do the conditional density functions get converted into the marginally density functions?
- (a) Only if random variables exhibit statistical dependency
 - (b) Only if random variables exhibit statistical independency**
 - (c) Only if random variables exhibit deviation from its mean value
 - (d) If random variables do not exhibit deviation from its mean value
9. Mutually Exclusive events _____
- (a) Contain all sample points
 - (b) Contain all common sample points
 - (c) Does not contain any sample point
 - (d) Does not contain any common sample point**

10. What would be the probability of an event 'G' if H denotes its complement, according to the axioms of probability?
- (a) $P(G) = 1 / P(H)$
 - (b) $P(G) = 1 - P(H)$**
 - (c) $P(G) = 1 + P(H)$
 - (d) $P(G) = P(H)$
11. If $f(x)$ is a probability density function of a continuous random variable, then $\int_{-\infty}^{\infty} f(x)dx = ?$
- (a) 0
 - (b) 1**
 - (c) Undefined
 - (d) Insufficient data
12. The variable that assigns a real number value to an event in a sample space is called _____
- (a) Random variable**
 - (b) Defined variable
 - (c) Uncertain variable
 - (d) Static variable
13. A random variable that assumes a finite or a countably infinite number of values is called _____
- (a) Continuous random variable
 - (b) Discrete random variable**
 - (c) Irregular random variable
 - (d) Uncertain random variable
14. A random variable that assume a infinite or a uncountably infinite number of values is called _____
- (a) Continuous random variable**
 - (b) Discrete random variable
 - (c) Irregular random variable
 - (d) Uncertain random variable

15. If $P(x) = 0.5$ and $x = 4$, then $E(x) = ?$

- (a) 1
- (b) 0.5
- (c) 4
- (d) 2**

16. The expected value of a random variable is its _____

- (a) Mean**
- (b) Standard Deviation
- (c) Mean Deviation
- (d) Variance

17. The covariance of two independent random variable is _____

- (a) 1
- (b) 0**
- (c) -1
- (d) Undefined

18. In random experiment, observations of random variable are classified as _____

- (a) Events**
- (b) Composition
- (c) Trials
- (d) Functions

19. The expectation of a random variable X (continuous or discrete) is given by _____

- (a) $\sum xf(x)$, $\int xf(x)$**
- (b) $\sum x^2 f(x)$, $\int x^2 f(x)$
- (c) $\sum f(x)$, $\int f(x)$
- (d) $\sum xf(x^2)$, $\int xf(x^2)$

20. Mean of a constant 'a' is _____
- (a) 0
 - (b) a**
 - (c) $a/2$
 - (d) 1
21. Variance of a constant 'a' is _____
- (a) 0**
 - (b) a
 - (c) $a/2$
 - (d) 1
22. The shape of the Normal Curve is _____
- (a) Bell Shaped**
 - (b) Flat
 - (c) Circular
 - (d) Spiked
23. Normal Distribution is symmetric is about _____
- (a) Variance
 - (b) Mean**
 - (c) Standard deviation
 - (d) Covariance
24. For a standard normal variate, the value of mean is?
- (a) Infinite
 - (b) 1
 - (c) 0**
 - (d) Not defined
25. The area under a standard normal curve is?
- (a) 0
 - (b) 1**
 - (c) Infinite
 - (d) Not defined

26. For a standard normal variate, the value of Standard Deviation is _____
- (a) 0
 - (b) 1**
 - (c) Infinite
 - (d) Not defined
27. Normal Distribution is also known as _____
- (a) Cauchy's Distribution
 - (b) Laplacian Distribution
 - (c) Gaussian Distribution**
 - (d) Lagrangian Distribution
28. For a normal distribution its mean, median, mode are equal.
- (a) True**
 - (b) False
29. Stochastic process are
- (a) Random in nature
 - (b) function of time
 - (c) Random in nature and are a function of time**
 - (d) None of the mentioned
30. Stochastic processes are
- (a) Strict sense stationary process
 - (b) Wide sense stationary process**
 - (c) All of the mentioned
 - (d) None of the mentioned
31. Gaussian process is a
- (a) Strict sense stationary process
 - (b) Wide sense stationary process
 - (c) All of the mentioned**
 - (d) None of the mentioned

32. Power spectral density function is a?
- (a) Real and even function
 - (b) Non negative function
 - (c) Periodic
 - (d) All of the mentioned**
33. Energy spectral density defines
- (a) Signal energy per unit area
 - (b) Signal energy per unit bandwidth**
 - (c) Signal power per unit area
 - (d) Signal power per unit bandwidth
34. How can power spectral density of non periodic signal be calculated?
- (a) By integrating
 - (b) By truncating**
 - (c) By converting to periodic
 - (d) None of the mentioned
35. What is Wiener-Khinchin theorem?
- (a) Spectral density and auto-covariance makes a Fourier transform pair
 - (b) Spectral density and auto-correlation makes a Fourier transform pair**
 - (c) Spectral density and variance makes a Fourier transform pair
 - (d) None of the mentioned
36. According to Parseval's theorem the energy spectral density curve is equal to?
- (a) Area under magnitude of the signal
 - (b) Area under square of the magnitude of the signal**
 - (c) Area under square root of magnitude of the signal
 - (d) None of the mentioned

37. Autocorrelation is a function which matches
- (a) Two same signals
 - (b) Two different signal
 - (c) One signal with its delayed version**
 - (d) None of the mentioned
38. Autocorrelation is a function of
- (a) Time
 - (b) Frequency
 - (c) Time difference**
 - (d) Frequency difference
39. Autocorrelation is maximum at _____
- (a) Unity
 - (b) Origin**
 - (c) Infinite point
 - (d) None of the mentioned
40. Autocorrelation function of periodic signal is equal to _____
- (a) Energy of the signal
 - (b) Power of the signal**
 - (c) Its area in frequency domain
 - (d) None of the mentioned
41. Autocorrelation is a _____ function.
- (a) Real and even**
 - (b) Real and odd
 - (c) Complex and even
 - (d) Complex and odd
42. Autocorrelation function of white noise will have?
- (a) Strong peak**
 - (b) Infinite peak
 - (c) Weak peak
 - (d) None of the mentioned

43. For random process $X = 6$ and $R_{xx}(t, t+\tau) = 36 + 25 \exp(-|\tau|)$. Consider following statements:

- (i) $X(t)$ is first order stationary.
- (ii) $X(t)$ has total average power of 36 W.
- (iii) $X(t)$ is a wide sense stationary.
- (iv) $X(t)$ has a periodic component.

Which of the following is true?

- (a) 1, 2 and 4
- (b) 2, 3 and 4
- (c) 2 and 3**
- (d) Only 3

44. White noise with power density $N_0/2 = 6 \text{ microW/Hz}$ is applied to an ideal filter of gain 1 and bandwidth W rad/s. If the output's average noise power is 15 watts, the bandwidth W is

- (a) 2.5×10^{-6}
- (b) 2.5×10^{-6}**
- (c) 5×10^{-6}
- (d) 5×10^{-6}

45. A stationary random process $X(t)$ is applied to the input of a system for which $h(t) = u(t) t^2 e^{-8t}$. If $E[X(t)] = 2$, the mean value of the system's response $Y(t)$ is

- (a) 1/128
- (b) 1/64
- (c) 3/128**
- (d) 1/32