

UNIT-V

NOISE SOURCES & INFORMATION THEORY

MULTIPLE CHOICE QUESTIONS:

1. A random process $X(t)$ of mean 3 is applied to a delay element. The mean of the output process is
 - a.) 2
 - b.) 3
 - c.) 1.5
 - d.) 9
2. A random process with PSD $k\omega/\text{Hz}$ for $-\infty < f < \infty$ is passed through a system with transfer function $H(f) = 2$ for $-B \leq f \leq +B$ and zero elsewhere. The output power of the system is
 - a.) Bk
 - b.) $2Bk$
 - c.) $Bk/2$
 - d.) B^2k
3. $X(t)$ is a WSS process with zero mean and is the input of an LTI system with $H(\omega) = 1/(j\omega + 2)$. If $R_{xx}(\tau) = e^{-2|\tau|}$, the area enclosed by the auto correlation function of output process is
 - a.) 1
 - b.) $\frac{1}{4}$
 - c.) $\frac{1}{16}$
 - d.) $\frac{1}{2}$
4. The equivalent noise temperature of an amplifier with noise figure of 0.2 dB at a temperature of 290°K is
 - a.) 13.6°
 - b.) 15°K
 - c.) 20°K
 - d.) 14.8°K
5. The noise temperature of parallel combination of two resistors $R_1 = R_2 = R$ operating at noise temperature T_1 and T_2 respectively is
 - a) $T_1 + T_2$
 - b) $(T_1 + T_2)^2$
 - c) $(T_1 + T_2)/2$
 - d) $T_1 \cdot T_2$
6. The available noise power unit Bandwidth at the input of an antenna with a noise temperature of 15°K , feeding into a microwave amplifier with $T_e = 20^\circ\text{K}$ is
 - a.) $483 \cdot 10^{-23} \omega$
 - b.) $4.83 \cdot 10^{-23} \omega$
 - c.) $48.3 \cdot 10^{-23} \omega$
 - d.) 483ω

7. In defining the noise bandwidth of a real system, it is required that the noise power N_1 passed by ideal filter and noise power N_2 passed by real filter should be related as
 - a.) $N_1 = 2N_2$
 - b.) $N_2 = 2N_1$
 - c.) $N_1 + N_2 = 1$
 - d.) $N_1 = N_2$
8. Which of the following is an expression for the noise figure of a two-port network?
 - a.) $g_a \cdot N_i (F - 1)$
 - b.) $1 + T_e$
 - c.) $N_0 / g_a \cdot N_i$
 - d.) kTB
9. a TV receiver has $4k\Omega$ input resistance and operates in a frequency range of 54-56MHz. at an ambient temperature of 27°C , the RMS thermal noise voltage at the input of the receiver is
 - a.) $25\mu\text{V}$
 - b.) $19.9\mu\text{V}$
 - c.) $14.8\mu\text{V}$
 - d.) $22\mu\text{V}$
10. A system is said to be LTI system if it holds_____
 - a.) Principle of superposition
 - b.) Principle of homogeneity
 - c.) Both
 - d.) None
11. Noise bandwidth $B_N = 1 / (|H(\omega)|^2) \cdot \int_0^\infty |H(\omega)|^2 d\omega$ is
 - a.) True
 - b.) False
 - c.) Both
 - d.) None
12. For quadrature component of noise $E[n_c(t) \cdot n_s(t)] = \underline{\hspace{2cm}}$
 - a.) 0
 - b.) 1
 - c.) 2
 - d.) None
13. Thermal noise is given by _____watts
 - a.) kT/B
 - b.) kB/T
 - c.) kTB
 - d.) none
14. thermal noise voltage is given by $V_n = \underline{\hspace{2cm}}$
 - a.) $4RkTB$
 - b.) $RkTB$
 - c.) kTB
 - d.) $\sqrt{4RkTB}$

15. Total noise power available at the output of the two port network is $N_{a0} =$ _____

- a.) $g_a k(T_s + t_e) B_N$
- b.) $g_a k(T_s - t_e) B_N$
- c.) $(T_s + t_e) B_N$
- d.) none

16. available noise power spectral density $G_{a0} = g_a(f) \cdot K(T_0 + T_e)/2$ is _____

- a.) true
- b.) false
- c.) inadequate
- d.) none

17. effective noise temperature $T_e =$ _____

- a.) $T_{e1} - T_{e2}/g_{a1}$
- b.) $T_{e1} \cdot T_{e2}/g_{a1}$
- c.) $T_{e1} + T_{e2}/g_{a1}$
- d.) None

ANSWERS:

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