

Assignment VII (Switches and Link budget)

- Tick the most appropriate answer.
 - All symbols have their usual meaning.
-

1. Available noise power from two resistors R_1 and R_2 over a bandwidth B Hz and at a temperature T are N_1 and N_2 respectively. If $R_1 > R_2$ then

- (a) $N_1 > N_2$ (b) $N_1 < N_2$ (c) $N_1 = N_2$ (d) none of these.

Ans. (c) $N_1 = N_2$.

2. Rayleigh-Jeans approximation is

- (a) $hf/KT = 1$ (b) $hf/KT \ll 1$ (c) $hf/KT \gg 1$ (d) $\exp(hf/KT) = 1$.

Ans. (b) $hf/KT \ll 1$.

3. Equivalent noise voltage due to one resistor R is

- (a) directly proportional to R (b) inversely proportional to R (c) proportional to the square root of R
(d) inversely proportional to square root of R .

Ans. (c) proportional to the square root of R .

4. For non-line of sight scenario, the path loss exponent n has the value

- (a) $n=1$ (b) $n < 1$ (c) $n = 2$ (d) $n > 2$.

Ans. (d) $n > 2$

5. Which of the device can improve signal to noise ratio (SNR) of a millimetre-wave system?

- (a) BPF (b) mixer (c) LNA (d) both (a) and (c).

Ans. (d) both (a) and (c).

6. Tick the wrong statement for a fixed millimetre-wave link.

- (a) Received power decreases with increasing frequency.
(b) Received power decreases with antenna gain.
(c) Received power decreases with polarization mismatch.
(d) Received power decreases with increasing noise in the channel.

Ans. (d) Received power decreases with increasing noise in the channel.

7. Which of the mentioned digital modulation scheme offers highest bandwidth efficiency?

- (a) QPSK (b) binary PSK (c) 16-QAM (d) 64-QAM.

Ans. (d) 64-QAM.

8. For a millimetre wave receiver noise floor is -110 dBm. If required minimum SNR is 10 dB and link margin is 3 dB then the received signal power should be at least

- (a) 2×10^{-14} W (b) 1×10^{-15} W (c) 2×10^{-11} W (d) 1×10^{-11} W.

Ans. (a) 2×10^{-14} W.

9. If the distance between the transmitting and receiving station are fixed then received power depends on

- (a) gain of transmitting antenna (b) gain of receiving antenna (c) operating frequency (d) all of these.

Ans. (d) all of these.

10. If receiving and transmitting antennas have 45° polarization difference then the received power with respect to same zero polarization difference system will be

- (a) same (b) 0.25 (c) 0.5 (d) zero.

Ans. (c) 0.5 .

11. The all conditions of Friis transmission equation can be achieved in

- (a) anechoic chamber (b) at high power (c) small distance and low frequency (d) high frequency applications.

Ans. (a) anechoic chamber.

12. Bit error rate at receiver depends on

(a) demodulation scheme (b) noise power (c) signal strength (d) all of these.

Ans. (d) all of these.

13. Noise floor is

(a) minimum signal power required for detection (b) signal that is created by the sum of all noises in a system (c) ratio of thermal noise and desired signal power (d) none of these.

Ans. (b) signal that is created by the sum of all noises in a system.

14. For a non-line of sight millimetre-wave indoor communication channel the suggested extra fade margin is typically

(a) 3 dB (b) 10 dB (c) 30 dB (d) 100 dB.

Ans. (c) 30 dB.

15. For a solid state switch, maximum power handling capability is

(a) independent of frequency (b) inversely proportional to frequency (c) inversely proportional to the square of the frequency (d) directly proportional to the frequency.

Ans. (c) inversely proportional to the square of the frequency.

16. Stacked FET can improve

(a) current handling capability (b) linearity (c) switching speed (d) all of these.

Ans. (b) linearity.

17. n-FET is preferred over p-channel FET due to

(a) lower recombination (b) higher electron mobility (c) higher pinch off voltage (d) all of these.

Ans. (b) higher electron mobility.

18. Diplexer requires

(a) high performance BPF (b) electronic switches (c) ferrite material (d) band stop filters.

Ans. (a) high performance BPF.

19. Tick the wrong statement. Channel capacity depends on

(a) signal to noise ratio at receiver (b) transmitted power (c) noise in the channel (d) none of the above.

Ans. (d) none of the above.

20. For a millimeter wave LOS system, path loss = 90 dB, transmitted power = 10 dBm, both transmit and receive antenna gain = 10 dBi, implementation loss is = 5 dB, noise power = -94 dBm, then the SNR at receiver is

(a) 159 dB (b) 29 dB (c) 21 dB (d) none of the above.

Ans. (b) 29 dB.