

Electronics & Communication

1 A system has poles at 0.01 Hz, 1 Hz and 80 Hz; zeros at 5 Hz, 100 Hz and 200 Hz. The approximate phase of the system-response at 20 Hz is

- A) -90°
- B) 0°
- C) 90°
- D) -180°

Answer : (A)

2 In an abrupt p-n junction, the doping concentrations on the p-side and n-side are $N_A = 9 \times 10^{16}/\text{cm}^3$ and $N_D = 1 \times 10^{16}/\text{cm}^3$ respectively. The p-n junction is reverse biased and the total depletion width is 3 mm. The depletion width on the p-side is

- A) 2.7 mm
- B) 0.3 mm.
- C) 2.25 mm
- D) 0.75 mm

Answer : (B)

3 A master-slave flip-flop has the characteristic that

- A) change in the input immediately reflected in the output
- B) change in the output occurs when the state of the master is affected
- C) change in the output occurs when the state of the slave is affected
- D) both the master and the slave states are affected at the same time

Answer : (C)

4 A parallel plate air-filled capacitor has plate area of 10^{-4} m^2 and plate separation of 10^{-3} m . It is connected to a 0.5 V, 3.6 GHz source. The magnitude of the displacement current is ($\epsilon_0 = 1/36\pi \times 10^{-9} \text{ F/m}$)

- A) 10 mA
- B) 100 mA
- C) 10 A
- D) 1.59 mA

Answer : (A)

5 The phase velocity of an electromagnetic wave propagating in a hollow metallic rectangular waveguide in the TE_{10} mode is

- A) equal to its group velocity
- B) less than the velocity of light in free space
- C) equal to the velocity of light in free space
- D) greater than the velocity of light in free space

Answer : (D)

6 Noise with uniform power spectral density of $N_0 \text{ W/Hz}$ is passed through a filter $H(\omega) = 2 \exp(-j\omega t_d)$ followed by an ideal low pass filter of bandwidth $B \text{ Hz}$. The output noise power in Watts is

- A) $2N_0B$

- B) $4N_0B$
 - C) eN_0B
 - D) $16 N_0B$
- Answer : (B)**

7 The cascade amplifier is a multistage configuration of

- A) CC-CB
 - B) CE-CB
 - C) CB-CC
 - D) CE-CC
- Answer : (B)**

8 Consider a lossless antenna with a directive gain of +6dB. If 1 mW of power is fed to it the total power radiated by the antenna will be

- A) 4 mW
 - B) 1 mW
 - C) 7 mW
 - D) 1/4 mW
- Answer : (A)**

9 The bandgap of Silicon at room temperature is

- A) 1.3 eV
 - B) 0.7 eV
 - C) 1.1 eV
 - D) 1.4 eV
- Answer : (C)**

10 In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor

- A) 8/6
 - B) 12
 - C) 16
 - D) 8
- Answer : (C)**

11 A device with input $x(t)$ and output $y(t)$ is characterized by: $y(t) = x^2(t)$. An FM signal with frequency deviation of 90 kHz and modulating signal bandwidth of 5 kHz is applied to this device. The bandwidth of the output signal is

- A) 370 kHz
 - B) 190 kHz
 - C) 380kHz
 - D) 95kHz
- Answer : (C)**

12 For the polynomial $P(s) = s^5 + s^4 + 2s^3 + 2s^2 + 3s + 15$, the number of roots which lie in the right half of the s-plane is

- A) 4
- B) 2
- C) 3
- D) 1

Answer : (B)

13 An AM signal is detected using an envelope detector. The carrier frequency and modulating signal frequency are 1 MHz and 2 kHz respectively. An appropriate value for the time constant of the envelope detector is

- A) 500 msec
- B) 20 msec
- C) 0.2 msec
- D) 1 msec

Answer : (B)

14 In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor

- A) 8/6
- B) 12
- C) 16
- D) 8

Answer : (C)

15 Consider the following statements S1 and S2.

S1: The β of a bipolar transistor reduces if the base width is increased.

S2: The β of a bipolar transistor increases if the doping concentration in the base is increased. Which one of the following is correct?

- A) S1 is FALSE and S2 is TRUE
- B) Both S1 and S2 are TRUE
- C) Both S1 and S2 are FALSE
- D) S1 is TRUE and S2 is FALSE

Answer : (D)