Raosaheb Wangde Master Charitable Trust's
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B+ NAAC 1st Cycle

Written Test for Degree Engineering Interview

Date:20/07/2024 Branch: E & TC Engineering Time:1 hr Marks:40

Note: All questions are compulsory

Q.1 to Q.20 carry 1 mark each

1. If silicon diode is operating in forward bias in a circuit with 12 V supply and 240 Ω series resistance, then what is the voltage drop across the diode.

   A. 1.5 V B. 0.4 V C. 1.1 V D. 0.7 V

2. Which of the following is the trivalent doping element?:

   A. Arsenic B. Boron C. Phosphorous D. Antimony

3. The ripple factor for the bridge rectifier is:

   A. 0.406 B. 1.21 C. 1.10 D. 2.22

4. According to barkhausen criteria the loop gain βv of the oscillator must be equal to ———.

   A. 0 B. 1 C. 0.8 D. -1

5. When PN junction is forward biased:

   A. Deletion region decreases B. Minority carriers are not affected C. Holes and electrons moves away from each other D. All of above.

6. According to boolean algebraic theorem the expression $A(A+B)$ is equivalent to:

   A. $\boldsymbol{A+B}$ B. $\boldsymbol{B}$ C. $\boldsymbol{A}$ D. $\boldsymbol{AB}$

7. The decimal number representation of the following number $(1\ 1\ 0\ 1\ 0\ 1)_2$ is:

   A. $(53)_{10}$ B. $(12)_{10}$ C. $(45)_{10}$ D. $(67)_{10}$

8. Which among the following is a current controlled device?

   A. MOSFET B. BJT C. IGBT D. JFET

9. The storage delay time can be reduced considerably by preventing transistor from going into saturation. This is achieved by connecting the schottky diode between ——— and ———:

   A. Base and Collector B. Base and Emitter C. Emitter and Collector D. In series with Base.

10. Gate to Source voltage must be ——- the threshold voltage for enhancement type MOSFET to be cut off.

    A. Greater than B. Equal to C. Less than D. All of the above

11. An equivalent base 2 number of $(13)_{10}$ is:

    A. $(0\ 1\ 0\ 1)_2$ B. $(1\ 1\ 0\ 1)_2$ C. $(1\ 1\ 1\ 1)_2$ D. $(1\ 0\ 0\ 1)_2$

12. The voltage across 660Ω resistance is (refer Figure 8):

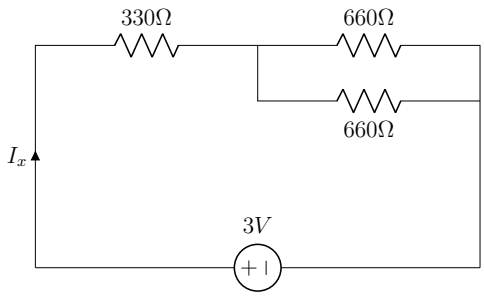

Figure 1: Q.12

    A. $0.65V$ B. $1.5V$ C. $0.72V$ D. $0.75V$

13. The current I_x and I_y are (refer Figure 2).

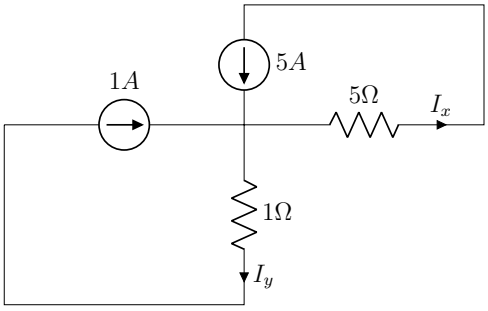

Figure 2: Q.13

    A. $-1A, 5A$ B. $5A, 1A$ C. $1A, 5A$ D. $5A, -1A$

14. Which of the following is not a property of semiconductors used in electronic devices?

    A. They excite electrons B. They don't emit light C. They have high thermal conductivity D. They have variable electrical conductivity

15. Which of the following is the correct relationship between temperature (T) and mobility (μ) of electrons in electronic circuits?

    A. $\mu \propto T^{-3/2}$ B. $\mu \propto T^{-1/2}$ C. $\mu \propto T$ D. $\mu \propto T^{-1}$

16. What type of semiconductor is used in LED electronic circuits?

A. Intrinsic semiconductor B. Compound semiconductor C. Degenerated semiconductor D. Compensated semiconductor

17. The equivalent resistance of the circuit given in Figure 3 is given by

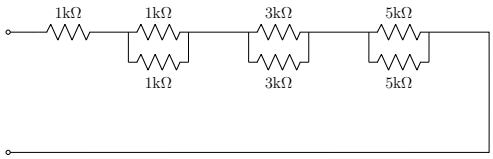

Figure 3: Q.17

A. 4 kΩ B. 10 kΩ C. 5.5 kΩ D. 5 kΩ

18. In the circuit shown in Figure 4 below, V_1 and V_2 are bias voltages. Based on input and output impedances, the circuit behaves as a

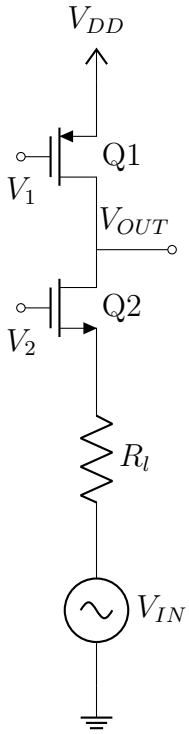

Figure 4: Q.18

A. voltage controlled voltage source. B. voltage controlled current source. C. current controlled voltage source. D. current controlled current source.

19. If silicon diode is operating in forward bias in a circuit with 12 V supply and 240 Ω series resistance, then what is the voltage drop across the diode.

A. 1.5 V B. 0.4 V C. 1.1 V D. 0.7 V

20. A digital communication system transmits a block of N bits. A probability of error in decoding a bit is α. The error event of each bit is independent of error event of other

bits. Received block is declared erroneous if atleast on of its bits decoded wrongly. The probability that the received block is erroneous is:

A. $N(1-\alpha)$ B. α^N C. $1-\alpha^N$ D. $1-(1-\alpha)^N$

Q.21 to Q.30 carry 2 marks each

21. Let $m(t)$ be a strictly band-limited signal with bandwidth B and energy E. Assuming $\omega_0 = 10B$, the energy in the signal $m(t)\cos\omega_0 t$ is

A. $\frac{E}{4}$ B. $\frac{E}{2}$ C. E D. $2E$

22. In feedback control system shown in Figure 5 below $G(s) = \frac{6}{s(s+1)(s+2)}$, where $R(s), Y(s), \& E(s)$ are Laplace transform of $r(t), y(t), \& e(t)$ respectively, if the input $r(t)$ is a unit ramp function then ——

A. $\lim_{t\to\infty} e(t) = 0$ B. $\lim_{t\to\infty} e(t) = \frac{1}{3}$ C. $\lim_{t\to\infty} e(t) = \frac{1}{4}$ D. $\lim_{t\to\infty} e(t)$ does not exist, $e(t)$ is oscillatory.

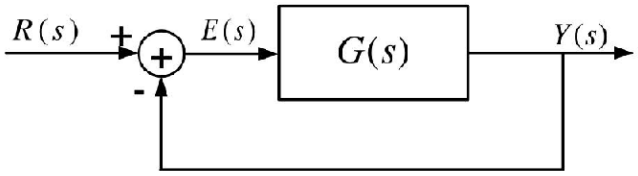

Figure 5: Q.22

23. What is the z-transform of the following finite duration signal? $x[n] = \{2, 4, \underset{\uparrow}{5}, 7, 0, 1\}$

A. $2+4z+5z^2+7z^3+z^4$ B. $2+4z+5z^2+7z^3+z^5$ C. $2+4z^{-1}+5z^{-2}+7z^{-3}+z^{-5}$ D. $2z^2+4z+5+7z^{-1}+z^{-3}$

24. The BJT as a switch is operated in one of the following: A. Only saturation region B. Active region C. Only cut off region D. Both saturation and cut off region

25. A DC power supply has no load voltage of 30 V and full load voltage of 25 V at full load current of 1 A. Its output resistance and load regulation respectively are.

A. 5Ω and 20% B. 25Ω and 20% C. 5Ω and 16.7% D. 25Ω and 16.7%

26. A 500 W carrier signal is amplitude modulated with modulation percentage of 60%. The total power in the modulated signal if the amplitude modulation used is the double sideband AM with full carrier(A3E) is.

A. 590 W B. 534 W C. 125 W D. 300 W

27. What will be the o/p of the given logic gate of Figure 6?

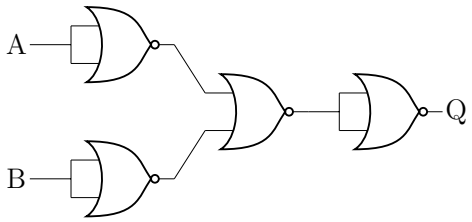

Figure 6: Q.27

A. NOR B. NAND C. AND D. OR

28. Let $\hat{i}$ and $\hat{j}$ be the unit vectors along x and y axes respectively, and let A be the positive constant. Which one of the following is true for vector fields $\bar{F}_1 = A(\hat{i}y + \hat{j}x)$, $\bar{F}_2 = A(\hat{i}y - \hat{j}x)$

A. Both $\bar{F}_1$ and $\bar{F}_2$ are electrostatic fields. B. Only $\bar{F}_1$ is an electrostatic fields.
C. Only $\bar{F}_2$ is an electrostatic fields. D. Neither $\bar{F}_1$ nor $\bar{F}_2$ are electrostatic fields.

29. The current I_y flowing through 660Ω resistance is (Refer Figure 7):

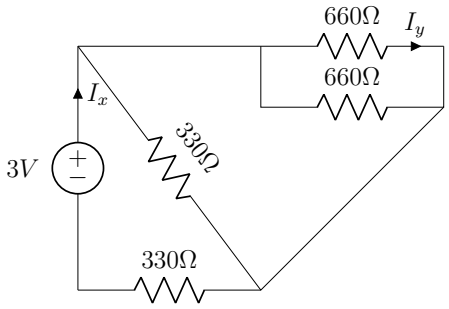

Figure 7: Q.29

A. I_x B. $I_x/2$ C. $I_x/4$ D. $I_x/3$

30. In the circuit shown below, P and Q are the inputs. The logical function realized by the circuit shown Figure 8 below is:

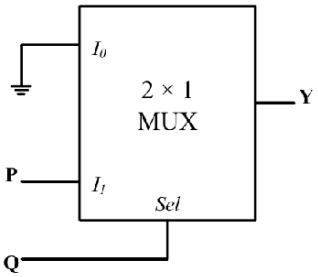

Figure 8: Q.30

A. $Y = PQ$ B. $Y = P + Q$ C. $Y = \overline{PQ}$ D. $Y = \overline{P + Q}$