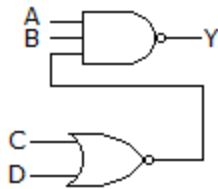


1. **Assertion (A):** A demultiplexer can be used as a decoder.
Reason (R): A demultiplexer can be built by using AND gates only.
- A. Both A and R are correct and R is correct explanation of A
 - B. Both A and R are correct but R is not correct explanation of A
 - C. A is true, R is false
 - D. A is false, R is true

2. The number of unused states in a 4 bit Johnson counter is
- A. 2
 - B. 4
 - C. 8
 - D. 12

3. A universal shift register can shift
- A. from left to right
 - B. from right to left
 - C. both from left to right and right to left
 - D. none of the above

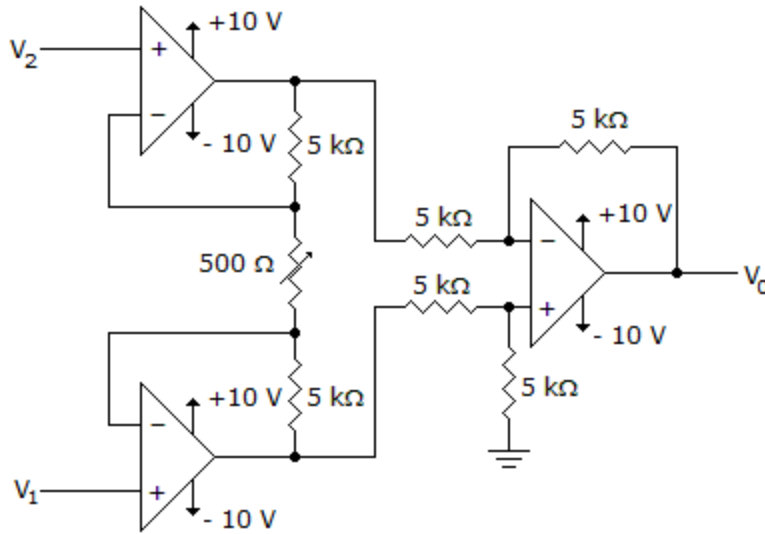
4. In the given figure, $A = B = 1$ and $C = D = 0$. Then $Y =$



- A. 1
- B. 0
- C. either 1 or 0
- D. indeterminate

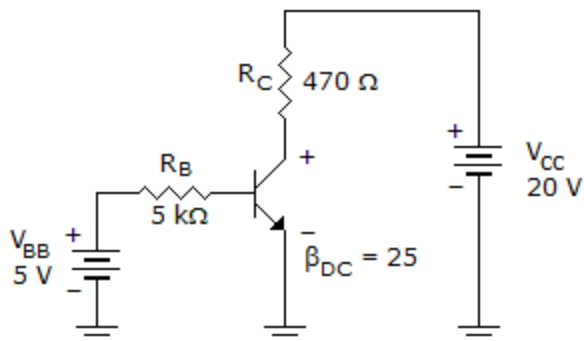
5. **Assertion (A):** CMOS devices have very high speed.
Reason (R): CMOS devices have very small physical size and simple geometry.
- A. Both A and R are correct and R is correct explanation of A
 B. Both A and R are correct but R is not correct explanation of A
 C. A is true, R is false
 D. A is false, R is true

6. Calculate the output voltage for this circuit when $V_1 = 2.5\text{ V}$ and $V_2 = 2.25\text{ V}$.



- A. -5.25 V
 B. 2.5 V
 C. 2.25 V
 D. 5.25 V

7. Refer to this figure. The value of V_{BC} is:

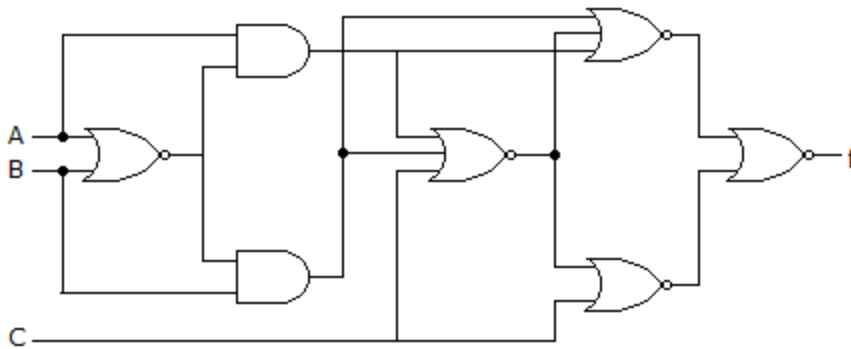


- A. 9.2 V
- B. 9.9 V
- C. -9.9 V
- D. -9.2 V

8. A rectangular waveguide, in dominant TE mode, has dimensions 10 cm x 15 cm. The cut off frequency is

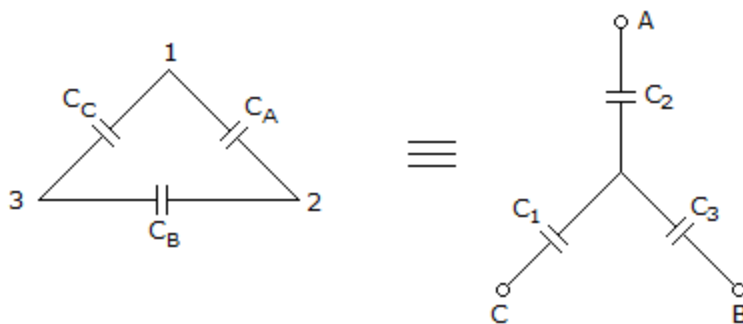
- A. 10 GHz
- B. 1 GHz
- C. 15 GHz
- D. 25 GHz

9. The following circuit can be represented as :



- A. C
- B. $f(A, B, (0, 1, 2, 3, 4, 5, 6, 7))$
- C. $C = (A$
- D. $B)C$

10. The star equivalent C_1, C_2, C_3 of the delta network is respectively



A. $\frac{C_B C_C + C_A C_C + C_B C_A}{C_A}, \frac{C_B C_C + C_A C_C + C_B C_A}{C_B}, \frac{C_B C_C + C_A C_C + C_B C_A}{C_C}$

B. $\frac{C_A C_B}{C_A + C_B + C_C}, \frac{C_B C_C}{C_A + C_B + C_C}, \frac{C_C C_A}{C_A + C_B + C_C}$

C. $\frac{C_A + C_B + C_C}{C_A C_B}, \frac{C_A + C_B + C_C}{C_B C_C}, \frac{C_A + C_B + C_C}{C_A C_C}$

D. $\frac{C_A}{C_A C_B + C_B C_C + C_C C_A}, \frac{C_B}{C_A C_B + C_B C_C + C_C C_A}, \frac{C_C}{C_A C_B + C_B C_C + C_C C_A}$

11. In amplitude modulation, carrier signals $A \cos \omega t$ has its amplitude A modulated in proportion with message bearing (low frequency) signal $m(t)$. The magnitude of $m(t)$ is chosen to be _____.

- A. less than 1
- B. less than or equal to 1
- C. more than 1
- D. none of these

12. An 8 level encoding scheme is used in a PCM system of 10 kHz channel BW. The channel capacity is

- A. 80 kbps
- B. 60 kbps
- C. 30 kbps
- D. 18 kbps

13. For static electric and magnetic fields in an homogenous source-free medium, which of the following represents the correct form of Maxwell's equations?

- A. $\Delta \cdot \mathbf{E} = 0$
 $\Delta \times \mathbf{B} = 0$
- B. $\Delta \cdot \mathbf{E} = 0$
 $\Delta \cdot \mathbf{B} = 0$

C. $\Delta \times E = 0$
 $\Delta \times B = 0$

D. $\Delta \times E = 0$
 $\Delta \cdot B = 0$

14. A material has conductivity of 10^5 mho/m and permeability of 4×10^{-7} H/m. The skin depth at 9 GHz is

A. $1.678 \mu\text{m}$

B. $26 \mu\text{m}$

C. $17 \mu\text{m}$

D. $32.32 \mu\text{m}$

15. A fair coin is tossed independently four times. The probability of the event "the number of times heads shown up is more than the number of times tails shown up" is

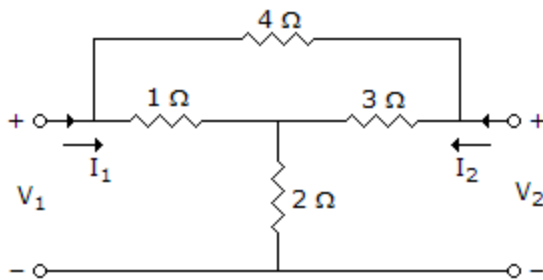
A. $\frac{1}{16}$

B. $\frac{1}{8}$

C. $\frac{1}{4}$

D. $\frac{5}{16}$

16. Find Y- parameters



A. $\begin{bmatrix} 31/44 & -19/44 \\ -19/44 & 23/44 \end{bmatrix}$

B. $\begin{bmatrix} 31/44 & 19/44 \\ 19/44 & 23/44 \end{bmatrix}$

C. $\begin{bmatrix} 25/12 & -4/5 \\ -4/5 & 374/9 \end{bmatrix}$

D. None of these

17. For a second-order system with the closed-loop transfer function $T(s) = \frac{9}{s^2 + 4s + 9}$
 The settling time for 2-percent band, in seconds, is :
- A. 1.5
 - B. 2.0
 - C. 3.0
 - D. 4.0

18. An open loop transfer function is given by $G(s)H(s) = \frac{K(s + 1)}{s(s + 2)(s^2 + 2s + 2)}$ has
- A. one zero at ∞
 - B. two zeros at ∞
 - C. three zeros at ∞
 - D. four zeros at ∞

19. If the memory chip size is 256 x 1 bits, then the number of chips required to make up 1 kB (1024) bytes of memory is
- A. 32
 - B. 24
 - C. 12
 - D. 8

20. What about the stability of system in $H(z) = \frac{z(3z - 4)}{(z - 0.4)(z - 2)}$
- A. system is stable
 - B. unstable
 - C. stable at 0.4
 - D. cant say

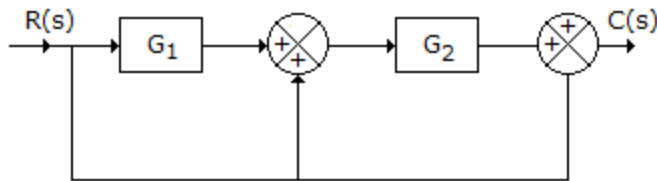
21. Which one is a causal system?
- A. $y(n) = 3x[n] - 2x[n - 1]$
 - B. $y(n) = 3x[n] + 2x[n + 1]$

- C. $y(n) = 3x[n + 1] + 2x[n - 1]$
- D. $y(n) = 3x[n + 1] 2x[n - 1] + x[n]$

22. A silicon (PN) junction at a temperature of 20°C has a reverse saturation current of 10 pico Ampere. The reverse saturation current at 40°C for the same bias is approximately.

- A. 30 pA
- B. 40 pA
- C. 50 pA
- D. 60 pA

23. For the system in the given figure. The transfer function $C(s)/R(s)$ is



- A. $G_1 + G_2 + 1$
- B. $G_1 G_2 + 1$
- C. $G_1 G_2 + G_2 + 1$
- D. $G_1 G_2 + G_1 + 1$

24. Propagation delay time, t_{PLH} , is measured from the _____.

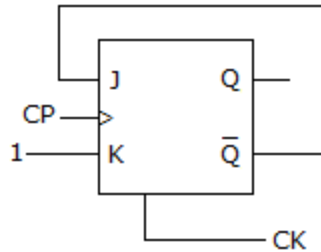
- A. triggering edge of the clock pulse to the LOW-to-HIGH transition of the output
- B. triggering edge of the clock pulse to the HIGH-to-LOW transition of the output
- C. preset input to the LOW-to-HIGH transition of the output
- D. clear input to the HIGH-to-LOW transition of the output

25. In an n-channel JFET, what will happen at the pinch-off voltage?

- A. the value of V_{DS} at which further increases in V_{DS} will cause no further increase in I_D
- B. the value of V_{GS} at which further decreases in V_{GS} will cause no further increases in I_D

- C. the value of V_{DG} at which further decreases in V_{DG} will cause no further increases in I_D
- D. the value of V_{DS} at which further increases in V_{GS} will cause no further increases in I_D

26. In a J-K FF we have $J = Q$ and $K = 1$. Assuming the FF was initially cleared and then clocked for 6 pulses, the sequence at the Q output will be



- A. 010000
- B. 011001
- C. 010010
- D. 010101

27. For the 8085 assembly language program given below, the content of the accumulator after the execution of the program is

3000	MVI	A,	45 H
3002	MOV	B,	A
3003	STC		
3004	CMC		
3005	RAR		
3006	XRA	B	

- A. 00H
- B. 45H
- C. 67H
- D. E7H

28. How many address bits are needed to select all memory locations in the 2118 16K × 1 RAM?

- A. 8
- B. 10
- C. 14
- D. 16

29. Convert the following SOP expression to an equivalent POS expression.

$$ABC + A\bar{B}\bar{C} + A\bar{B}C + AB\bar{C} + \bar{A}\bar{B}C$$

- A. $(\bar{A} + \bar{B} + \bar{C})(A + \bar{B} + C)(A + \bar{B} + C)$
- B. $(A + B + C)(A + \bar{B} + C)(A + \bar{B} + \bar{C})$
- C. $(\bar{A} + \bar{B} + \bar{C})(A + B + \bar{C})(\bar{A} + B + C)$
- D. $(A + B + C)(\bar{A} + B + \bar{C})(A + \bar{B} + C)$

30. Calculate the resistivity of *n*-type semiconductor from the following data, Density of holes = $5 \times 10^{12} \text{ cm}^{-3}$. Density of electrons = $8 \times 10^{13} \text{ cm}^{-3}$, mobility of conduction electron = $2.3 \times 10^4 \text{ cm}^2/\text{V-sec}$ and mobility of holes = $100 \text{ cm}^2/\text{V-sec}$.

- A. 0.43 Ω-m
- B. 0.34 Ω-m
- C. 0.42 Ω-m
- D. 0.24 Ω-m

31. In all metals

- A. conductivity decreases with increase in temperature
- B. current flow by electrons as well as by holes
- C. resistivity decreases with increase in temperature
- D. the gap between valence and conduction bands is small

32. **Assertion (A):** Two transistors one *n-p-n* and the other *p-n-p* are identical in all respects (doping, construction, shape, size). The *n-p-n* transistor will have better frequency response.

Reason (R): The electron mobility is higher than hole mobility.

- A. Both A and R are true and R is correct explanation of A
- B. Both A and R are true but R is not a correct explanation of A
- C. A is true but R is false
- D. A is false but R is true

33. Which of the following elements act as donor impurities?

Gold
Phosphorus
Boron
Antimony
Arsenic
Indium

Select the answer using the following codes :

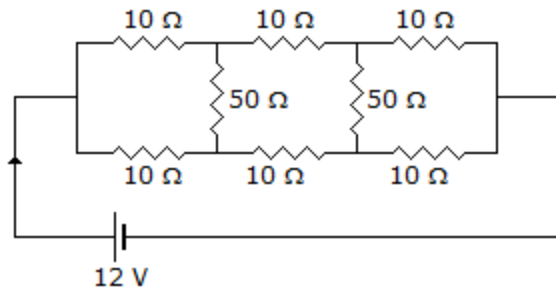
- A. 1, 2 and 3
- B. 1, 2, 4, and 6
- C. 3, 4, 5 and 6
- D. 2, 4 and 5

34. The open loop transfer function of a unity feedback control system is given

as $G(s) = \frac{1}{s(1 + sT_1)(1 + sT_2)}$ The phase cross over frequency and the gain margin are respectively.

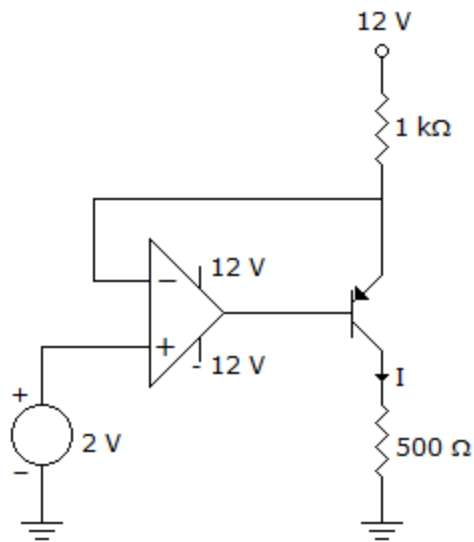
- A. $\frac{1}{\sqrt{T_1 T_2}}$ and $\frac{T_1 + T_2}{T_1 T_2}$
- B. $\sqrt{T_1 T_2}$ and $\frac{T_1 + T_2}{T_1 T_2}$
- C. $\frac{1}{\sqrt{T_1 T_2}}$ and $\frac{T_1 T_2}{T_1 + T_2}$
- D. $\sqrt{T_1 T_2}$ and $\frac{T_1 T_2}{T_1 + T_2}$

35. Find current i .



- A. $4/5$ A
- B. $5/4$ A
- C. 1.23 A
- D. 1.32 A

36. The circuit I in figure is



- A. 1 mA
- B. 4 mA
- C. 8 mA
- D. 10 mA

37. For dielectric to dielectric interface with surface charge density, which of the following statements are true?

$$D_{n2} - D_{n1} = \rho_s$$

$$E_{t1} = E_{t2}$$

$$E_{n1} = E_{n2}$$

$$\frac{D_{t1}}{\epsilon_{01}} = \frac{D_{t2}}{\epsilon_{02}}$$

- A. 1, 2 and 3
- B. 1, 2 and 4
- C. 1, 2 only
- D. 1, 4 only

38. The early effect in a BJT is caused by

- A. fast turn on
- B. fast turn off
- C. large collector base reverse bias
- D. large emitter base forward bias

39. In an integrated circuit the SiO₂ layers provide

- A. electrical connection to external Ckt.
- B. physical strength
- C. isolation
- C. conducting path.

40. Which impurity atom will give *p* type semiconductor when added to intrinsic semiconductor?

- A. Phosphorus
- B. Boron
- C. Arsenic
- D. Antimony

41. Zener breakdown occurs

- A. due to rupture of covalent band
- B. mostly in germanium junctions
- C. in lightly doped junctions
- D. due to thermally generated minority carriers

42. In modern MOSFETS, the material used for the gate is

- A. high purity silicon
- B. high purity silica
- C. heavily doped polycrystalline silicon
- D. epitaxial grown silicon

43. Consider the following statements.

Etching

Exposure to UV radiation

Stripping

Developing

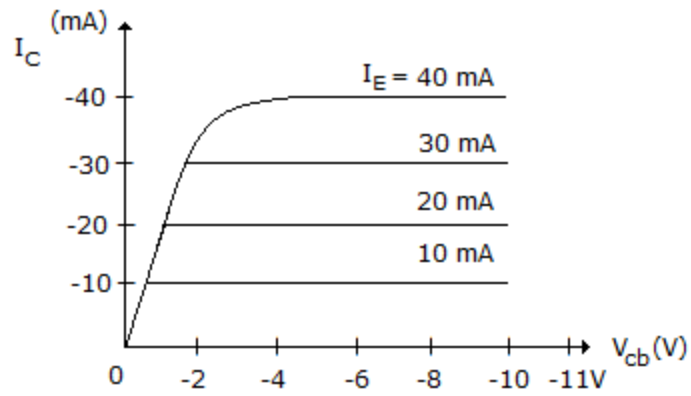
After a wafer has been coated with photo resist the correct sequence of these steps in photolithography is

- A. 2, 4, 3, 1
- B. 2, 4, 1, 3
- C. 4, 2, 1, 3
- D. 3, 2, 3, 1

44. Peak inverse voltage will be highest for

- A. half wave rectifier
- B. full wave rectifier
- C. bridge rectifier
- D. three phase full wave rectifier

45. Figure shows characteristics curves for bipolar transistor. These curves are



- A. output characteristics of $n-p-n$ transistor (common base)
- B. output characteristics of $p-n-p$ transistor (common base)
- C. output characteristics of $n-p-n$ transistor (common emitter)
- D. output characteristics of $p-n-p$ transistor (common emitter)