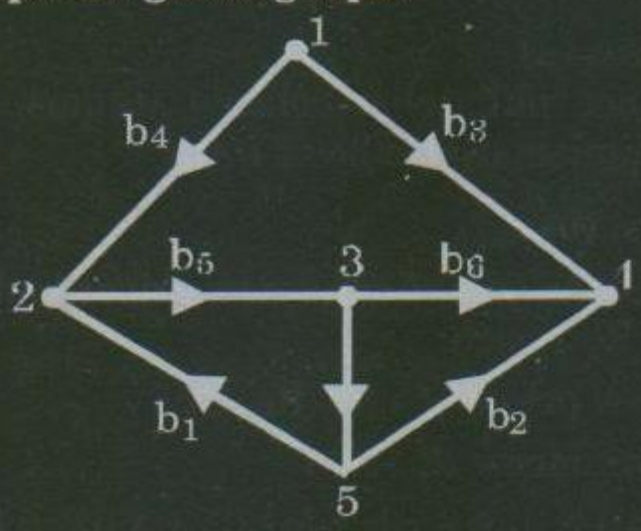
Electronics & Communication

Q1 to 25 carry 1 mark each.

1. What is the number of fundamental loops for given graph.



(a) 2 (b) 4 (b) 3 (d) 1

2. The differential volume in spherical co-ordinate is equal to

(a) $dv = r\sin^2\theta\, dr d\theta\, d\phi$

(b) $dv = r^2\sin^2\theta\, dr d\theta\, d\phi$

(c) $dv = r\sin^2\theta\, dr d\theta\, dz$

(d) $dv = r^2\sin\theta\, dr d\theta\, d\phi$

3. A loop is rotating about the y-axis in a magnetic field $B = B_o \sin\omega t\ a_x$ Wb/m². The voltage induced in the loop is due to

(a) Motional emf

(b) Transformer emf

(c) A combination of motional and transformer emf.

(d) None of these

4. What is energy of the following sequence

$$x(n) = \begin{cases} \left(\frac{1}{2}\right)^n & \text{for } n \geq 0 \\ 0 & \text{for } n < 0 \end{cases}$$

(a) 5 (b) 0

(c) ∞ (d) 4/3

5. $\int_{-\infty}^{\infty} \left[t^2 + 1\right]\delta(t)\,dt$ evaluates to be equal to

(a) Not defined (b) 1

(c) 0 (d) Infinite.

6. What are centre and radius of given equation which represents the circle

$|\ z - 1 + 3i\ | = 2$

(a) c = (1, - 3) and R = 2

(b) c = (-3,1) and R = 2

(c) c = (1,-3) and R = 2.5

(d) c = (-3,1) and R = 2.5

7. The laplace transform of te^{at} is given by

(a) $\frac{1}{(s+a)^2}$ (b) $\frac{1}{(s-a)^2}$

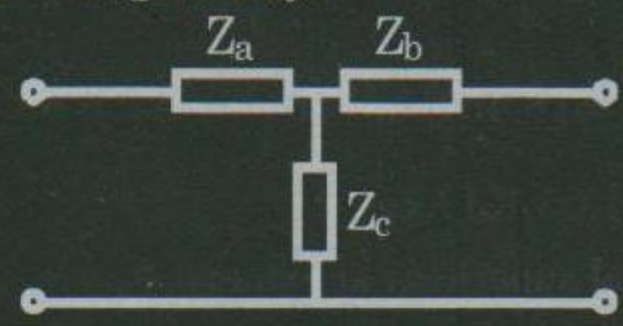
(c) $\frac{1}{s^2}$ (d) $\frac{1}{s+a}$

8. Identify the order and degree of the following differential equation.

$$\frac{d^2y}{dx^2} + 5\left(\frac{dy}{dx}\right)^3 - 4y = e^x$$

(a) 2,1 (b) 3,1 (c) 2,3 (d) 1,2

9. The Z Matrix for the T network as shown below is given by.



(a) $\begin{bmatrix} Z_a+Z_c & Z_c \\ Z_c & Z_b+Z_c \end{bmatrix}$ (b) $\begin{bmatrix} Z_a & Z_b \\ Z_b+Z_c & Z_c \end{bmatrix}$

(c) $\begin{bmatrix} Z_b+Z_c & Z_c \\ Z_b & Z_a \end{bmatrix}$ (d) $\begin{bmatrix} Z_c & Z_a+Z_c \\ Z_a & Z_c \end{bmatrix}$

10. The Boolear expression $Y = (A + B)(\bar{A} + C)$ is equal to

(a) $AC + \bar{A}B$ (b) $AC + \bar{A}B + BC$

(c) $\bar{A}B + BC + A\bar{B}C$ (d) Above all.

11. Which of the following power amplifier is used only for tuned or resonant circuit mainly for communication?

(a) Class A (b) Class D

(b) Class C (d) Class AB

12. What are the main advantage of VMOS over conventional commercially available MOSFETs?

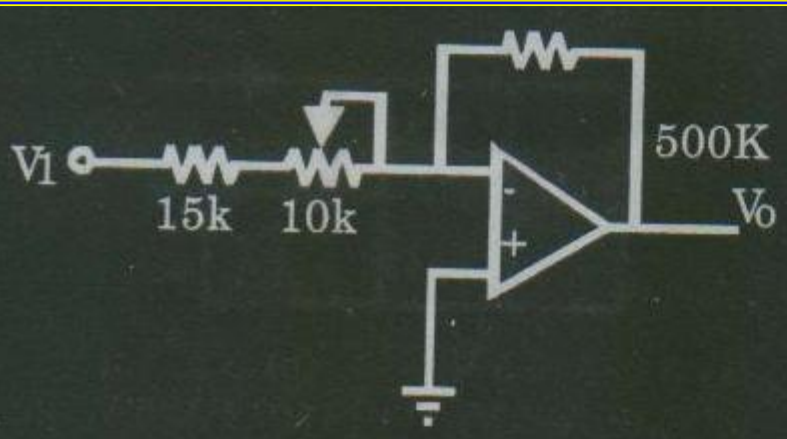
(a) Higher input impedance

(b) Negative temperature coefficient

(c) VMOS performs exactly like MOSFET.

(d) Higher current and power rating.

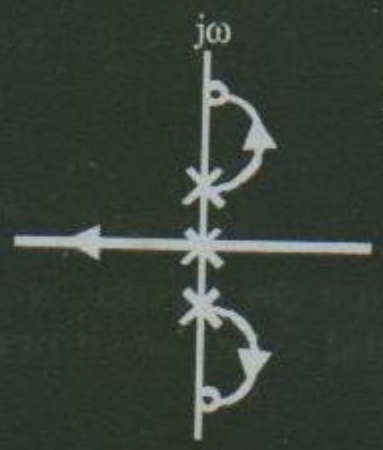
13. What is the range of the voltage gain adjustment as shown in following circuit.



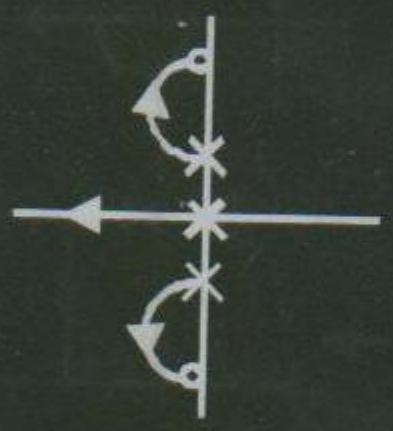
(a) -20 to -33.3 (b) -20 to -30
(c) -25 to -40 (d) -25 to -33.3

14. The valid root locus diagram is given by,

a.

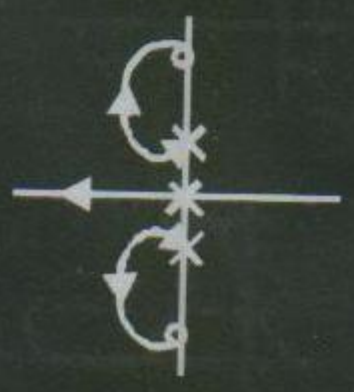


b.



c.

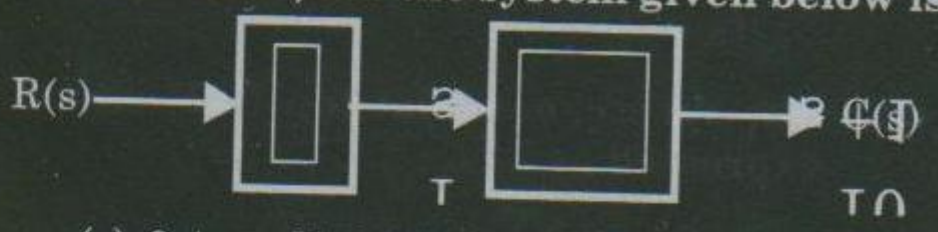
d.



15. If A and B are two mutually exclusive events of a random experiment, then which of the following Condition are satisfied.

(a) $P(A \cap B) = P(A) + P(B)$
(b) $P(A \cup B) = P(A) + P(A \cap B)$
(c) $P(A \cup B) = P(A) + P(B)$
(d) None of there

16. The settling time (2% of the final steady stat value) for the system given below is



(a) 0.4s (b) 0.22s (c) 0.5s (d) 0.12s

17. For the system,

Find the value of output y(t)?

(a) $\frac{1}{2}e^{-t} + \frac{1}{2}\cos t + \frac{1}{2}\sin t$

(b) $-\frac{1}{2}e^{-t} + \frac{1}{2}\cos t - \frac{1}{2}\sin t$

(c) $\frac{1}{2}e^{-t} + \frac{1}{2}\cos t + \frac{1}{2}\sin t$

(d) $\frac{1}{2}\cos t + \frac{1}{2}\sin t$

18. A J-K flip flop can be made from SR flip flop by using two additionl
(a) AND gates (b) OR gates
(c) NOT gates (d) NOR gats

18. The energy spent in moving a charge of 20 coulomb from one point 'a' to another point 'b' is 50 joules. The potential difference between points a and b is
(a) 2 V (b) 2.5 V (c) 10 V (d) 0.1 V

19. A system has the input – output relation given by
$Y(n) = nx(n)$

The system is
(a) Memory less and casual
(b) Has memory and casual
(c) Has memory and anticasual
(d) Memory less and anticasual.

20. The laplace transform of $te^{-at}u(t)$ and associated ROC are given by

(a) $\frac{1}{(s+a)^2}$ and ROC : $\mathrm{Re}(\hat{}) < -\mathrm{Re}(a)$

(b) $\frac{1}{(s+a)^2}$ and $\mathrm{Re}(s) > \mathrm{Re}(a)$

(c) $\frac{1}{s+a}$ and $\mathrm{Re}(s) > -\mathrm{Re}(a)$

(d) $\frac{1}{(s+a)^2}$ and $\mathrm{Re}(s) > -\mathrm{Re}(a)$

21. The spectrum of flat top PAM signal is expressed as

$$G(g) = f_0 \sum_{-\infty}^{\infty} (f - nf_s) H(f)$$

What is the significance of H(f) here?

(a) It is the Fourier transform of impulse function.

(b) It is the Fourier transform of rectangular pulse

(c) Cannot be specified

(d) It is Fourier transform of triangular pulse

22. The figure of merit for an FM system with sinusoidal wave is

(a) $\frac{3}{4}m^2$ (b) $2m^2$

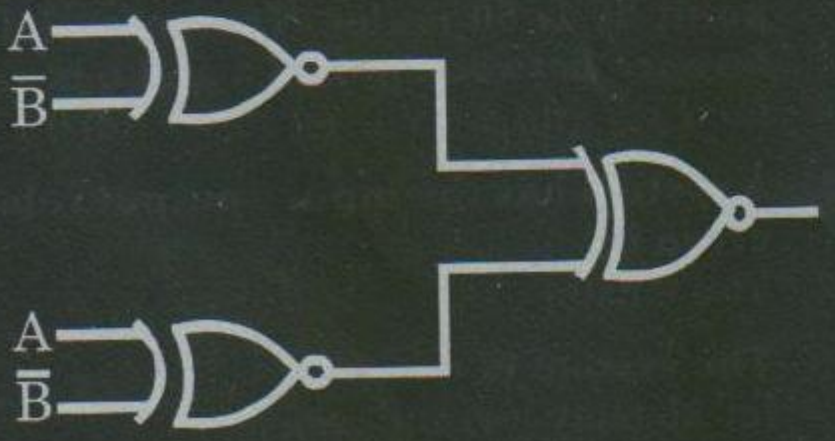
(c) $\frac{m^2}{4}$ (d) $\frac{3}{2}m^2$

23. Find the eigen values of following given matrix.

$$A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$$

(a) -2, -5 (b) 2,5 (c) 2, -5 (d) -2, 5

24. In the following circuit the output z is

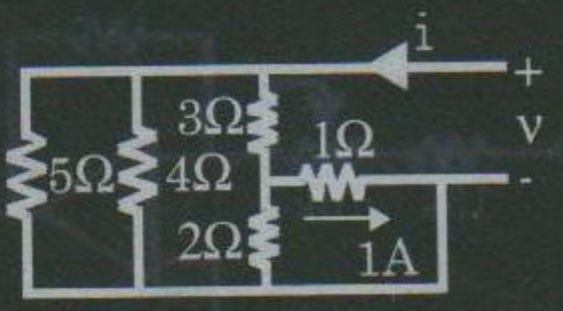


(a) $\bar{A}B + A\bar{B}$ (b) $AB + \bar{A}\bar{B}$

(c) 0 (d)1

Q.26-55 carry two marks each

26. Find out the value of v and i for the network shown below.



(a) 3.98A, 5.5 V (b) 3 A, 5.5 V

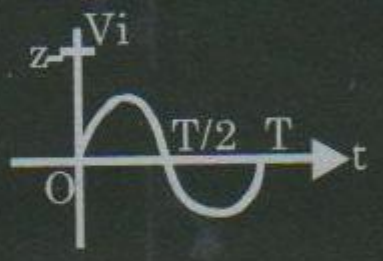
(c) 3.98 A, 5 V (c) 4 A, 5 V

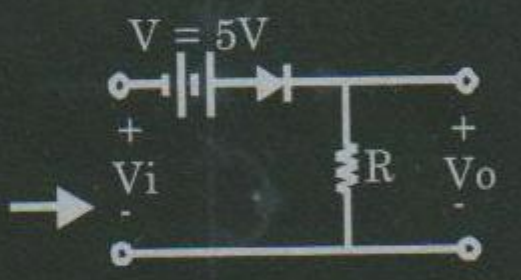
27. The 3 – stage Johnson Counter as shown below is clocked at a constant frequency of f_c from the starting state of $Q_2Q_1Q_0 = 101$. The frequency of output $Q_2Q_1Q_0$. will be

(a) $\frac{fc}{8}$ (b) fc | 5

(c) $\frac{fc}{3}$ (d) $\frac{fc}{2}\ \frac{fc}{2}$

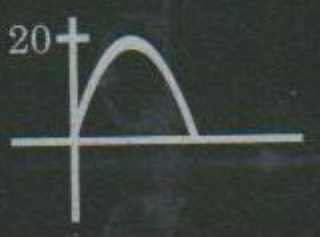
28. Determine the output waveform for the sinusoidal input as shown below:



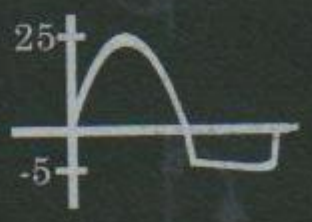


Assum diode D to be ideal.

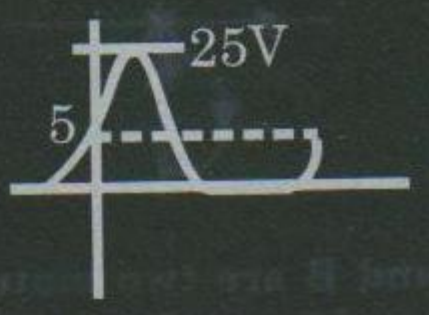
(a)



(b)



(c)



(d) None of these

29. The z axis carries filamentary currant of 10π A along a_z. Which of these is in correct ?
(a) H = - ax A/m at (0,5,0)
(b) H = aϕ A/m at (5,π/4,0)
(c) H = -0.8ax – 0.6ay A/mat (-3, 4, 0)
(d) H = -aϕ A/m at (5,3π/2, 0).

30. For the smith chart used for matching purpose, the centre and radius of resistance circle are

(a) $C = \left(\frac{r}{1+r}, 0\right)$ $R = \frac{1}{r}$

(b) $C = \left(\frac{r}{1+r}, 0\right)$ $R = \frac{1}{1+r}$

(c) $C = \left(0, \frac{r}{1+r}\right)$ $R = \frac{1}{r}$

(d) $C = \left(0, \frac{r}{1+r}\right)$ $R = \frac{1}{1+r}$

31. The inverse DFT of X(t) = [1, 2, 3, 4] is given by,

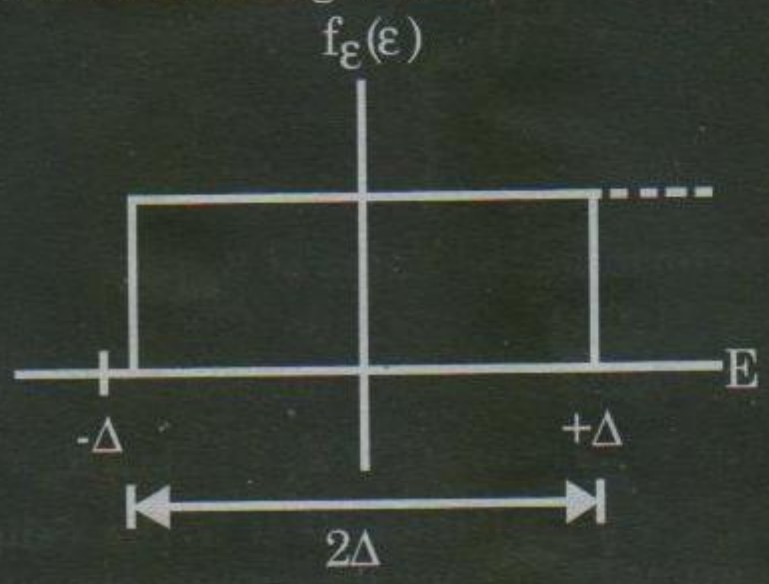
(a) $\left[\frac{5}{2}, -\frac{1}{2} - \frac{j}{2}, -\frac{1}{2}, -\frac{1}{2} + j\frac{1}{2}\right]$

(b) $\left[\frac{5}{2}, -\frac{1}{2} + \frac{j}{2}, -\frac{1}{2}, -\frac{1}{2} - j\frac{1}{2}\right]$

(c) $\left[\frac{5}{2}, -\frac{1}{2}, \frac{1}{2}, -\frac{1}{2} + j\frac{1}{2}\right]$

(d) None of these

32. The PDF of quantization error for delta modulation is given as



The mean square value or variance of the quantization noise is equal to

(a) $\frac{\Delta^2}{12}$ (b) $\frac{\Delta^2}{4}$ (c) $\frac{\Delta^2}{3}$ (d) $\frac{\Delta^2}{2}$

33. A system is described by the following equation

$$A = \begin{bmatrix} 0 & 1 \\ -3 & -6 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, C = [0 \;\; 1]$$

The steady state error due to step input is

(a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c) ∞ (d) 0

34. Suppose that C is a piece wise – smooth simple simple closed curve bounding a simply connected region R. If P, Q, $\frac{\partial P}{\partial y}$ and $\frac{\partial Q}{\partial x}$ are continuous or R, There which of the following is true according to Green's theorem.

(a) $\oint_c P\,dy + Q\,dx = \iint_R \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right) dA$

(b) $\oint_c P\,dx + Q\,dy = \iint_R \left(\frac{\partial Q}{\partial y} - \frac{\partial P}{\partial x}\right) dA$

(c) $\oint_c P\,dx + Q\,dy = \iint_R \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right) dA$

(d) None of these

35. The Taylor series representation for function

$f(z) = \frac{1}{1-z}$ is equal to

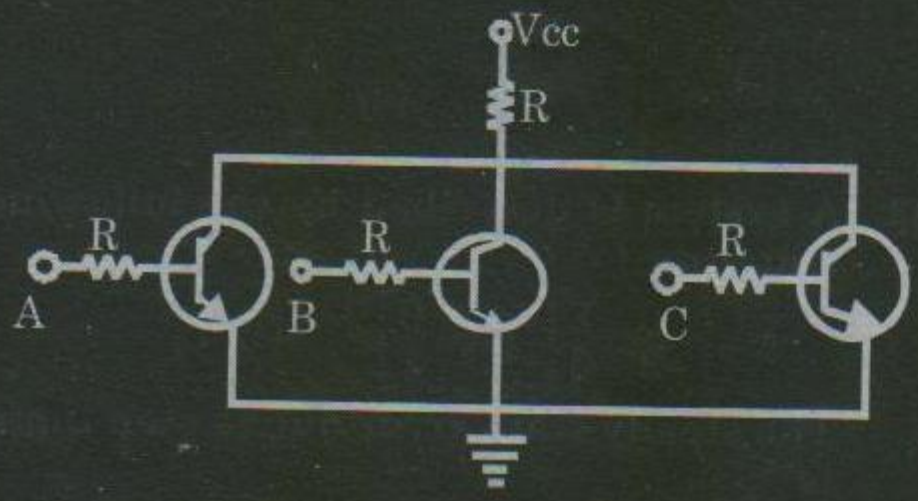
(a) $\sum_{n=0}^{\infty} \frac{(z-i)^n}{(1-i)^{n+1}}$ for $(|z-i| < \sqrt{2})$

(b) $\sum_{n=0}^{\infty} \frac{(z+i)^n}{(1+i)^{n+1}}$ for $(|z-i| < \sqrt{2})$

(c) $\sum_{n=0}^{\infty} \frac{(z-i)^n}{(1+i)^{n+1}}$ for $(|z-i| < \sqrt{2})$

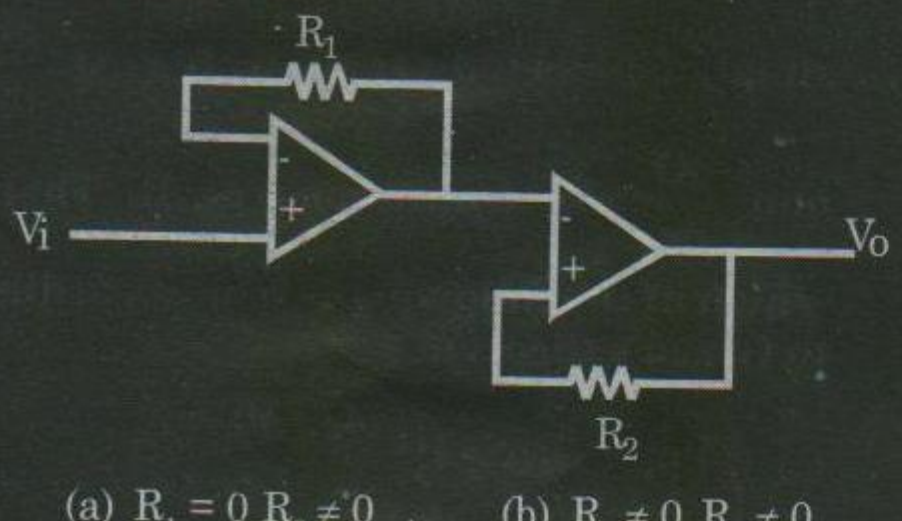
(d) Taylor series can't be found

36. Which logic is implemented by following circuit arrangement. (RTL)



(a) NAND (b) NOR
(c) EX -OR (d) AND

37. For the circuit shown above we want V_o to be equal to Vi. To achieve this, which of the following condition are needed to be satisfied.



(a) $R_1 = 0\ R_2 \neq 0$ (b) $R_1 \neq 0\ R_2 \neq 0$
(c) $R_1 = 0\ R_2 = 0$ (c) $R_1 \neq 0\ R_2 = 0$.

38. The initial and final values of the corresponding sequence for which $X(z) = 2+3z^{-1} + 4z^{-2}$

(a) 2 and 0 (b) 0 and 2
(c) 1 and 0 (d) Not defined.

39. Which of these is not true for a lossless line?

(a) $Z_{in} = -jZ_0$ for a shorted line with $l = \lambda/8$.
(b) $Z_{in} = j\infty$ for a shorted line with $l = \lambda/4$.
(c) $Z_{in} = Z_0$ for a matched line
(d) All are correct.

40. Evaluate $\oint_c \frac{z^2 - 4z + 4}{z + i}$,

where C is circle $|z|=2$.

(a) $2\pi(3+4i)$ (b) $2\pi(-4-3i)$
(c) $2\pi(+4-3i)$ (d) $2\pi(-4+3i)$

41. If A,B,C are mutually exclusive and exhaustive events associated with a random experiment

Such that

P(B) = 0.6P(A)

P(C) = 0.2 P (A), then what will be

The value of P(A)

(a) 7/9 (b) 5/9 (c) 2/9 (d) 4/9

42. For a JFET, The Correct Value of transconductance is given by

(a) $g_m = g_{mo}\left[\frac{-V_{GS}}{V_p}\right]$

(b) $g_m = g_{mo}\left[1 + \frac{V_{GS}}{V_p}\right]$

(c) $g_m = g_{mo}\left[1 - \frac{V_{G^2S}}{V_p}\right]$

(d) $gm = g_{mo}\left[1 - \frac{V_{GS}}{V_p}\right]$

43. Consider the following loop

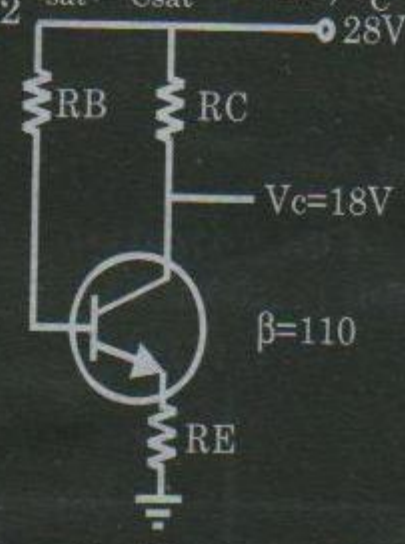
```
        XRA    A
        LXI    B, 0007H
LOOP :  DCX    B
        JNZ    LOOP
```

This loop will be executed

(a) 1 times (b) 8 times
(c) 7 times (d) infinte times

44. For the emitter bias configuration shown below, having specification

$I_{CQ} = \frac{1}{2}I_{sat}$, $I_{Csat} = 8mA, V_C = 18V, \beta = 110$



Determine the Value of R_E.

(a) 1100 Ω (b) 1200 Ω
(c) 1500 Ω (d) 1000 Ω

45. For 555 Timer IC, if $R_A = 7.5k\Omega$, $R_B = 7.5k\Omega$, C = 0.1 μF then what is the value of output frequency for astable operaton ?

(a) 520 Hz (b) 456 Hz
(c) 640 Hz (d) 690 Hz

46. A cascaded two – stage amplifier with noise figure and gain value as indicated

29. The z axis carries filamentary current of 10π A along a_z. Which of these is in correct ?
(a) H = - ax A/m at (0,5,0)
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(c) $\left[\frac{5}{2}, -\frac{1}{2}, \frac{1}{2}, -\frac{1}{2} + j\frac{1}{2}\right]$

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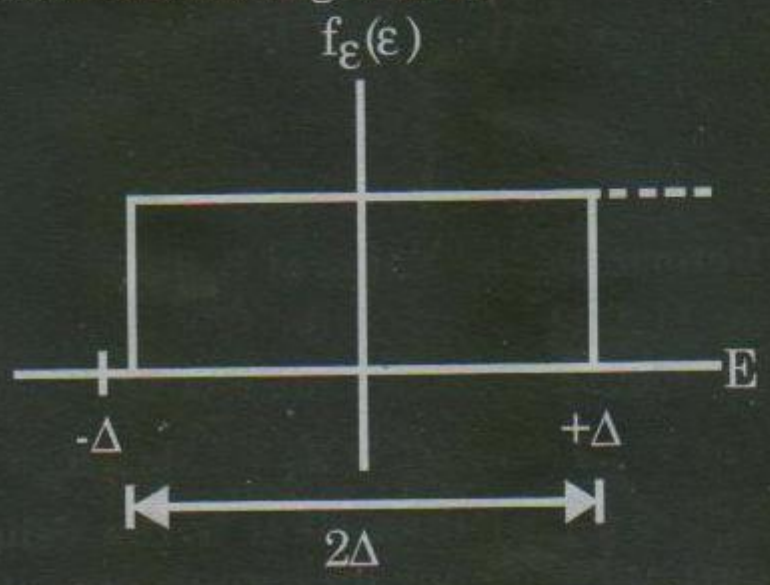

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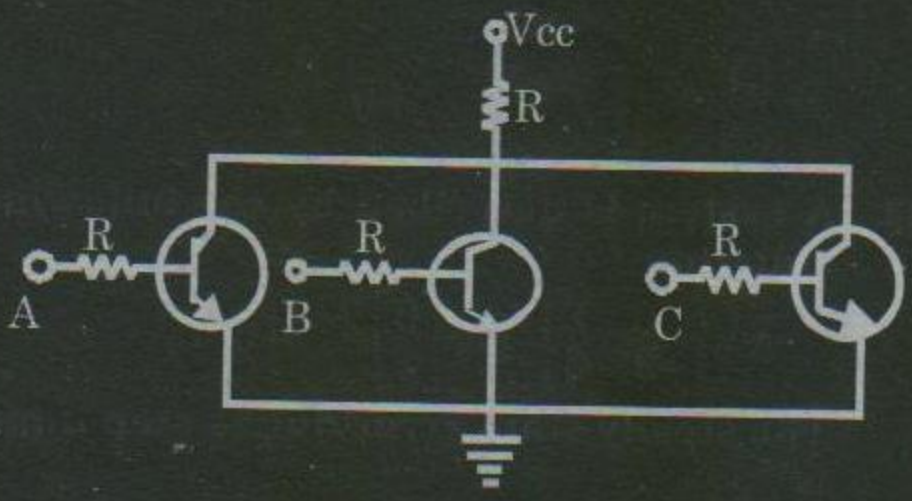

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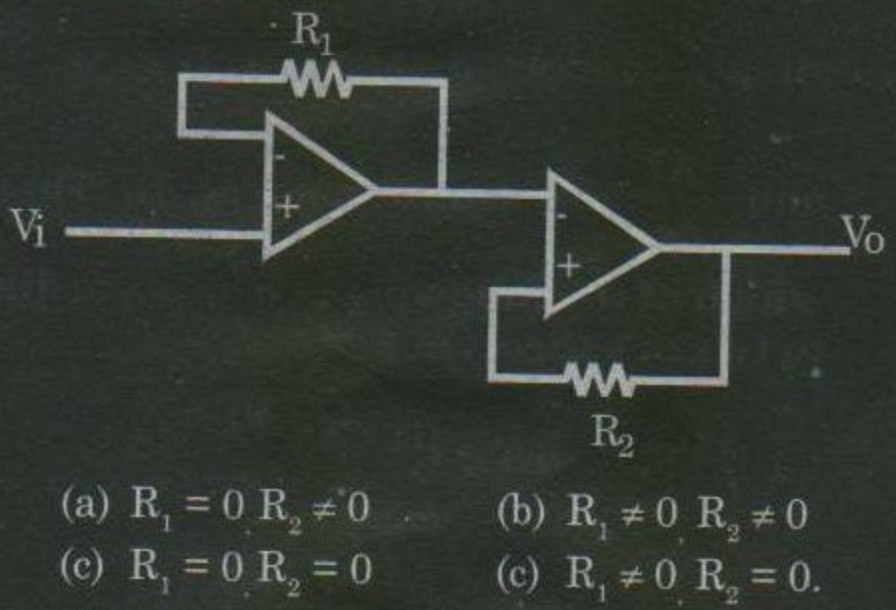

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(c) 1 and 0 (d) Not defined.

39. Which of these is not true for a lossless line?

(a) $Z_{in} = -jZ_0$ for a shorted line with $l = \lambda/8$.
(b) $Z_{in} = j\infty$ for a shorted line with $l = \lambda/4$.
(c) $Z_{in} = Z_0$ for a matched line
(d) All are correct.

40. Evaluate $\oint_C \frac{z^2 - 4z + 4}{z + i}$,

where C is circle $|z|=2$.

(a) $2\pi(3+4i)$ (b) $2\pi(-4-3i)$
(c) $2\pi(+4-3i)$ (d) $2\pi(-4+3i)$

41. If A,B,C are mutually exclusive and exhaustive events associated with a random experiment

Such that

P(B) = 0.6P(A)

P(C) = 0.2 P (A), then what will be

The value of P(A)

(a) 7/9 (b) 5/9 (c) 2/9 (d) 4/9

42. For a JFET, The Correct Value of transconductance is given by

(a) $g_m = g_{mo}\left[\frac{-V_{GS}}{V_p}\right]$

(b) $g_m = g_{mo}\left[1 + \frac{V_{GS}}{V_p}\right]$

(c) $g_m = g_{mo}\left[1 - \frac{V_{G^2S}}{V_p}\right]$

(d) $gm = g_{mo}\left[1 - \frac{V_{GS}}{V_p}\right]$

43. Consider the following loop

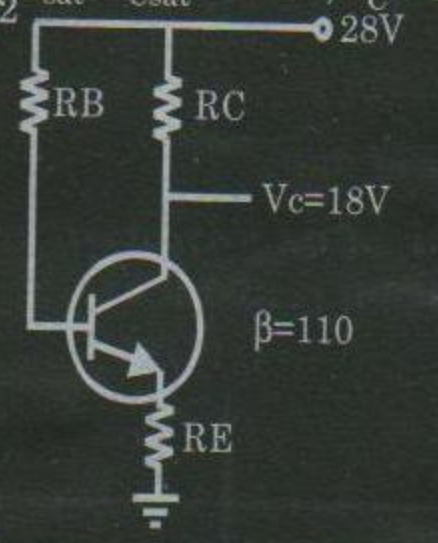
```
        XRA    A
        LXI    B, 0007H
LOOP :  DCX    B
        JNZ    LOOP
```

This loop will be executed

(a) 1 times (b) 8 times
(c) 7 times (d) infinte times

44. For the emitter bias configuration shown below, having specification

$I_{CQ} = \frac{1}{2}I_{sat}$, $I_{Csat} = 8mA$, $V_C = 18V$, $\beta = 110$



Determine the Value of R_E.

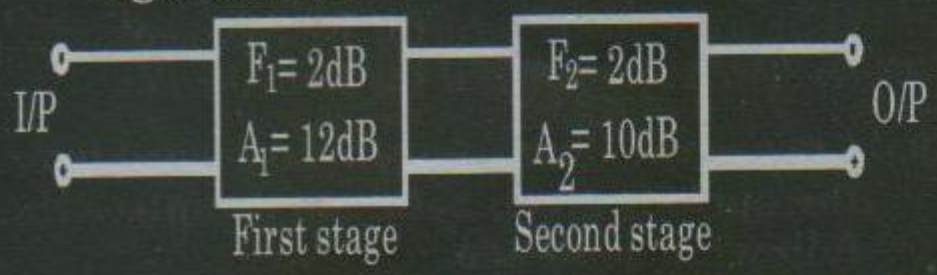
(a) 1100 Ω (b) 1200 Ω
(c) 1500 Ω (d) 1000 Ω

45. For 555 Timer IC, if $R_A = 7.5k\Omega$, $R_B = 7.5k\Omega$, C = 0.1 μF then what is the value of output frequency for astable operaton ?

(a) 520 Hz (b) 456 Hz
(c) 640 Hz (d) 690 Hz

46. A cascaded two – stage amplifier with noise figure and gain value as indicated

is shown blow. Find the overall noise figure in dB.



(a) 1.5 dB (b) 2.5 dB (c) 3.7 dB (d) 4.8 dB

47. Given or audio signal consisting of sinosoidal term given as

$x(t) = 3\cos(500\pi t)$.

How many bits of quantization are needed to achieve a signal to quantization noise ratio of at least 40 dB?

(a) 7 (b) 8 (c) 9 (d) 10

Common Data questions:

Common data for question 48 & 49

The two port network is shown below having h

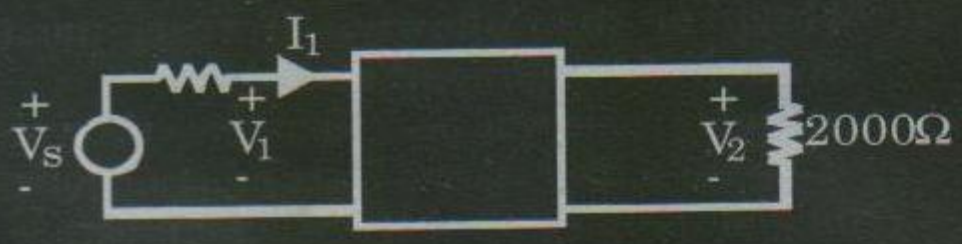
Parameters as $h_{11} = 1000\Omega$

$h_{12} = 0.003\Omega$

$h_{21} = 100$

$h_{22} = 50\times10^{-6}\mho$

If $V_s = 10^{-2}\angle 0^\circ$ V



48. The value of V_2 is given by

(a) 1.905 V (b) 1.87 V

(c) – 1.905 V (d) – 1.75 V

49. The Z parameter for the given network is

(a) $\begin{bmatrix} -5000\Omega & 60\Omega \\ -2\times10^6\Omega & 20\times10^3\Omega \end{bmatrix}$

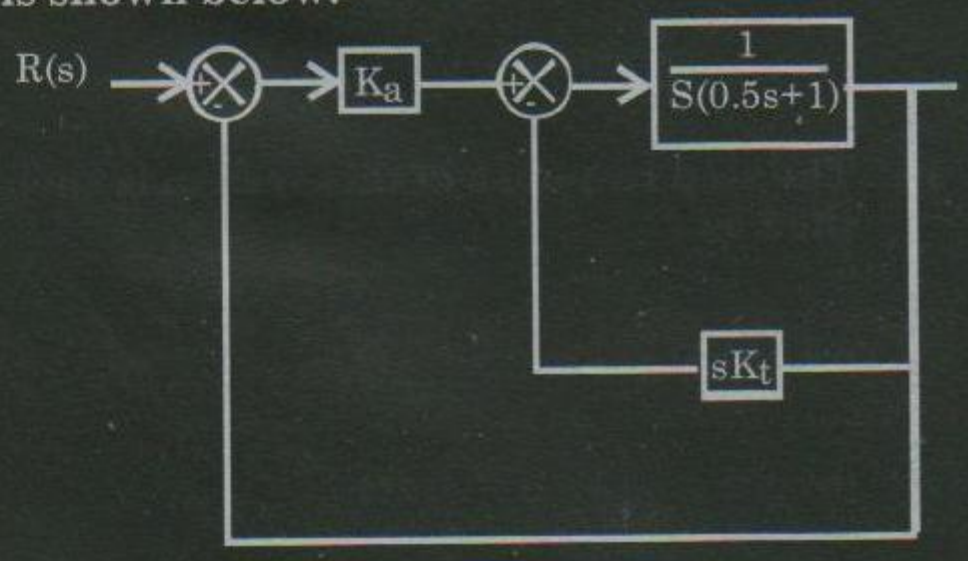
(b) $\begin{bmatrix} 600\Omega & 50\Omega \\ -10^6\Omega & 10^3\Omega \end{bmatrix}$

(c) $\begin{bmatrix} 0.6\Omega & 60\Omega \\ -2\times10^6\Omega & 20\Omega \end{bmatrix}$

(d) None of there.

Common data for question 50 to 51

Block diagram of a position control system is shown below:-



50. If $K_t = 0$ and $K_a = 5$, then the steady state error to unit ramp input is

(a) 5 (b) 0.2 (c) ∞ (d) 0

51. If the damping ratio of the system is increased to 0.7 with out affecting the steady state error, thus the value of K_a and K_t are

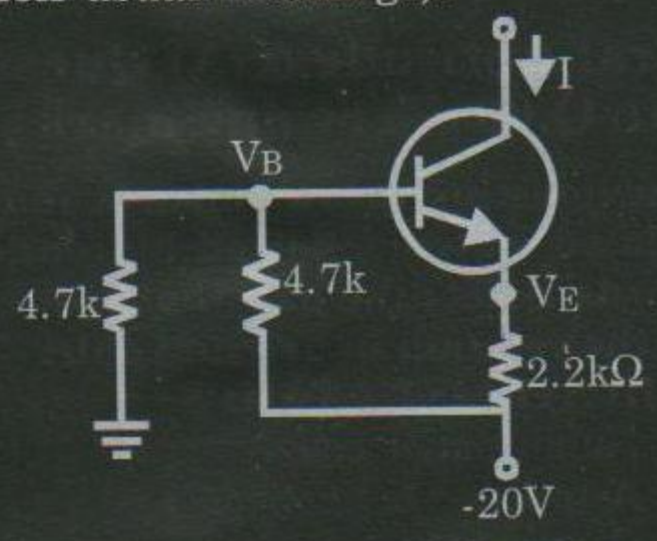
(a) 86, 12.8 (b) 49, 9.3

(c) 24.5, 3.9 (d) 43, 6.4

Linked answer question:-

Statement for linked questions 52 and 53

For circuit shown below (where the symbol have their usual meanings).



52. What is the exact value of V_B?

(a) -12V (b) -2V (c) -10 V (d) -15V

53. Assure $V_{BE} = 0.7$ for the given transistor, then the value of V_E and I_E are found to be equal to

(a) -10.7V and 4.96mA

(b) -10.7V and 4.22mA

(c) -10V and 4 mA

(d) -12V and 4.22mA

Statement linked question 54 and 55

The differential equation of a continuous time causal and stable LTI system is expressed as

$$\frac{d}{dt}y(t) + 5y(t) = 2x(t)$$

54. The step response of this system is specified as

(a) $g(t) = \frac{2}{3}\left[1 - e^{-5t}\right]u(t)$

(b) $g(t) = \frac{2}{5}\left[1 - e^{-5t}\right]u(t)$

(c) $g(t) = \frac{2}{5}e^{-5t}u(t)$

(d) $g(t) = \frac{2}{5}\left[1 - e^{-5t}\right]$

55. The value of t_o for which the following expression is valid is given by

$$g(t_o) = g(\infty)\left[1 - \frac{1}{e^2}\right]$$

(a) $\frac{2}{5}$ sec. (b) $\frac{2}{3}$ sec.

(c) 2 sec. (d) $\frac{2}{7}$ sec.

General Aptitude (GA) Questions: Q.56 to Q.60 carry one marks each.

56. The question below consists of a pair of related words followed by four pair of words. Select the pair that best expresses the relation in original pair:
PHILATELIST: STAMPS
(a) Numismatist: coins
(b) Astrologer: predictions
(c) Cartographer: maps
(d) Pawn broken: jewelry

57. A screwdriver and a hammer currently have the same price. If the price of a screw driver rises by 3% by what percent will the cost of 3 screw drivers and 3 hammers rise?
(a) 3% (b) 4% (c) 5% (d) 8%

58. Choose the most appropriate word from the options given below to complete the following sentence.
We last confidence in him because he never_____the grandiose promises he had made.
(a) Forgot about (b) Reneged on
(c) Tired of (d) Delivered on

59. Choose the most appropriate word from the options given below to complete the following sentence.
To the dismay of the student body, the class president was _____ berated by the principal at a school assembly
(a) Ignominiously (b) Privately
(c) Magnanimously (d) Fortuitously

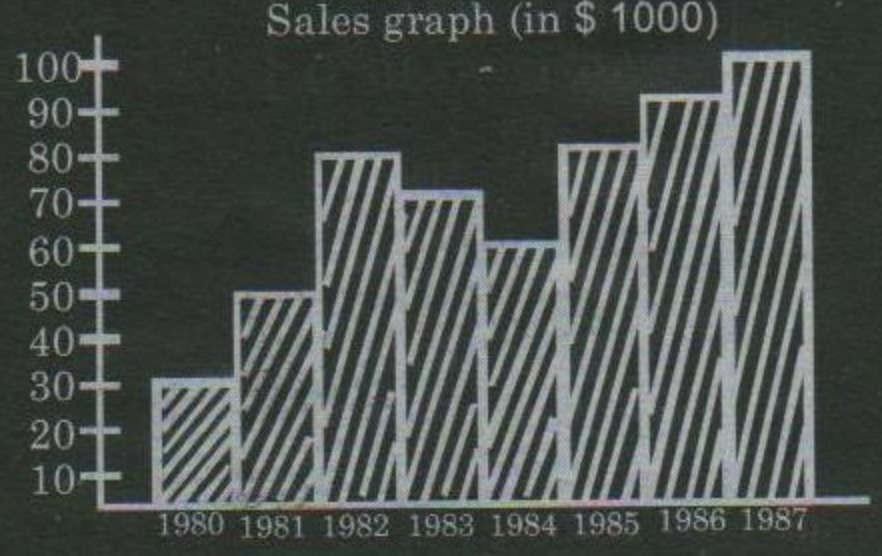
60. Choose the word that is exactly similar in meaning to the given word:
VIGILANCE
(a) Bivouac (b) Guide
(c) Watchfulness (d) Passe

Q.61 to Q.65 carry two marks each

61. When 6 gallons of gasoline are put into a car, the indicator goes from $\frac{1}{4}$ to $\frac{5}{8}$. The total capacity of tank is
(a) 12 (b) 14 (c) 15 (d) 16

62. It is important to teach students to use Computers effectively Therefore, students should be taught computer programming in school.
Which of the following if true, most weaken the argument above,
(a) Only people who use computers effectively are skilled at computers programming.
(b) Only people skilled at computer programming use computers effectively.
(c) Some people who use computers effectively cannot write computer programs.
(d) None of these.

63. What is the average (arithmetic mean) in thousands of dollars of the sales for the period 1982 – 1985?



(a) \$60 (b) \$70 (c) \$72.5 (d) \$80

64. One wheel rotates once every 7 minutes and another rotates once every 5 minutes. How after will both begin to rotate at the same time?

(a) Every 6 minutes

(b) Every 12 minutes

(c) Every 17.5 minutes

(d) Every 35 minutes.

65. Which of the following has the greatest value?

(a) 0.3 (b) $\sqrt{0.3}$ (c) $\frac{2}{5}$ (d) 0.01π