ACE Engineering Academy

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ESE- 2019 (Prelims) - Offline Test Series Test-17

ELECTRONICS & TELECOMMUNICATION ENGINEERING

SUBJECT: ELECTROMAGNETICS, MATERIALS SCIENCE, NETWORK THEORY AND BASIC ELECTRONICS ENGINEERING

SOLUTIONS

01. Ans: (c)

Sol: In TM_1 mode ($H_z = 0, E_z \neq 0$). only E_x , E_z & H_y fields will exist.

Where $E_x = E_{x_0} \cos\left(\frac{\pi}{a}x\right)e^{-j\beta_z z}$ …..(1)

$E_z = E_{z_0} \sin\left(\frac{\pi}{a}x\right)e^{-j\beta_z z}$ …..(2)

$H_y = H_{y_0} \cos\left(\frac{\pi}{a}x\right)e^{-j\beta_z z}$ …..(3)

From (1), (2) & (3) Equations we can say that E_x & E_z are in space quadrature (i.e.) where ever E_x is maximum there E_z will be zero & vice versa.

$\therefore$ From the above we can conclude that 2,3&4 statements are correct.

02. Ans: (c)

Sol: All the options a, b & d are exactly the correct reasons but option 'c' is not.

03. Ans: (d)

Sol: $\because E_z \neq 0,$ the mode must be TM

For TM_{mn}

$$E_z = E_0 \sin\left(\frac{m\pi}{a}x\right)\sin\left(\frac{n\pi}{b}y\right)e^{-j\beta_z z} \quad \text{------ (1)}$$

By comparing (1) with the given "E_z" in the problem

We get $E_0 = 20$, $\frac{m\pi}{a} = 40\pi \Rightarrow \frac{m}{0.05} = 40$

$\therefore m = 2$

Similarly $\frac{n\pi}{b} = 50\pi \Rightarrow n = 50 \times 0.02 = 1$

$\therefore n = 1$

$\therefore$ The mode is TM_{21}

04. Ans: (c)

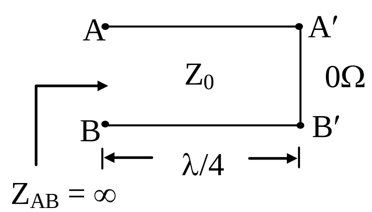
Sol: $$Z_{in} = Z_0\left(\frac{Z_L + jZ_0 \tan\beta\ell}{Z_0 + jZ_L \tan\beta\ell}\right)$$

$$Z_{oc} = \lim_{Z_L\to\infty} Z_0\left(\frac{Z_L + jZ_0 \tan\beta\ell}{Z_0 + jZ_L \tan\beta\ell}\right) = \lim_{Z_L\to\infty} Z_0\left(\frac{\frac{Z_L}{Z_L} + j\frac{Z_0}{Z_L}\tan\beta\ell}{\frac{Z_0}{Z_L} + j\frac{Z_L}{Z_L}\tan\beta\ell}\right)$$

$$= Z_0\left(\frac{1+0}{0+j\tan\beta\ell}\right) = -jZ_0\cot\beta\ell$$

05. Ans: (a)

Sol:



06. Ans: (d)

Sol: $\alpha = \sqrt{RG}$ and LG = RC

$$\alpha = \sqrt{R}\sqrt{\frac{RC}{L}} = R\sqrt{\frac{C}{L}} = \frac{R}{Z_0} = \frac{0.1}{50} = 0.002$$

07. Ans: (a)

Sol: Center: (1, 1/x) Radius: 1/x

(1, 1/0.5) (1/0.5)

(1, 2) (2)

08. Ans: (b)

Sol: Given $Z_{TE_{13}} = 200\pi$

$$Z_{TE_{13}} Z_{TM_{13}} = \eta^2$$

$$\therefore Z_{TM_{13}} = \frac{\eta^2}{Z_{TE_{13}}} = \frac{120\pi \times 120\pi}{200\pi} = 72\pi\Omega$$

09. Ans: (c)

Sol: From Faraday's law

$$\oint \bar{E}.d\bar{l} = -\frac{d}{dt}\int_S \bar{B}.d\bar{s}$$

$$E_{\phi}(2\pi\rho) = -\frac{d}{dt}\int_{\rho=0}^{\rho}\int_{\phi=0}^{2\pi} B_0 e^{kt}\rho d\rho d\phi$$

$$E = -\frac{1}{2}B_0 k e^{kt}\rho\hat{a}_{\phi}$$

10. Ans: (d)

Sol: $\frac{J_c}{J_d} = \frac{\sigma}{\omega\varepsilon}$

$$= \frac{\sigma}{2\pi f\varepsilon_r\varepsilon_0} = \frac{15\times10^9}{2\pi\times2\times10^6\times\frac{10^{-9}}{36\pi}\times2}$$

$$\frac{J_c}{J_d} = 0.675\times10^{14}$$

11. Ans: (a)

Sol: $\frac{\sin\theta_1}{\sin\theta_2} = \tan 60 = \sqrt{3}$

From snell's law

$$\frac{\sin\theta_1}{\sin\theta_2} = \sqrt{\frac{\varepsilon_{r_2}}{\varepsilon_{r_1}}}$$

$$\frac{\sin\theta_1}{\sin\theta_2} = \sqrt{\frac{\varepsilon_{r_2}}{\varepsilon_{r_1}}} = \sqrt{3}$$

$$\varepsilon_{r_2} = 3\varepsilon_{r_1}$$

So, $v_2 = \frac{v_1}{\sqrt{\varepsilon_{r_2}}} = \frac{v_1}{\sqrt{3}}$

$v_1 = \sqrt{3}v_2$

$\therefore$ n = $\sqrt{3} = 1.732$

12. Ans: (b)

Sol: $f = \frac{v}{\lambda} = \frac{2\times10^8}{500\times10^{-9}} = 4\times10^{14}\,\text{Hz}$

$$n_2 = \frac{5}{4}n_1$$

$$n_1 = \frac{3}{2}$$

$$\text{so, } n_2 = \frac{15}{8}$$

$$v_{p_2} = \frac{3\times10^8}{n_2} = 1.6\times10^8\,\text{m/sec}$$

$$\lambda_2 = \frac{v_{p_2}}{f} = \frac{1.6\times10^8}{4\times10^{14}} = 400\text{nm}$$

13. Ans: (a)

Sol: The wave is propagating along positive x-direction.

since $\alpha = 0$ and

$v = \frac{\omega}{\beta} \neq c$, the medium is not a free space but a loss- less medium .

$$v = \frac{\omega}{\beta} = \frac{1}{\sqrt{\mu \in}}$$

$$\Rightarrow \frac{2\pi\times10^7}{0.8} = \frac{3\times10^8}{\sqrt{\in_r}}$$

$$\Rightarrow \sqrt{\in_r} = \frac{3\times0.8\times10^8}{2\pi\times10^7} = \frac{24}{2\pi} = \frac{12}{\pi}$$

$$\eta = \sqrt{\frac{\mu}{\in}} = \frac{120\pi}{\frac{12}{\pi}} = 10\pi^2\Omega$$

$$\omega = 2\pi f = 2\pi\times10^7$$

$f = 10^7$Hz = 10MHz

So 1 and 3 are correct.

14. Ans: (c)

Sol: $$\nabla.\overline{D} = \frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\times\frac{2\cos\theta}{r^3}\right) + \frac{1}{r\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta\times\frac{\sin\theta}{r^3}\right)$$

$$= \frac{-2\cos\theta}{r^4} + \frac{2\cos\theta}{r^4} = 0$$

15. Ans: (d)

Sol: Power Received $P_r = A_e \overline{S}_{avg}$

Where $\overline{S}_{avg} \rightarrow$ average power density (W/m^2)

$\therefore P_r = (650\times10^{-4})\times5\times10^{-3}$

$= 3250\times10^{-7}$

$= 325\mu$W

16. Ans: (c)

Sol: Net flux through S_1= –2Q+Q= –Q C

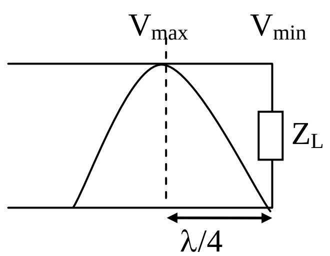
Net flux through S_2= +Q– Q =0

Net flux through S_3 = –2Q +Q– Q = –2Q C

Net flux through S_4 = +Q C

17. Ans: (c)

Sol:



At load $V_{min} \Rightarrow R_{min} = Z_L = \frac{Z_0}{\rho} = \frac{100}{4} = 25\Omega$

18. Ans: (d)

Sol: Relaxation time, $\tau_r = \frac{\varepsilon}{\sigma} = \frac{\varepsilon_0\varepsilon_r}{\sigma}$

$$= \frac{8.854\times10^{-12}\times1}{5.8\times10^{7}}$$

$$= 1.52\times10^{-19} \text{ sec}$$

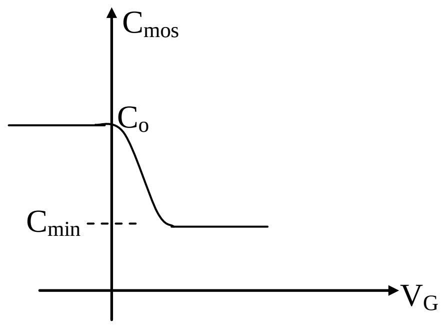
19. Ans: (c)

Sol: Capacitance of MOS Capacitor can be varied by changing the voltage applied at gate layer. Hence MOS capacitor is called voltage dependent capacitor. So, statement (1) is correct and statement (2) is false.

When negative voltage applied to MOS Capacitor with p-type substrate, the holes from substrate accumulate near the oxide layer statement (3) is correct.

20. Ans: (a)

Sol: If gate voltage is increase rapidly the inversion layer can not form because minority carriers can not respond to rapid changes in gate voltage. Due to this MOS Capacitance remains constant at C_{min} whenever gate voltage varies rapidly.



21. Ans: (a)

Sol: Diffusion = Depth of source and drain regions depends on temperature of furnace and duration of substrate in furnace.

Ion-Implantation = The depth of source and drain depends on controlling of electron beam.

Dry Oxidation = Used to form thin layers.

Wet Oxidation = Used to form thick layers.

22. Ans: (a)

Sol: For deep triode region,

$$I_D = \mu_n C_{ox}\left(\frac{W}{L}\right)[(V_{GS} - V_T)V_{DS}]$$

$$\therefore\ (g_m)_{\text{deep triode}} = \frac{dI_D}{dV_{GS}}$$

$$\Rightarrow (g_m)_{\text{deep triode}} = \mu_n C_{ox}\left(\frac{W}{L}\right)V_{DS}$$

For Saturation region,

$$I_D = \frac{1}{2}\mu_n C_{ox}\left(\frac{W}{L}\right)(V_{GS} - V_T)^2$$

$$\therefore (g_m)_{\text{saturation}} = \frac{dI_D}{dV_{GS}}$$

$$\Rightarrow (g_m)_{\text{saturation}} = \mu_n C_{ox}\left(\frac{W}{L}\right)(V_{GS} - V_T)$$

$$\therefore \frac{(g_m)_{\text{deep triode}}}{(g_m)_{\text{saturation}}} = \frac{\mu_n C_{ox}\left(\frac{W}{L}\right)V_{DS}}{\mu_n C_{ox}\left(\frac{W}{L}\right)(V_{GS} - V_T)} = \frac{V_{DS}}{(V_{GS} - V_T)}$$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23. Ans: (d)

Sol: For saturation region,

$$I_D = I_{DSS}\left(1-\frac{V_{GS}}{V_P}\right)^2$$

$$\Rightarrow \left(1-\frac{V_{GS}}{V_P}\right)=\sqrt{\frac{I_D}{I_{DSS}}} \qquad (\because\ I_{DSS} = 5mA \text{ at } V_{GS} = 0)$$

$$= \sqrt{\frac{45}{5}} = \sqrt{9} = 3$$

$$\Rightarrow \left(1-\frac{V_{GS}}{V_P}\right)=3$$

As we know, $g_m = \frac{2I_{DSS}}{|-V_P|}\left(1-\frac{V_{GS}}{V_P}\right)$

$$\Rightarrow g_m = \frac{2\times5\times10^{-3}}{5}\times3$$

$$\Rightarrow g_m = 6 \times 10^{-3}\ A/V$$

$$\Rightarrow g_m = 6\ m\mho$$

24. Ans: (a)

Sol: $\therefore$ Solar diode can be operated in F.B.

$\therefore$ I_0 is the reverse saturation current

I_L = short circuit current

$$I_L = I_0\left(e^{\frac{Vq}{KT}}-1\right)$$

$$\frac{I_L}{I_0} = \left(e^{\frac{Vq}{KT}}-1\right)$$

$$V = \frac{KT}{q}\ln\left(1+\frac{I_L}{I_0}\right)$$

25. Ans: (d)

Sol: CMOS amplifier has lowest power dissipation as compare to NMOS & PMOS devices.

Disadvantage: propagation delay is high.

26. Ans: (b)

Sol: Biasing in Transistor amplifier to

1. Stabilize the operating point against temperature variations.
2. Reduce distortion and increase dynamic range
3. Operating point in the linear region of characteristics

27. Ans: (d)

Sol: For zero temperature coefficient

$|V_{GS}| = |V_P| - 0.63V$

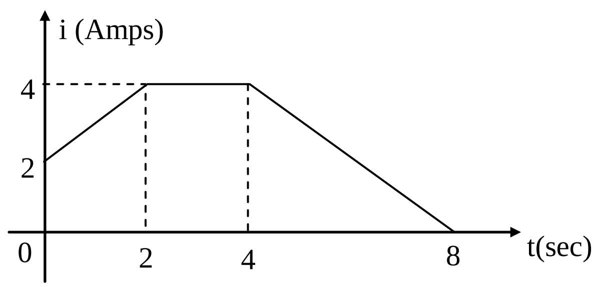
$= 4 - 0.63$

$|V_{GS}| = 3.37V$

28. Ans: (b)

Sol: Given data L = 2H

Current waveform



i) Voltage across the inductor

$V_L(t) = L\frac{di(t)}{dt}$

Case (i)

$0 < t < 2$

$i(t) = t + 2$

$V_L = 2\times\frac{d}{dt}(t+2)$

$V_L = 2V$

Case (ii)

$2 < t < 4$

$i(t) = 4$

$V_L = 2\times 0$

$= 0$

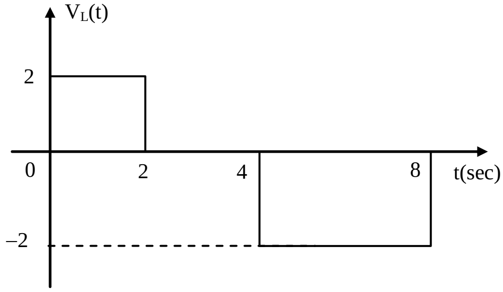
Case (iii)

$4 < t < 8$

$i(t) = 8 - t$

$V_L = 2\frac{d}{dt}(8-t)$

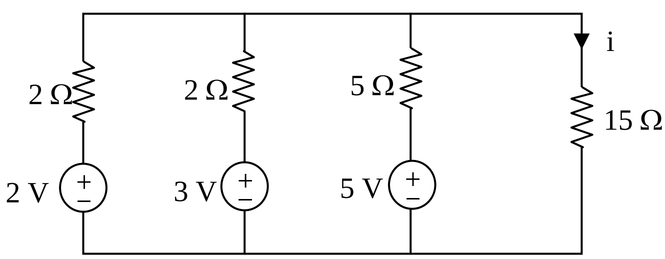
$= -2$ V



Average voltage = $\frac{(2\times 2)+(4\times -2)}{8}$ = –0.5V

29. Ans: (a)

Sol: The given circuit



$$V_{eq} = \frac{V_1G_1 + V_2G_2 + V_3G_3}{G_1 + G_2 + G_3}$$

Where G is conductance

$$= \frac{\frac{2}{2}+\frac{3}{2}+\frac{5}{5}}{\frac{1}{2}+\frac{1}{2}+\frac{1}{5}}$$

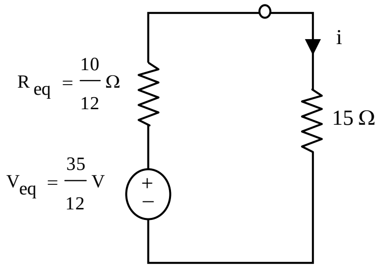
$$= \frac{10+15+10}{5+5+2}$$

$$= \frac{35}{12}\text{V}$$

$$R_{eq} = \frac{1}{G_1 + G_2 + G_3}$$

$$= \frac{1}{\frac{1}{2}+\frac{1}{2}+\frac{1}{5}} = \frac{10}{12}\Omega$$

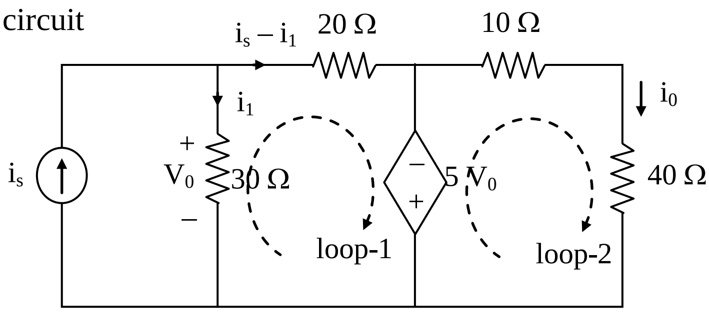
The milliman's equivalent circuit



$$i = \frac{\frac{35}{12}}{\frac{10}{12}+15} = 0.184 \text{ A}$$

30. Ans: (b)

Sol: The given circuit



Apply KVL in loop-(1)

$-V_0 + 20(i_s - i_1) - 5V_0 = 0$

$20(i_s - i_1) - 6V_0 = 0$ ……. (i)

but $V_0 = 30\, i_1$

substitute V_0 in equation (i)

$20(i_s - i_1) - 6(30\, i_1) = 0$

$i_s = 10\, i_1$ …….. (ii)

Apply KVL in loop-(2)

$5V_0 + (10 + 40)i_0 = 0$ …… (iii)

but $V_0 = 30\, i_1$

substitute V_0 in equation (iii)

$5(30\, i_1) + 50\, i_0 = 0$

$150\, i_1 = -50\, i_0$

$i_1 = -\frac{1}{3} i_0$ ……… (iv)

solving equation (ii) and (iv)

$i_s = 10\left(-\frac{1}{3}\right) i_0$

$\frac{i_0}{i_s} \Rightarrow -\frac{3}{10} = -0.3$

31. Ans: (a)

Sol: R = 150 Ω, L = 30 mH,

V_S = 12 V, I = 50 mA

The current through coil is given by

$i(t) = i(\infty) + [i(0) - i(\infty)]e^{-t/\tau}$

$$i(t) = \frac{V_S}{R} + \left(0 - \frac{V_S}{R}\right)e^{-\frac{t}{\tau}}$$

$$\tau = \frac{L}{R} = \frac{30\times10^{-3}}{150} = \frac{1}{5000}$$

$$50\times10^{-3} = \frac{12}{150} - \frac{12}{150}e^{-5000t}$$

$$e^{-5000t} = \frac{3}{8}$$

$$-5000t = \ell n\left(\frac{3}{8}\right)$$

t = 0.196 msec

Relay delay time t = 0.196 msec

32. Ans: (a)

Sol: $Z_{11} = \frac{A}{C} = \frac{4}{3}$

33. Ans: (b)

Sol: Since maximum current is 5 A

$$E_{max} = \frac{1}{2}LI^2_{max} = \frac{1}{2}(2m)(25)$$

$$= 25 \text{ mJ}$$

34. Ans: (c)

Sol:

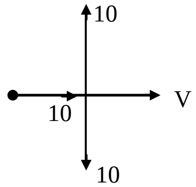


Fig. Phasor diagram

I = 10A

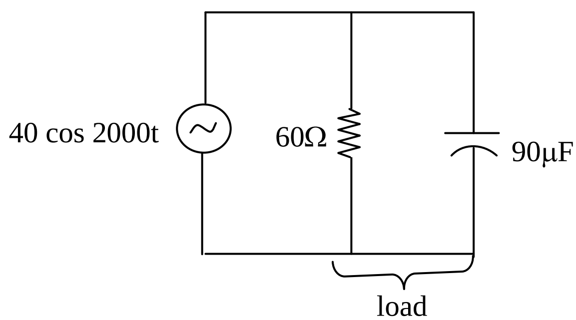
35. Ans: (b)

Sol: $$I_L = I_{ph} = \frac{V_{ph}}{|Z_{ph}|} = \frac{440/\sqrt{3}}{\sqrt{100+400}} = \frac{440}{10\sqrt{15}}$$

$$= \frac{44}{\sqrt{15}} \approx 11.4 \text{ A}$$

36. Ans: (b)

Sol:



P_{avg} = Active power = Real power

$$P = \frac{V_{Rms}^2}{R} = \frac{\left[\frac{40}{\sqrt{2}}\right]^2}{60}$$

$$= \frac{40\times 40}{2\times 60} = \frac{80}{6} \approx 13.33 \text{ W}$$

37. Ans: (a)

Sol: $$V_L = \frac{V}{R_1 + j\omega L}(j\omega L)$$

$$= \frac{V}{1+\left(\frac{1}{j\omega\sqrt{LC}}\right)} \qquad \because R_1 = \sqrt{\frac{L}{C}}$$

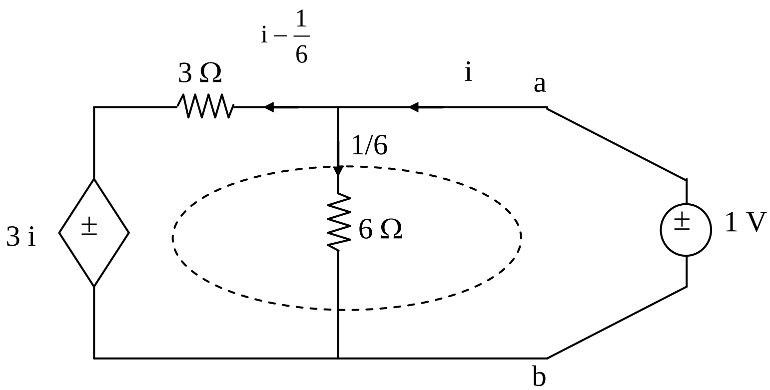
$$V_{R2} = \frac{V}{R_2 + \frac{1}{j\omega c}} R_2$$

$$= \frac{V}{1+\left[\frac{1}{j\omega\sqrt{LC}}\right]} \qquad \because R_2 = \sqrt{\frac{L}{C}}$$

38. Ans: (a)

39. Ans: (b)

Sol:



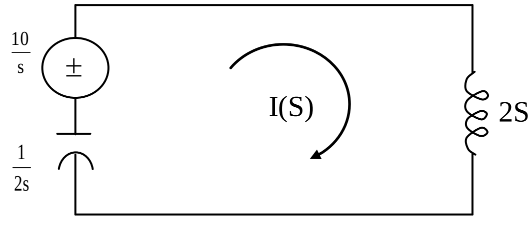
$$-1+3i-\frac{1}{2}+3i=0$$

$$6i=\frac{3}{2}\Rightarrow i=\frac{1}{4}$$

$$\text{So, } R_{th}=\frac{1}{i}=\frac{1}{1/4}=4\ \Omega$$

40. Ans: (a)

Sol:



$$I(s)\left[2s+\frac{1}{2s}\right]=\frac{10}{s}$$

$$\Rightarrow I(s)\left[\frac{4s^2+1}{2s}\right]=\frac{10}{s}$$

$$I(s)=\left[\frac{20}{4s^2+1}\right]=\frac{5}{s^2+\left(\frac{1}{2}\right)^2}$$

$$i(t)=10\sin\frac{t}{2}$$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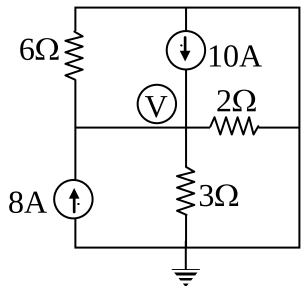
41. Ans: (b)

Sol:



By nodal analysis $\frac{V}{3}+\frac{V}{2}+\frac{V}{6}=10+8$

$V = 18V$

Power delivered by source

$= (18\times 8) + (10\times 18) = 324W$

42. Ans: (b)

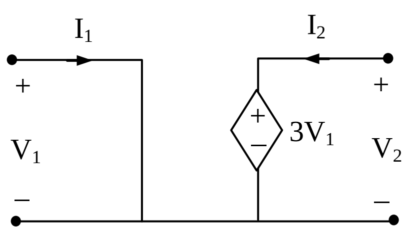
Sol: Independent loops = meshes

$m = b - (n - 1)$

$= 9 - [6 - 1] = 9 - 5 = 4$

43. Ans: (d)

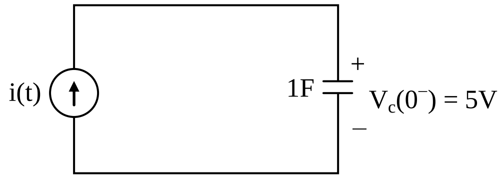
Sol: Given network



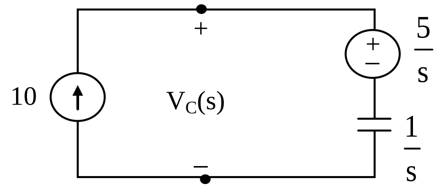
As we are unable to write I_1 interms of V_1 and V_2 therefore Y parameters doesn't exist.

44. Ans: (d)

Sol: At $t = 0^+$ the circuit is



Convert into Laplace domain



$\Rightarrow V_C(s) = \frac{5}{s} + \frac{1}{s} \times 10 = \frac{15}{s}$

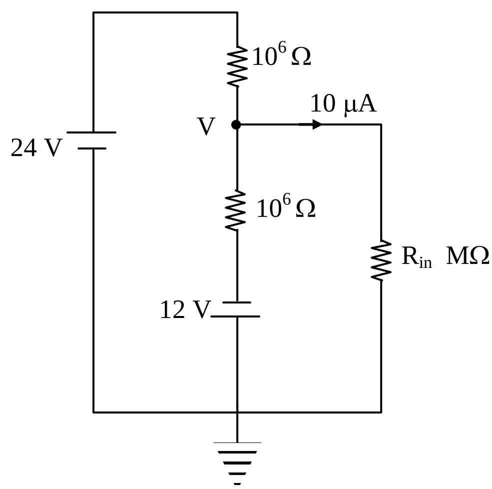
$\Rightarrow v_C(t) = 15\, u(t)$

At $t = 0^+ \Rightarrow u(t = 0^+) = 1$

$\Rightarrow V_C(0^+) = 15$ V

45. Ans: (c)

Sol: Redrawn the given circuit as shown



By applying Nodal at V

$$\frac{V+12}{1M} + \frac{V-24}{1M} + 10\,\mu A = 0$$

$\Rightarrow V = 1$

$$R = \frac{1}{10\mu} = 100\,k\,\Omega$$

46. Ans: (b)

Sol: All the statements listed are correct. (Reciprocity theorem however strictly applies to passive, linear, bilateral networks).

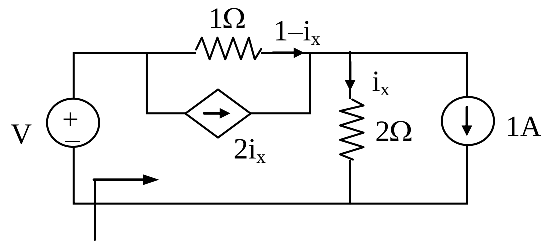
47. Ans: (a)

Sol: At steady state ($t \to \infty$), input voltage is zero

Therefore, $I = \frac{V(\infty)}{1} = 0A$

48. Ans: (a)

Sol:



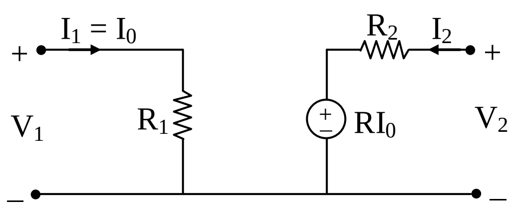
$$R_{eff} = \frac{v}{i_T} = \frac{v}{(1+i_x)}$$

KVL: $-V + 1(1-i_x) + 2\,i_x = 0$

$$\Rightarrow \frac{v}{(1+i_x)} = 1\Omega$$

49. Ans: (a)

Sol:



By KVL $V_1 = I_1R_1$ ------(1)

Here $I_0 = I_1$

By KVL

$V_2 = I_2R_2 + RI_1$

$V_2 = RI_1 + R_2I_2$ -----(2)

Compare equation (1) and (2) with general of Z-Parameters.

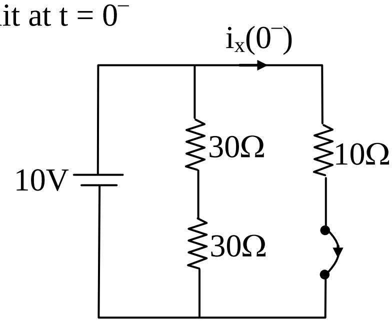
$V_1 = Z_{11}I_1 + Z_{12}I_2$

$V_2 = Z_{21}I_1 + Z_{22}\,I_2$

$$\text{Z-Parameters} = \begin{bmatrix} R_1 & 0 \\ R & R_2 \end{bmatrix}\Omega$$

50. Ans: (a)

Sol: Circuit at $t = 0^-$



$$\therefore i_x(0^-) = \frac{10}{10} = 1A$$

51. Ans: (d)

Sol: The nano particles from iron and palladium were synthesized and they are used to produce the magnetic storage devices. They produce only tera byte storage capabilities.

52. Ans: (b)

Sol: The fabrication of the ceramic is easier through the nano structuring fabrication is the process of producing the things.

53. Ans: (c)

Sol: The extensively used nano particles as catalyst are gold. Some of them are molybdenum, cerium oxide and nickel.

54. Ans: (c)

Sol: Since steels have very small amount of carbon (usually less than 6%) they are considered iron alloy. Hence metallic solid.

55. Ans: (b)

Sol: Void fraction = 1 – packing fraction

Packing fraction is 0.74 = 1 – 0.74

= 0.26

56. Ans: (b)

Sol: Maximum value of incident angle can be 90° for which sine is 1.

Hence $d = \lambda/2$ $(n\lambda = 2d. \sin\theta)$

57. Ans: (d)

Sol: Cesium chloride has a simple cubic structure with a coordination number of 8.

58. Ans: (a)

Sol: A linear configuration is formed when two anions bond with cation. This configuration is the only possible stable configuration for $0 < x < 0.155$. The number of nearest neighbour (or) the coordination number is two.

59. Ans: (a)

Sol: For dense silicate ceramic, water absorption percentage should be less than 2% for fine structure and less than 6% for coarse structure.

60. Ans: (c)

Sol: Aluminum oxide reaches fracture point before glass in aluminum oxide for a large amount of stress little strain is produced.

61. Ans: (a)

Sol: Brass which is not a pure metal but combination of copper & zinc. It contains 65% copper and 35% zinc. This non ferrous metal very corrosive, yellow in colour, tarnishes very easily. It is harder than copper and it's good electrical conductor.

62. Ans: (c)

Sol: The minimum amount of current passed through the body of super conductor in order to destroy the superconductivity is called critical current.

63. Ans: (d)

64. Ans: (d)

Sol: The number of nearest neighbors (co-ordination number) of HCP crystal = 12.
The number of nearest neighbors (co-ordination number) of FCC crystal = 12.
So difference is = 12 – 12 = 0.

65. Ans: (a)

Sol: A paramagnetic material is characterized by a very small and positive susceptibility when placed in strong magnetic fields, they display magnetic movement that are parallel to the applied field.

66. Ans: (a)

Sol: Ferrites are organic chemical compounds. They are having following properties.
1. High resistivity
2. Low eddy current losses
3. Soft magnetic in nature.
4. They are used as material in high frequency transformers.

67. Ans: (b)

Sol: $\chi \propto \frac{1}{T}$

$$\Rightarrow \frac{\chi_1}{\chi_2} = \frac{T_2}{T_1}$$

$$\Rightarrow \frac{3\times10^{-4}}{\chi_2} = \frac{400}{300}$$

$\chi_2 = 2.25 \times 10^{-4}$

68. Ans: (a)

Sol: A good conductor of electricity is as follows:

1. It's conductivity decreases with increasing temperature

$\rho_{t2} = \rho_{t1}[1+\alpha(T_2-T_1)]$

2. Number of free electrons is around 10^{28} per m^3
3. It's conductivity decreases with addition of impurities
4. There also possess good thermal conductivity.

69. Ans: (d)

Sol: Given the battery is disconnected from the capacitor. So, Q = constant.

$$\therefore \text{ energy} = \frac{Q^2}{2C} = \frac{Q^2 d}{2\varepsilon_0 A}$$

$\therefore$ energy $\propto$ d (since Q, ε_0 and A are constant)

So, as distance between the plate d increases, the potential energy will also increases. Hence statement I is wrong.

Statement (II) is correct. work is to be done in order to charge the capacitor and whatever work that is done that will be stored as potential energy in the capacitor.

70. Ans: (a)

Sol: Brewster's angle is defined for parallel polarization (or) vertical polarization only.

At Brewster's angle there is no reflection for the wave

$$\Gamma_{11} = \frac{E_r}{E_i} = 0$$

$$\text{VSWR} = \frac{1+|\Gamma_{11}|}{1-|\Gamma_{11}|} = 1$$

$\therefore$ Both Statement (I) & Statement (II) are true and Statement (II) is the correct explanation of Statement (I)

71. Ans: (a)

Sol: Because of higher mobility of electrons than that of holes, I_{DSS} in n-channel DMOSFET is more than 'I_{DSS}' in p-channel DMOSFET. So, Both statement (I) and statement (II) are true and statement (II) is correct explanation for statement (I).

72. Ans: (d)

Sol: A resistance does oppose increase or decrease of current through it

Initial current inductor circuit is zero

When the switch is closed current through it will remain as zero.

$\Rightarrow$ Current in wire 'ab' will be non zero as voltage source connected to it.

73. Ans: (b)

74. Ans: (c)

Sol: At 0°K, neighbouring atomic magnetic moments are frozen with magnetic dipoles pointing in opposite directions.

75. Ans: (a)

Sol Good conductors like silver, copper and gold do not show the superconductivity. Based on BCS (Bardeen-cooper-Schrieffer) theory electrons and phonons interaction leads to formation copper pairs in good conducting metals so that do not show the superconductivity.

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