ACE
Engineering Academy

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ESE- 2018 (Prelims) - Offline Test Series Test- 17

ELECTRONICS & TELECOMMUNICATION ENGINEERING

SUBJECT: ELECTROMAGNETICS + MATERIALS SCIENCE + NETWORK THEORY + BASIC ELECTRONICS ENGINEERING SOLUTIONS

01. Ans: (d)

Sol: We know

$$\eta = \eta_0\sqrt{\frac{\mu_r}{\varepsilon_r}}$$

$\eta \rightarrow$ Intrinsic impedance of the medium

$\eta_0 \rightarrow$ intrinsic impedance of the free space

$$\frac{\eta}{\eta_0} = \sqrt{\frac{\mu_r}{\varepsilon_r}} = \sqrt{\frac{12(1-j3)}{48(1-j3)}} = \frac{1}{2}$$

02. Ans: (c)

Sol: By using pattern multiplication

Resultant pattern = unit pattern × group pattern

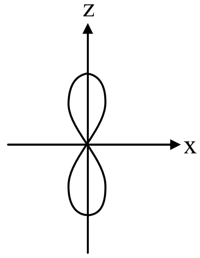
Unit pattern:

Here the antenna is Hertzian dipole, placed perpendicular to z-axis (horizontally), so its radiation pattern is

$F(\theta) \propto \cos\theta$

$\theta_{max} = 0, \pi$

$\theta_{min} = \pm\frac{\pi}{2}$



Unit pattern

Group pattern:

$$AF = 2\cos\left(\frac{\psi}{2}\right)$$

$$\psi = \delta + \beta d\cos\theta$$

$$\delta = 0,\ d = \frac{\lambda}{2}$$

$$\psi = 0 + \frac{2\pi}{\lambda}\frac{\lambda}{2}\cos\theta$$

$$\psi = \pi\cos\theta$$

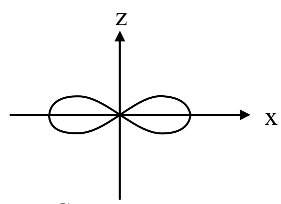
For maximum radiation, AF should be maximum

$$AF = 2\cos\left(\frac{\pi}{2}\cos\theta\right)$$

$$\frac{\pi}{2}\cos\theta = 0$$

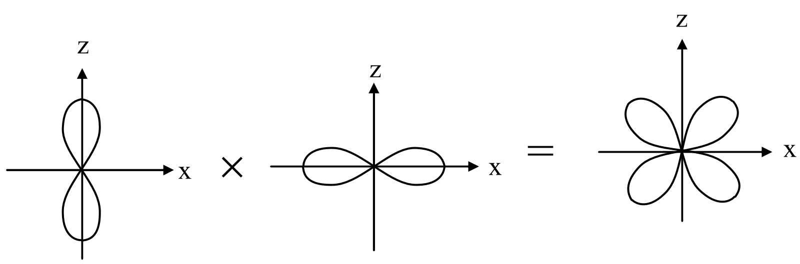
$$\cos\theta = 0$$

$$\theta = \pm\frac{\pi}{2}$$



Group pattern

unit pattern × group pattern = Resultant pattern



03. Ans: (b)

Sol: TE → ($E_z = 0$)

$$H_z = H_0\cos\left(\frac{m\pi}{a}x\right)\cos\left(\frac{n\pi}{b}y\right)$$

$$E_y = \frac{\partial H_z}{\partial x} = -H_1\sin\left(\frac{m\pi}{a}x\right)\cos\left(\frac{n\pi}{b}y\right) \ldots (1)$$

Given

$$E_y = 5\sin\left(\frac{2\pi}{a}x\right)\cos\left(\frac{\pi}{b}y\right)\sin(\omega t - 12z) \ldots (2)$$

By comparing equation (1) and (2)

$m = 2,\ n = 1$

$\therefore TE_{21}$ mode

04. Ans: (a)

Sol: We known condition for V_{max}

$$2\beta x_{max} = \phi + 2n\pi$$

$$2\frac{2\pi}{150}x_{max} = -150 + 360$$

$$x_{max} = 43.75$$

1^{st} V_{max} = 43.75m

2^{nd} V_{max} = 75 + 43.75

3^{rd} V_{max} = 150 + 43.75

4^{th} V_{max} = 3(75) + 43.75

5^{th} V_{max} = 4(75) + 43.75

6^{th} V_{max} = 5(75) + 43.75

7^{th} V_{max} = 6 (75) + 43.75

= 493.75

So, 7^{th} maximum are possible

05. Ans: (c)

Sol: $V_{emf} = -N\dfrac{d\phi}{dt}$

$V_{enf} = -N\dfrac{d}{dt}[BA\cos\theta]$

$V_{emf} = NBA\sin\theta\dfrac{d\theta}{dt}$

$V_{emf} = NBA\omega\sin\theta$

$(V_{emf})_{max} = NBA\omega$

$\sqrt{2}\times10\times10^{-3} = N(60\times10^{-6})\,(100\times100\times10^{-6})\,(30)$

$N = \dfrac{\sqrt{2}\times10\times10^{-3}}{60\times10^{-6}\times10^{-2}\times30}$

$N = 785.67 \approx 786$

06. Ans: (a)

Sol: $v_p = K\sqrt{\lambda}$

$K = \dfrac{v_p}{\sqrt{\lambda}}$ ....(1)

We know that

$v_p = \dfrac{\omega}{\beta}$ ......(2)

$v_g = \dfrac{d\omega}{d\beta}$ .....(3)

$\dfrac{dv_p}{d\beta} = \dfrac{\beta\left(\dfrac{d\omega}{d\beta}\right) - \omega}{\beta^2}$

$\beta\dfrac{dv_p}{d\beta} = \dfrac{d\omega}{d\beta} - \dfrac{\omega}{\beta}$

$\beta\dfrac{dv_p}{d\beta} = v_g - v_p$

$v_g = v_p + \beta\dfrac{dv_p}{d\beta}$

We know $\beta = \dfrac{2\pi}{\lambda}$

$d\beta = -\dfrac{2\pi}{\lambda^2}d\lambda$

$v_g = v_p + \dfrac{2\pi}{\lambda}\dfrac{dv_p}{\left(\dfrac{-2\pi}{\lambda^2}d\lambda\right)}$

$v_g = v_p - \lambda\dfrac{dv_p}{d\lambda}$ ---------(4)

Given

$v_p = K\sqrt{\lambda}$

$\dfrac{dv_p}{d\lambda} = \dfrac{K}{2\sqrt{\lambda}}$

From equation (1)

$\dfrac{dv_p}{d\lambda} = \dfrac{1}{2\sqrt{\lambda}}\dfrac{v_p}{\sqrt{\lambda}} = \dfrac{v_p}{2\lambda}$

From equation (4)

$v_g = v_p - \lambda\left(\dfrac{v_p}{2\lambda}\right)$

$v_g = v_p - \dfrac{v_p}{2} = \dfrac{v_p}{2}$

$v_g = 1.5\times10^8$ m/s

07. Ans: (d)

Sol: $\dfrac{\text{average poynting vector}}{\text{average energy density}} = \text{Velocity}$

$$\text{average energy density} = \frac{\text{average poynting vector}}{\text{velocity}}$$

$$\text{average energy density} = \frac{1}{3\times10^{8}}$$

$$= 3.33\text{nJ/m}^3$$

08. Ans: (a)

Sol: Given $f = 1\times10^9$ Hz

Skin depth $(\delta) = 100\times10^{-3}$ m

We know, index of

refraction, $n = \dfrac{free\ space\ velocity}{velocity\ in\ a\ medium}$

Velocity in the medium $(v_p) = \dfrac{\omega}{\beta}$

For high loss medium (good conductor),

$\alpha = \beta$

$v_p = \dfrac{\omega}{\alpha}$

Skin depth $(\delta) = \dfrac{1}{\alpha}$

$v_p = \omega\delta$

So, index of refraction

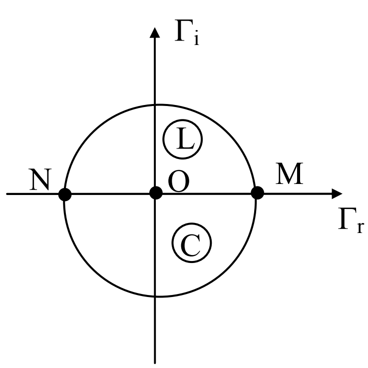
$$n = \frac{3\times10^8}{\omega\delta}$$

$$n = \frac{3\times10^8}{2\pi\times10^9\times100\times10^{-3}}$$

n = 0.4775

09. Ans: (b)

Sol:



M- open circuited load

N-short circuited load

O- matched load

Above the Γ_r –axis, inductive in nature and below the Γ_i-axis capacitive is nature. So, the centre of the smith chart is a matched load.

10. Ans: (c)

Sol: $Z_{in} = \dfrac{Z_o^2}{Z_R} = \dfrac{(50)^2}{-j100} = j25\Omega$

11. Ans: (a)

Sol: Reflection coefficient at any position on the line is given by

$\Gamma_{at\,x'} = K e^{-2j\beta x'}$

at $\left(x' + \dfrac{\lambda}{24}\right)$ reflection coefficient is given by $\Gamma_{at\left(x'+\frac{\lambda}{24}\right)} = K e^{-2j\beta\left(x'+\frac{\lambda}{24}\right)}$

Given: $\Gamma_{at(x')}(\text{point A}) = 0.3\,e^{-j30^o}$

$\Gamma_{at\left(x'+\frac{\lambda}{24}\right)} = K e^{-2j\beta\left(x'+\frac{\lambda}{24}\right)}$ ----- (1)

$\Gamma_{at\,x'} = K e^{-2j\beta x'}$ ----- (2)

$$\frac{(1)}{(2)} \Rightarrow \frac{\Gamma_{at\left(x'+\frac{\lambda}{24}\right)}}{0.3e^{-j30}} = \frac{e^{-2j\frac{2\pi}{\lambda}\times\frac{\lambda}{24}}}{1}$$

$\therefore$ Reflection coefficient at a distance of $\frac{\lambda}{24}$ from point A is $\Gamma = 0.3\,e^{-j60^o}$

$$\text{(or) } 0.3 \angle -60^o$$

12. Ans: (d)

13. Ans: (b)

Sol: $f_c(TE_{01}) = \frac{c}{2b} = \frac{3\times10^{10}}{2\times5} = 3GHz$

14. Ans (a)

Sol: Directivity of an antenna is given by

$$D = \frac{4\pi U(\theta,\phi)_{max}}{P_{rad}}$$

Given

$$U(\theta,\phi) = U_0\cos^4\theta\,;\ 0 \le \theta \le \frac{\pi}{2},\ 0 \le \phi \le 2\pi$$

$$= 0 \qquad ;\text{ else where}$$

$$U(\theta,\phi)_{max} = U_0$$

$$P_{rad} = \int_{\theta=0}^{\pi/2}\int_{\phi=0}^{2\pi} U_0\cos^4\theta\ \sin\theta d\theta d\phi$$

Put $\cos\theta = t$ (Limits t: 1 to 0)

$-\sin\theta\ d\theta = dt$

$$= U_0\int_{t=0}^{1}\int_{\phi=0}^{2\pi} t^4\ dtd\phi$$

$$P_{rad} = \left(\frac{2\pi}{5}\right)U_0 \quad \text{Watt}$$

$$D = 4\pi\frac{U_0}{\left(\frac{2\pi}{5}\right)U_0} = 10$$

$\therefore$ Directivity, $D = 10$

15. Ans: (d)

Sol: (1) $\overline{E} = -\nabla V$

$$= 5000\left(e^{-50x}\sin 50y\hat{a}_x - e^{-50x}\cos 50y\hat{a}_y\right)$$

$$\overline{\nabla}.\overline{D} = \varepsilon_0\left(\nabla.\overline{E}\right) = 0$$

(2) $V = 100e^{-50x}\sin 50y\,V$

$$= 100e^{-50x}\sin 50\times 0 = 0$$

Since V is a constant and independent of x and z, y =0 is an equipotential surface.

(3) $\overline{E}(\text{at } y=0) = -5000e^{-50x}\,\hat{a}_y$

Hence $\overline{E}(\text{at } y=0)$ is perpendicular to the plane y = 0

16. Ans: (a)

Sol: The continuity equation is given by

$$\oiint \overline{J}.d\overline{A} = -\iiint\frac{\partial\rho_v}{\partial t}dv$$

17. Ans: (c)

Sol: $R_{rad} = 80\pi^2\left[\frac{d\ell}{\lambda}\right]^2$

$$= 80\pi^2\left(\frac{0.1\lambda}{\lambda}\right)^2$$

$$= 0.8\pi^2\Omega$$

18. Ans: (b)

19. Ans: (b)

Sol: $\frac{R_A}{R_B} = \frac{n_B e}{n_A e}$

$= \frac{4\times10^{21}\times e}{2\times10^{21}\times e}$

$= \frac{2}{1}$

20. Ans: (a)

21. Ans: (c)

Sol: Silver is a monovalent atom with highest conductivity of $7\times10^{7}(\Omega\text{–m})^{-1}$, but aluminium is a trivalent atom with $4\times10^{7}(\Omega\text{–m})$ so 1st statement is wrong.

With increasing temperature in conducting metals, lattice vibration takes place and hence conductivity decrease.

$\sigma = \frac{ne^2t}{m}$ $\qquad \sigma \propto t$

t = average collusion time.

22. Ans: (a)

Sol: Self-assembly is a bottom-up manufactory technique, all the other options are correct. In self-assembly, weak interaction play very important role, self assembling molecules adopt a organised structure which thermodynamically more stable that the single, unassembled components.

23. Ans: (a)

Sol: Silicon carbide material is a high melting point material with good semiconductivity character.

24. Ans: (c)

Sol: PVC material is a thermoplastic materials. They are formed by addition polymerization and in PVC each polymer chain is connected linearly.

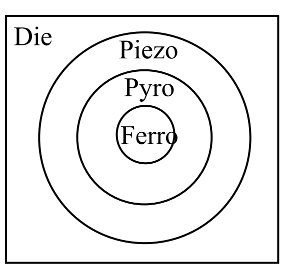
25. Ans: (b)

26. Ans: (b)

27. Ans: (b)

28. Ans: (a)

Sol:



All ferroelectric materials are piezoelectric material, some of piezoelectric materials are pyroelectric materials.

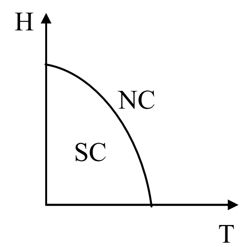
29. Ans: (a)

Sol: Ionic polarisability = $\alpha_I = \dfrac{e^2}{\omega^2 m}$

Ionic polarisability is inversely proportional to the square of natural frequency.

30. Ans: (a)

Sol: **1:** Super conductors exhibits normal conductivity when the applied field is more than critical field.



2 & 3: Ceramic materials are becoming super conductor at much higher temperature than metals.

31. Ans: (a)

Sol: The magnetic bubbles used in computer memories to store the data which made up of Yttrium-iron garnet.

32. Ans: (d)

Sol: The conductivity is in descending order as follows. Hard drawn copper, cadmium copper, Aluminium & galvanised steel.

33. Ans: (d)

Sol: The number of independent current equations $= n - 1$

34. Ans: (d)

Sol: $H(s) = \dfrac{4(s^2+25)}{s^2+2.5s+100}$,

$$H(j\omega) = \frac{4(25-\omega^2)}{(100-\omega^2)+j2.5\omega}$$

$|H(j\omega)| = 1,\ \omega = 0$

$= 0,\ \omega = 5$ (notch occurs here)

$= 4,\ \omega = \infty$

Gain at high frequencies is more than the gain at low frequencies.

$\therefore$ The given H(s) represents a high pass notch filter.

35. Ans: (c)

36. Ans: (c)

Sol: $2\,I_1 + 2\,I_2 = 6$

If $I_1 = 1.5$ A, $I_2 = 1.5$ A

37. Ans: (d)

Sol: $I_1 = 2\,V_1 + V_2$

$I_2 = 2\,V_1 + 3\,V_2$

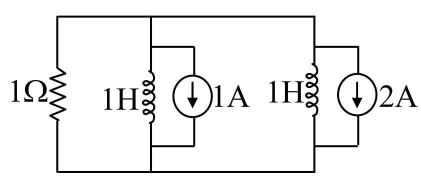
$$Z_{12} = \left.\frac{V_1}{I_2}\right|_{I_1=0}$$

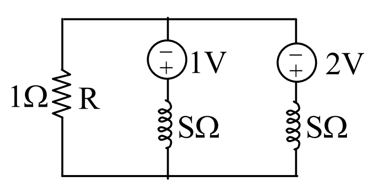
$I_1 = 0$, $V_2 = -2\,V_1$, $I_2 = -4\,V_1$,

$$Z_{12} = -\frac{1}{4}\,\Omega$$

38. Ans: (a)

Sol: The circuit as stated in the question is given below





By nodal analysis,

$$\frac{V(s)+1}{s} + \frac{V(s)+2}{s} + \frac{V(s)}{1} = 0$$

$$\Rightarrow V(s)\left(\frac{2}{s}+1\right) = -\frac{1}{s} - \frac{2}{s}$$

$$\Rightarrow V(s)\left(\frac{2+s}{s}\right) = -\frac{3}{s}$$

$$\Rightarrow V(s) = \frac{-3}{s+2}$$

∴ Current through 'R' is

$$I_R(s) = \frac{V(s)}{R} = \frac{V(s)}{1} = V(s)$$

$$\Rightarrow I_R(s) = \frac{-3}{s+2}\,A$$

∴ by ILT, $i_R(t) = -3e^{-2t}$ A

$\Rightarrow i_R(\infty) = -3e^{-\infty} = 0$A

∴ $i_R(\infty) = 0$A

39. Ans: (d)

Sol: Keeping c–d open,

$R_{ab} = (30 + 90)\,||\,(60 + 60) = 60\ \Omega$

Keeping a–b open

$R_{cd} = (30 + 60)\,||\,(60 + 90) = 56.25\ \Omega$

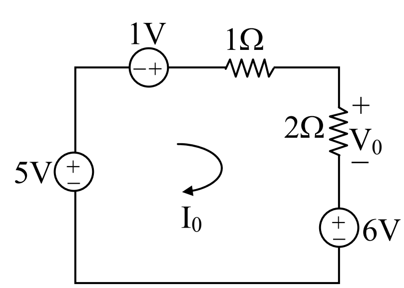
40. Ans: (b)

Sol: $Q = \int i.dt$; $Q = i.t = CV$

$$V = \frac{I}{C}.t = \frac{40\times10^{-3}}{50\times10^{-6}}\times10\times10^{-3} = 8\,V$$

41. Ans: (b)

Sol:



Hence, $I_0 = \frac{5+1-6}{32}$

$= \frac{0}{32}$

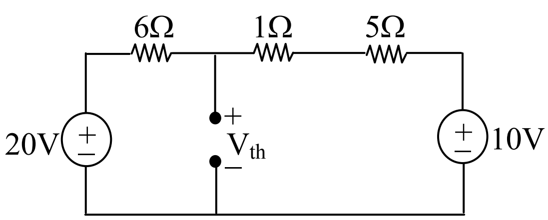
$= 0A$

$V_0 = I_0 \times 2$

$= 0V$

42. Ans: (a)

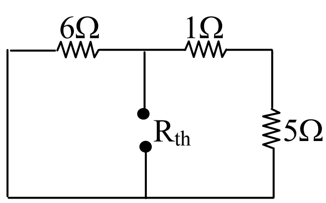
Sol: Calculation for V_{th}



$\therefore \frac{V_{th}-20}{6} + \frac{V_{th}-10}{6} = 0$

$\Rightarrow V_{th} = 15$ Volts

Calculation for R_{th}



$\therefore R_{th} = 6 // 6 = \frac{6}{2} = 3\Omega$

$\therefore P_{max} = \frac{V_{th}}{4R_{th}} = \frac{15^2}{4\times 3} = \frac{15\times 15}{4\times 3}$

$= \frac{15\times 5}{4}$

$= \frac{75}{4}$

$= 18.75W$

43. Ans: (d)

Sol: For two capacitor C_1 and C_2, connected in parallel and charged to a voltage V.

We have $C_1V = Q_1$ and $C_2V = Q_2$

or $\frac{C_1}{C_2} = \frac{Q_1}{Q_2}$

From the data,

$\frac{50}{100} = \frac{Q_1}{Q_2}$ and $Q_1 + Q_2 = 300\mu C$

Hence, $Q_1 = 100\mu C$ and $Q_2 = 200\mu C$ (transferred to the 100-μF capacitor)

44. Ans: (a)

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

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

45. Ans: (b)

Sol: $Y(s) = \frac{1}{R} + Cs + \frac{1}{Ls}$,

$Y(\infty) = \infty$, Pole at $s = \infty$,

$Y(0) = \infty$, Pole at $s = 0$

46. Ans: (b)

Sol: $V_A = \left(20 - \frac{V_A}{2}\right)2 + \left(20 - \frac{V_A}{2} - 10\right)1$

$= 40 - V_A + 10 - \frac{V_A}{2}$

$2.5\, V_A = 50,\ V_A = 20$ Volts.

47. Ans: (c)

Sol: Area under the graph

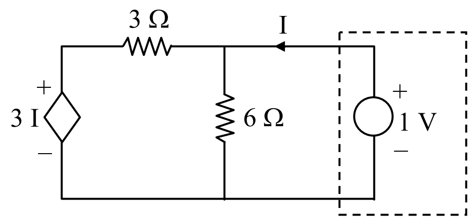
$$\text{Charge} = \left[\frac{1}{2}\times 2\times 5-1\times 1\right]\mu C$$

$$= 5-1$$

$$= 4\mu C$$

48. Ans: (b)

Sol:



Apply KCL,

$$I = \frac{1}{6}+\frac{1-3I}{3}$$

$$I = \frac{1}{4}A$$

$$R_{th} = \frac{1}{I} = \frac{1}{0.25} = 4\ \Omega$$

49. Ans: (b)

Sol: When voltage source is in parallel with current source then we can neglect the current source.

50. Ans: (c)

Sol: KVL is applicable to only planar circuits only.

KCL is applicable to both planar and non planar circuits.

51. Ans: (c)

Sol: CB: $Z_{in} = \frac{-h_{ie}}{1+h_{fe}}$

CE: $Z_{in} = h_{ie}$

CC: $Z_{in} = h_{ie}+(1+h_{fe})Z_L$

Darlington pair, $Z_{in} = \frac{h_{ie}+(1+h_{fe})h_{fe}R_e}{1+h_{oe}h_{fe}R_e}$

$Z_{in} = h_{ie}+h_{fe}^2 R_e \quad [h_{oe} = 10^{-6}]$

52. Ans: (c)

Sol: The substrate in a monolithic circuit must be connected to most negative voltage for P-type substrate.

53. Ans: (c)

Sol: Acceptor level lies close to the valence band. Donor level lies close to the conduction band and p & n-type semiconductor behaves as an insulator at zero Kelvin

54. Ans: (a)

Sol: ∴ Solar diode can be operated in F.B.

∴ I_0 is the reverse saturation current

I_L = short circuit current

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

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

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

55. Ans: (b)

Sol: npn transistor in IC

n+ layer is p – substrate

n+ layer highly doped (I↑) means low series resistance.

56. Ans: (b)

Sol: Biasing in Transition 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

57. Ans: (d)

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

Disadvantage: propagation delay is high.

58. Ans: (d)

Sol: Energy gap, $E_g > 5eV$ for insulators,

$E_g \cong 1eV$ for semiconductors,

$E_g = 0$ for metals (or) conductors.

59. Ans: (d)

Sol: $I_2 = I_{02}\left[e^{V_2/\eta V_T} - 1\right]$

$$\frac{I_2}{I_{02}} = e^{V_2/\eta V_T} - 1$$

$$\frac{V_2}{\eta V_T} = \ln\left[1 + \frac{I_2}{I_{02}}\right]$$

$$V_2 = \eta V_T \ln\left[1 + \frac{I_2}{I_{02}}\right]$$

$$V_2 = \eta V_T \ln\left[1 - \frac{I_{01}}{I_{02}}\right]$$

$$V_2 = 0.02586 \ln\left(1 - \frac{5}{10}\right) = -0.018\text{ V}$$

Applying KVL

$-V_a - V_1 - V_2 = 0$

$V_1 = -V_a - V_2 = -8.982\text{ V}$

60. Ans: (c)

Sol: For the proper working of BJT, conditions are

1. Doping level : emitter > collector > base
2. If it is PNP transistor : $W_B << L_p$
3. If it is NPN transistor : $W_B << L_n$

61. Ans: (c)

Sol: As the intensity of illumination increases, more electron-hole pairs are formed.

The conductivity increased and resistance reduces

62. Ans: (d)

Sol: For zero temperature coefficient

$|V_{GS}| = |V_P| - 0.63V = 4 - 0.63$

$|V_{GS}| = 3.37V$

63. **Ans: (b)**

64. **Ans: (b)**

Sol: $\eta_D = \dfrac{2}{1+\sqrt{\dfrac{8N_D}{N_C}\exp\left(\dfrac{E_G}{KT}\right)+1}}$

Clearly, if doping (N_D) increases, η_D decreases.

65. **Ans: (d)**

Sol: $n_i = A\,T^{3/2}\,e^{-Eg_0/2KT}$

From the above equation

$n_i \propto e^{-Eg_0/2KT}$

Hence, statement (1) is False and statement (2) is True

→ Intrinsic carrier concentration of Si at room temperature is higher than that of GaAs, why because Si has less energy bandgap compared to GaAs.

Si: Energy band gap = 0.7eV.

GaAs: Energy band gap = 1.4eV

66. **Ans: (d)**

Sol: Given, I_{CEO} = 300 μA

$\gamma = 100$

We know that relationship between I_{CEO} and I_{CBO},

$I_{CEO} = (1+\beta)I_{CBO}$

$I_{CBO} = \dfrac{I_{CEO}}{1+\beta}$

$I_{CBO} = I_{CEO}/\gamma$

$= \dfrac{300\times10^{-6}}{100}$

$= 3\mu A$

$\therefore I_{CBO} = 3\mu A$

67. **Ans: (a)**

Sol: $W_pN_A = W_nN_D$

$W_p 10N_D = W_nN_D$

$W_p/W_n = 0.1$

68. **Ans: (b)**

Sol: In case of GaAs and InP, because the vapour pressure is very high, a thin layer of molten B_2O_3 is used as a capping layer which prevents evaporation of GaAs layer which prevents evaporation of GaAs and InP.

69. **Ans: (d)**

Sol: A high voltage on the p-type body will make it easier to pull electrons from the source into the channel region reducing the threshold voltage.

70. **Ans: (b)**

Sol: For an LTI network:

$y(t) = h(t) * x(t)$, $Y(s) = H(s)\,X(s)$

A is True.

$\delta(t) \xrightarrow{LT} 1$

R is True and is not the correct explanation of A.

71. Ans: (a)

Sol: In resonance the current in series RLC circuit is maximum and the voltage across the capacitor is quality factor times the input voltage.

72. Ans: (c)

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

73. Ans: (c)

Sol: Critical field exists only below the transition temperature.

74. Ans: (c)

75. Ans: (a)

Sol: Condition for lossless transmission line

$R = 0$ & $G = 0$

Characteristic impedance, Z_o is given by

$$Z_o = \sqrt{\frac{(0 + j\omega L)}{(0 + j\omega C)}} = \sqrt{\frac{L}{C}} = R_o$$

As R and G both are zero and hence characteristic impedance is purely resistive for the given values of L and C, characteristic impedance is purely resistive.

Therefore both Statement (I) and Statement (II) are independently true and Statement (II) is the correct explanation for Statement (I).

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