CLASSROOM CONTACT PROGRAMME

(Academic Session : 2024 - 2025)

ENTHUSIAST COURSE

TARGET : PRE-MEDICAL 2025

Test Type : **PRACTICE TEST** Test Pattern : **NEET (UG)**

TEST DATE : 19-02-2025

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A.	1	4	3	1	4	3	1	3	1	3	3	1	2	2	4	1	2	1	1	3	3	3	1	1	3	4	4	3	4	4
Q.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
A.	4	3	3	2	3	2	4	1	1	4	1	3	1	2	2	3	2	4	1	2	4	1	4	2	1	1	2	4	2	1
Q.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
A.	4	2	3	3	1	3	1	2	2	4	3	1	1	1	3	2	2	3	2	2	1	4	4	2	3	4	1	4	1	4
Q.	91	92	93	94	95	96	97	98	99	100																				
A.	3	2	1	4	2	3	4	4	3	1																				

HINT – SHEET

1. **Ans (1)**

Forces are attractive, if $q_1 q_2 < 0$

2. **Ans (4)**

$\tau = \text{P.E.} \sin 30° = 10\sqrt{2}$

$\text{P.E} = 20\sqrt{2}$ .....(1)

Now potential energy is given by

$|U| = \text{PE} \cos 30°$

$U = 20 \times \sqrt{2} \times \dfrac{\sqrt{3}}{2}$

$= 24.5$ J

3. **Ans (3)**

$$\phi s_1 = \frac{\Sigma q}{\epsilon_0} = \frac{Q/2}{\epsilon_0} = \frac{Q}{2\epsilon_0}$$

$$\phi s_2 = \frac{\Sigma q}{\epsilon_0} = \frac{Q/2 + Q/4}{\epsilon_0} = \frac{3Q/4}{\epsilon_0} = \frac{3Q}{4\epsilon_0}$$

$$\frac{\phi s_1}{\phi s_2} = \frac{Q/2\ \epsilon_0}{3\ Q/4\ \epsilon_0} = \frac{4}{3 \times 2} = \frac{2}{3} = \frac{\sqrt{4}}{3}$$

4. **Ans (1)**

$\phi = \vec{E} \cdot \vec{A}$

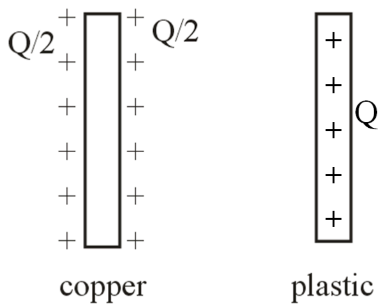
$= (4\hat{i} - 5\hat{j}) \cdot (3\hat{k} - 3\hat{j}).(10^5 \times 10^2 \times 10^{-4})\ \text{Nm}^2/\text{C}$

$\Rightarrow \phi = 15 \times 10^3\ \text{Nm}^2/\text{C}$

5. **Ans (4)**

From the Gauss law, $\phi = \dfrac{q_{\text{enclosed}}}{\varepsilon_0}$; where q_{enclosed} is the net charge inside an imaginary closed surface (a Gaussian surface) and the flux does not depend on radius of imaginary closed surface.

6. **Ans (3)**



For copper plate, $\sigma_1 = \dfrac{Q}{2A}$

$$E = \frac{\sigma_1}{\varepsilon_0} = \frac{Q}{2A\varepsilon_0}$$

For plastic plate,

$$\sigma_2 = \frac{Q}{A} \Rightarrow E' = \frac{\sigma_2}{2\varepsilon_0} = \frac{Q}{2A\varepsilon_0} = E$$

$\Rightarrow E = E' = 10$ V/m

7. **Ans (1)**

$W = q\,\Delta V$

$15 = 0.01\,(V_B - V_A) \Rightarrow V_B - V_A = 1500$ V

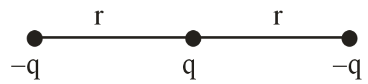
8. Ans (3)

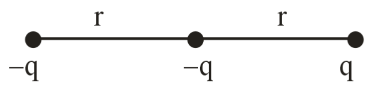
$V_1 = \frac{k(4q)}{r}, V_2 = \frac{k(-2q)}{r}$

$V_3 = \frac{k(2q)}{r}, V_4 = \frac{k(2q)}{r}$

$\Rightarrow V_1 > V_3 = V_4 > V_2$

9. Ans (1)

(1)


(2)


$U_1 = \left[\frac{-2Kq^2}{r} + \frac{Kq^2}{2r}\right] = -\frac{3Kq^2}{2r}$

$U_2 = \left[\frac{Kq^2}{r} - \frac{Kq^2}{r} - \frac{Kq^2}{2r}\right] = -\frac{Kq^2}{2r}$

$\Rightarrow \quad U_1/U_2 = 3$

10. Ans (3)

$V = \frac{kQ}{r} \Rightarrow 60 = \frac{kQ}{0.1} \Rightarrow kQ = 6$

Therefore, $E = \frac{kQ}{r^2} = \frac{6}{r^2}$

11. Ans (3)

Electric field is changed at point B due to change of medium, but remain same at points A & C.

12. Ans (1)

$U = \frac{1}{2}\epsilon_0 E^2$

$= \frac{1}{2}\epsilon_0\left(\frac{q}{\epsilon_0 A}\right)^2$

$= \frac{q^2}{2\epsilon_0 A^2}$

13. Ans (2)

Since, I $\longrightarrow$ Same ; $V_d \propto \frac{1}{A}$

Also, $R_1 = R_2 \Rightarrow \frac{\rho L}{A_1} = \frac{\rho(2L)}{A_2}$

$\Rightarrow \frac{A_1}{A_2} = \frac{1}{2}$

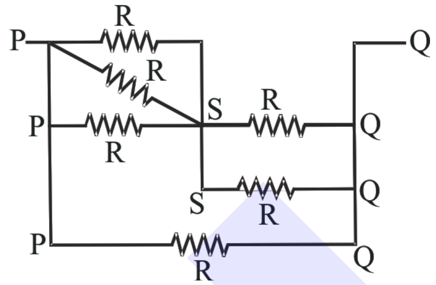
$\Rightarrow \frac{(V_d)_1}{(V_d)_2} = \frac{A_2}{A_1} = \frac{2}{1}$

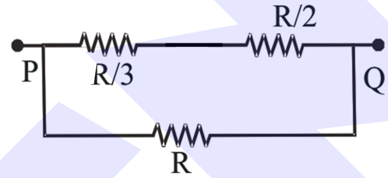
14. Ans (2)

$\frac{I_1}{I_2} = \frac{R_2}{R_1} = \left(\frac{\rho\ell_2}{A_2}\right)\left(\frac{A_1}{\rho\ell_1}\right) = \left(\frac{r_1}{r_2}\right)^2\left(\frac{1}{\ell_1/\ell_2}\right)$

$= \left(\frac{2}{3}\right)^2 \times \frac{3}{4} = \frac{1}{3}$

15. Ans (4)





$R_{PQ} = \frac{5}{11}R = 5\Omega$

$R = 11\Omega$

16. Ans (1)

For upper loop, by KVL:

$E_1 + E_2 = i_2x - i_1y$

$\Rightarrow E_1 - i_2x + E_2 + i_1y = 0$

17. Ans (2)

By KCL, $\Sigma i = 0$

Let incoming currents are taken positive, then

$-1 - 2 + 2 + 3 + 4 + 2 + I = 0$

$8 + I = 0, \quad I = -8$

means, $I = 8A$ outgoing

or $I = 8A \longrightarrow$

18. Ans (1)

$V = E_{eq} = \frac{8 \times 3 - 10 \times 2}{3 + 2} = \frac{4}{5} = 0.8$ Volt

19. Ans (1)

Case- I : Power in single bulb,

$P = \frac{V^2}{R} \Rightarrow \frac{V^2}{R} = 150$ W

Total power in parallel combination,

$P_1 = 150 \times 3 = 450$ W

Total power in series combination,

$P_2 = \frac{V^2}{(R + R + R)} = \frac{1}{3}.\frac{V^2}{R} = \frac{150}{3} = 50$ W

20. Ans (3)

$$\overrightarrow{dB} = \frac{\mu_0}{4\pi}\frac{(Id\vec{\ell} \times \vec{r})}{r^3}$$

$\overrightarrow{dB} \perp \vec{r}$, $\overrightarrow{dB} \perp Id\vec{\ell}$

22. Ans (3)

$T \propto \frac{m}{q}$

$\frac{T_{proton}}{T_{alpha}} = \frac{m/e}{4m/2e} = \frac{1}{2}$

$T_{alpha} = 2\ T_{Proton}$

$= 10\ \mu s$

23. Ans (1)

Use Lorentz force,

$\vec{F}_{net} = e\vec{E} + q \times (\vec{v} \times \vec{B}) = \vec{F}_E + \vec{F}_m$

For case 1 : $F_m = 0,\ F_E \neq 0$

For case 2 : $F_m \neq 0,\ F_E \neq 0$ but $\vec{F}_m || \vec{F}_E \Rightarrow \vec{F}_{net} \neq 0$

For case 3 : $F_m = 0,\ F_E \neq 0$

For case 4 : $F_m \neq 0,\ F_E \neq 0$; F_E outwards,

F_m inwards,

Net force is zero for case-4.

24. Ans (1)

$\oint \vec{H}.\overrightarrow{dl} = \Sigma I$

Here, $I = -I + 2I - 3I = -2I$

25. Ans (3)

In non-uniform magnetic field, $F \neq 0$ (always) and it may be possible that $\tau = 0$ or $\tau \neq 0$, so needle may experience force and torque, both.

26. Ans (4)

$W = MB(\cos\theta_1 - \cos\theta_2)$

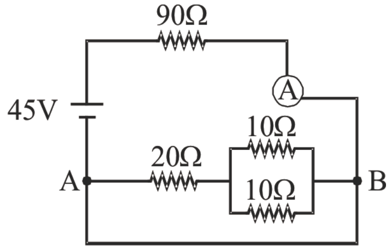
27. Ans (4)

$\chi \propto T^o$ – Does not depend on temperature

28. Ans (3)

As direction of motion changes, velocity changes.

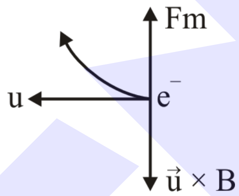
31. Ans (4)



terminal A & B ⟶ Become short circuit

So, $i = \frac{45}{90} = \frac{1}{2}A$

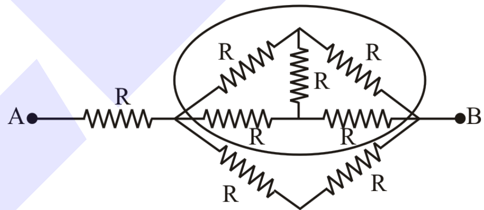
34. Ans (2)

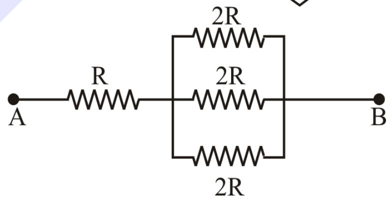


$\therefore$ –z-direction

35. Ans (3)

Balanced W.S.B.





$R_{AB} = R + \frac{2R}{3} = \frac{5R}{3}$

36. Ans (2)

$\phi = BA\cos\theta = 4 \times \frac{1}{2} \times \frac{1}{2} = 1\ Wb$

37. Ans (4)

By lenz law

39. Ans (1)

$B = \mu_0 nI = 4\pi \times 10^{-7} \times 10^4 \times 5 = 2\pi \times 10^{-2}\ T$

$\phi = BNA = 2\pi \times 10^{-2} \times 100 \times \frac{\pi}{10^4} = 2\pi^2 \times 10^{-4} Wb$

$\text{Charge} = \frac{\phi_1 - \phi_2}{R} = \frac{4\pi^2 \times 10^{-4}}{20} = 2 \times 10^{-4}\ C$

41. Ans (1)

NCERT XII Pg#225

Phase difference between flux and induce EMF is 90 degree which implies when flux is maximum EMF is zero and when EMF is maximum flux is zero.

42. Ans (3)

$$\text{Efficiency} = \frac{P\text{out}}{P\text{in}} \times 100$$

$$\frac{88}{100} = \frac{880}{P_{in}}$$

$P_{in} = 1000W$

$V_i\, I_i = 1000$

$$I_i = \frac{1000}{2200} = 0.4545 \text{ A}$$

43. Ans (1)

$$V = \sqrt{V_R^2 + (V_L - V_C)^2}$$

$$50 = \sqrt{V_R^2 + (100-60)^2} \Rightarrow V_R = 30 \text{ V}$$

$V_R = 30$ V

$R = 30\ \Omega$

$$I = \frac{30}{30} = 1 \text{ Amp.}$$

44. Ans (2)

Resonance frequency (i.e. angular frequency),

$$\omega = \frac{1}{\sqrt{LC}}$$

$$\Rightarrow \omega = \sqrt{\frac{1}{8 \times 10^{-3} \times 20 \times 10^{-6}}}$$

$$\Rightarrow \omega = 2500 \text{ rad s}^{-1}$$

current in the circuit,

$$I = \frac{220V}{44\Omega} = 5A$$

45. Ans (2)

$$X_L = 2\pi fL = 2\pi \times 50 \times \frac{2.2}{\pi} = 220\ \Omega$$

$R = 220\ \Omega$

$\Rightarrow X_L = R$

$$Z = \sqrt{R^2 + X_L^2} = R\sqrt{2} = 220\sqrt{2}$$

$i_{wattless} = i_{rms} \sin\phi$

$$= \frac{V}{Z} \times \frac{X_L}{Z} = \frac{220}{220\sqrt{2}} \times \frac{220}{220\sqrt{2}} = 0.5A$$

46. Ans (3)

$R_{net} = 40 + 40 = 80\ \Omega$

$X_L = 100\ \Omega$, $X_C = 40\ \Omega$

$$Z = \sqrt{(80)^2 + (100-40)^2}$$

$\Rightarrow Z = 100\ \Omega$

$$\text{Power factor} = \cos\phi = \frac{R}{Z} = \frac{80}{100} = 0.8$$

47. Ans (2)

$\vec{V} \to \vec{E} \times \vec{B}$

$\hat{j} \to \hat{k} \times \hat{i}$

49. Ans (1)

Earth is heated by sun's infrared radiation, the earth also emits radiations most in infrared region. These radiations are reflected back due to heavy gases like CO_2 by atmosphere. These back radiations keep the earth's surface warm at night. The phenomenon is called green house effect. When the atmosphere were absent, then temperature of earth would fall.

50. Ans (2)

$u = +5$cm

$f = +10$ cm

$$v = \frac{5 \times (-10)}{5-(-10)}$$

$$v = -\frac{10}{3} \text{ cm}$$

51. Ans (4)

$$+4 = \frac{-60}{-60-u} \Rightarrow -240 - 4u = -60$$

$\Rightarrow 4u = -180$

$$u = \frac{-180}{4} = -45\text{cm}$$

52. Ans (1)

$\tan\theta = \mu \Rightarrow \mu = \tan 60°$

$\mu = \sqrt{3}$

53. Ans (4)

Frequency does not change, it depends only on source.

54. **Ans (2)**

$D_{BF} = D_F + D_B \times \mu_{water}$

$= 16 + 12 \times \frac{4}{3}$

$= 32$ m

56. **Ans (1)**

$\mu_{PW} = \dfrac{1.5}{\left(\frac{4}{3}\right)} = \dfrac{9}{8}$

For TIR,

$\sin\theta > \dfrac{1}{\mu_{PW}}$

57. **Ans (2)**

for angle of incidence θ,

$\sin\theta = \sqrt{n_1^2 - n_2^2}$

$\sin\theta = \sqrt{\left(\dfrac{2}{\sqrt{3}}\right)^2 - 1}$

$\theta = \sin^{-1}\left(\dfrac{1}{\sqrt{3}}\right)$

59. **Ans (2)**

Using lens makers formula

$\dfrac{1}{f} = (\mu - 1)\left(\dfrac{1}{R_1} - \dfrac{1}{R_2}\right)$

$\dfrac{1}{f} = (1.5 - 1)\left(\dfrac{1}{20} - \dfrac{1}{-10}\right)$

$f = \dfrac{40}{3}$ cm

$P = \dfrac{100}{f} = \dfrac{100}{40/3} = 7.5D$

60. **Ans (1)**

$m = \dfrac{f}{f + u}$

$-2 = \dfrac{\frac{1}{3}}{\frac{1}{3} + u}$

$-\dfrac{2}{3} - 2u = \dfrac{1}{3}$

or $-2u = \dfrac{1}{3} + \dfrac{2}{3} = 1$ or $u = -\dfrac{1}{2}$ m $= -0.5$ m

61. **Ans (4)**

$M = 1 + \dfrac{D}{f}$

$\Rightarrow M = 1 + \dfrac{25}{5}$

$\Rightarrow M = 6$

62. **Ans (2)**

$M = \left(\dfrac{f_0}{f_0 + u_0}\right)\left(\dfrac{D}{f_e}\right)$

$M = \left(\dfrac{1.2}{1.2 - 1.25}\right)\left(\dfrac{25}{3}\right) = -200$

$-$ve sign $\longrightarrow$ inverted final image

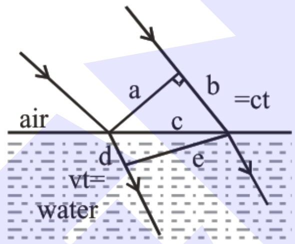
63. **Ans (3)**

Focal length of the objective mirror

$f_0 = \dfrac{80}{2} = 40$ cm

$\therefore\ |M| = \left|\dfrac{f_0}{f_e}\right| = \dfrac{40}{1.6} = \dfrac{400}{16} = 25$

64. **Ans (3)**



Time taken by wave in air to travel distance

$t = \dfrac{b}{c}$

During same time, distance travelled in medium,

$d = tv$

so, $\mu = \dfrac{c}{v} = \dfrac{b/t}{d/t} = \dfrac{b}{d}$

65. **Ans (1)**

$I = I + I + 2I\cos\Delta\phi$

$\cos\Delta\phi = -\dfrac{1}{2} \Rightarrow \Delta\phi = \dfrac{2\pi}{3}$

66. **Ans (3)**

$n_1\lambda_1 = n_2\lambda_2$

$n_1 \times 3000 = n_2 \times 6000$

$\dfrac{n_1}{n_2} = \dfrac{2}{1}$

$\therefore\ x = \dfrac{n_1\lambda_1 D}{d} = \dfrac{2 \times 3000 \times 10^{-10} \times 1}{1 \times 10^{-3}}$

$= 6 \times 10^{-4}$ m $= 0.6$ mm

67. **Ans (1)**

Displacement of fringe pattern,

$x = (\mu - 1)\,t.\,\dfrac{D}{d'}$

$= \left(\dfrac{5}{3} - 1\right).t.\dfrac{D}{2d} = \dfrac{Dt}{3d}$

68. Ans (2)

Angular with of central maxima

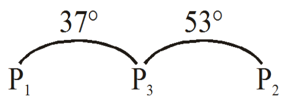
$$\theta_{central} = \frac{2\lambda}{d}$$

69. Ans (2)

$$y = \frac{7}{2}\frac{\lambda D}{a}$$

$$a = \frac{7\lambda f}{2y} \text{ (Here, D = f)}$$

70. Ans (4)



$$I_0 \qquad \frac{I_0}{2} \qquad \frac{I_0}{2}\cos^2 37° \qquad \frac{I_0}{2}\cos^2 37° \cos^2 53°$$

$$I_{net} = \frac{I_0}{2} \times \frac{16}{25} \times \frac{9}{25} = \frac{72 I_0}{625}$$

72. Ans (1)

(1) λ_1 infra-red

(2) λ_2 radio-waves

(3) λ_3 x-rays

(4) λ_4 ultra-violet rays $\Rightarrow \lambda_2 > \lambda_1 > \lambda_4 > \lambda_3$

73. Ans (1)

In a purely inductive or capacitive circuit, power factor, $\cos\phi = 0$ and no power is dissipated even though a current is flowing in the circuit. In such cases, current is referred to as wattless current.

74. Ans (1)

$$\phi = \frac{hc}{\lambda_0} \Rightarrow \phi \propto \frac{1}{\lambda_0}$$

$$\because \phi_A < \phi_B$$

$$\lambda_{0A} > \lambda_{0B}$$

75. Ans (3)

By Einstein equation

$k_{max} = h\nu - \phi$

from graph $\longrightarrow \phi = 2\text{eV}$

76. Ans (2)

$$\lambda \propto \frac{1}{\sqrt{V}} \Rightarrow \frac{\lambda_2}{\lambda_1} = \sqrt{\frac{V_1}{V_2}}$$

$$\frac{\lambda_2}{10^{-10}} = \sqrt{\frac{150}{600}} = 0.5$$

$$\lambda_2 = 0.5 \times 10^{-10} \text{m} = 0.5 \text{ Å}$$

77. Ans (2)

By using

$E = W_0 + K_{max} \Rightarrow K_{max} = E - W_0$

Hence, $K_1 = 1 - 0.5 = 0.5$ eV

and $K_2 = 2.5 - 0.5 = 2$ eV $\Rightarrow \frac{K_1}{K_2} = \frac{1}{4}$.

79. Ans (2)

$\because R = R_0 A^{1/3} \Rightarrow R \propto A^{1/3}$

$$\therefore \frac{R_{Te}}{R_{Al}} = \left(\frac{125}{27}\right)^{1/3} = \left(\frac{5^3}{3^3}\right)^{1/3} = \frac{5}{3}$$

$$\Rightarrow R_{Te} = \left(\frac{5}{3}\right)(3.6) = 6 \text{ fm}$$

81. Ans (1)

Nuclear force is charge independent, it also acts between two neutrons.

82. Ans (4)

$$X^{240} \longrightarrow Y^{110} + Z^{130}$$

$$Q = (B.E)_{product} - (B.E)_{reactant}$$

$$= [(7.8 \times 110) + (8 \times 130)] - [240 \times 7.5]$$

$$= (858 + 1040) - 1800$$

$$= 1898 - 1800 = 98 \text{ MeV}$$

83. Ans (4)

Binding energy per nucleon is almost same for nuclei of mass number ranging 30 to 170.

84. Ans (2)

$$\frac{\text{Binding energy}}{\text{Nucleon}} = \frac{0.0303 \times 931}{4} \approx 7$$

85. Ans (3)

$$|E_n| = \frac{13.6\text{eV}}{n^2}$$

$n = 2$

$|E_2| = 3.4$ eV

86. Ans (4)

Minimum $\lambda \Rightarrow$ series limit

Lyman $\Rightarrow$

$$\frac{1}{\lambda_1} = R\left(1 - \frac{1}{\infty}\right) \& \frac{1}{\lambda_2} = R\left(\frac{1}{4} - \frac{1}{\infty}\right)$$

$$\frac{\lambda_1}{\lambda_2} = \frac{1}{4}$$

87. **Ans (1)**

Maximum number of photon is given by all the transitions possible $= \frac{4(4-1)}{2} = 6$

Minimum number of transition = 1, that is directly jump from 4 to 1.

88. **Ans (4)**

T.E. = –K.E.

$= \frac{P.E.}{2}$

90. **Ans (4)**

Cu $\longrightarrow$ conductor $\longrightarrow T\downarrow R\downarrow$

Ge $\longrightarrow$ semi conductor $\longrightarrow T\downarrow R\uparrow$

91. **Ans (3)**

Si is more abundant & cost effective than Ge, making it preferred choice for mass production.

92. **Ans (2)**

V = Ed

$V = 6 \times 10^5 \times 500 \times 10^{-9}$

= 0.3 V

$\therefore$ $E_K = 0.3$ eV

93. **Ans (1)**

(a) P $\longrightarrow$ H.P & N $\longrightarrow$ L.P $\Rightarrow$ F.B.

(b) P $\longrightarrow$ H.P & N $\longrightarrow$ L.P $\Rightarrow$ F.B.

(c) P $\longrightarrow$ L.P & N $\longrightarrow$ H.P $\Rightarrow$ R.B.

(d) P $\longrightarrow$ H.P & N $\longrightarrow$ L.P $\Rightarrow$ F.B.

94. **Ans (4)**

Due to motion of majority carriers from high concentration to low concentration, diffusion current is established whose direction is from P to N region.

95. **Ans (2)**

In RB, current mainly due to electric field i.e. drift current.

96. **Ans (3)**

Intensity of emitted light is maximum for a particular potential drop.

97. **Ans (4)**

$\lambda \leqslant \frac{12400}{\Delta E_g}$

$\lambda \leqslant \frac{12400}{2.8}$

$\lambda \leq 4428.57Å$

98. **Ans (4)**

Potential difference across $R_L = 2k\Omega$ is,

$V = \frac{2k}{1k + 2k} \times 15$ (By potential divider Rule)

V = 10 volt

As $V < V_z = 12$ volt, the zener diode is not in breakdown region.

So, current through zener is zero.

99. **Ans (3)**

$\lambda = \frac{h}{\sqrt{2m(K.E.)}}$ ....(i)

As K.E'. = 3 K.E.

$\therefore \lambda' = \frac{h}{\sqrt{2m(3K.E.)}}$ ....(ii)

From (i) and (ii)

$\lambda' = \frac{1}{\sqrt{3}}\lambda$

100. **Ans (1)**

$\lambda = \frac{h}{mv}$. Speed of electron will not change, therefore, de-Broglie wavelength remains same.