ANSWER KEY (AIPMT-2005)

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans	3	2	3	2	3	3	1	1	2	2	3	4	3	2	1	4	4	3	1	4
Ques.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans	1	3	3	4	4	4	3	4	1	3	2	3	4	2	1	4	2	2	2	2
Ques.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	1	1	3	2	2	4	2	2	3	3	4	2	1	3	4	4	3	3	3	3
Ques.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans	2	3	3	1	3	2	2	2	2	3	2	3	2	2	2	4	4	2	2	2
Ques.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans	2	1	1	1	4	2	1	2	1	2	2	2	1	2	1	4	4	4	1	4
Ques.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans	3	3	1	4	3	1	3	2	4	1	4	4	4	2	2	2	1	3	3	3
Ques.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Ans	4	4	1	3	2	1	2	3	2	2	2	1	2	4	1	2	1	1	1	4
Ques.	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Ans	4	1	1	1	4	3	2	1	1	4	1	4	1	1	2	2	3	1	2	4
Ques.	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans	2	1	2	2	4	1	2	2	3	2	4	1	4	2	4	1	3	4	2	1
Ques.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
Ans	2	4	1	4	2	3	4	2	1	4	3	2	4	2	1	3	4	3	3	3

HINTS & SOLUTIONS

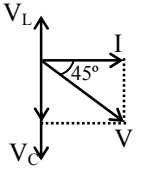
1. Energy of photon $= \frac{12400}{4100} \approx 3\text{eV}$

3. Energy released in given reaction = BE of products – BE of reactants = C – (a+ b) = C – a – b

4. Here $X_C - X_L' = R$

$\Rightarrow \quad \frac{1}{2\pi fc} = (R + 2\pi fL)$

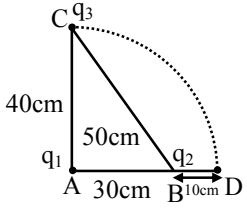
$\Rightarrow \quad C = \frac{1}{2\pi(2\pi fL + R)}$



6. Reading of voltmeter $= \frac{\frac{E_1}{r_1} + \frac{E_2}{r_2}}{\frac{1}{r_1} + \frac{1}{r_2}} = \frac{E_1 r_2 + E_2 r_1}{r_1 + r_2}$

$= 14$ volt

7.



$U_i = \frac{1}{4\pi \in_0}\left[\frac{q_1 q_3}{(0.4)} + \frac{q_1 q_2}{(0.3)} + \frac{q_2 q_3}{(0.5)}\right]$

$U_i = \frac{1}{4\pi \in_0}\left[\frac{q_1 q_3}{(0.4)} + \frac{q_1 q_2}{(0.3)} + \frac{q_2 q_3}{(0.1)}\right]$

Therefore $\Delta U = U_f - U_i = \frac{1}{4\pi \in_0} q_2 q_3 \left(\frac{1}{0.1} - \frac{1}{0.5}\right)$

$= \frac{q_2 q_3}{\pi \in_0}(10^{-2}) = \frac{q_3}{4\pi \in_0}(8q_2)$

$\Rightarrow K = 8q_2$

8. $B = \frac{\mu_0 I}{2R} = \frac{\mu_0}{2R}\left(\frac{e}{T}\right) = \frac{\mu_0}{2R}\left(\frac{ev}{2\pi R}\right)$

$\Rightarrow R^2 = \frac{\mu_0 ev}{4\pi B} \Rightarrow R \propto \sqrt{\frac{v}{B}}$

9. $P = I^2 R \Rightarrow R = \frac{P}{I^2} = \frac{1}{25} = 0.04\ \Omega$

10. Work done $= \frac{1}{4\pi\epsilon_0}\left(\frac{(-qQ)}{a} - \frac{(-Q)}{a}\right) = 0$

11. $\vec{F} = q(\vec{v}\times\vec{B}) = qvB(\hat{i}\times(-\hat{k})) = qvB\,\hat{j} \Rightarrow$ force on the charge is along OY

12. $\mu_p \neq 0, \quad \mu_f \neq 0 \;\&\; \mu_d = 0$

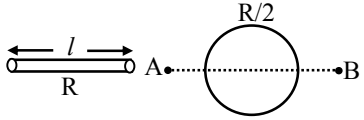
13. Number of beats per second $= n_2 - n_1 = 3$

$(\because n_1 = 250, n_2 = 253)$

$\Rightarrow$ Number of beats produced per minute

$= 3 \times 60 = 180$

14.



$\Rightarrow R_{AB} = \left(\frac{R/2}{2}\right) = \frac{R}{4}$

15. $V_{max} = a\omega \Rightarrow f = \frac{\omega}{2\pi} = \frac{V_{max}}{2\pi a} = \frac{31.4}{2\pi\times 5}$

$= \frac{31.4}{10\pi} = 1$ Hz

16. Let $e = \alpha(\theta - \theta_C) + \beta(\theta^2 - \theta_C^2)$

where θ_C = temperature of cold junction. at inversion temperature $e = 0 \Rightarrow \theta_i = -\theta_C - \frac{\alpha}{\beta}$ at neutral temperature $\frac{de}{d\theta} = 0$

$\Rightarrow \theta_n = -\frac{\alpha}{2\beta}$

$\Rightarrow \theta_i = -\frac{\alpha}{\beta} - \theta_C = 2\theta_n - \theta c \Rightarrow \boxed{\theta_n = \frac{\theta_i + \theta_C}{2}}$

$\Rightarrow 300 = \frac{620 + \theta_C}{2} \Rightarrow \theta_C = -20°C$

17. $\frac{h}{I} \equiv \frac{J - sec}{Kg - m^2} \equiv \frac{ML^2T^{-1}}{ML^2} = \frac{1}{T} \equiv$ frequency

18. $KE = \frac{P^2}{2m} = \frac{(18\times 6)^2}{2\times 12} = 486\,J$

19. Isotones $\rightarrow$ Number of neutrons are same .

20. $2hv_0 = hv_0 + \frac{1}{2}m(4\times 10^6)^2$

$5hv_0 = hv_0 + \frac{1}{2}mv^2 \Rightarrow 4 \times \frac{1}{2}m(4\times 10^6)$

$= \frac{1}{2}mv^2 \Rightarrow v = 8 \times 10^6$ m/s

21. $\because \oint \vec{E}.d\vec{\ell} = V \;\therefore\; \oint Q\vec{E}.d\vec{\ell} = QV$

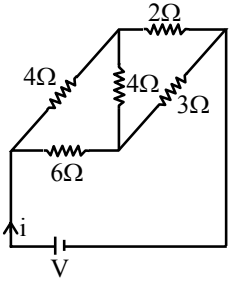
But $Q\vec{E} = \vec{F}$ & $\vec{F}.\,d\vec{\ell} = dW \Rightarrow \boxed{W = QV}$

22. $\eta = \frac{W}{Q} = 1 - \frac{T_2}{T_1} \Rightarrow W = Q\left(1 - \frac{T_2}{T_1}\right)$

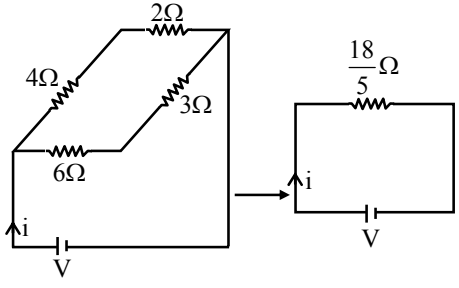
$= 1.2 \times 10^4$ cals

23. $\tau = MB = (IA)\,B = I\frac{\sqrt{3}}{4}l^2B \Rightarrow l = 2\left(\frac{\tau}{\sqrt{3}BI}\right)^{1/2}$

26.



Here $\frac{4}{6} = \frac{2}{3} \Rightarrow$ Balanced wheat stone Bridge Therefore given ckt. can be reduced to



$\Rightarrow i = \frac{5V}{18}$

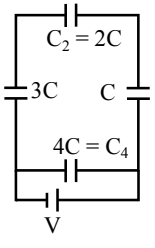
27. $I = I_{cm} + Md^2 = \frac{MR^2}{2} + MR^2 = \frac{3}{2}MR^2$

29. For FCC $4r = a\sqrt{2}$ but $2r = 2.54$ Å

so $a = (\sqrt{2})(2.54) = 3.59$ Å

31. use $\theta \sim \lambda/a \simeq 10^{-6}$ rad.

32.



$Q_4 = 4$ V; $Q_2 = \left(\frac{6}{11}C\right)V = \frac{6CV}{11}$

$\Rightarrow \frac{Q_2}{Q_4} = \frac{6CV}{11} \times \frac{1}{4CV} = \frac{3}{22}$

34. $a_r = \omega^2 r = (2\pi n)^2 r = \left(2\pi \times \frac{1}{2}\right)^2 (1) = \pi^2$

$a_T = 0 \Rightarrow$ option (2) is correct

37. K.E. $= -$ T.E. $= +3.4$ eV

39. Use $R_{Heat} = \frac{\ell}{KA} = \frac{\ell}{K\pi r^2}$

40. $(2\hat{i}+3\hat{j}+8\hat{k}).(4\hat{j}-4\hat{i}+\alpha\hat{k}) = 0 \Rightarrow \alpha = \frac{1}{2}$

41. use $g = \frac{GM}{R^2} = \frac{G\,\frac{4}{3}\pi R^3 \rho}{R^2} = \frac{4}{3}\pi G \rho R$

42. $(\vec{B}\times\vec{A}).\vec{A} = (BA\sin\theta)\,(\vec{n}.\vec{A}) = 0$

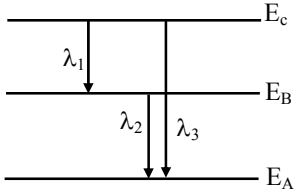
since $\hat{n}$ is perpendicular to both $\vec{A}$ & $\vec{B}$

43. Use $I \propto \frac{1}{r^2}$

44. $W = \int F.\ dx =$ Area under the curve

$= (3\times 3) + \frac{1}{2} \times (3)\,(3) = 13.5$ J

46.



$\because\ (E_C - E_B) + (E_B - E_A) = (E_C - E_A)$

$\Rightarrow \boxed{\frac{hc}{\lambda_3} = \frac{hc}{\lambda_1} + \frac{hc}{\lambda_2}} \Rightarrow \lambda_3 = \left(\frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}\right)$

47. $x = ae^{-\alpha t} + be^{\beta t}$

$v = \frac{dx}{dt} = -a \propto e^{-\alpha t} + .b\beta e^{\beta t}$

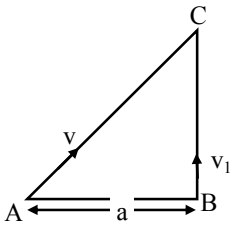
$\frac{dv}{dt} = a\ \alpha^2 e^{-\alpha t} + b\beta^2 e^{\beta t}$

$\because\ \frac{dv}{dt} > 0$ (Always)

$\Rightarrow$ v is increasing function of t

$\Rightarrow$ option (2) is correct

48.



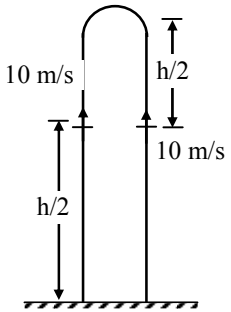
$Ac = vt$, $BC = v_1 t$

$\because\ AB = \sqrt{AC^2 - BC^2}$

$\therefore\ a = \sqrt{v^2t^2 - v_1^2t^2} \Rightarrow t = \frac{a}{\sqrt{v^2 - v_1^2}}$

49. $\frac{L_1^2}{2I_1} = \frac{L_2^2}{2I_1} \Rightarrow \frac{L_1^2}{2(I)} = \frac{L_2^2}{2(2I)} \Rightarrow \frac{L_1}{L_2} = \frac{1}{\sqrt{2}}$

50.



$10^2 = 2(g)\left(\frac{h}{2}\right) \Rightarrow h = \frac{100}{10} = 10$ m