MOCK TEST 2 (Physics Solutions)

01. $PE = \frac{1}{2}kx^2 \therefore x = \sqrt{\frac{2}{k}} \cdot \sqrt{E}$

Hence PE at $x+y$ will be

$\frac{1}{2}k(x+y)^2 = \frac{1}{2}k.\left(\sqrt{\frac{2}{k}}.\sqrt{9}+\sqrt{\frac{2}{k}}.\sqrt{16}\right)^2$

$= (3+4)^2 = 49$

short memory trick is if at x is E_1 & y is E_2 then at $x+y$ is $(\sqrt{E_1}+\sqrt{E_2})^2$

02. $\Delta Q = \Delta W$ as cyclic, & area is ΔW

$= \pi.R.R. = \pi.$ ~~100~~$.(10\times10^{3}).10.10^{-6}$

(Units ab3 4el....)

$= \pi.10$ hence 31.4J.

05. terminal velocity formula is also applicable for upcoming bubble

$\eta = \frac{2.r^2(\rho-\sigma_{air})g}{9.v_t} \simeq 130$ Pa.s

06. Pascal's law: $\frac{W_1}{A_1} = \frac{W_2}{A_2} \therefore A_2 = \frac{W_2}{W_1} \times A_1$

07. $g_h = g\left(\frac{R}{R+h}\right)^2 \therefore \left(\frac{R}{R+h}\right)^2 = \frac{1}{100} \therefore \frac{R}{R+h} = \frac{1}{10} \therefore h = 9R$

08. $B_0 = \frac{E_0}{c} = \frac{48}{3\times10^8} = 1.6\times10^{-7}$ T

09. No need to find current time req. to change $I_{max} \rightarrow \frac{I_{max}}{\sqrt{2}} = I_{rms}$ is $T/8 = \frac{1}{8}.\frac{1}{f} = \frac{1}{8\times50} = 2.5$ ms

10. $e = \frac{\Delta\phi}{\Delta t} = \frac{\pi r^2 n(B_2-B_1)}{t} = 17.7$ V

11. $W = MB(1-\cos\theta) = 2MB = 2.N.I(\ell.b)B$

$= 2.250.55\times10^{-6}(2\times10^{-2}\times1.25\times10^{-2})0.64$

$= 4.4\,\mu$J

12. no. of free electrons = no. of molecules

$= \frac{6\times10^{23}}{27\times} \times \frac{2.7\times10^{3}}{10^{-3}} = 6\times10^{28}$

$\left(\frac{N_A}{m_0} = \text{no. of molecules}\right)$

$v_d = \frac{1}{nAe} = \frac{1}{6\times10^{28}\times4\times10^{-6}\times1.6\times10^{-19}}$

$= 2.6\times10^{-4}$ m/s

13. $\bar{x} = \frac{10.0+20.10}{10+20} = \frac{200}{30} = \frac{20}{3}$

14. $\Delta P = 3.5 = 15$ ~~kg~~ N.s

$F = \frac{15}{0.5} = 30$N

15. $[ML^2T^{-3}I^{-2}]$ as $R = \frac{V}{I} = \frac{W}{q.I} = \frac{W}{I^2t}$

16. $I_{rms} = \frac{I_{max}}{\sqrt{2}} = \frac{4.2}{\sqrt{2}} = 4.\sqrt{2} = 4.(1.414)$
$= 5.6\,A$

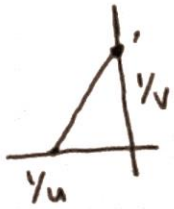
17. $P_{AV} = \frac{200 \times 50 \times 10^{-3}}{2} . \cos\frac{\pi}{3}$ $\left(\frac{\pi}{3} = \frac{\pi}{6} - \frac{-\pi}{6}\right)$
$= 2.5\,W$

18. $\frac{1}{\lambda} = R\left(\frac{1}{2^2} - \frac{1}{\infty}\right) \Rightarrow \lambda = \frac{4}{R}$ Balmer
$\frac{1}{\lambda'} = R\left(\frac{1}{4^2} - \frac{1}{\infty}\right) \Rightarrow \lambda' = \frac{16}{R} = 4\lambda$

19. when $\theta = 0$, α is approaching head on hence $\theta = 180°$. (NCERT – must)

~~4~~47. $m = \frac{f}{f-u} \Rightarrow f = -15\,m$

20. Graph in st. line hence (4).



21. $G = 25\,\Omega$; $I_{max} = 25 \times (4 \times 10^{-4}) = 10^{-2}\,A$.
So to convert $\frac{25}{100}$ to 25 means 100 times
Hence $S = (100-1)G = 2450\,\Omega$

22. (4)

23. (2). as $\frac{1}{2} m_1 u^2 = \frac{1}{4\pi\varepsilon} \cdot \frac{z_1 . z_2}{r_0}$

24. when voltmeter is bet^n A&B, $V_L = 36V$
bet^n A&C $\sqrt{36^2 + V_R^2} = 39 \therefore V_R = 15V$
bet^n B&D $\sqrt{36^2 + V_R^2} = 25 \therefore V_C = 20V$
$\therefore V_R^2 \propto V_R$
$V_{AD} = \sqrt{V_R^2 + (V_L - V_C)^2} = \sqrt{15^2 + 16^2}$
$= \sqrt{481}$

25. Resistance of lamp $= \frac{V^2}{P} = 10\,\Omega$
current through lamp $= \frac{P}{V} = 3A$
Resistance of line $= \frac{V_d}{I} = \frac{120}{3} = 40\,\Omega$
Hence added resistance will be
$40 - 10 = 30\,\Omega$

26. $V_B - V_A = \frac{W}{q} = \frac{6}{30} = 0.2V$

27. As ~~assume~~ for x-ray $h\nu = eV$
$\frac{hc}{\lambda} = eV \therefore \lambda = \frac{hc}{eV}$ so $\lambda \propto \frac{1}{V}$
cutoff wavelength will be half if $V \to 2V$

28. $P^2 + Q^2 + 2P.Q.\cos\theta = R^2$ hence
$W = \sqrt{W_1^2 + W_2^2 + 2.W_1.W_2.\frac{\sqrt{3}}{2}} \equiv (1)$

MOCK TEST 2 (Physics Solutions)

29. Go through lab manual & ans is (4).

30. $q_1 = 500\,\mu C$, $q_2 = 0$

$$V = \frac{q_1+q_2}{C_1+C_2} = \frac{500}{10+C_2} = 20 \text{ (given)}$$

$$\therefore 500 = 200 + 20C_2 \therefore C_2 = \frac{300}{20} = 15\,pF$$

31. formula $V = \frac{C_1 V}{C_1+C_2}$

32. (2)

33. $g_h = g.\left(\frac{R}{R+h}\right)^2$ we need $\left(\frac{R}{R+h}\right)^2 = \frac{1}{9}$

$$\therefore \frac{R}{R+h} = \frac{1}{3} \therefore h = 2R \text{ (4)}$$

34. (3) statements from NCERT.

35. II combination hence $n = \frac{1}{T} = \frac{1}{2\pi}\sqrt{\frac{k_1+k_2}{m}}$

36. $\Delta P = -B\frac{\Delta V}{V} \therefore \frac{\Delta V}{V} = \frac{-\Delta P}{B} = \frac{1.6\times10^7}{5\times10^9} = -0.32\times10^{-2}$

$\therefore$ % ↓ of 0.32

37. 

⊥ distance from rod $= \frac{1}{3}\cdot\frac{\sqrt{3}}{2}L = \frac{L}{2\sqrt{3}}$

MI. about M ≡ axis through centre $= \frac{ML^2}{12}$ $\therefore$ by II axis theo. req. MI

$$= 3\left(\frac{ML^2}{12} + \left(\frac{L^2}{12}\right)M\right) = 3\frac{ML^2}{6} = \frac{ML^2}{2}$$

38. $PV^r = \text{const.}$ for diatomic $r = \frac{C_P}{C_V} = \frac{7/2}{5/2} = 1.4$

$$P_2 = P_1\left(\frac{V_1}{V_1/2}\right)^{1.4} = 2^{1.4}P$$

39. Dist betn boats must be $\frac{\lambda}{2}$

$\therefore \lambda = 2.10 = 20m$; $n = \frac{1}{4}$ Hence

speed of wave $= 20.\frac{1}{4} = 5\,m/s$

40. $x = \frac{t^3}{3} \Rightarrow v = t^2$; $W = \Delta KE = \frac{1}{2}m.t^4$

$$W = \frac{1}{2}.2.2^4 = 16\,J$$

41. when dist. is doubled intensity is $1/4^{th}$ Hence photocurrent $= \frac{12}{4}\,mA$

42. $M = -\frac{f_o}{f_e}\left(1+\frac{f_e}{d}\right) = \frac{200}{5}\left(1+\frac{5}{25}\right) = -48$

$$M = -\frac{f_o}{f_e} = -\frac{200}{5} = -40$$

$2m = 200cm$ & d.d.V $= 25cm$.

43. $E_0 = B_0.C = 2\times10^{-7}\times3\times10^8 = 60\,V/m$

Hence $E_z = 60\sin(0.5\times10^3 x + 1.5\times10^{11}t)\frac{V}{m}$

44. $x = 40 + 12t - t^3$; $V = 12 - 3t^2$

(d) $V = 0$ at $t = 2$

$\therefore x = 40 + 12.2 - 2^3 = 56m$

at $t = 0$ was at 40 now at 56

hence travelled 16 m

45. (c) $i_2 r_2 = i_3 r_3 \therefore \frac{i_3}{i_2} = \frac{r_2}{r_3} \therefore$

Hence $\frac{i_3}{i_2+i_3} = \frac{r_2}{r_3+r_2}$.

$\therefore \frac{i_3}{i_1} = \frac{r_2}{r_2+r_3}$

46. On F.B. the resistance of diode is almost zero hence pot. drop will be accross R.

47. $m = \frac{f}{f-u} \therefore -3 = \frac{f}{f-(-20)} \Rightarrow -(3f+60) = f$

$\therefore 4f = -60 \therefore f = -15\text{cm}$ focal length 15

48. $\mu = \frac{c}{v} = \frac{3\times10^8}{2.3\times10^8} = \frac{30}{23}$

$i_c = \sin^{-1}\left(\frac{23}{30}\right) = \sin^{-1}(0.77)$

49. $\frac{r}{10} = \frac{3}{2} \therefore r = 15\Omega \equiv 1.5\text{m}$

$1\Omega \equiv \frac{1.5}{15} = 0.1\text{m}$ (d)

50. $V = i.R_T = 1.\left(\rho_{Cu}\frac{l}{A} + \rho_{fe}\frac{l}{A}\right)$

$= (1.7\times10^{-8} + 1\times10^{-7})\frac{1}{0.01\times10^{-4}} = \frac{1.17\times10^{-7}}{10^{-6}} = 0.117\text{ V}$

ohm centimeter → ohm meter