Path to Success
ALLEN CAREER INSTITUTE
KOTA (RAJASTHAN)

MAJOR TEST # 02

ALLEN NEET-UG | **DATE : 26 - 03 - 2013**

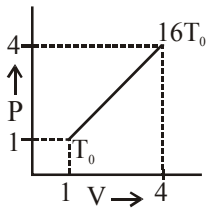
SYLLABUS - 02

ANSWER KEY

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

HINT – SHEET

1.



$\Delta Q = \Delta W + \Delta U$

ΔW = enclosed Area

$$= \left[\frac{1}{2}\times(1+4)\times 3\right]\times 10^5 = 7.5 \times 10^5 \text{ J}$$

$$\Delta U = \mu C_v \Delta T = \mu \times \frac{3}{2} R\Delta T \qquad [P_0V_0 = \mu RT_0]$$

$$= \frac{3}{2}\mu R(16T_0 - T_0]$$

$$= \frac{45}{2}\times P_0V_0 = 22.5 \times 10^5 \text{ J}$$

$\Delta Q = \Delta W + dU$

$\Delta Q = 30 \times 10^5$ joule

2. $Q \propto T^4 \qquad \Rightarrow \frac{Q_1}{Q_2} = \left(\frac{T_1}{T_2}\right)^4 = \left(\frac{T}{T+\frac{T}{2}}\right)^4 = \frac{81}{16}$

$$\% \text{ increment in energy} = \frac{Q_2 - Q_1}{Q_1}\times 100$$

$$= \frac{\frac{81}{16}-1}{1}\times 100 = 400\%$$

3. $\frac{P}{\rho} = \frac{RT}{M_w} \Rightarrow \rho \propto \frac{P}{T}$

$\Rightarrow \frac{\rho_A}{\rho_B} = \frac{P'}{T'} \times \frac{4T'}{2P'} = \frac{2}{1}$

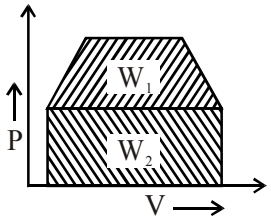
5. $P_{mix} = \frac{P_1V_1 + P_2V_2}{V_{mix}} = \frac{PV + PV}{V}$

$P_{mix} = 2P$

6. When rate of flow is same then level does not rise

$\Rightarrow Av = A \times \sqrt{2gh} \qquad \Rightarrow h = \frac{v^2}{2g}$

7. W = Area enclosed between curve and V = axis



$W = W_1 + W_2$

$= \left[\frac{1}{2}(5+2) \times 2 + 1 \times 5\right] \times 10^5$

$= 12 \times 10^5$ J

8. upthrust on body = $W_A - W_B = 20 - 16 = 4N$
reading of weighting machine
$= W + Th$
$= 40 + 4 = 44N$

9. $U_{mix} = \mu_1 C_{V_1} T + \mu C_{V_2} T$

$U_{mix} = 2 \times \frac{5}{2}RT + 4 \times \frac{3}{2}RT$

$U_{mix} = 11RT$

10. $v^2 = u^2 + 2gh$
$= (0.4)^2 + 2 \times 10 \times 0.2 = 4.16$
$v = 2.04$ m/s
$A_1v_1 = A_2v_2$

$\Rightarrow \frac{\pi D_1^2}{4}v_1 = \frac{\pi D_2^2}{4}v_2$

$\Rightarrow D_2 = D_1\sqrt{\frac{v_1}{v_2}} = 8 \times 10^{-3}\sqrt{\frac{0.4}{2.04}} = 3.6 \times 10^{-3}$ m

11. $E = \frac{5}{2}PV = \frac{5}{2}\frac{PM}{\rho}$

$E = \frac{5}{2} \times \frac{8 \times 10^4 \times 1}{4} = 5 \times 10^4$ J

12. $w = 2t\ell \Rightarrow T = \frac{w}{2\ell} = \frac{1.5 \times 10^{-2}}{2 \times (30 \times 10^{-2})} = 0.025$N/m

13. $C_p - C_v = \frac{R}{M_W}$

(Where C_P, C_V = gram specific heat)

14. Applied maximum load on wire does not depend on length of wire

15. At T = same $\Rightarrow V_{rms} \propto \frac{1}{\sqrt{M_w}}$

$\frac{(v_{rms})_H}{(v_{rms})_{He}} = \sqrt{\frac{(M\omega)_{He}}{(M\omega)_H}} \Rightarrow \frac{(V_{rms})_H}{(V_{rms})_{He}} = \sqrt{\frac{4}{1}} = 2$

17. Heat supplied $Q_1 = Q_{AB} + Q_{BC}$
V = Const, Q_{AB}
$= \mu C_V dT$
$= N \times \frac{3}{2}R(2T_0 - T_0)$
$= \frac{3}{2}P_0V_0$

$T_A = \frac{P_0V_0}{NR} = T_0$
$T_B = \frac{2P_0V_0}{NR} = 2T_0$
$T_C = \frac{2P_0 \times 2V_0}{NR} = 4T_0$

P = const $Q_{BC} = \mu C_p dT = N \times \frac{5}{2}(4T_0 - 2T_0)$

$= 5P_0V_0$

$Q_1 = \frac{3}{2}P_0V_0 + 5P_0V_0 = \frac{13}{2}P_0V_0$

W = Area $= P_0V_0$

$\eta = \frac{W}{Q_1} \times 100\% = \frac{P_0V_0}{\frac{13}{2}P_0V_0} \times 100 \approx 15\%$

20. $\xrightarrow[v_0=10m/s]{B}$ $\xrightarrow[v_s=30m/s]{A}$

frequency heard by observer

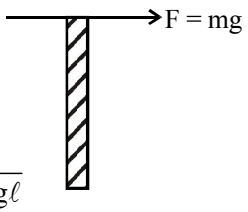
$n' = \left[\frac{v + v_0}{v + v_s}\right]x$

$= \left[\frac{330 + 10}{330 + 30}\right]450$

$= 425$Hz

21. In phase conversion $\Rightarrow$ T = const., KE = const
$V \downarrow \Rightarrow IMF \uparrow \Rightarrow PE \downarrow$

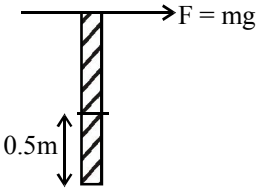
22. at upper end



$$v = \sqrt{\frac{F}{\mu}}$$

$$\Rightarrow \sqrt{\frac{mg}{\left(\frac{m}{\ell}\right)}} = \sqrt{\frac{mg\ell}{m}} = \sqrt{g\ell}$$

$$\Rightarrow \sqrt{10 \times 2.5} = 5 \text{ m/s}$$



$$v = \sqrt{\frac{F}{m}} = \sqrt{\frac{10/50}{1/25}} = \sqrt{\frac{10}{50} \times 25} = \sqrt{5} \text{ m/s}$$

24. $n_1 = \frac{v}{2\ell} = \frac{330}{2 \times 25 \times 10^{-2}} = 660\text{Hz}$ (fundamental freq.)

$$n_2 = \frac{v}{2\ell} = \frac{2 \times 330}{2 \times 25 \times 10^{-2}} = 1320\text{Hz}(\text{II}^{\text{nd}} \text{ harmonic})$$

$$n_3 = \frac{v}{2\ell} = \frac{3 \times 330}{2 \times 25 \times 10^{-2}} = 1980\text{Hz}(\text{III}^{\text{rd}} \text{ harmonic})$$

25. $R_F \propto \frac{1}{r}$ [ρ, S, T, T_0 = same]

27. $\frac{dQ}{dt} = \frac{kA}{L}(T_1 - T_2) = \frac{mL}{dt}$

$$\Rightarrow \frac{m \times 8 \times 10^4}{60} = \frac{92 \times 10^{-3}}{1}(100 - 0)$$

$\Rightarrow m = 6.9 \times 10^{-3}$ kg

28. will be more than v

29. $\frac{\theta_1 - \theta_2}{t} = k\left[\frac{\theta_1 + \theta_2}{2} - \theta_0\right]$

$$\Rightarrow \frac{61 - 59}{4} = k\left[\frac{61 + 59}{2} - 30\right] \Rightarrow k = \frac{1}{60}$$

$$\Rightarrow \frac{51 - 49}{t} = \frac{1}{60}\left[\frac{51 + 49}{2} - 30\right] \Rightarrow t = 6 \text{ minute}$$

30. Given $v = 320$ m/s

$\ell = 1$ m

$$n_1 = \frac{v}{4\ell} = \frac{320}{4} = 80\text{Hz}$$

$$n_2 = \frac{3v}{4\ell} = \frac{3 \times 320}{4} = 240\text{Hz}$$

$$n_3 = \frac{5v}{4\ell} = \frac{5 \times 320}{4} = 400\text{Hz}$$

31. $\frac{dQ}{dt} = e_r \sigma A T^4 = E$

$E \propto r^2 T^4$

$$\frac{E_1}{E_2} = \left(\frac{r_1}{r_2}\right)^2 \left(\frac{T_1}{T_2}\right)^4 = \frac{1}{1}$$

33. $\lambda_m T$ = constant

$\Rightarrow \lambda m_1 T_1 = \lambda m_2 T_2$

$\Rightarrow 1.75 \times 1640 = 14.35 \times T_2$

$\Rightarrow T_2 = 200$ K

34. A = 0.2

v = 360 m/s

λ = 60 m

wave travel in positive x direction , then

$y = A\sin(\omega t - kx)$

$$\Rightarrow k = \frac{2\pi}{\lambda} = \frac{2\pi}{60}$$

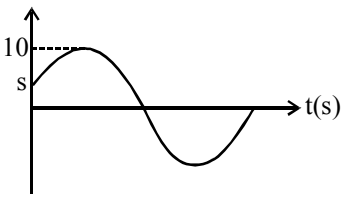
$$\Rightarrow k = \frac{\omega}{v}$$

$$\Rightarrow \omega = kv = \frac{2\pi}{60} \times 360 = 2\pi \times 60$$

$$\therefore y = A\sin\left(2\pi \times 60t - \frac{2\pi}{60}x\right)$$

$$y = A\sin 2\pi\left(60t - \frac{x}{60}\right)$$

35.



T = 2

$$\omega = \frac{2\pi}{T} = \pi$$

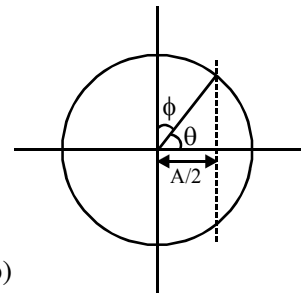
$A_{max} = 10$

particle start from mid point of mean position & extreme position, then

$\cos\theta = \frac{5}{10} = \frac{1}{2}$

$\theta = 60°$

$\theta = 30° = \frac{\pi}{6}$

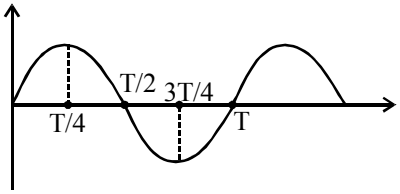


eq. of S.H.M.

$x = A\sin(\omega t + \phi)$

$= 10\sin(\pi t + \frac{\pi}{6})$

37.



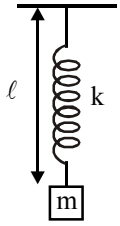
(i) at $\frac{3T}{4}$, particle at extreme position, so the force is not zero.

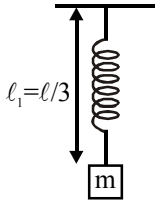
(ii) at $\frac{T}{2}$, particle at mean position, so the velocity is maximum

(iii) at T, particle at mean position , so the acceleration is zero.

(iv) at $\frac{T}{2}$, particle at mean position, at this instant P.E. is equal to zero.

38.





$T_1 = 2\pi\sqrt{\frac{m}{k}}$

$\frac{k}{k_1} = \frac{\ell_1}{\ell} = \frac{\ell/3}{\ell}$

$k_1 = 3k$

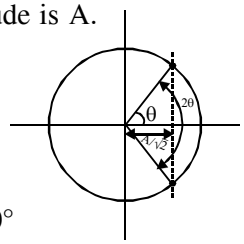
$\frac{f_1}{f_2} = \frac{\frac{1}{2\pi}\sqrt{\frac{k}{m}}}{\frac{1}{2\pi}\sqrt{\frac{3k}{m}}}$

$\frac{f_1}{f_2} = \sqrt{\frac{k}{m}\times\frac{m}{3k}} = \frac{1}{\sqrt{3}}$

$f_2 = \sqrt{3}\, f_1$

39. Suppose maximum amplitude is A.

$\cos\theta = \frac{A/\sqrt{2}}{A} = \frac{1}{\sqrt{2}}$



$\theta = 45°$

phase difference $= 2\theta = 90°$

40. If smal length pendulum has time period is T then greater length pendulum has 4T.

Thus, if one complete n cycles.

Than other one n – 1.

$\therefore \frac{n}{n-1} = \frac{4}{1}$

$\Rightarrow n_2 = 4n - 4$

$\Rightarrow 3n = 4 \Rightarrow n = \frac{4}{3}$

41. $T_0 = 2\pi\sqrt{\frac{\ell}{g}}$ ...(i) (When lift is stationary)

suppose lift is going upward with acceleration a_0, the time period will be $T_0/2$,

$\frac{T_0}{2} = 2\pi\sqrt{\frac{\ell}{g+a}}$ ...(ii)

From (i)/(ii)

$\Rightarrow \frac{T_0}{\frac{T_0}{2}} = \frac{2\pi\sqrt{\frac{\ell}{g}}}{2\pi\sqrt{\frac{\ell}{g+a}}}$

$\Rightarrow 2 = \sqrt{\frac{\ell}{g}\times\frac{g+a}{\ell}}$

(squaring both the sides).

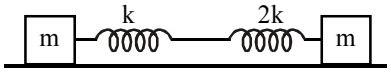
$4 = \frac{g+a}{g}$

$\Rightarrow 4g = g + a$

$\Rightarrow a = 3g$

42. maximum reading when N has maximum value

$N = mg + ma$

43. 

$$\frac{1}{k_{eq}} = \frac{1}{k} + \frac{1}{2k}$$

$$\Rightarrow k_{eq} = \frac{2k}{3}$$

$$\mu = \frac{m_1 m_2}{m_1 + m_2} = \frac{m^2}{2m} = \frac{m}{2}$$

$$T = 2\pi\sqrt{\frac{\mu}{k}} = 2\pi\sqrt{\frac{m/2}{2k/3}} = 2\pi\sqrt{\frac{3m}{4k}}$$

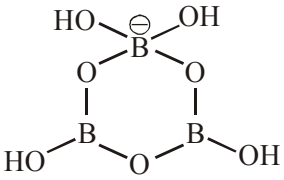
44. $k_{eq} = k + k = 2k$

$$T = 2\pi\sqrt{\frac{m}{k_{eq}}} = 2\pi\sqrt{\frac{m}{2k}}$$

54. $P_4 + 3O_2 \xrightarrow{N_2} P_4O_6$

less availability of oxygen.

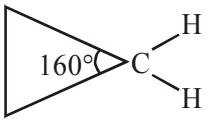
55. Graphite shows different conductivity in different directions.

58. 

60. % ionic character = $\frac{\mu_{obs}}{\mu_{Theoritical}} \times 100$

$$= \frac{1.2\times10^{-18}\,\text{esu}\times\text{cm}}{4.8\times10^{-10}\,\text{esu}\times1.0\times10^{-8}\,\text{cm}}\times100 = 25\%$$

62. Due to angle strain $C\hat{C}C$ bond angle = 60°.



So $H\hat{C}H$ bond angle is higher than 109°28'.

65. More ionic character, more extent of hydration.

86. NCERT XI Part–II, Page # 278 Topic : Hydrogen

87. NCERT XI Part–II, Page # 278 Topic : Hydrogen

88. $Fe + HCl \rightarrow FeCl_2$ change = + 2

$Cr_2O_7^{2-} \xrightarrow{\overline{OH}} CrO_4^{2-}$ change = 0

$NH_4\underline{N}O_2 \xrightarrow{\Delta} N_2$ change = 3

$FeSO_4(aq) + NO \rightarrow [\overset{+1}{Fe}(H_2O)_5NO]SO_4$ charge = 1

89. In sym. H-bonding, (----H----) both bonds around H are identical.

90. Due to very small size, it has strong polarising power & doesn't exist independently.

92. NCERT Page # 247

94. NCERT Page # 250

96. NCERT Page # 250

98. NCERT Page # 252

100. NCERT Page # 247

102. NCERT Page # 245

104. NCERT Page # 245

106. NCERT Page # 244

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