Path to Success
ALLEN CAREER INSTITUTE
KOTA (RAJASTHAN)

MAJOR TEST # 01

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

SYLLABUS - 01

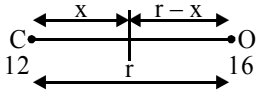
ANSWER KEY

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

HINT – SHEET

1. $V_{ang} = \dfrac{\text{Total disp}}{\text{Total time}} = \dfrac{2r\sin\frac{60°}{2}}{\frac{\pi r}{3v}} = \dfrac{3v}{\pi}$.

2.



$m_1x_1 = mx_2x_2$

$m_1x = m_2(r - x)$

$12x = 16(r - x)$

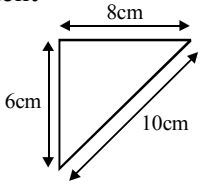
$x = \dfrac{16r}{25}$

$x = \dfrac{16}{25} \times 1.12 \times 10^{-10}$

$= 0.64 \times 10^{-10}$ m

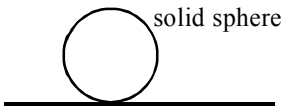
3. In a single stair, displacement

$= \sqrt{8^2 + 6^2} = 10$



total no. of stairs is 10,
then total displacement
$= 10 \times 10$
$= 100$ cm.

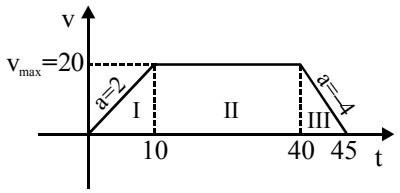
4.



$KE = \dfrac{1}{2}mv^2 + \dfrac{1}{2}I\omega^2$

$= \dfrac{1}{2}mv^2 + \dfrac{1}{2}\left(\dfrac{2}{5}MR^2\right)\left(\dfrac{v^2}{R^2}\right) = \dfrac{7}{10}mv^2$

5. Given u = 0, a = $2m/s^2$ & a = $-4m/s^2$



$v_{max} = u + at$

$= 0 + 2 \times 10 = 20$

velocity becomes zero, when retardation is $4m/s^2$, after a time interval.

$v = u + a\Delta t$

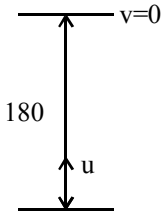
$\Rightarrow 0 = 20 - 4\Delta t$

$\Rightarrow \Delta t = 5s$

means, at t = 45s, velocity becomes zero.

distance is total area under velocity-time graph.

7. $H_{max} = \frac{u^2}{2g}$



$\Rightarrow 180 = \frac{u^2}{20}$

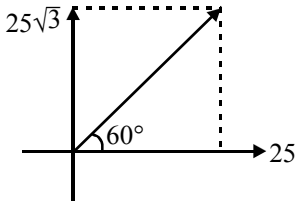
$\Rightarrow 3600 = u^2$

$\Rightarrow u = 60m/s$

velocity after 8 sec. will be

$v = 60 - 10 \times 8 = -20$ m/s

9. $\vec{v}_{actual} = \vec{v}_{relative} + \vec{v}_{reference}$



12. Applying angular momentum conservation

$L_i = L_f$

$\Rightarrow I_i\omega_i = I_f\omega_f$

$\Rightarrow \frac{ML^2}{12}\omega_0 = \left[\frac{ML^2}{12} + \frac{mL^2}{4} + \frac{mL^2}{4}\right]\omega_f$

$\Rightarrow \frac{ML^2}{12}\omega_0 = L^2\left[\frac{M}{12} + \frac{m}{4} + \frac{m}{4}\right]\omega_f$

$\Rightarrow \omega_f = \left[\frac{M}{M+6m}\right]\omega_0$

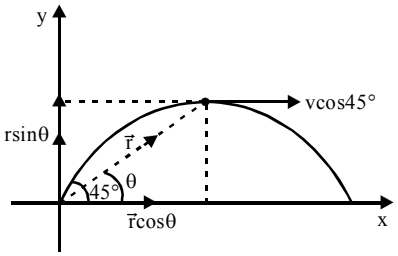
13. $\frac{x}{a} = \cos t$ ...(1)

$\frac{y}{b} = \sin t$ ...(2)

eq. $(1)^2$ + eq$(2)^2$

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

14.



$\vec{L} = m(\vec{r} \times \vec{v})$

The value of rsinθ is equal to the maximum height

$L = m(H_{max})v\cos45°$

$= m\frac{v^2\sin^2 45°}{2g}v\cos45° = \frac{mv^3}{4\sqrt{2}g}$

15. Velocity at t = 0 sec

$\vec{v} = \frac{d\vec{r}}{dt} = \left(3\hat{j} + 4\hat{j}\right)$ m/s

and $\tan\theta = \frac{V_y}{V_x} = \frac{4}{3}$.

17. $2y = 2x - 5x^2$

$\Rightarrow y = x - \frac{5}{2}x^2$

$\Rightarrow y = x\tan\theta - \frac{x^2}{R}\tan\theta$

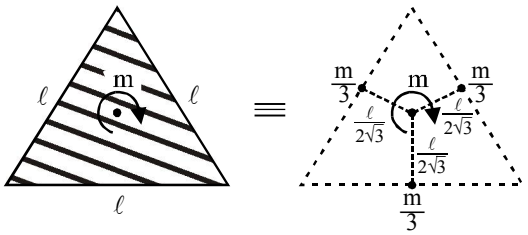
comparing both the equations, then

$\tan\theta = 1$ & $\frac{\tan\theta}{R} = \frac{5}{2}$

$\Rightarrow \frac{1}{R} = \frac{5}{2}$

$\Rightarrow R = 0.4m$

18. For calculation of moment of inertia any tiangular lamina is equivalent to three point masses as shown in figure



therefore

$$I = 3\left(\frac{m}{3}\right)\left(\frac{\ell}{2\sqrt{3}}\right)^2 = \frac{m\ell^2}{12}$$

19. If, both the vectors are perpendicular, then

$\vec{A}\cdot\vec{B}=0$

$\Rightarrow (2\hat{i}+m\hat{j}+\hat{k})\cdot(4\hat{i}-2\hat{j}-2\hat{k})=0$

$\Rightarrow 8 - 2m - 2 = 0$

$\Rightarrow 6 = 2m \Rightarrow m = 3$

20. $F = v\frac{dm}{dt}$ = (60000 m/s) (1kg/s)

F = 60000 N

21. $\tan45° = \frac{v_y}{v_x}$

$\Rightarrow 1 = \frac{v_y}{v_x} \Rightarrow v_y = v_x$

$v = \sqrt{v_x^2+v_y^2} = 250\sqrt{2}\,m/s$

22. Power = $\frac{\text{change in KE}}{t}$

$P = \frac{\frac{1}{2}mv^2-0}{t}$

$t = \frac{1}{2}\frac{mv^2}{P}$

23. $V = \frac{s}{t} = \frac{24}{6} = 4$ m/s

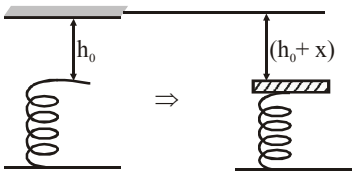
$\frac{\Delta V}{V} = \frac{\Delta S}{S} + \frac{\Delta t}{t}$

$\Delta V = V\left[\frac{0.2}{24}+\frac{0.1}{6}\right]$

$\Delta V = 0.1$

$V = (4 \pm 0.1)$ m/s.

24.



Loss in gravitational P.E. = Gain in spring P.E.

$mg(h_0 + x) = \frac{1}{2}Kx^2$

26. For equilibrium

$\boxed{F = 0}$

As $F = -\frac{du}{dr}$

so $F = -\frac{-d}{dr}\left(\frac{a}{r^2}-\frac{b}{r}\right) = \frac{2a}{r^3}-\frac{b}{r^2}$

F = 0

$\frac{2a}{r^3}-\frac{b}{r^2} = 0$

$\frac{2a}{r^3}=\frac{b}{r^2}$

$\Rightarrow \frac{2a}{r}=b \Rightarrow r = \frac{2a}{b}$

$\boxed{r=\frac{2a}{b}}$

28. Retardation $=\frac{F}{m}=\frac{\mu mg}{m}=\mu g=0.5\times10 = 5\ m/s^2$

By III equation of motion

$v^2 = u^2 + 2as$

$\Rightarrow 0 = (100)^2 - 2 \times 5 \times s$

$\Rightarrow 10s = 10000$

$\Rightarrow s = 1000$ m

29. $F = \frac{a}{t} + bt^2$

$[F] = \left[\frac{a}{t}\right]$

$\Rightarrow [MLT^{-2}] = \left[\frac{a}{t}\right]$

$\Rightarrow [a] = [MLT^{-1}]$

Now $[F] = [bt^2]$

$\Rightarrow [MLT^{-2}] = [bT^2]$

$\Rightarrow [b] = [MLT^{-4}]$

30. $F = \frac{mv}{t} = \frac{150}{1000}\times\frac{20}{0.1} = 30$ N

31. $F = \frac{Gm_1m_2}{r^2}$

$[MLT^{-2}] = \frac{[G][M^2]}{[L^2]}$

$[G] = [M^{-1}L^3T^{-2}]$

32. Loss is potential energy = work against friction

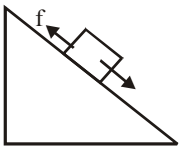
$mgh = (\mu mg)d$

$d = \frac{h}{\mu} = \frac{1}{0.2} = 5$ m

33. Area under velocity-time graph gives the displacement.

$v = \frac{dx}{dt}$

$\int dx = \int vdt$

34. 

friction (f) = $\frac{3}{10}$ Mg

work done = – fd

$W = \frac{-3}{10}$ Mgd

$W = \frac{-3}{10} \times 200 \times 10$

$\boxed{W = -600J}$

35. $F_1 = \frac{mv^2}{r_1}$ and $F_2 = \frac{mv^2}{r_2}$

$\Rightarrow \frac{F_1}{F_2} = \frac{r_2}{r_1}$

u = 0 m/s

v = 4 m/s

According to work energy theorem

$W = (KE)_f - (KE)_i$

$= \frac{1}{2} mv^2 - \frac{1}{2} mu^2$

$= \frac{1}{2} m (v^2 - u^2) = \frac{1}{2} \times 2 [(4)^2 - 0]$

$= 16$ J

37. $r = 25 \times 10^{-2}$ m

$n = 2$

$\omega = 2\pi n = 4\pi$

$a_c = \omega^2 r = 4\pi \times 4\pi \times 25 \times 10^{-2}$

$= 4\pi^2$

38. When velocities exchange between two bodies in elastic collision then they have same masses

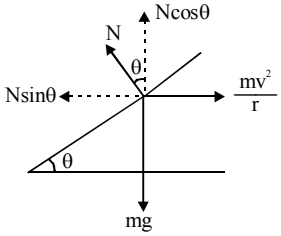
so $\frac{m_a}{m_b} = 1$

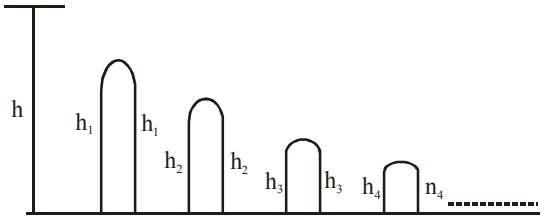
जब भी दो वस्तुओं के वेग परस्पर बदल जाते है तो उनके द्रव्यमान बराबर होते है $\frac{m_a}{m_b} = 1$

39. $N\sin\theta = \frac{mv^2}{r}$

and $N\cos\theta = mg$

$\Rightarrow \tan\theta = \frac{v^2}{rg}$



40. 

$n_1 = e^2h$ $h_2 = e^4h$ $h_3 = e^6h$.....

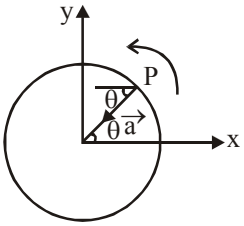
Total distance $= h + 2h_1 + 2h_2 + 2h_3 + ...$

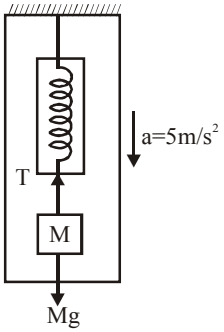
$= h + 2e^2h + 2e^4h + ...$

$= h + 2e^2h [1+e^2+e^4+ .....]$

$= h + 2e^2h \left(\frac{1}{1-e^2}\right)$

$= h\left[\frac{1-e^2+2e^2}{1-e^2}\right] = h\left[\frac{1+e^2}{1-e^2}\right]$

41. 

42. 

$Mg - T = Ma$

$Mg - Ma = T$

$T = M(g - a)$

$= 5(9.8 - 5)$

$= 5 \times 4.8 = 24$ N

$Mg = 49$

$M = \frac{49}{9.8} = 5$ kg

43. $\vec{r} = \sin t\,\hat{i} + \cos t\,\hat{j} + t\,\hat{k}$

$\vec{v} = \frac{d\vec{r}}{dt} = \cos t(\hat{i}) - \sin t(\hat{j}) + \hat{k}$

at $t = \frac{\pi}{2}$

$\vec{v} = 0(\hat{i}) - 1(\hat{j}) + \hat{k}$

$\vec{v} = -\hat{j} + \hat{k}$

$|\vec{v}| = \sqrt{2}$ m/s

44. $P = \sqrt{2mKE}$ $\quad E_1 = 100$

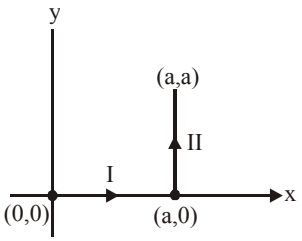
$P \propto \sqrt{KE}$ $\quad E_2 = 100 + 300 = 400$

$$\left(\frac{P_2 - P_1}{P_1}\right) \times 100 = \left(\frac{\sqrt{E_2} - \sqrt{E_1}}{\sqrt{E_1}}\right) 100$$

$$\left(\frac{P_2 - P_1}{P_1}\right) \times 100 = \left(\sqrt{\frac{E_2}{E_1}} - 1\right) 100$$

$$\left(\frac{P_2 - P_1}{P_1}\right) \times 100 = \left(\sqrt{\frac{400}{100}} - 1\right) 100 = 100\%$$

45.



$$W_I = \int_0^a F_x dx = \int_0^a -kx\,dx = \left[\frac{-kx^2}{2}\right]_0^a = \frac{-ka^2}{2}$$

$$W_{II} = \int_0^a F_y dy = \int_0^a -ky\,dy = \left[\frac{-ky^2}{2}\right]_0^a = -\frac{Ka^2}{2}$$

$$W = W_I + W_{II} = \left(\frac{-Ka^2}{2}\right) + \left(\frac{-Ka^2}{2}\right) = -Ka^2$$

46. $d = \frac{PM_W}{RT}$

$\frac{d_1T_1}{P_1} = \frac{d_2T_2}{P_2}$

48. $\frac{r_2}{r_1} = \sqrt{\frac{d_1}{d_2}}$

49. $\begin{matrix} H \\ H \end{matrix}\!>\!P\!-\!P\!<\!\begin{matrix} H \\ H \end{matrix}$

$355 = 1 \times$ BE of p–p $+ 4 \times$ BE of P-H

$355 = x + 4 \times 76$

$x = 355 - 304 = 51$ Kcal/mol

51. NaOH is formed from its constituent particles which are in stable state.

52. 10^{-8} M $HClO_4$ solution is very dilute solution of acid.

55. $\Delta C_p = \frac{\Delta H_{T_2} - \Delta H_{T_1}}{T_2 - T_1}$ (kirchoffs eq^n)

$\Delta C_p = (1 \times 8.97) - (1 \times 6.97 + \frac{1}{2} \times 7)$

$\Delta C_p = -1.5$

$-1.5 = \frac{\Delta H_{100} - (-67650)}{75}$

$\Delta H_{100} = -67650 - 75 \times 1.5$

$\Delta H_{100} = -67537.5$ cal.

56. NCERT Page # 18/1.10.1

58. NCERT Page # 204/7.8.4

It is endothermic reaction so on increasing temperature equilibrium shifts in forward direction.

59. $(\Delta H_{neu})_{SA+SB} = (\Delta H_{neu})_{WA+SB} + \Delta H_{ionization}$

$27.4 = 25.4 + \Delta H_{ionize}$

$\Rightarrow \Delta H^i_{in} = 2\,.\,\frac{Kcal}{mol}$

60. eq (iii) = eq (i) + eq (ii)

$\therefore K_3 = K_1K_2 = 10^{(x+y)}$

62. NCERT Page # 18/1.10.1

63. $W_{iso.rev} = 2.303 \times 1 \times 2 \log \frac{1}{5}$

$= +4.606 \times 0.70 = 32.242$ cal/mol.

65. $A \rightarrow 8 \times \frac{1}{8} + 6 \times \frac{1}{2} = 4$

$B \rightarrow \frac{25}{100} \times 4 = 1$

$C \rightarrow 8$

A_4BC_8.

66. NCERT Page # 203/7.8.2

The reactions having $\Delta n = 0$ are not affected by pressure.

70. NCERT Page # 214/7.11.4

NH_4OH is weak base

pH = 11 $\Rightarrow$ pOH = 3 $\Rightarrow [OH^-] = 10^{-3}$ M

$[OH^-] = C.\alpha$

$\alpha = \frac{10^{-3}}{5 \times 10^{-2}} = 0.02$

71. $\Psi_{(n, \ell m)} \rightarrow$ Tells about all the three quantum nos.

73. $\uparrow$ value of $(n + \ell) \uparrow$ energy

74. $\Delta T_f = i.K_f.m$

78. (i) 1.2 g atom of N = 1.2 mole of N-atom = 16.8g

81. Total energy = n × energy of one photon

$$1 \times 1000 \ \frac{J}{S} = n \times h\upsilon$$

$$n = \frac{1000}{6.626\times10^{-34}\times800}$$

$$n = \frac{100\times10^{33}}{8\times6.7} = \frac{100}{536} \times 10^{33} = 0.186 \times 10^{33}$$

$= 1.86 \times 10^{32}$.

82. NCERT Page # 15/1.9

% of element =

$$\frac{\text{number of atoms of element} \times \text{atomic weight}}{\text{Molecular weight of compound}} \times 100$$

83. NCERT Page # 195/equation 7.15

$K_p = K_C (RT)^{\Delta n}$

87. NCERT Page # 219

89. Acetone + $CHCl_3$ shows negative deviation.

90. NCERT Page # 20/1.3

93. NCERT : Pg. 23 (2.3)

95. NCERT : Pg. 23 (2.3).

97. NCERT : Pg. 23 (2.3.1).

99. NCERT : Pg. 23 (2.3.1).

101. NCERT : Pg. 23 (2.3.1).

107. NCERT : Pg. 24 (2.3.4).

111. NCERT : Pg. 27 (2.6).

113. NCERT : Pg. 29.

117. NCERT : Pg. 30.

119. NCERT : Pg. 30.

121. NCERT : Pg. 30 (3.1).

123. NCERT : Pg. 30 (3.1).

125. NCERT : Pg. 31 (3.1).

126. NCERT Page No. 133

128. NCERT Page No. 132

129. NCERT : Pg. 32 (3.1).

130. NCERT Page No. 133, fig. 8.5 XIth

131. NCERT : Pg. 32 (3.1.1).

132. NCERT Page No. 129

134. NCERT Page No. 126

135. NCERT : Pg. 32 (3.1.1).

137. NCERT : Pg. 33 (3.1.2).

138. NCERT XI, Pg. No. 96, III-Para

139. NCERT : Pg. 33 (3.1.2).

140. NCERT XI, Pg. No. 96, III-Para

143. NCERT : Pg. 33 (3.1.2).

144. NCERT XI, Pg. No. 94, IV-Para

145. NCERT : Pg. 33 (3.1.3).

147. NCERT : Pg. 33 (3.1.3).

150. NCERT XI, Pg. No. 68, Fig. 5.5(b)

151. NCERT (E) Part-I, Page no. # 8,9,18

152. NCERT XI, Pg. No. 74

153. NCERT (E) Part-I, Page no. # 22

154. NCERT XI, Pg. No. 74

155. NCERT (E) Part-I, Page no. # 46

157. NCERT (E) Part-I, Page no. # 49

158. NCERT, Page No. # Eng., 118, Para. No. 4
Hindi, 118, Para. No. 7

159. NCERT (E) Part-I, Page no. # 49

160. NCERT, Page No. # Eng. 107, Para. No. 3 & 4
Hindi 107, 108 Para. No. 3 & 4

161. NCERT (E) Part-I, Page no. # 50,54

162. NCERT, Page No. # Eng. 113, Para. No. 5
Hindi 113, Para. No. 6

163. NCERT (E) Part-I, Page no. # 50

164. NCERT, Page No. # 113, Figure 7.17

165. NCERT (E) Part-I, Page no. # 51,52,53,57

166. NCERT Page No. 103

167. NCERT (E) Part-I, Page no. # 48

168. NCERT Page No. 101

169. NCERT (E) Part-I, Page no. # 53,54,57

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