MAJOR TEST # 05

ALLEN NEET-UG | **DATE : 11 - 04 - 2013**

SYLLABUS - 01 & 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.	1	1	3	2	2	2	1	1	4	2	1	1	3	3	4	2	3	2	4	4
Q.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A.	2	3	1	4	4	3	2	4	4	3	2	1	2	4	4	2	2	4	3	4
Q.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
A.	2	3	4	3	4	2	4	1	2	1	4	4	3	1	4	2	1	1	4	1
Q.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
A.	4	2	1	2	3	2	2	1	1	4	4	1	3	1	4	4	1	3	4	2
Q.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
A.	2	4	1	1	4	2	2	1	4	2	3	2	1	2	4	2	1	1	3	4
Q.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
A.	2	2	4	2	3	1	4	4	3	1	3	4	3	4	1	4	4	2	2	2
Q.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
A.	4	2	4	1	3	1	1	4	4	1	2	3	1	3	3	3	4	1	3	3
Q.	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
A.	1	3	4	4	4	4	1	2	4	2	4	3	4	3	1	1	2	4	2	3
Q.	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
A.	2	3	2	3	1	4	1	4	2	3	4	1	2	1	1	2	2	4	3	3

HINT – SHEET

1. NCERT Topic # Horizontal projectile motion

$V_x = V_y$

$30 = U_y + a_y t$

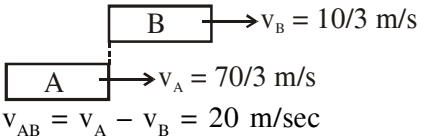
2. $n' = n\left(\frac{V}{V-30}\right)$

$= 500\left(\frac{330}{300}\right) = 550$ Hz

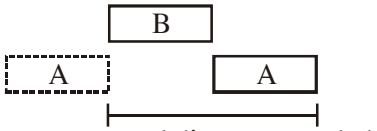
3. $\tan\theta = \frac{V_y}{V_x}$

4. $n' = n\left(\frac{V+\frac{V}{5}}{V}\right) = 1.2n$

5.

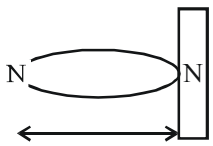


$v_{AB} = v_A - v_B = 20$ m/sec



so $10 = 20\ t \Rightarrow t = 0.5s$

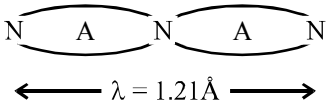
6.



$\frac{\lambda}{2} = 10 \Rightarrow \lambda = 20$ cm

$V = n\lambda = 100 \times 20$ cm $= 20$ m/sec

8.



9. $4s = M + 2Nt^4$
By diff.w.r.to t

$$4\frac{ds}{dt} = 2N\ 4t^3$$

$v = 2Nt^3$

10. $K = \pi = \frac{2\pi}{\lambda} \Rightarrow \lambda = 2cm$

11. NCERT Topic # Acceleration

$$a = V\frac{dV}{dx}$$

12. $V = \frac{\omega}{K} = \frac{2\pi}{2\pi} = 1\,m/sec$

14. $T = 2\pi\sqrt{\frac{\ell}{g}}$

16. $KE_{max} = \frac{1}{2}KA^2 = \frac{1}{2}Mw^2A^2$

$$= \frac{1}{2}\times 1\times (100)^2\times\left(\frac{60}{100}\right)^2$$

17. Resultant may be zero if sum of three smaller displacements ≥ fourth displacement

18. $v_{max} = Aw = 50 \times 10^{-3} \times \frac{2\pi}{2}$

$= 157 \times 10^{-3}$ m/sec
$= 0.157$ m/sec

20. $x = 5\sin\left(4t-\frac{\pi}{6}\right)$ ...(1)

$$3 = 5\sin\left(4t-\frac{\pi}{6}\right)$$

$$\frac{3}{5} = \sin\left(4t-\frac{\pi}{6}\right) \qquad \therefore\ \frac{4}{5} = \cos\left(4t-\frac{\pi}{6}\right)$$

$$v = 5 \times 4\cos\left(4t-\frac{\pi}{6}\right) \quad \text{from (1)}$$

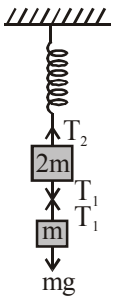
$$= 5 \times 4 \times \frac{4}{5} = 16 \text{ m/sec}$$

21. Before cutting string

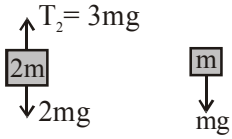
$\boxed{T_1 = mg}$

$T_2 = 2mg + T_1$

$\boxed{T_2 = 3mg}$



Just after cutting string



So for mass 2m, acc^n $= \frac{3mg-2mg}{2m}$

$$= \frac{mg}{2m} = \frac{g}{2}$$

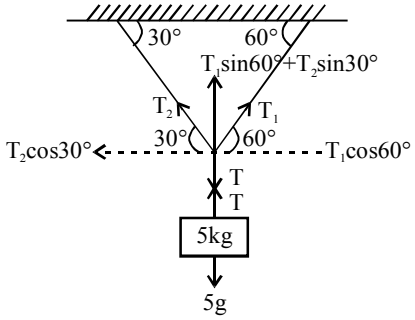
So for mass m, acc^n. $= \frac{mg}{m} = g$

22. $\frac{W_P}{Q_P} = \frac{\mu R\Delta T}{\mu C_P\Delta T} = \frac{R}{C_P} = \frac{R}{\frac{5}{2}R}$

$$\Rightarrow W = \frac{2}{5}Q$$

23. At t = 2 sec
$F = Kt^2 = (2N/s^2)(2s)^2 = 8N$
Limiting friction
$f_L = \mu N = \mu mg = 0.8 \times 4 \times 10 = 32$ N
Because applied force is less than limiting friction so static friction will act here
$f_{static} = f_{applied} = 8N$

25. $T_1\cos60° = T_2\cos30°$



$$T_1 \times \frac{1}{2} = T_2 \times \frac{\sqrt{3}}{2}$$

$T_1 = \sqrt{3}\,T_2$ ...(1)
$T_1\sin60° + T_2\sin30° = 5g$

$$T_1 \times \frac{\sqrt{3}}{2} + \left(\frac{T_1}{\sqrt{3}}\right)\left(\frac{1}{2}\right) = 5g$$

$$T_1\left(\frac{\sqrt{3}}{2}+\frac{1}{2\sqrt{3}}\right) = 5g$$

$$T_1\left(\frac{3+1}{2\sqrt{3}}\right) = 50$$

$$T_1 = 50 \times \frac{2\sqrt{3}}{4} = 25\sqrt{3}\text{ N}$$

$T_2 = 25$ N

26. $dU_{cyclic} = 0 \Rightarrow \Delta Q_{cyclic} = \Delta W_{cyclic}$
$\Rightarrow \Delta Q_{cyclic} = W_{AB} + W_{BC} + W_{CA}$
$\Rightarrow 10 = 0 + 15 + W_{CA}$
$\Rightarrow W_{CA} = -5J$

27. To remain at rest

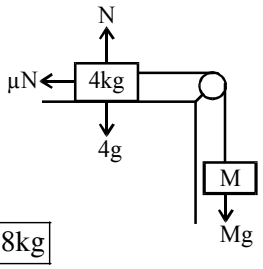
$\mu N \geq Mg$

$\mu(4g) \geq Mg$

$4\mu \geq M$

$4(0.2) \geq M$

$\Rightarrow \boxed{M \leq 0.8}$



So for just slide $\boxed{M = 0.8kg}$

29. $F = mnv$

$$144 = \frac{40}{1000} \times n \times 1200$$

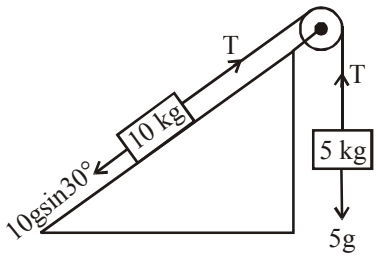
$$n = \frac{144}{48} = 3$$

31. $K_i + U_i = K_f + U_f$

$0 + mg\ell = K_f + 0$

$\boxed{K_f = mg\ell}$

33.



$10g\sin30° - T = 10a$

$$10g \times \frac{1}{2} - T = 10a$$

$5g - T = 10a$ ...(1)

$T - 5g = 5a$ ...(2)

(1) + (2)

$0 = 15a \Rightarrow \boxed{a = 0}$

34. $TV^{\gamma-1} = \text{const.}$

$$\Rightarrow T_1V_1^{\gamma-1} = T_2V_2^{\gamma-1} \Rightarrow T_2 = \left(\frac{V_1}{V_2}\right)^{\gamma-1} T_1$$

$$\Rightarrow T_2 = \left(\frac{V}{8V/27}\right)^{\frac{5}{3}-1} \times 400 = 900K$$

$$W_{AD} = \frac{\mu R(T_1 - T_2)}{\gamma - 1}$$

$$= \frac{1 \times 2 \times (400 - 900)}{\frac{5}{3} - 1}$$

$W_{AD} = -1500$ cal

then, work done on the system = 1500 cal

35. $$I_T = \frac{Mr^2}{2} + \frac{Mr^2}{2} + M(2r)^2$$

$= Mr^2 + 4Mr^2$

$I = 5Mr^2$

36. $P_1V_1 = P_2V$

$\Rightarrow PV = P_2 \times 0.95\ V$

$\Rightarrow P_2 = 1.0526\ P$

$$\text{Now } \frac{P_2 - P_1}{P_1} \times 100 = \frac{1.0526P - P}{P} \times 100$$

$= 5.26\%$

37. $K.E. = \frac{1}{2} I\omega^2$

$\Rightarrow 1500 = \frac{1}{2} \times 1.2 \times \omega_f^2$

$\Rightarrow 3000 = 1.2\ \omega_f^2$

$$\Rightarrow \omega_f^2 = \frac{30000}{12}$$

$\Rightarrow \omega_f = 50$

Now $\omega_i + \alpha t = 50$

$\Rightarrow 0 + 25t = 50$

$\Rightarrow t = 2s$

38. $$\frac{P}{\rho} = \frac{RT}{M_W}$$

(i) At T = constant $\Rightarrow P \propto \rho$

(ii) At P = constant $\Rightarrow T \propto \frac{1}{\rho}$

(iii) $P \propto T \Rightarrow \rho$ = constant

39. at same angular freq.

40. $P = e_r\sigma AT^4$ [P, A, σ = same]

$$e_rT_A^4 = e_{r_B}T_B^4 \Rightarrow T_B = \left(\frac{e_{r_A}}{e_{r_B}}\right)^{1/4} \times T_A$$

$$= \left(\frac{0.04}{0.64}\right)^4 \times 5802 = 2901\ K$$

41. apply angular momentum conservation

$L_i = L_f$

$I_i\omega_i = I_f\ \omega_f$

$$\frac{Mr^2}{2}\omega_i = \frac{10}{16}Mr^2\omega_f$$

$$\boxed{\omega_f = \frac{4}{5}\omega_i}$$

44. $$h \propto \frac{1}{r}$$

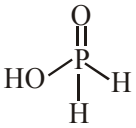
53. NCERT XII Part-I Page # 244

55. NCERT XII Part-I Page # 248
High spin complex means weak ligand hence outer d orbitals are used.

57. NCERT XII Part-I Page # 187

59. Presence of N is must.

63. Hypophosphorous acid is H_3PO_2



67. NCERT XI Part-II Page # 294

73. NCERT XI Part-II Page # 284

79. [Bond order $\propto$ 1/bond length]

81. $H_2SO_3 \xrightarrow{-H_2O} SO_2$

82. $\lambda = \dfrac{h}{\sqrt{2m(K.E.)}}$

$$= \frac{6.626 \times 10^{-34}}{\sqrt{2 \times 1.6 \times 10^{-27} \times 0.04 \times 1.6 \times 10^{-19}}}$$

$= 1.460 \times 10^{-10}$ m $= 1.460$ Å

84. From law of energy conservation :

$$E_T = E_1 + E_2$$

$$\frac{hc}{\lambda} = \frac{hc}{\lambda_1} + \frac{hc}{\lambda_2}$$

$$\frac{1}{\lambda} = \frac{1}{\lambda_1} + \frac{1}{\lambda_2}$$

$$\frac{1}{300} = \frac{1}{496} + \frac{1}{\lambda_2}$$

$$\frac{1}{\lambda_2} = \frac{1}{300} - \frac{1}{496}$$

$$\therefore \quad \lambda_2 = \frac{300 \times 496}{496 - 300} = 759 \text{ nm}$$

85. Carges size minimum I.E.

86. $\because \quad \Delta x m \Delta V = \dfrac{h}{4\pi}$

$$\therefore \quad \Delta V = \frac{6.62 \times 10^{-34}}{4 \times 3.14 \times 9.1 \times 10^{-31} \times 0.1 \times 10^{-10}}$$

$= 0.576 \times 10^7$ ms^{-1}

87. NCERT XI Part-II, Page # 292

88. $v_{rms} \propto \dfrac{1}{\sqrt{M_w}}$

91. NCERT - XI, Page No. # 4

95. NCERT - XI, Page No. # 5, 25

97. NCERT - XI, Page No. # 1

99. NCERT - XI, Page No. # 1, 5

101. NCERT - XI, Page No. # 5

103. NCERT - XI, Page No. # 5

105. NCERT - XI, Page No. # 22

107. NCERT - XI, Page No. # 22, 23

109. NCERT - XI, Page No. # 25, Last three lines

111. NCERT - XI, Page No. # 45 (Q.11)

113. NCERT - XI, Page No. # 44 (Q.4)

115. NCERT - XI, Page No. # 31, 34, 37

117. NCERT - XI, Page No. # 19, 23

119. NCERT - XI, Page No. # 26, 31

121. NCERT-XI, (Eng.) Page No. # 59

123. NCERT-XI, (Eng.) Page No. # 58

127. NCERT-XI, (Eng.) Page No. # 52

129. NCERT-XI, (Eng.) Page No. # 56-57

131. NCERT-XI, (Eng.) Page No. # 50

135. NCERT-XI, (Eng.) Page No. # 52

137. NCERT-XI, (Eng.) Page No. # 48

139. NCERT, Page No. # 101-102

141. NCERT, Page No. # 103

143. NCERT, Page No. # 102

145. NCERT, Eng. Pg # 108 Para # 5, Line # 20
NCERT, Hin. Pg # 108 Para # 5, Line # 18

147. NCERT, Eng. Pg # 112 Para # 4, Line # 01
NCERT, Hin. Pg # 113 Para # 5, Line # 01

149. NCERT-XI, Page No. # 242

151. NCERT-XI, Page No. # 98

153. NCERT-XI, Page No. # 90, 91. 92, 93, 13

158. NCERT, Page No. # 237

160. NCERT, Page No. # 245

162. NCERT, Page No. # 243

164. NCERT, Page No. # 232

166. NCERT, Page No. # 211

170. NCERT, Page No. # 233

171. NCERT, Page No. # 197

172. NCERT, Page No. # 210

173. NCERT, Page No. # 178

174. NCERT, Page No. # 218

175. NCERT, Page No. # 203

177. NCERT, Page No. # 250-254

178. NCERT, Page No. # 188

179. NCERT, Page No. # 250

180. NCERT, Page No. # 179