NURTURE TEST SERIES / JOINT PACKAGE COURSE

TARGET : PRE-MEDICAL 2017

Test Type : **ALL INDIA OPEN TEST** (MAJOR) Test Pattern : AIPMT

TEST DATE : 21 - 02 - 2016

ANSWER KEY

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

HINT – SHEET

1. $a = \frac{dv}{dt} = v\frac{dv}{dx}$

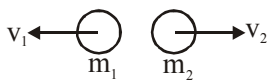
$= 2(x \sin x + \cos x)\,[2 \sin x + 2x \cos x - 2 \sin x]$

At $x = \frac{\pi}{2}$, $a = 4\left[\frac{\pi}{2}(1)+0\right]\left[1+\frac{\pi}{2}(0)-1\right] = 0$

2. $a_{au} = \frac{v_f - v_i}{t_f - t_i} = \frac{0-10}{4-2} = -5 m/s^2$

4. momentum before = momentum after
explosion explosion

$0 = m_2v_2 - m_1v_1$



$\Rightarrow \frac{v_1}{v_2} = \frac{m_2}{m_1} = \left(\frac{r_2}{r_1}\right)^3 = \frac{8}{1}$

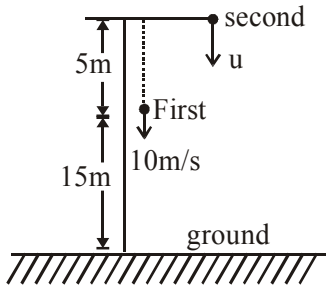
5. $PV = nRT = \frac{m}{M_w}RT$

$\Rightarrow$ For same P, $V \propto m$

There fore $m_1 > m_2$

6. $\frac{K_f}{K_i} = \left(\frac{p_f}{p_i}\right)^2 \Rightarrow \frac{p_f}{p_i} = \sqrt{0.81} = 0.9$

7.



Let time taken by first chestnut to reach ground be t then

$15 = 10\,t + \frac{1}{2}(10)\,t^2$

$\Rightarrow t^2 + 2t - 3 = 0 \Rightarrow t^2 + 3t - t - 3 = 0$

$\Rightarrow t = 1$ s

In this time second chestnut must have to reach ground.

Therefore $20 = u(1) + \frac{1}{2}(10)\,(1)^2 \Rightarrow u = 15$m/s

8. Let both blocks move together so

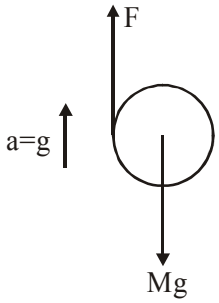
$a_c = \frac{20-2}{2+4} = 3$ m/s^2 (leftward)

for upper block

$f - 2 = 2\,(3) \Rightarrow f = 8$ N

Which is less than limiting friction (i.e. 10N) so our assumption is correct.

9.



$F - Mg = Mg \Rightarrow F = 2\,Mg$

$FR = I\alpha = \frac{MR^2}{2}\alpha$

$\Rightarrow F = \frac{M}{2}(R\alpha) \Rightarrow \frac{2(2Mg)}{M} = R\alpha$

$\Rightarrow R\alpha = 4g$

10. $\because$ Produce 4 beats $\therefore$ f = 288 ± 4 = 292 or 284 cps

By waxing beats ↓ so f = 292 cps.

11. $KE = \frac{1}{2}mv^2$

$\Rightarrow$ unit of KE = (unit of mass) $\left(\frac{\text{unit of length}}{\text{unit of time}}\right)^2$

$= (100\text{ g})\left(\frac{1\text{cm}}{10\text{s}}\right)^2 = 1\text{ g cm}^2/\text{s}^2$

$= 1$ erg

12. By using $v^2 = u^2 + 2as$ for relative motion

$(0)^2 = (v_1 + v_2)^2 + 2(-a_1 - a_2)\,s_{min}$

$\Rightarrow s_{min} = \frac{(v_1+v_2)^2}{2(a_1+a_2)}$

13. Here $\frac{dv}{dt} = -1 = -\mu g \Rightarrow \mu = 0.1$

14. $I = \frac{Ma^2}{4} + M\left(\frac{a}{2}\right)^2 = \frac{Ma^2}{2}$

Now $I_0 = \frac{Ma^2}{2} + M\left(\sqrt{\left(\frac{a}{2}\right)^2 + \left(\frac{a}{2}\right)^2}\right)^2$

$= \frac{Ma^2}{2} + \frac{Ma^2}{2} = Ma^2 = 2I$

15. At x = 0, y = a sinωt so y' = – a sinωt at x = 0

16. $P = \frac{a - t^2}{bx} = \frac{a\left(1 - \frac{t_2}{a}\right)}{bx}$

$\Rightarrow \left[\frac{a}{b}\right] = [Px] = [(ML^{-1}T^{-2})\,(L)] = ML^0T^{-2}$

17. To catch $(v_y)_A = (v_y)_B$

$\Rightarrow v\sin37° = 30$

$\Rightarrow v = \frac{30}{3/5} = 50$ m/s

Time taken = $\frac{200}{v\cos37°} = 5$ s.

18. By using work energy theorem, $W = \Delta KE$

$$W_{gravity} + W_{air\text{-}drag} = \frac{1}{2}m\,(v^2 - u^2)$$

$$\Rightarrow mgh + W_{air\text{-}drag} = \frac{1}{2}m\,(1.96\,gh - 0^2)$$

$$\Rightarrow W_{air\text{-}drag} = -\,0.02\,mgh$$

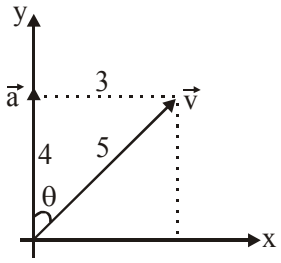
19. For solid sphare, $I_{min} = \frac{2}{5}MR^2$

20. apparent frequency, $n' = \left(\frac{v + v_0}{v}\right)^n$

$$\%\ \text{increase} = \frac{n' - n}{n} \times 100 = \left(\frac{v_0}{v}\right) \times 100$$

$$= \left(\frac{v/5}{v}\right) \times 100 = 20\%$$

22. $\vec{a} = \frac{d\vec{v}}{dt} = 4\hat{j}$ and at t = 1s, $\vec{v} = 3\hat{i} + 4\hat{j}$



from diagram $a_t = 4\cos\theta = 4\left(\frac{4}{5}\right) = \frac{16}{5}$

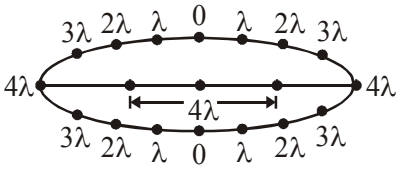
$$a_v = 4\sin\theta = 4\left(\frac{3}{5}\right) = \frac{12}{5}$$

Therefore $\frac{a_t}{a_v} = \frac{4}{3}$

23. Total energy = KE + PE
↑ ↑
Information-I Information-II

24. $\tau = I\alpha$
$\Rightarrow 10 \times (30 \times 10^{-2}) + 9 \times (30 \times 10^{-2}) - 12 \times (5 \times 10^{-2}) = 5100\,\alpha$
$\Rightarrow \alpha = 10^{-3}$ rad/s^2

25.



$\Rightarrow$ No. of maximum = 16

26. $\sum \vec{F}_i = 4\hat{j} + 2\hat{k}$ $\Rightarrow$ moves in Y–Z plane.

28. acceleration = 0 $\Rightarrow$ force = 0 $\Rightarrow$ $\frac{dU_{(x)}}{dx} = 0$

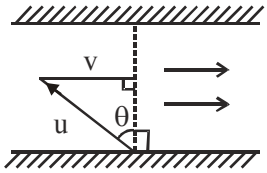
30. Use $T \propto R^{3/2}$.

31. $\because F = -\frac{dU}{dx}$

$\therefore$ Force is negative when x is between B and C.

32. Given that $v = \frac{u}{n}$

Direction for minimum drift is shown below.



$$\sin\theta = \frac{v}{u} = \frac{1}{n}$$

$\therefore$ Required angle $= \frac{\pi}{2} + \theta = \frac{\pi}{2} + \sin^{-1}\left(\frac{1}{n}\right)$

33. $E_k \propto t \Rightarrow u^2 \propto t \Rightarrow u \propto \sqrt{t}$

$$a = \frac{du}{dt} \Rightarrow a \propto \frac{1}{\sqrt{t}} \Rightarrow F \propto \frac{1}{\sqrt{t}}$$

34. $e_A \sigma A T_A^4 = e_B \sigma A T_B^4 \Rightarrow \frac{T_A}{T_B} = \left(\frac{e_B}{e_A}\right)^{\frac{1}{4}}$

35. By COME, $-\frac{GMm}{R} + E_{required} = -\frac{GMm}{2(3R)}$

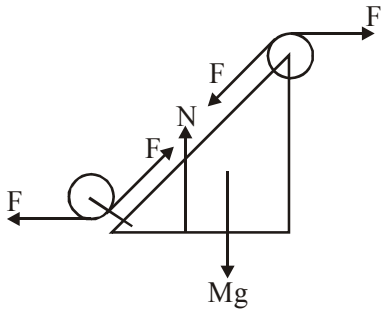
$$\Rightarrow E_{required} = \frac{5\,GMm}{6R}.$$

36. Required component = $\left(\vec{v}\cdot\hat{a}\right)\hat{a}$

$$= \left[\left(6\hat{i}+2\hat{j}-2\hat{k}\right)\cdot\left(\frac{\hat{i}+\hat{j}+\hat{k}}{\sqrt{3}}\right)\right]\left[\frac{\hat{i}+\hat{j}+\hat{k}}{\sqrt{3}}\right]$$

$$= 2\left(\hat{i}+\hat{j}+\hat{k}\right).$$

37. F.B.D. of the wedge



So $F_{Net} = 0$

38. $Y_{cm} = \dfrac{2m(0)+2m(D)+m(2D)}{5m} = \dfrac{4}{5}D$

39. It is clear that $T_B > T_A$, $T_B > T_C$ and $W_{AB} > W_{BC}$ therefore $U_B > U_A$.

40. At maximum extension, $v_{3kg} = v_{6kg} = v_{cm} =$

$$\frac{6(2)+3(-1)}{6+3} = 1 m/s \text{ (right)}$$

By COME,

$$\frac{1}{2}(6)(2)^2+\frac{1}{2}(3)(1)^2 = \frac{1}{2}(200)x_m^2+\frac{1}{2}(6+3)(1)^2$$

$\Rightarrow x_m = 0.3$ m = 30 cm.

41. Speed is zero at t = 4 s.

43. Change in momentum = Impulse

$= \int F dt$

= Area of graph

$= 10 \times 5 + \dfrac{1}{2} \times 10 \times 4$

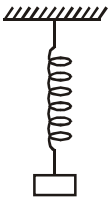
= 70 N s.

44. $\dfrac{\theta_1-\theta_2}{t} = k\left(\dfrac{\theta_1+\theta_2}{2}-\theta_0\right)$

$\Rightarrow \dfrac{0.1}{5} = k\ (50-30)$ & $\dfrac{0.1}{t} = k\ (40-30)$

$\Rightarrow t = 10$ s.

45. $Mg = kx$



$$\Rightarrow \quad \frac{k}{m} = \frac{YA}{\ell m} = \frac{g}{x}$$

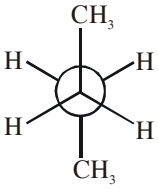
or $$\frac{m}{k} = \frac{\ell m}{YA} = \frac{x}{g}$$

$$T = 2\pi\sqrt{\frac{x}{g}} = 2\pi\sqrt{\frac{m}{k}}$$

$$\Rightarrow \quad T = 2\pi\sqrt{\frac{m\ell}{YA}}$$

54. In B_2H_6 only four terminal H-atom are replaced.

55.



Max^m $\rightarrow$ distance between methyl

min^m $\rightarrow$ Repulsion

most stable

61. At high pressure = $P + \dfrac{n^2a}{V^2} \simeq P$

(P) (V – nb) = nRT

PV – Pb = RT { n = 1

PV = RT + Pb

62. $Ag_2CrO_4 \rightleftharpoons 2Ag^+ + CrO_4^{2-}$

$K_{sp} = [Ag^+]^2\,[CrO_4^{2-}]$

$$[Ag^+] = \sqrt{\frac{K_{sp}}{\left[CrO_4^{2-}\right]}} = \sqrt{\frac{1.9\times10^{-12}}{0.1}}$$

$$= \sqrt{19\times10^{-12}}$$

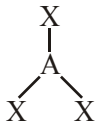
$$= 4.35\times10^{-6} M$$

$K_{sp} = [Ag^+]\,[Cl^-]$

$K_{sp} = (4.35 \times 10^{-6}) \times [Cl^-]$

$$[Cl^-] = \frac{1.7\times10^{-10}}{4.35\times10^{-6}}$$

$[Cl^-] =$

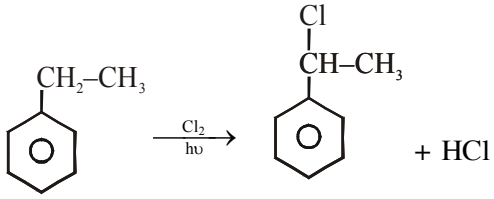
63.  Net dipole moment is zero

72. 29g of H_2SO_4 present in 100g of solution

$$M = \frac{x(\text{In g.}) \times 1000}{M\omega \times V(\text{In mL})}$$

$$3.6 = \frac{29 \times 1000}{98 \times \frac{100}{d}}$$

78. $CaH_2 + H_2O \longrightarrow Ca(OH)_2 + H_2(g)$
$Al + NaOH \longrightarrow NaAlO_2 + H_2(g)$
$Zn + \text{dil } H_2SO_4 \longrightarrow ZnSO_4 + H_2(g)$

79.  + HCl

F.R.S.R

86. $$\frac{P \times V_{total}}{RT} = \frac{P_1V_1}{RT} + \frac{P_2V_2}{RT} + \frac{P_3V_3}{RT}$$

$V_{total} = V_1+V_2+V_3$

88. Mg^{+2} does not impart colour to the flame due to high ionisation energy.

106. NCERT Pg. # 133

107. NCERT Pg. # 111,112,114

114. Module No.1 Pg. # 187 (Eng.), 205 (Hindi)

116. NCERT Pg. # 103

124. NCERT Pg. # 35

141. NCERT Pg. # 33

149. NCERT Pg. # 308, Para-20.2.2 (Eng.),
Pg. # 307, Para-20.2.2 (Hindi)

154. NCERT XI Pg. # 90,91,96