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NEET 2023-24

Mark	Group		Date : 17/03/2024
720	PCB	**PRE FINAL ROUND -01**	Time : 3 :20 Hours

Answer Key Version - Q (PCB NEET 2023-24)

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PHYSICS

SECTION - A (35 Questions)

01. **(2)** $a = bt$

$$\frac{dv}{dt} = bt$$

$$\int_u^v dv = \int_0^t bt\,dt$$

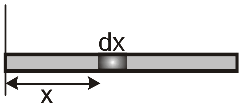
$$V = u + \frac{bt^2}{2}$$

$$[V = u + \frac{bt^2}{2}]$$

02. **(1)** $W = \vec{F}.\vec{s} = (-2\hat{i} + 15\hat{j} + 6\hat{k}).10\hat{j}$

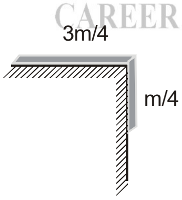
$= 150$ J.

03. **(2)**



$$x_{cm} = \frac{\int dmx}{\int dm} = \frac{\int (\lambda_0 x dx)x}{\int \lambda dx} = \frac{\int_0^L \lambda_0 x^2 dx}{\int_0^L \lambda_0 x dx} = \frac{2L}{3}.$$

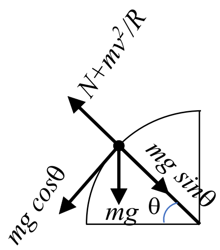
04. **(1)** Apply system equation



$$\frac{m}{4} g = \frac{3m}{4} g \times \mu$$

$$\Rightarrow \mu = \frac{1}{3} = 0.33$$

05. **(1)**

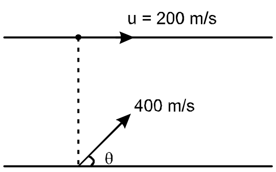


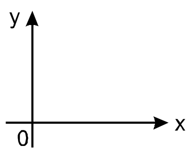
$$N + \frac{mv^2}{R} = mg \sin\theta$$

$$N = mg\sin\theta - \frac{mv^2}{R}$$

as $\theta \uparrow \Rightarrow N \uparrow$

06. **(2)**





To hit, $400 \cos\theta = 200$

{$\because$ Both travel equal distance along horizontal, of their start and coordinates an x axis are same}

$\Rightarrow \theta = 60°$.

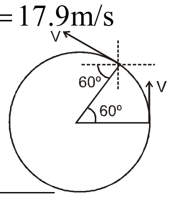
07. **(3)** $V_{com} = \frac{200 \times 10\hat{i} + 500(3\hat{i} + 5\hat{j})}{200 + 500}$

$$= \frac{20\hat{i} + 15\hat{i} + 25\hat{j}}{7} = 5\hat{i} + \frac{25}{7}\hat{j}.$$

08. **(1)** $V = \sqrt{5lg} = \sqrt{5 \times 6.4 \times 10} = 17.9$m/s

09. **(4)** $\Delta V = V_2 - V_1$

$= 0$

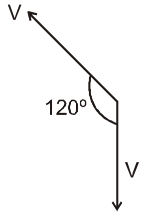


$\Delta\vec{V} = \vec{V_2} - \vec{V_1}$

$|\Delta\vec{V}| = \sqrt{V_2^2 + V_1^2 + 2V_1V_2\cos 120°}$

$= \sqrt{V^2 + V^2 + 2V^2\cos 120°}$

$= \sqrt{2V^2 + 2V^2\left(\frac{-1}{2}\right)}$



$|\Delta\vec{V}| = V$

10. **(2)** $X_{CM} = \frac{0 \times m + m \times a + m \times \frac{a}{2}}{m + m + m} = \frac{a}{2}$,

$$Y_{CM} = \frac{0 \times m + 0 \times m + m \times \frac{a\sqrt{3}}{2}}{m + m + m} = \frac{a\sqrt{3}}{6},$$

11. **(4)** $a = \frac{S^2}{t^4} = \frac{(\text{metre})^2}{(\text{second})^4} = m^2\,s^{-4}$

12. **(1)** KE. $= \frac{1}{2}mV^2$

$[KE] = ML^2\,T^{-2}]$

If unit of M and L are doubled

Then unit of K.E.

K.E. $= [(2M)\,(2L)^2\,T^{-2}]$

$= 8\,[ML^2\,T^{-2}]$

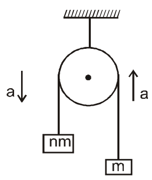
unit of K.E. is 8 times.

13. **(3)** $a = \frac{(nm - m)}{nm + m} g$

$$= \frac{(n-1)}{(n+1)} g$$

$a_1 = a_2 = a$

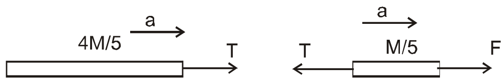
$$a_{cm} = \frac{nma_1 - ma_2}{(nm + m)} = \frac{(n-1)}{(n+1)} \times a$$



$$a_{cm} = \frac{(n-1)^2}{(n+1)^2} g.$$

14. **(1)** Velocity can't change its value suddenly.

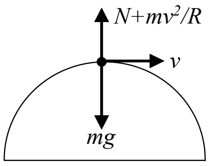
15. **(3)** $a = \dfrac{F}{M}$



By FBD

$T = \dfrac{4M}{5} \times a = \dfrac{4M}{5} \times \dfrac{F}{M} = \dfrac{4F}{5} \Rightarrow T = 4\text{ N.}$

16. **(2)**



For leaving contact N = 0

$\Rightarrow \dfrac{mv^2}{R} = mg \Rightarrow v = \sqrt{gR}.$

17. **(3)** use $m_1v_1 = m_2v_2 = P$

$K.E. = \dfrac{1}{2}m_1{v_1}^2 + \dfrac{1}{2}m_2{v_2}^2$

$= \dfrac{1}{2}m_1\left(\dfrac{P}{m_1}\right)^2 + \dfrac{1}{2}m_2\left(\dfrac{P}{m_2}\right)^2$

$= \dfrac{1}{2}\dfrac{P^2(m_2+m_1)}{m_1m_2}.$

18. **(2)** $x = 6t$ $\qquad y = 8t - 5t^2$

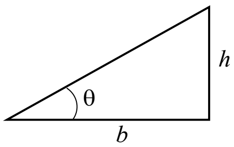
$\dfrac{dx}{dt} = 6 \qquad \dfrac{dy}{dt} = 8 - 10t$

at t = 0

$V_x = 6$ m/sec $\qquad V_y = 8$ m/sec

$V = \sqrt{{V_y}^2 + {V_x}^2} = \sqrt{8^2+6^2} = 10$ m/sec

19. **(1)**



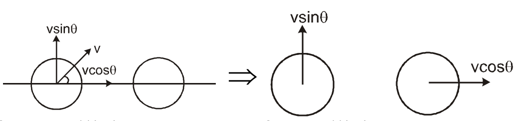
as $\upsilon = \sqrt{Rg\tan\theta}$

$h = \dfrac{\upsilon^2 b}{Rg}$

20. **(2)** $\dfrac{H}{R} = \dfrac{\tan\theta}{4}$

$\theta = 45° \;\&\; R = 36$ m $\qquad \therefore H = 9$ m.

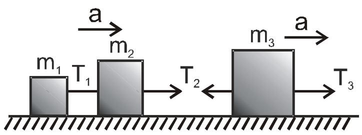
21. **(3)**



be fore collision $\qquad$ after collision

So angle between velocity vectors is 90°

22. **(3)** $a = \dfrac{60}{10+20+30} = 1\text{ ms}^{-2}$



$\Rightarrow T_2 = (m_1 + m_2)\,a = (10 + 20) \times 1 = 30$ N.

23. **(4)** It can be observed that component of acceleration perpendicular to velocity is $a_c = 5\text{m/s}^2$

$\therefore$ radius $= \dfrac{v^2}{a_c} = \dfrac{25}{5} = 5$ metre.

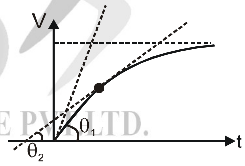
24. **(4)**

25. **(3)** Let v be the speed of B at lowermost position, the speed of A at lowermost position is 2v.
From conservation of energy

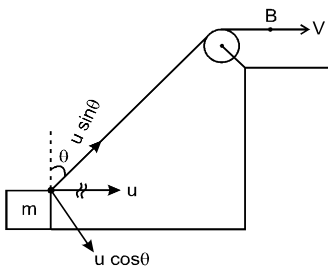
$\dfrac{1}{2}m(2v)^2 + \dfrac{1}{2}mv^2 = mg(2l) + mgl.$

Solving we get $v = \sqrt{\dfrac{6}{5}gl}.$

26. **(1)** As the slope of tangent decreases, velocity also decreases with time.
after time distance becomes constant i.e particle stops.



27. **(2)**



The length of string AB is constant.

⇒ speed A and B along the string are same u sin θ = V

u sin θ = V

$u = \dfrac{V}{\sin\theta}$

28. **(3)** $[Y] = [F^a A^b D^c]$

$[ML^{-1}T^{-2}] = [(MLT^{-2})^a (L^2)^b (ML^{-3})^c]$

equating power of M, L and T

$1 = a + c, \qquad -1 = a + 2b - 3c$

$-2 = -2a \qquad a = 1, \quad c = 0$

$b = -1$

$[Y] = F A^{-1} D^0.$

29. **(2)** $[h] = ML^2T^{-1}$

$[V_s] = \dfrac{[W]}{[Q]} = \dfrac{ML^2T^{-2}}{AT} = ML^2T^{-3}A^{-1}$

$[\phi] = ML^2T^{-2}$

$[P] = MLT^{-1}$.

30. **(2)**

31. **(3)** $W_G - W_f = 0 \Rightarrow mgh = \mu mgl$

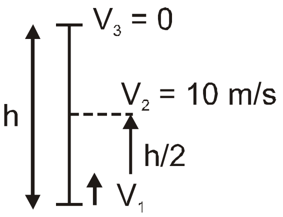
$h = \mu l$

$h = (0.2)l$

$\Rightarrow l = \dfrac{1.5}{0.2}$

$l = 7.5$ m $= (3 + 3 + 1.5)$ m.

32. **(3)**



$V_2^2 = V_3^2 + 2g\,\dfrac{h}{2}$

$\Rightarrow (10)^2 = 2 \times 10 \times \dfrac{h}{2}$

$\Rightarrow h = \dfrac{100}{10} = 10$ m

33. **(3)** It can be observed that power delivered to particle by force F is -

$P = Fv = K$.

The power is constant. Hence work done by force in time t is -

$\Delta W = Pt = Kt$

34. **(1)** $W_S + W_f = \Delta K$

$-\Delta U + W_f = -K_i$

$-U_f - \mu mgx = -K_i$

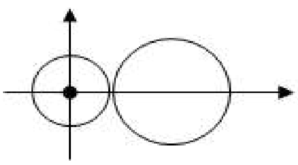
$\dfrac{1}{2}Kx^2 + \mu mgx = \dfrac{1}{2}mu^2$

$100x^2 + 2(0.1)(50)(10)x = 50 \times 4$

$x^2 + x - 2 = 0$

$x = 1$ m.

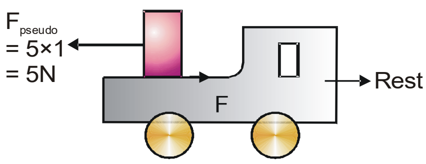
35. **(2)**



$X_{com} = \dfrac{m \times 0 + 2m \times (3a)}{m + 2m} = 2a.$

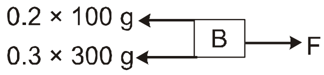
SECTION - B (Attempt Any 10 Questions)

36. **(1)** Solving from the frame of truck



$f \le \mu mg = 6 \Rightarrow f = 5N$.

37. **(4)**



for motion to start

$F \ge 0.2 \times 100\ g + 0.3 \times 300\ g = 1100$ N

$F_{min} = 1100$ N.

38. **(1)** $N = mg + Q\cos\theta$

frictional force $f = \mu(mg + Q\cos\theta)$

$P + Q\sin\theta = \mu(mg + Q\cos\theta)$

$\mu = \dfrac{P + Q\sin\theta}{mg + Q\cos\theta}$

39. **(1)** From given conditions :

$V_A = V_B\cos 37^0 = 15.\dfrac{4}{5} = 12$ m/sec.

$\therefore$ time of flight of A (t)$= \sqrt{\dfrac{2 \times 20}{10}} = 2$ sec.

$\Rightarrow$ Range $= V_A t = 24$ m.

40. **(3)**

41. **(3)** Density, $\rho = \dfrac{m}{V}$

$\Rightarrow \left|\dfrac{\Delta\rho}{\rho}\right|_{max} = \dfrac{m}{\pi r^2 l} = \left|\dfrac{\Delta m}{m}\right| + 2\left|\dfrac{\Delta r}{r}\right| + \left|\dfrac{\Delta l}{l}\right|$

$= \dfrac{0.01}{0.4} + \dfrac{2(0.03)}{6} + \dfrac{0.04}{8}$

% error in density $= \left(\dfrac{\Delta\rho}{\rho}\right) \times 100\%$

$= \left(\dfrac{1}{0.4} + \dfrac{6}{6} + \dfrac{4}{8}\right)\% = (2.5 + 1 + 0.5)\% = 4\%$

42. **(3)** MSR = 2.5 mm

$CSR = 45 \times \dfrac{0.5}{50}mm = 0.45\ mm$

Diameter reading = Reading of crew gauge

$= 2.5 + 0.45 - (-0.03) = 2.98$ mm.

43. **(1)** $\dfrac{dx}{dt} =$ slope ≥ 0 always increasing

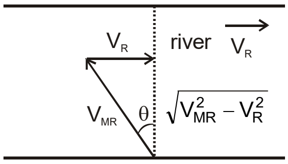
$\dfrac{dx}{dt} < 0$; and at $t \to \infty\ \dfrac{dx}{dt} \to 0$

$\dfrac{dx}{dt} > 0$ for first half $\dfrac{dx}{dt} < 0$ for second half.

$\dfrac{dx}{dt} =$ constant

44. **(1)** Work done by a force is positive if displacement is in direction of force and work done by a force is negative if displacement is in direction opposite to that of force.

45. **(2)** 15 min = 1/4 hr.



$$t = \frac{d}{V_y}$$

$$\Rightarrow \frac{1}{4} = \frac{1}{\sqrt{V_{MR}^2 - V_R^2}} = \frac{1}{4} = \frac{1}{\sqrt{5^2 - V_R^2}}$$

$\Rightarrow V_R = 3$ km/h

46. **(1)** As block is shifted slowly $\Delta K.E. = 0$

$\therefore W_g + W_f + W_F = 0$

Work done :

$= Mgh_1 + Mgh_2 + Mgh_3 + \mu_1 Mgl_1 + \mu_2 Mgl_2 + \mu_3 Mgl_3$

$= Mg(h_1 + h_2 + h_3) + Mg(\mu_1 l_1 + \mu_2 l_2 + \mu_3 l_3)$

$= Mg(8 + 0.2 + 0.4 + 0.4) = 90$ J.

47. **(2)** $W = \int \vec{F}.d\vec{s} = \int (3t\hat{i} + 5\hat{j}).(4t\ dt\ \hat{i})$

$$= \int_0^2 12t^2 dt = \frac{12\left[t^3\right]_0^2}{3} = 32J.$$

48. **(1)** $m\vec{V}_m = -M\vec{V}_b$

$m(\vec{V}_{rel} + \vec{V}_b) = -M\vec{V}_b$

$$\vec{V}_b = \frac{-m\vec{V}_{rel}}{M + m}$$

$\Rightarrow \vec{V}_b$ will be opposite to V_{rel}.

49. **(1)** $\Delta U = \frac{1}{2}\frac{m_1 m_2}{(m_1 + m_2)}(V_1 - V_2)^2 = \frac{100}{3}$

$$(V_1 - V_2)^2 \times \frac{2m.m}{2(m + 2m)} = \frac{100}{3}$$

putting m = 1 kg

$(V_1 - V_2) = 10$ m/sec.

50. **(2)** Case (1) : $a = \frac{F}{3m}$

$N_1 = m \times a$

Similarly in case (2)

$$N_2 = 2m \times a \Rightarrow \frac{N_1}{N_2} = \frac{1}{2}.$$

CHEMISTRY

SECTION - A (35 Questions)

51. **(3)**

Wt. of solvent = Wt. of solution – Wt. of solute

$= [1000 \times 1.02 - 20.5 \times 60] = 897$ g.

$$m = \frac{\text{Moles of } CH_3COOH}{\text{Wt. of solvent in kg}} = \frac{2.05 \times 1000}{897}$$

$= 2.285$

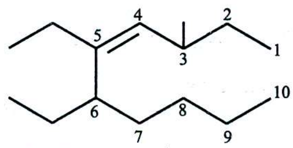
52. **(2)**

Mol. wt. of H_3PO_4 is 98 and change in its valence = 1.

$$\text{Eq. wt. of } H_3PO_4 = \frac{\text{Mol. wt.}}{\text{Change in valency}}$$

$= 98/1 = 98$

53. **(2)**



5, 6-Diethyl-3-methyldec-4-ene

54. **(3)**

NO_2^+, $AlCl_3$, SO_3 and $CH_3\overset{+}{C}{=}O$ are electrophiles.

55. **(1)**

Three, that is, d-tartaric acid, 1-tartaric acid and meso-tartaric acid.

56. **(1)**

$$2NaHCO_3 \longrightarrow Na_2CO_3 + H_2O + CO_2$$

2 mol of $NaHCO_3$ on complete decomposition gives 1 mol of Na_2CO_3.

So, 0.2 mol of $NaHCO_3$ on complete decomposition gives 0.1 mol of Na_2CO_3.

57. **(4)**

According to stoichiometry, they should react as follows:

$$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(l)$$

4 mol	5 mol	4 mol	6 mol
0.8 mol	1 mol	0.8 mol	1.2 mol

In this reaction 1 mole of O_2 and 0.8 mole of NH_3 are consumed. There by indicating complete consumption of O_2.

58. **(3)** Order of stability of carbanions is $1^o > 2^o > 3^o$.

59. **(1)** II > I > III

60. **(3)** As both the carbon atoms of each of the three double bonds are differently substituted, therfore, $2^3 = 8$ geometrical isomers are possible.

61. **(4)** Number of moles of oxygen = 2 × number of moles of given compounds

62. **(1)** 1

63. **(4)** If both assertion and reason are false.

64. **(4)** E^+ attacks on ring which has more e^- density.

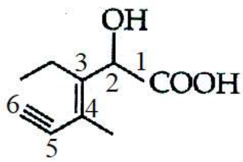
65. **(2)** 1 is staggered and 2 is eclipsed.

66. **(2)** 2s

67. **(2)** As values of m is from –1 to +1 including zero.

68. **(4)** All the above

69. **(2)** Higher are number of $\alpha-H$, more the hyperconjugating structures, more the stability of the compound.
70. **(1)** 1, 2 and 3
71. **(4)** Helium nuclei, which impinged on a metal foil and got scattered.
72. **(1)** 1
73. **(4)**



74. **(4)** (A) is elimination, (B) is substitution and (C) is addition reaction.
75. **(4)** (1)-(iv), (2)-(iii), (3)-(ii), (4)-(i)
76. **(4)**

$$X_3 = \frac{X_1X_2}{X_1 + X_2}$$

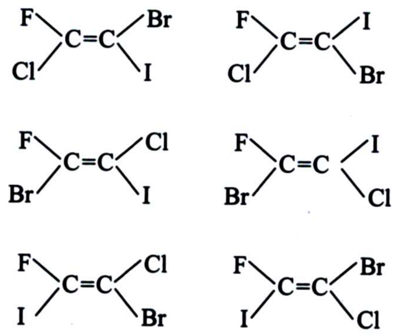
77. **(3)** (1)-(iv), (2)-(ii), (3)-(i), (4)-(iii)
78. **(3)** Four primary amines are possible. These are: $CH_3CH_2CH_2CH_2NH_2$, $(CH_3)_2CH–CH_2NH_2$, $CH_3CH(NH_2)CH_2CH_3$ and $(CH_3)_3CNH_2$.
79. **(1)** 9σ and 9π
80. **(4)** Statement-I is incorrect and Statement-II is correct
81. **(4)** (1)-(iv), (2)-(iii), (3)-(ii), (4)-(i)
82. **(2)** 3, 3 and 3 respectively
83. **(2)** $–COOH$, $–SO_3H$, $–CONH_2$, $–CHO$
84. **(3)** $(A) \rightarrow (iii), (B) \rightarrow (iv), (C) \rightarrow (ii), (D) \rightarrow (i)$
85. **(3)** Three, that is, $CH_3OCH_2CH_2CH_3$, $CH_3–O–CH(CH_3)_2$ and $CH_3CH_2OCH_2CH_3$.

SECTION - B (Attempt Any 10 Questions)

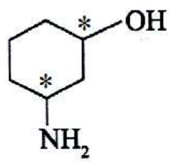
86. **(1)**
As halogens are most electronegative so the configuration is $ns^2\ np^5$.
87. **(2)**
Carbanions are stabilised by electron withdrawing groups. $–NO_2$ is stronger electron withdrawing group as compared to $–CHO$. At ortho-position, the effect is more pronounced.
88. **(3)**
$–NO_2$ group is meta-directing, thus will stabilize a electrophile at m-position.
89. **(3)**

$$\lambda = \frac{h}{\sqrt{2m(KE)}} = 0.3328\ nm$$

90. **(3)**
As maximum number of electrons in any orbit, sub-orbit or orbital is decided by Pauli's law.
91. **(1)**
Non-superimposable on its mirror image.
92. **(4)**
The two stereoisomers are not mirror images and hence, the diastereomers.
93. **(4)**
Six isomers are



94. **(3)**
2 and 3
95. **(3)**



96. **(3)**
Statement-I is correct but Statement - II is incorrect. Zeros at the end or right of a number are significant provided they are on the right side of the decimal point.
97. **(1)**
Molecular weight of the metal chloride

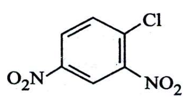
$$= \frac{0.72 \times 22400}{100} = 161.28\ g$$

Weight of chlorine in metal chloride

$$= \frac{65.5 \times 161.28}{100} = 105.64\ g$$

So, Mole atoms of chlorine $= \frac{105.64}{35.5} = 3$

Hence, metal chloride is MCl_3
98. **(4)**
4-chloro-3-ethylcyclohexanol
99. **(3)**



4-chloro-1,3-dinitrobenzene

100. **(3)**
Charge of electron