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UTS-NEET TEST SERIES HINTS & SOLUTION

TEST - 02, 04-03-2017 **TEST- 02 CODE -B ACD040317**

[PHYSICS]

1. (C) Since there is no external force the mass move due to mutual attraction.
The COM remains at same position

2. (D) $m_1 d = m_2 x$

$$x = \frac{m_1 d}{m_2}$$

3. (A) Internal forces do not effect motion of COM. Reason correct explanation

4. (A) $X = \dfrac{\frac{1}{2}(0) + \frac{3}{2}(0) + 1(4)}{\frac{1}{2} + \frac{3}{2} + 1} = \dfrac{4}{3}$

$$Y = \frac{\frac{1}{2}(0) + \frac{3}{2}(3) + 1(0)}{\frac{1}{2} + \frac{3}{2} + 1} = \frac{3}{2}$$

5. (B) CM of bricks, above each brick must not be beyond its edge.
$X_{cm} = L$

$$X_1 = a + \frac{L}{2},\ X_2 = 2a + \frac{L}{2},\ X_3 = 3a + \frac{L}{2}$$

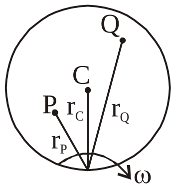
$$X_{cm} = \frac{m_1 x_1 + m_2 x_2 + m_3 x_3}{m_1 + m_2 + m_3}$$

$$L = \frac{6a + \frac{3L}{2}}{3}$$

$$a = \frac{L}{4}$$

6. (D)

7. (A) $V_P = \omega r_P$
$V_C = \omega r_C$
$V_Q = \omega r_Q$
$V_Q > V_C > V_P$



8. (D) $\theta_1 = \frac{1}{2}\alpha t^2$

$$50 = \frac{1}{2}\alpha(2)^2$$

$$Q_2 = \frac{1}{2}\alpha(4)^2$$

Divide both $\theta_2 = 200$
In next 2 sec $= \theta_2 - \theta_1$
$= 150$

9. (B) $T = mr\omega^2 = 0.1 \times 1.25 \times (2)^2 = 0.5\ N$

10. (B) $I = \frac{2}{5}mR^2 = \frac{2}{5}D\frac{4}{3}\pi R^2 R^2$

$$I = \frac{8}{15}\pi D R^5$$

11. (A) $I = 4 \times m\left(\frac{L}{\sqrt{2}}\right)^2 = 2mL^2$

$4mK^2 = 2mL^2$

$$K = \frac{L}{\sqrt{2}}$$

12. (C) $I = \frac{2}{5}mR^2 + mR^2 = \frac{7}{5}mR^2$

$$mK^2 = \frac{7}{5}mR^2$$

$$K = \sqrt{\frac{7}{5}}R$$

13. (D) $I_1\omega_1 = I_2\omega_2$ Angular momentum conservation

$$mK^2\omega = m\left(\frac{312}{4}\right)^2 \omega_2$$

$$\omega_2 = \frac{16\omega}{9}$$

14. (D) $T = \frac{mv^2}{R} + mg$

$= \frac{m}{R}(5gR) + mg = 6mg$

15. (B) $L = \sqrt{2I(KE)}$

$= \sqrt{2 \times \frac{mR^2}{2} \times 8} = 4$ J-s

16. (B) Torque is same

$\tau = I\alpha$

α inversely proportional to I.

$I_1 > I_2$, $\therefore$ $\alpha_1 < \alpha_2$

17. (D) Angular momentum conservation

$I_1\omega_1 = I_2\omega_2$

$I\omega = (I + mR^2)\,\omega_2$

$\omega_2 = \frac{I\omega}{I + mR^2}$

18. (B) $V = \sqrt{5gL}$

$V \propto \sqrt{2}$

Speed becomes $\frac{V}{2}$

19. (A) $\frac{1}{2}mv^2 = 250$

20. (D) At lowest position

$\frac{mu^2}{R} = T - mg$

$\frac{mu^2}{R} = 3mg - mg$

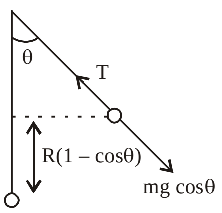
$u = \sqrt{2gR}$

At angle θ with vertical

$\frac{1}{2}mu^2 = \frac{1}{2}mv^2 + mgR(1 - \cos\theta)$

For $V = 0$

$\theta = 90^o$



21. (C) A black hole has very large mass in neraly zero volume.

22. (C) $g = \frac{GM}{r^2}$

23. (A) $\frac{R_A}{R_B} = r$, $\frac{g_A}{g_B} = x$

$V_e = \sqrt{2gR}$

$\frac{V_A}{V_B} = \sqrt{rx}$

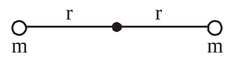
24. (B) Escape velocity is independent of the mass to be projected

25. (A) Satellite should be imported energy equal to Binding energy

$|BE| = \frac{GMm}{2r}$

26. (C) $\frac{mv^2}{r} = \frac{Gm^2}{(2r)^2}$

$V = \sqrt{\frac{Gm}{4r}}$



27. (A) $F = \frac{Gm^2}{r^2} = \frac{G\left(\rho\frac{4}{3}\pi r^3\right)^2}{r^2} \propto r^4$

28. (A) $g_{eff} = g - Rw^3$ at the equator

For $g_{eff} = 0$

$\omega = \sqrt{\frac{g}{R}}$

$\frac{\omega}{\omega_0} = \frac{\sqrt{\frac{g}{R}}}{\left(\frac{2\pi}{T}\right)} = \frac{\sqrt{\frac{9.8}{6.4 \times 10^6}}}{\left(\frac{2\pi}{24 \times 60 \times 60}\right)}$

= nearly 17 times

29. (C) $Y = \frac{FL}{A\Delta L}$

$\frac{\Delta l}{F} = \frac{L}{YA}$

slope $\propto$ L

Longest wire is C

30. (A) $\frac{du}{dv} = \frac{1}{2} \times \text{stress} \times \text{strain}$

$= \frac{1}{2} \times S \times \frac{S}{Y} = \frac{S^2}{2Y}$

31. (A) Strain $= \frac{\Delta L}{L} = \frac{0.01}{100} = 10^{-4}$

32. (C) $F = \frac{YA}{L}\Delta L = 10^4$ N

33. (B) $h = \frac{2T\cos\theta}{r\rho g}$

Since $\theta > 90^o$, $\cos\theta$ is negative

hence mercury descends in capillary tube

34. (C) $F = T \times L$

$F = T(2\pi R + 2\pi r)$

35. (B) $\frac{4}{3}\pi R^3 = n\frac{4}{3}\pi r^3$

$R = n^{1/3}r$

Energy required = $Tn\,4\pi r^2 - T\,4\pi R^2$

$= 4\pi TR^2\left(n^{1/3}-1\right)$

36. (B) $W = T(A_2 - A_1)$

$T = \frac{6\times10^{-4}}{2(110-60)\times10^{-4}} = 6\times10^{-2}\,N/m$

37. (D) When the coin is on block it displaces water equal to it weight but when it falls in water it displaces water equal to its volume.

38. (C)

39. (B) AV = constant

$P + \frac{1}{2}\rho V^2 + \rho gh = \text{constant}$

Area, velocity & h are same for.

Cross-section corresponding to A and C. Hence $P_A = P_C$

40. (A) At greater depth, pressure is greater hence viscosity is higher

41. (C) Standard curve

42. (D) $A_1V_1 = A_2V_2$

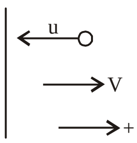
$\pi(2)^2 5 = \pi(1)^2 V_2$

$V_2 = 20$ m/s

43. (C) $\Delta P = mv - (-mu)$

$\Delta P = m(u + v)$

away from wall since it is positive



44. (A) Momentum conservation

$64 \times 5.4 - 32 \times 1.8 = 96\,V$

V = 3km/hr

45. (A) $m_1u_1 = m_2u_2$

$0.02 \times 100 = 8u_2$

$u_2 = 0.25$ m/s

[CHEMISTRY]

46. (A) $P_{N_2} = 500 - 23 = 477$ milibar

P_{N_2} after compession $2 \times 477 = 954$ m bar

Total pressure = 954 + 23 = 977 m bar

47. (B)

48. (C) $\left(P + \frac{a^2}{v^2}\right)(v - b) = RT$

At high pressure neglect $\frac{a^2}{V^2}$

$\Rightarrow P(V-b) = RT$

$PV - Pb = RT$

$\frac{PV}{RT} - \frac{Pb}{RT} = 1$

$\Rightarrow \frac{PV}{RT} = 1 + \frac{Pb}{RT}$

49. (D)

50. (B) $V_{ave,CH_4} = V_{ave,O_2}$

$\sqrt{\frac{8RT}{16}} = \sqrt{\frac{8R\times300}{32}}$

$\sqrt{T} = \sqrt{150}$

$T = 150\,K$

51. (B)

52. (A)

53. (C) $\frac{K.E._1}{K.E._1} = \frac{M_2}{M_1}$

54. (C) $P = \frac{nRT}{V}$

55. (A) $\Delta G = \Delta H - T\Delta S$

$O = 179.1 \times 10^3 - T \times 160$

$T = \frac{179.1\times10^3}{160}$

$= 1118\,K$

56. (D) $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$

$x_{N_2O_4} = \frac{1-0.5}{1+0.5}$ $x_{NO_2} = \frac{2\times0.5}{1+0.5}$

$P_{N_2O_4} = \frac{0.5}{1.5}\times1\,atm$ $P_{NO_2} = \frac{1}{1.5}\times1\,atm$

$Kp = \frac{\left(P_{NO_2}\right)^2}{P_{N_2O_4}} = \frac{1.5}{(1.5)^2(0.5)} = 1.33$ atm

since $\Delta_r G^\theta = -RT \ln Kp$

$\Delta_r G^0 = (-8.314\,J.K^{-1}\,mol^{-1}) \times (2.303) \times (0.1239) \times 333$

$= -763.8$ K.J mol^{-1}

57. (B)

58. (C) $V_2 = \frac{nRT}{P} = 249L$

$W = P\Delta V = 1 \times (249 - 10) = 239$ L bar

59. (A) $W = -P(V_2 - V_1)$

$= -P\left(\frac{nRT_2}{P} - \frac{nRT_1}{P}\right)$

60. (B)

61. (B)

62. (A) $n = \frac{1000\times1}{500} = 2$ moles

2 moles = 2.72 K.cal

$\therefore \quad \Delta H_N = 13.6 - 2.72 = 10.98$ k.cal/ mole

63. (D) 9 gm $H_2O = 0.5$ moles

0.5 moles require 142.5 kJ heat to decompose H_2O

$\Rightarrow$ 1 moles require $= 142.5 \times 2 = 185$ kJ

$\Rightarrow$ Enthalpy of formation of water is –185 kJ

64. (B)

65. (C)

66. (A)

67. (A)

68. (C) $C(S) + CO_2(g) \rightleftharpoons 2CO(g)$

$1 \qquad 0$

$1-\frac{1}{2} \qquad 2\times\frac{1}{2}$

$$\Rightarrow K_p = \frac{(\rho_{CO})^2}{(\rho_{CO_2})}$$

$$\Rightarrow \frac{(X_{CO}P_T)^2}{(X_{CO_2}P_T)}$$

$$\Rightarrow \frac{(X_{CO})^2}{(X_{CO_2})}\times P_T$$

$$\Rightarrow \frac{\left(\frac{1}{1.5}\right)^2}{\frac{0.5}{1.5}}\times 12$$

$$\Rightarrow \frac{1}{1.5\times 0.5}\times 12$$

$\Rightarrow$ 16

69. (A) $S_8 \rightleftharpoons 4S_2$

$1 \qquad 0$

$1-0.29 \qquad 4\times 0.29$

$$Kp = \frac{1.81}{0.71} = 2.55 \text{ atm}^3$$

70. (C) If 10% of PCl_5 disociated

PCl_5	$\Leftrightarrow$	PCl_3	+	Cl_2
100–10		10		10
90		10		10

partial pressure

$\frac{90}{110}\times 4 \qquad \frac{10}{110}\times 4 \qquad \frac{10}{110}\times 4$

$$\therefore K_p = \frac{1}{99}$$

If 20% of PCl_5 dissociated

PCl_5	$\Leftrightarrow$	PCl_3	+	Cl_2
100-20		20		20
80		20		20

partial pressure

$\frac{80}{120}\times 4 \qquad \frac{20}{120}\times 4 \qquad \frac{20}{120}\times 4$

$$\therefore K_p = \frac{1}{24}P \text{ But } K_p = \frac{1}{99}; \quad \therefore P = \frac{24}{99} = 0.96$$

71. (A) $A + B \rightleftharpoons 3C$

mole	1	2	4
vol.	3	3	3
conc	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{4}{3}$

$$Q = \frac{\left(\frac{4}{3}\right)^3}{\frac{1}{3}\times\frac{2}{3}}$$

$\Rightarrow \frac{64}{6} = 10.6$

$\Rightarrow Q > K$

$\Rightarrow$ Reaction will go in backward direction

72. (B) $N_2O_4 \rightleftharpoons 2NO_2$

wt.	9.2	0
mole	$\frac{9.2}{92}$	0
conc.	$\frac{0.10}{1}$	0
At eq.	$0.10-\frac{0.10}{2}$	0.10

$$\Rightarrow K_{eq.} = \frac{(0.1)^2}{0.05}$$

$$\Rightarrow \frac{0.01}{0.05} = 0.2$$

73. (C)

74. (B)

75. (A) Concentration of Ag^+ in AgBr($K_{sp} = 5 \times 10^{-13}$)is minimum,

$K_{sp} = [Ag^+][Br^-]$

$$[Br^-] = \frac{K_{sp}}{[Ag^+]}$$

76. mili moles of HCl $= 40 \times 0.1 \Rightarrow 4$

milimoles of NaOH $= 10 \times 0.45 = 4.5$

$\Rightarrow$ milimoles of OH^- will left 0.5

$\Rightarrow$ pOH $= -\log 10^{-2} = 2$

$\Rightarrow$ pH $= 12$

77. (D) Buffer capacity

$$= \frac{\text{No. of moles of acid or base added per litre}}{\text{change in pH}}$$

$$= \frac{\frac{0.2X10}{1000} X \frac{1000}{250}}{(6.34-6.32)} = 0.4$$

78. (D)$M_1V_1 = M_2V_2$

$10^{-3} \times 5 = 10^{-2} \times V_2$

$\frac{10^{-3} \times 5}{10^{-1}} = V_2$

$5 \times 10^{-2} = V_2$

$\Rightarrow$ volume evapourated = $5 - 5 \times 10^{-2} = 4.95$

79. (D) For $Mg(OH)_2$ not to be precipitated

$$[OH^-] < \left[\frac{K_{sp}(Mg(OH)_2)}{[Mg^{2+}]}\right]^{1/2}$$

$$[OH^-] < \left[\frac{1.2x10^{-11}M^3}{0.10M}\right]^{1/2} < 1.035x10^{-5}M$$

$pOH < 4.36, pH > 14 - 4.36 = 9.04$

80. (D)$K_{sp} = x^2$ (CuS)

$K_{sp} = x^3$(AgS)

$K_{sp} = x^2$ (HgS)

x of Ag_2S is maximum, so it solubility in water is maximum.

81. (A) Given that concentration of solution = 0.1

Degree of ionisation $= 2\% = \frac{2 \times 0.1}{100} = 0.02$

Ionic product of water = 1×10^{-14}

concentration of $[H^+]$ = concentration of solution X degree of ionisation

$= .1 \times 0.2 = 2 \times 10^{-3}$ M

$$\left[OH^-\right] = \frac{\text{Ionic product of water}}{[H^+]}$$

$$= \frac{1 \times 10^{-14}}{2 \times 10^{-3}} = 0.5 \times 10^{-11} = 5 \times 10^{-12} M$$

82. (A)

83. (B)

84. (B)

85. (D)

86. (B)

87. (C) $8H^+ + 8e^- + H_2\overset{+6}{S}O_4 \longrightarrow H_2\overset{-2}{S} + 4H_2O$

$\left[2H\overset{-1}{I} \longrightarrow \overset{0}{I_2} + 2e^- + 2H^+\right] \times 4$

$H_2SO_4 + 8HI \rightarrow H_2S + 4I_2 + 4H_2O$

88. (A) $\left[8H^+ + 5e^- + \overset{+7}{Mn}O_4^- \longrightarrow Mn^{2+} + 4H_2O\right] \times 2$

$\left[\overset{+3}{C_2}O_4^{2-} \longrightarrow \overset{+4}{2CO} + 2e^-\right] \times 5$

$16H^+ + 2MnO_4^- + 5C_2O_4^{2-} \rightarrow 2Mn^{2+} + 8H_2O + 10CO_2$

89. (A)

90. (C)