SOLUTION

FINAL TEST SERIES NEET XI (TYM) TEST-04 Date :09-02-2020

[PHYSICS]

1. (B) $T = KP^a d^b E^c$

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

$[T] = [M^{a+b+c}] [L^{-a-3b+2c}] [T^{-2a-2c}]$

$a + b + c = 0$

$-a - 3b + 2c = 0$

$-2a - 2c = 1,\ a = -\frac{5}{6},\ \ b = \frac{1}{2},\ \ c = \frac{1}{3}$

2. (A) $N_2 = N_1 \left[\frac{M_1}{M_2}\right]\left[\frac{L_1}{L_2}\right]^2\left[\frac{T_1}{T_2}\right]^{-2}$

$$= 1\times\frac{1}{10}\times\left[\frac{1}{10^3}\right]^2\left[\frac{1}{60}\right]^{-2} = 3.6\times10^{-4}$$

3. (A) $R_1 = \sqrt{3^2 + 4^2} = 5$

$R_2 = \sqrt{3^2 + 4^2 + 2(3)(4)\cos 60^\circ}$

$R_3 = \sqrt{3^2 + 4^2 + 2(3)(4)\cos 120^\circ}$

4. (D) $T = 6 + 2 = 8$ S

$\frac{2u\sin\theta}{g} = 8$

$u\sin\theta = 40$

Height gained in 2 sec.

$y = u\sin\theta(2) - \frac{1}{2}(10)(2)^2 = 60m$

Maximum height $H = \frac{u^2\sin^2\theta}{2g} = 80m$

5. (D) $R_{max} = 400$ at $\theta = 45^\circ$

$\frac{u^2}{g} = 400$

Velocity is maximum at maximum height coordinate $\left(\frac{R}{2}, H\right)$

$\frac{R}{2} = 200,\qquad H = \frac{u^2\sin^2 45}{2g} = 100$

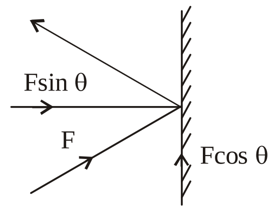
6. (C) $v = \frac{dx}{dt} = 2at - 3bt^2$

$a = \frac{dv}{dt} = 2a - 6bt = 0$

$t = \frac{a}{3b}$

7. (B) $F_{net} = 2F\sin\theta$

$F_{net} = 2\rho AV^2\sin\theta$



8. (C) Newton's law for a system

$F_{net} = m_1a_1 + m_2a_2$

$200 = 10\times12 + 20a_2$

$a_2 = 4\ m/s^2$

9. (D) Point of application of force does not moves hence w.d. is zero.

10. (B) $KE = \frac{P^2}{2m}$ parabola

11. (B) $\frac{25-0}{100} = \frac{P-25}{200} \Rightarrow P = 75^\circ$

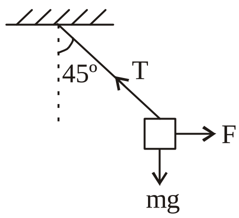
12. (B) $F = m(g - a) = 4N$

13. (A) $15a = 150 + 15g$

$a = 20\ m/s^2$

14. (C) $a = \frac{m_1g + m_2g\sin30^\circ - m_3g}{m_1 + m_2 + m_3} = \frac{5g}{8}$

15. (B)



$T\sin45^\circ = F$

$T\cos45^\circ = mg$

$\therefore F = mg$

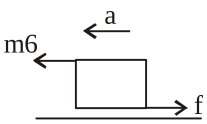
16. (B) $P_{ave} = \frac{W_{net}}{t} = \frac{\Delta KE}{t} = \frac{\left(\frac{1}{2}mv^2\right)n}{t}$

$P_{ave} = \frac{mnv^2}{2t}$

17. (B) $f_k = \mu mg$

$ma = m6 - \mu mg$

$a = 6 - 4.9 = 1.1\ m/s^2$

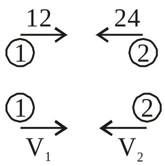


18. (D) $F = \mu mg$ $\qquad \omega = \frac{6\pi}{3.14} = 6 rad/s$

$mr\omega^2 = \mu mg$

$\mu = \frac{r\omega^2}{g} = \frac{0.1 \times 6^2}{g} = 0.36$

19. (A) $1 \times 12 + 2(-24) = 1V_1 + 2V_2$



$V_1 + 2V_2 = -36$

$e = \frac{2}{3} = -\frac{V_1 - V_2}{12 + 24}$

$V_1 - V_2 = -24$

Solving both equations $V_1 = -28\ m/s$

$V_2 = -4 m/s$

20. (C) $a = \frac{(M+m)-(M-m)}{M+m+M-m}g = \frac{mg}{M}$

$a_{CM} = \frac{(M+m)a + (M-m)(-a)}{M+m+M-m}$

$= \frac{m^2 g}{M^2}$

$V_{CM} = u + a_{CM}t = \frac{m^2 gt}{M^2}$

21. (B) Radius $r = \frac{a}{\sqrt{3}}$

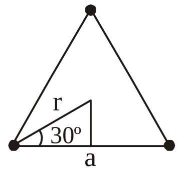
Force on each particle

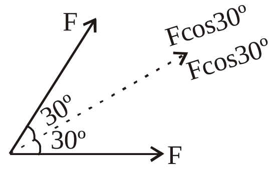
$F_{net} = 2F\cos 30^o$

$mr\omega^2 = 2\frac{Gm^2}{a^2}.\frac{\sqrt{3}}{2}$

$\omega^2 = \frac{Gm\sqrt{3}}{ra^2}$ $\qquad \because \left[\omega = \frac{2\pi}{T}\right]$

$T = 2\pi\sqrt{\frac{a^3}{3Gm}}$





22. (A) $KE = \frac{GMm}{2r} = K$

$PE = -\frac{GMm}{r} = -2K$

Total energy TE = – K

If this energy is given to it then it will escape.

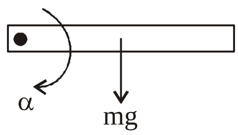
23. (D) $W = \frac{Gm^2}{r} \times 3 = \frac{6.67 \times 10^{-11} \times 10^{-4} \times 3}{0.1}$

$= 2 \times 10^{-13}$ J

24. (C) $\tau = mg\frac{L}{2}$

$\frac{mL^2}{3}\alpha = mg\frac{L}{2}$

$\alpha = \frac{3g}{2L}$



25. (C) $I\alpha = Fr$

$\frac{mR^2}{2}\alpha = Fr$

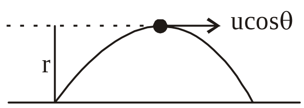
$\alpha = 20\ rad/s^2$

26. (A)

27. (D) $L = mu\cos\theta\, r$

$L = mu\frac{1}{2}H$

$= \frac{3mu^3}{16g}$ $\qquad \left[\because H = \frac{u^2\sin^2\theta}{2g}\right]$



28. (B) $h = L\cos 30^o - L\cos 60^o$

$h = \frac{L}{2}\left(\sqrt{3} - 1\right)$

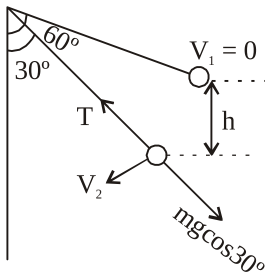
$V_2 = \sqrt{2gh}$

$V_2 = \sqrt{gL\left(\sqrt{3}-1\right)}$

$\frac{mv_2^2}{L} = T - mg\cos 30^o$

$T = mg\left(\sqrt{3}-1\right) + mg\frac{\sqrt{3}}{2}$

$T = mg\left(\frac{3\sqrt{3}-2}{2}\right)$



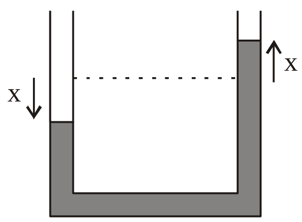
29. (B) For metal $\rho_m V_m = 210$
Loss of weight in water = 210 – 180
Bouyancy force = 30
$\rho_W V_W = 30$
$\rho_W V_M = 30$
$\rho_W = \frac{210}{\rho_m} = 30$

$1 \times \frac{210}{\rho_m} = 30$

$\rho_m = 7 g/cc$

30. (B) $\rho_3 < \rho_2$ and $\rho_3 > \rho_1$

31. (A) Force = $m_{Liq} g$
F = $(\rho A\, 2x)$ g



32. (B) $E = \frac{1}{2}kA^2 e^{-bt/m}$

$t = \frac{\ell n\, 2}{b} m = \frac{\ell n 2}{\ell n 2} 2 = 2 \sec$

33. (A) $\frac{dU}{dV} = \frac{1}{2}\text{Stress} \times \text{Strain}$

$= \frac{1}{2}\frac{F}{A} \times \frac{F}{AY}$

$= \frac{1}{2}(Y\alpha\Delta T)(\alpha\Delta T)$

$= \frac{Y\alpha^2\Delta T^2}{2}$

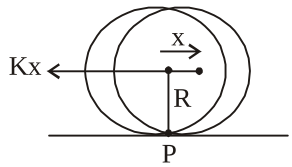
$= 2880\ J/m^3$

34. (A) $Y = \frac{\text{Stress}}{\text{Strain}}$ Slope of line A greater hence $Y_A > Y_B$

35. (D) $\tau = -K\, xR$
$I_p \alpha = -KxR$

$\frac{3mR^2}{2}.\frac{a}{R} = -KxR$

$\frac{3ma}{2} = -kx$

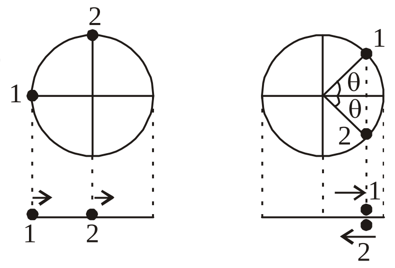


$a = -\frac{2K}{3m}x$

Compare with $a = -\omega^2 x$

$T = 2\pi\sqrt{\frac{3m}{2K}}$

36. (D)



Initial phase difference $\Delta\phi = 90^o$
phase difference remains same
$2\theta = 90^o$
$\theta = 45^o$
Particle's angular position on phase diagram at time t is
$90^o + 45^o$
$\theta_0 = wt$

$\frac{3\pi}{4} = \frac{2\pi}{T}t$

$t = \frac{3T}{8}$ and $x = \frac{A}{\sqrt{2}}$

37. (B) $T = 2\pi\sqrt{\frac{L}{g}}$ $T' = 2\pi\sqrt{\frac{L}{4g}}$

$T' = \frac{T}{2}$

$t = t_1 + t_2$

$= \frac{T}{2} + \frac{T'}{2} = \frac{T}{2} + \frac{T}{4} = \frac{3T}{4}$

38. (A) $x = a \cos \omega t$

$x_1 = a \cos \omega$

$x_2 = a \cos 2\omega$

$x_3 = a \cos 3\omega$

Add

$x_1 + x_3 = a(\cos \omega + \cos 3\omega)$

$x_1 + x_3 = 2a\cos 2\omega \cos\omega$

$x_1 + x_3 = 2x_2 \cos \omega$

$$\omega = \cos^{-1}\left(\frac{x_1 + x_3}{2x_2}\right)$$

$$T = \frac{2\pi}{\cos^{-1}\left(\frac{x_1 + x_3}{2x_2}\right)}$$

39. (C) $\lambda_m \propto \frac{1}{T}$ weins displacement equation

40. (C) Body x cools down faster

Hence $E_x > E_y$ and since good emitters are also good absorbers $a_x > a_y$.

41. (D) $P = \sigma A T^4$

$P = \sigma(4\pi R^2) T^4$

$$P_2 = \frac{R_2^2 T_2^4}{R_1^2 T_1^4} P_1 = 1800W$$

42. (B) In addition (or substraction),the last significant digit of sum (or difference) occupies the same relative position as the last significant digit of quantities being added (or substracted)

43. (A) $\Delta U = \frac{1}{2}mv^2$

$$\frac{m}{M} C_v \Delta T = \frac{1}{2} mv^2$$

$$\frac{RJ}{\gamma - 1}\Delta T = \frac{M}{2} V^2$$

$$\Delta T = \frac{MV^2(\gamma - 1)}{2RJ}$$

44. (B) $\frac{P_1 V}{T_1} + \frac{P_2 V}{T_2} = \frac{P2V}{T}$

$$\frac{1}{2}\left(\frac{P_1}{T_1} + \frac{P_2}{T_2}\right) = \frac{P}{T}$$

45. (D) $PV = nRT = \frac{m}{M}RT$

depends on all

[CHEMISTRY]

46. (C) CuO and Cu_2O illustrate the law of multiple proprotion

47. (B) $CaO + Ca(HCO_3)_2 \rightarrow 2CaCO_3 + H_2O$

Eq.of $Ca(HCO_3)_2$ in 1 L = $\frac{1.62}{\frac{162}{2}} = 0.02$

Eq. of CaO required to remove $Ca(HCO_3)_2$ in 1 L

$= 0.02$

Eq. of CaO requried to remove $Ca(HCO_3)_2$ in 10^6 L

$= 0.02 \times 10^6$

wt of CaO $= 0.02 \times 10^6 \times \frac{56}{2} = 5.6 \times 10^5$ g

48. (B) $n = \frac{6.023 \times 10^{20}}{6.023 \times 10^{23}} = 0.001$

So conc. $= \frac{0.001}{100} \times 1000 = 0.01M$

49. (A) As speed of electron increases, its mass increases so specif charge ratio decreases

50. (B) $E_{CA} = E_{CB} + E_{BA}$

51. (C) In period the size always decreases and atlast size of noble gases increases (vanderwaal's radius)

52. (C) Neptunium present in actinide series and all are present in lanthaides series

53. (D) In isoelectronic species the no. of electron are same

54. (B)

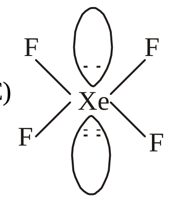
55. (A)

56. (D) CaC_2, NaH and $BeCl_2$ has ionic character what BF_3 has covalent character

57. (C) Maximum no. of covalent bond are in $CO(NH_2)_2$

8 covalent bonds

58. (C)



4BP and 2LP

59. (B) According to Fajan rule

60. (C) Copper has CN = 4 so

61. (D) Rate of diffusion is inversely proportional to molecular masses

$$r \propto \sqrt{\frac{1}{M.Mass}}$$

62. (D) CO+ Cl_2 gives $COCl_2$ form compound so not applicable for Dalton's law

63. (B) At constant volume $P \propto T$

So, $P_2 > P_1$

64. (C) B.E = 250 kJ/mol

$$\text{B.E. per } e^- = \frac{250\times10^3}{6.023\times10^{23}} = 4.15\times10^{-19}\text{ J}$$

B.E . = $h\nu_0$
$\nu_0 = 6\times10^{14}\ s^{-1}$

65. (B) $Mn^{7+} + 5e^- \rightarrow Mn^{2+}$
$O_2^- \rightarrow O_2 + 2e^-$

Eq. wt of $H_2O_2 = \frac{34}{2}$

Meq. of $KMnO_4$ = Meq. of H_2O_2 $N\times X = \frac{X}{100\times\frac{34}{2}}\times1000$

N ($KMnO_4$) = 0.588

66. (D) $CuSO_4 + 5H_2O \rightarrow CuSO_4.5H_2O$
249.5
249.5 g of $CuSO_4.5H_2O$ give –78.2

1 g ________ = $\frac{-78.2}{249.5}$

24.95 _______ = $\frac{-78.2}{249.5}\times24.95 = -7.82\text{kJ}$

67. (D) Heat of dissociation of NH_4OH
= 13.7 – 12.27
= 1.43 kcal.

68. (D) HCl + NaOH
500 ml, 0.4 N   500 ml, 0.4
= 200 Meq   = 200 Meq
= 0.2 Eq.   = 0.2 Eq.
1 eq. neutrilization gives 57.3 kJ heat
0.2 ______________ gives 57. 3 × 0.2
= 11.46 kJ heat released

69. (C) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
10 g methane give 560 kJ heat

1 ___________ give $\frac{560}{10}$

16 g ________ give $\frac{560}{10}\times16$ = 896 kJ/mol

70. (D) $\Delta G = \Delta H - T\Delta S$
$= 150 - (300\times0.1)$
= 120 kJ

71. (A) $H_2CO_3 \rightarrow HCO_3^- + H^+$
acid   conjugate base

72. (C) N_3H _________ N_3^- which is conjugate base of hydrozoic acid

73. (A) Na_2CO_3 _________ basic
NH_4Cl _________ acidic
CH_3COONH_4 _________ slightly acidic or basic
HCN _________ acidic

74. (C) pH = 5 diluted 100 times
$[H^+] = 10^{-5}$
$M_1V_1 = M_2V_2$
$10^{-5}\times1 = M_2\times100$
$M_2 = 10^{-7}$ pH = 7 Not possible for acids
means acids is highly diluted
so pH = 6.96

75. (A) $\text{Molarity} = \frac{\frac{8}{40}}{250}\times1000 = 8\times10^{-1}$

$pOH = -\log 8\times10^{-1} = 0.097$
$pH = 14 - 0.097 = 13.9$

76. (B) $HA \rightarrow H^+ + A^-$
$[H^+] = C\alpha = 0.01\times0.05 = 5\times10^{-4}$

77. (B) POH = $pOH = pK_b + \log\frac{[\text{salt}]}{[\text{base}]}$

$= 5 + \log\frac{0.01}{0.1} = 4$

pH = 14 – 4 = 10

78. (B) All give nascent hydrogen
79. (B) Zinc gives hydrogen on treatment with acid as well as base
80. (B) Be not form super oxide
81. (A) Thermalstability of alkaline earth metal increases down the group
82. (C)
83. (B) $Si_2O_7^{6-}$ is the formula of di silicate anion
84. (B) $2Na(g) \rightleftharpoons Na_2(g)$

mole at $\rightleftharpoons$ $\frac{71}{23} = 3.087$ $\frac{29}{46} = 0.630$

$$K_p = \frac{0.630}{(3.087)^2}\times\left(\frac{3.717}{1.013}\right) = 0.242\ \text{MPa}^{-1}$$

85. (A) Order of energy → Violet > Blue > yellow > red
Order of energy → $E_{2\rightarrow1} > E_{5\rightarrow2} > E_{6\rightarrow3} > E_{4\rightarrow3}$
∴ Violet ($2\rightarrow1$), Blue ($5\rightarrow2$), yellow ($6\rightarrow3$), Red ($4\rightarrow3$)
86. (C)
87. (A) At A and D the temperatures of the gas will be equal, so
$\Delta E = 0$, $\Delta H = 0$
Now $w = W_{AB} + W_{BC} + W_{CD} = -P_0V_0 - 2P_0V_0\ln2 + P_0V_0 = -2P_0V_0\ln2$
and $q = -W = 2P_0V_0\ln2$
88. (B) $CS_2(\ell) + 3O_2(g) \longrightarrow CO_2(g) + 2SO_2(g)$;
$\Delta H^o_{rxn.} = 5\times -215 = -1075$ kJ
$\Delta H^o_{rxn.} = \Delta H^o_f(CO_2) + 2\times\Delta H^o_f(SO_2) - \Delta H^o_f(CS_2)$
$\Delta H^o_{rxn.} = (-393.5 - 2\times296.8) - (-1075)$
$\Delta H^o_{rxn.} = 87.9$
89. (B) px and py overlapping non-operating
90. (C) The cyclic methphosphate ion is