KANTIPUR ENGINEERING COLLEGE
Dhapakhel, Lalitpur
Model Entrance Test (2074)

Solution Set: I (A)

Section I

1. (B)	2. (C)	3. (A)	4. (D)	5. (D)
6. (D)	7. (A)	8. (A)	9. (A)	10. (C)
11. (C)	12. (C)	13. (B)	14. (B)	15. (B)

16. (B)

Solution: No. of mol. of hydrogen = Wt. in gm / molar wt. = 5/2 = 2.5

1 mol = 6.023×10^{23}

2.5 mol = $2.5 \times 6.023 \times 10^{23}$ molecules

= 1.505×10^{24} molecules

17. (A)

Solution: If $[H^+]$ is less than 10^{-6}, consider the ions of H_2O

$[H^+] = 10^{-8} + 10^{-7} = 1.1 \times 10^{-7}$ M

pH = - log $[H^+]$ = - log 1.1×10^{-7} = 6.95

18. (C)	19. (D)	20. (D)	21. (A)	22. (C)
23. (B)	24. (B)	25. (D)	26. (C)	27. (A)
28. (D)	29. (B)	30. (A)	31. (C)	32. (C)
33. (B)	34. (D)	35. (A)	36. (B)	37. (D)
38. (C)	39. (A)	40. (B)		

41. (D)

Hint: $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + ... = \cos hx$

42. (C)

43. (A)

44. (A)

45. (A)

Hint: $x_2 - x_1 = 12$, $y_2 - y_1 = 4$, $z_2 - z_1 = 3$

$$l = \frac{x_2 - x_4}{\gamma},\ m = \frac{y_2 - y_1}{\gamma},\ n = \frac{z_2 - z_1}{\gamma},\ \gamma = \sqrt{(x_2 - x_4)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

46. (C)	47. B)	48. (C)	49. (B)	50. (D)
51. (D)	52. (B)	53. (C)	54. (A)	55. (A)
56. (B)	57. (C)	58. (D)	59. (B)	60. (D)

Section II

61. (A) 62. (C) 63. (C) 64. (A)

65. (B)

Solution: The definition of pH is

$pH = -\log[H^+]$

$[H^+] = 3.3 \times 10^{-2}$

$pH = -\log(3.3 \times 10^{-2}) = -(-1.48)$

$= 1.48$

66. (D)

Solution: ECE = 0.0003294

1 C electricity deposit 0.0003294 gm

In order to deposit 5 gm of Cu 5 / 0.0003294 = 15179 C

67. (A) 68. (A)

69. (C)

Solution:

$$\cos\theta = \frac{\vec{A}.\vec{b}}{|A||B|} = 0 \Rightarrow \theta = 90^0$$

70. (C)

Solution:

Assuming upward direction as the and downward direction as –ve

4 = 100 mls, u = -100 mls, g = 10 mls^2

S_6 – 100 = 100 – 10 t.

$\Rightarrow 10\,t = 200$

$\therefore t = 20 \sec$

71. (D)

Solution:

$$\frac{(K.E)\,escape}{(K.E)\,orbital} = \frac{\frac{1}{2}mu_e^2}{\frac{1}{2}mu_0^2} = \left(\frac{u_e}{u_0}\right)^2 = \left(\frac{\sqrt{2}\,u_0}{u_0}\right)^2 = 2$$

$\therefore Ee = 2E_0$

72. (D)

Solution:

$2d_1 = v\, f_1 \Rightarrow d_1 = 525$ m

Similarly, $d_2 = 875$ m

$\therefore$ Distance between two cliffs $d = d_1 + d_2 = 1400$ m

73. (B)

Solution:

$$\frac{c}{100} = \frac{\theta - LFP}{UFP - LFP} \Rightarrow \frac{50}{100} = \frac{60-(-10)}{UFP-(-10)}$$

$\therefore UFP = 130^0 C$

74. (B)

Solution:

When two gases are mixed, the internal energy of the system is $U = U_1 + U_2$

$(n_1 + n_2)$ Cv T = n_1 Cv T_1 + n_2 CV_e T_2 ($\therefore$ both are diatomic gas, ev is same for both)

$$T = \frac{n_1\ T_1 + n_2\ T_2}{n_1\ n_2}$$

$T_1 = 273 + 27 = 300k$, $T_2 = 273 + 37 = 310$ k

$$n_1 = \frac{22}{12+3L}\ 0.5 \quad , n_2 = \frac{16}{32} = 0.5$$

$$\therefore T = \frac{300 \times 0.5 + 0.5 \times 310}{1} = 150 + 155 = 305$$

$$\therefore T = 305 - 273 = 32^{v} c$$

75. (D)

76. (D)

Solution:

Potential areas $1\mu F, V_1 = \frac{c_2}{c_1+c_2} \times V = 4V$

Potential areas $2\mu F$, $\frac{c_1}{c_1+c_2} \times V = 2V$

$$\therefore U_1 = \frac{1}{2} c_1\ v_1^{\ 2} = 8$$

$$U_2 = \frac{1}{2} c_2\ v_2^1 = 4$$

$$\therefore \frac{U_1}{U_2} = 2{:}1$$

77. (B)

Solution:

Rt = R_o (1 + $\alpha \Delta\theta$) $\Rightarrow$

2 = 1 (1 + 0.00125 $\Delta\theta$)

1 = 0.00125 $\Delta\theta$

$\Delta\theta$ = 1/0.00125 = 100000/125 = 800 $\therefore$ T_2 = 1100k

78. (C)

Solution:

$$Radius\ \ r = \frac{m6}{B9} = \frac{\sqrt{2mk}}{B9}$$

On doubling the K.E. of the particle, the radius because $\sqrt{2}$ time

79. (A)

Solution:

$$E = -\frac{l\,dt}{dt} = -5 \times -2 \quad = 10V$$

80. (A)

Solution:

$$\delta_A = (a\mu g - 1)A = \left(\frac{3}{2} - 1\right)A = A/2$$

$$\delta w = (w\mu g \;\; -1)\; A = \left(\frac{\mu g}{\mu w} - 1\right)A$$

$$= \left(\frac{3/2}{4/3} - 1\right)A = A/8$$

$$\therefore \frac{\delta_w}{\delta_A} = \frac{1}{4}$$

81. (B)

82. (C)

Solution: The change in stopping potential

$$= \frac{4c}{e}\left(\frac{1}{\lambda 2} - \frac{1}{\lambda 1}\right) = \frac{6.6 \times 10^{-34} \times 3 \times 10^{8}}{1.6 \times 10^{-19}}\left(\frac{10^{10}}{3000} - \frac{10^{10}}{4000}\right)$$

= 1.03 V

83. (D)

Solution: $As \quad V = \frac{hc}{\lambda e} - \phi_0$

$$= \frac{4.14 \times 10^{-15} \times 3 \times 10^{8}}{2000 \times 10^{-10} \times 1} - 5.01ev$$

= 1.2 ev

84. (B) 85. (D) 86. (A) 87. (C) 88. (C) 89. (A)

90. (B)

Solution: Centroid (a, b, c) $= \left(\frac{x_1}{3}, \frac{y_1}{3}, \frac{z_1}{3}\right)$

A (x_1 , 0, 0), B(0, y_1, 0), C(0, 0, z_1)

Eq^n. g plane $\frac{x}{x_1} + \frac{y}{y_1} + \frac{z}{z_1} = 1$

$$\Rightarrow \frac{x}{3a} + \frac{y}{3b} + \frac{z}{3c} = 1$$

$$\Rightarrow \frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 3$$

91. (D)

Solution: $x = \frac{1}{1-a},\; y = \frac{1}{1-b}, z = \frac{1}{1-c}$

A, b, c are in A.P

1 – a, 1- b, 1- c are in A.P.

$\frac{1}{1-a}, \frac{1}{1-b}, \frac{1}{1-c}$ are in H.P.

92. (A)
Hint: $|z| = 1 \Rightarrow z\bar{z} = 1$

93. (A) 94. (C) 95. (C) 96. (D)

97. (D)
Hint:
$$V = \frac{4}{3}\pi r^3,\ \frac{dv}{dt} = 4\pi r^2 \frac{dr}{dt}$$

98. (B)
Hint:
$$\int_{-1}^{1} |1-x|\,dx = \int_{-1}^{0} |1-x|\,dx + \int_{0}^{1} |1-x|\,dx$$
$$= \int_{-1}^{0} (1-x)\,dx + \int_{0}^{1} (1-x)\,dx$$

99. (B) 100. (D)