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

Solution Set: III (A)

Section I

1. (B) 2. (C) 3. (A) 4. (D) 5. (A)

6. (A) 7. (A) 8. (A) 9. (A) 10. (C)

11. (C) 12. (C) 13. (B) 14. (B) 15. (B)

16. (B)

Solution: Mass of one mole of Methane (CH_4) = 16 g

Mass of 0.1 mole methane 16×0.1 g = 1.6 g

17. (A)

Solution: pH = - log $[H^+]$

$[H^+] = 0.0001 = 1\times10^{-4}$

pH = - log $[1.0\times10^{-4}]$ = 4

18. (C) 19. (D) 20. (D) 21. (A)

22. (C)

Solution:

Let O.N. of Cl be x

x + 3(-2) = -1

or x - 6 = -1

or x = 6 -1 = 5

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)

Hint: $2\cos^2 x + 2\sin x . \cos x – \sin x . \cos x – \sin x$

$(\cos x + \sin x)(2\cos x – \sin x) = 0$

Tan x = -1, tam x = 2 (imp)

$x = n\pi - \frac{\pi}{4}$

39. (A)

40. (B) Hint: Point of intersection : (3, 11)

m = tan $\theta = \infty$
line 11 to y - axis

41. (D) **Solution:** $D = \sqrt{(x_2 - m)^2 + (y_2 - y_1)^2 + (z_2 - z_1)} = \sqrt{6^2 + 2^2 + 3^2} = 7$

42. (A) 43. (C)

44. (A) **Solution:** $\lim_{x \to \infty} \frac{\tan 1/x}{1/x} = \lim_{y \to 0} \frac{\tan y}{y} = 1$

45. (A) 46. (D) 47. (B) 48. (C) 49. (B)

50. (D) 51. (D) 52. (A) 53. (C) 54. (A)

55. (A) 56. (B) 57. (C) 58. (D) 59. (B)

60. (D)

Section II

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

65. (B)

Solution: Molecular weight of $(COOH)_2 . 2H_2O) = 126$

Equivalent weight = $\frac{\text{Molecular weight}}{2} = \frac{126}{2} = 63$ [Because basicity = 2]

Weight of $(COOH)_2 . 2H_2O)$ in solution = 32.5 g

$\text{Normality} = \frac{\text{No.of gram equivalent wt.}}{\text{Volume (in L)}} = \frac{32.5/63}{0.5} = 1.03\ \text{N} = 1.0\text{N}$

66. (D)

Solution: $\frac{\text{Wt.of copper}}{\text{Wt.of iodine}} = \frac{\text{Eqvt.wt.of copper}}{\text{Eqvt.wt.of iodine}}$ Let x be the weight of iodine deposited

$\frac{1.25}{x} = \frac{31.7}{127}$ or x 31.7 = 1.25 × 127 or x = $\frac{158.75}{31.75}$ or x = 5.0 g

67. (A) 68. (A)

69. (C)

Solution:

F = a + bt^2

[a] = [F] | [E] = $[MLT^{-2}]$ / [T] = $[MlT^{-3}]$

[b] = [F] | $[t^2]$ = $[MLT^{-2}$ / $[T^{-2}]$ = $[MLT^{-4}]$

70. (C)

Solution:

$y = 12x - \frac{3}{4}x^2$

At $x = R_1$ $y = 0$

$0 = 12r - \frac{3}{4}R^2 \Rightarrow R = 16$ m

71. (D)

Solution:

Initial momentum = $P_1 = p$

Final momentum = $P_2 = P + p \times 0.5 = 1.5\,p$

Kinetic energy $K = \frac{p^2}{2m} \alpha\ p^2$

$$\frac{k_2}{k_1} = \left(\frac{p_2}{p_1}\right)^2 \Rightarrow \frac{k_2}{k_1} - 1 = \left(\frac{p_2}{p_1}\right)^2 - 1$$

$$\frac{k_2 - k_1}{k_1} = (1.5)^2 - 1$$

$$\Delta k\,5\% = (2.25 - 1) \times 100\%$$

$= 125\ \%$

72. (D)

Solution:

Time taken by store to fall down,

$t_1\ \sqrt{2h/g} = \sqrt{2 \times 500/10} = 10\,\text{sec}$

Time taken by sound to travel 500 m distance is

$t_2 = \frac{4}{\vartheta} = \frac{500}{332} = 1.5\,\text{sec}$

$\therefore t\ \ 10 + 1.5 = 11.5$ sec

73. (B)

Solution:

$l_{20} = 1$ km

$l_{10} = l_{20}(1 + \alpha\Delta\theta) = 1(1 + \alpha 10)$

$= 0.99988$ km distance will have reading 1 km

1 km distance will have reading $\frac{1}{0.99988}\,km = 1.00012\,km$

74. (B)

Solution:

$R.H. = \frac{P}{p} \times 100\%\ given\ p = p$

$\therefore RH = 100\%$

75. (D)

Solution:

$E = -\left.\frac{dv}{dx}\right|_{atx\,1} = -20\,v/m$

76. (D)

77. (B)
Solution:

$$R\,\alpha\,\frac{l}{A}\Rightarrow\frac{\Delta R}{R}=\frac{\Delta l}{l}+\frac{\Delta A}{A}$$

Since the volume of the wire is constant, so increasing the length by 10% leads to reduction in area by 10%

$$\frac{\Delta R}{R}=0.1+0.1$$

$$\Delta R=0.2\times R=2\Omega$$

$$\therefore Rf\;\; R_1+R=10+2=12\;\Omega$$

78. (C) **Solution:** F = B il $\sin\theta$ = 1.2 N

79. (A)
Solution:

$$\frac{V_s}{V_p}=\frac{I_p}{I_s}=\frac{N_s}{N_p}=\frac{25}{1}$$

$$\therefore I_p\;25\;I_s\;=50A$$

80. (A) Hint: $\mu=\dfrac{real\;\;depth}{appament\;\;depth}$

81. (B) Hint: $\dfrac{a_1}{a_2}=\sqrt{\dfrac{I_1}{I_2}}$

82. (C)
Solution:

The ratio of left mass to original mass $=\dfrac{1}{6}=\left(\dfrac{1}{2}\right)^4$

$$\left(\frac{1}{2}\right)^4=\left(\frac{1}{2}\right)^{1/T}\Rightarrow t=4T$$

$\therefore$ Half life of the substance is T = t/4

Hence, t = 120 days

$$\therefore T=\frac{120}{4}=30\;days$$

83. (D)
Solution:

$$En=\frac{13.6}{n^2}=\frac{13.6}{100}=0.136\,ev$$

84. (B) Hint: Domain : $4-x^2\geq 0$
Range : [Min, Max] = [0, 2]

85. (D)

Solution: $x^2 - 3x - 7 = 0$

$$Cos\, A = \frac{b^2 + c^2 - a^2}{2bc} \Rightarrow c^2 - 3c - 7 = 0$$

86. (A) Hint: $|\vec{a} + \vec{b} + \vec{c}|^2 = (\vec{a} + \vec{b} + \vec{c}) \,.\, (\vec{a} + b + \vec{c})$

87. (C)

88. (C) Hint: $r^2 = h^2 + l^2$

$r = k \Rightarrow h^2 + l^2 = k^2, (h,k) \rightarrow centre$

89. (A)

Hint: $y^2 = \frac{4}{5}x$

$a = \frac{1}{5}$

Directrix : x =-a

90. (B)

Solution: Plane through (4, 0, 0) and (0,0,3) parallel to y – axis.

91. (D)

92. (A)

Hint: $(w)^{3n} + (w^2)^{3n} = (w^3)^n + (w^3)^{2n}$

93. (A) 94. (C)

95 (C) Hint: $y = -[-x - \frac{x^2}{2} - \frac{x^3}{3} .....] = -\log_e (1 - x)$

96. (D)

Hint: $I = \int_0^{\pi/2} \frac{\sin(\pi/2 - x)}{\sin(\pi/2 - x) + \cos(\pi/2 - x)}\, dn = \int_0^{\pi/2} \frac{\cos x\, dx}{\cos n + \sin x}$

$2I = \int_0^{\pi/2} dx$

97. (D)

Hint: $V = \frac{4}{3}\pi r^3 \quad \frac{dv}{dr} = 4\pi r^2 \quad \frac{dv}{ds} = \frac{r}{2}$

$S = 4\pi r^2, \frac{ds}{dr} = 8\pi r$

98. (B)

Hint: $A = 2\int_0^a y\, dx$

99. (B) 100. (B)

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