Kantipur Engineering College

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING

Solution of B.E. Entrance Test (2075)

Set: I (A)

1. (A)	2. (B)	3. (C)	4. (D)
5. (D)	6. (C)	7. (B)	8. (A)
9. (A)	10. (A)	11. (C)	12. (C)
13. (D)	14. (D)	15. (B)	16. (B)
17. (D)			

Solution

Initial volume $V_1 = 2$ L Final volume = $V_1 = 2$ L + 4 L = 6 L

Initial Molarity $M_1 = 6$ M Final Molarity M_2=?

Then $V_1 \times M_1 = V_2 \times M_2$

$2 \text{ L} \times 6\text{M} = 6 \text{ L} \times M_2$

$$M_2 = \frac{6 \text{ M} \times 2 \text{ L}}{6 \text{ L}} = \frac{6 \times 2}{6} \text{M} = 2 \text{ M}$$

18. (C) anode

19. (B)

Solution: $K_2Cr_2O_7 = 0$ *[Thesum of O.N. of atoms in a molecule =0]*

Let oxidation number of chromium be X

$2 + 2X + (-2 \times 7) = 0$

Or $2 + 2 X - 14 = 0$

Or $2X = 14 - 2$

Or $X = 12/2 = +6$

20. (A)	21. (A)	22. (C)	23. (D)
24. (B)	25. (A)		

26. (D)

Solution:

RCN - Alkylcyanide and RNC - Alkyisocyanide

27. (B)

Solution:

$$f = \frac{1}{2\pi\sqrt{LC}}$$

or $T = 2\pi\sqrt{LC}$ $\therefore \sqrt{LC}$ has the dimension of time.

28. (C) In the absence of gravity, these will be no force to prevent the rise of liquid due to surface tension.

29. (C) Absolute temperature α average K.E. α $(v_{rms})^2$.

30. (C) Beats are produced due to superposition of waves for which the maximum intensity is four times the intensity of either source.

31. (D) Frequency is same when light is propagating from one medium to another.

32. (D) When the refractive index of the lens is equal to the refractive index of liquid, then the lens behaves like a plane surface. Now, the focal length becomes infinity.

33. (A) For microscope, $M = \frac{L}{fo}\left(1+\frac{D}{fe}\right)$ when L increased, M is also increased.

34. (A) There will be mutual repulsion. Hence the radius will increase.

35. (B) In a metallic rod, charge carries flow through whole of the cross-section, the magnetic field exists both inside as well as outside

36. (B) In forward bias, the width of potential barrier in P-N junction diode decreases.

37. (D) 3 men and 3 women be seated in a row if two persons of the same sex do not sit together =3!.3!.2! = 72

38. (C)

39. (A)

40. (B

41. (D)

42. (D)

43. (D)

44. (B

45. (B)

46. (A)	48. (A)	49. (A)	50. (C)
51. (C)	52. (C)	53. (D)	54. (A)
55. (C)	56. (B)	57. (D)	58. (A)
59. (C)	60. (B)	61. (D)	62. (A)
63. (C)	64. (B)		

65. (C) Solution

Equivalent weight of H_2SO_4 = 49

1000 ml of N H_2SO_4 contains 49 gm of H_2SO_4

1000 ml of 0.1 N H_2SO_4 contains 4.9 gm of H_2SO_4

250 ml of 0.1 N H_2SO_4 contains $\frac{4.9}{1000} \times 250$ gm of H_2SO_4

= 1.225 gm of H_2SO_4

66. (B)

Solution:t = 50 minutes = 50 ×60 seconds = 3000 seconds

l = 0.2 ampere, Quantity of electricity used is

$Q = l \times t = 0.2 \times 3000 = 600$ Coulombs

Amount of copper deposited by 600 coulombs = 0.1978 g

Amount of copper deposited by 1 coulomb = 0.1978 / 600 g = 0.0003296 g

Electrochemical equivalent of copper = 0.0003296

67. (C) 68. (B)

69. (D) Sum of two vectors $R_1 = A + B$

Difference of two vectors $R_2 = A - B$

Since R_1 and R_2 are at right angles to each other, their dot product should be zero

i.e$R_1 \cdot R_2 = 0$

$(A + B) \cdot (A-B) = 0$

$A^2 - A \cdot B + B \cdot A - B \cdot B = 0$

$A^2 - B^2 = 0$ $(\therefore A \cdot B = B.A)$

$\therefore A = B$.

70. (A) $v^2 = u^2 + 2as$ $\Rightarrow v^2 - u^2 = 2as$

Maximum retardation , $a = \frac{v^2}{2s}$

When the initial velocity is nv, then the distance over which it can be stopped is given by

$$s_n = \frac{v_0^2}{2a} = \frac{(nv)^2}{2\, v^2/2s} = n^2 s.$$

71. (D) $T_{1/2}$ 10 days and t = 30 days

Now, $t = n \times T_{1/2}$ $n = \frac{t}{T_{1/2}} = 3$

$$\frac{N}{N_0} = \left(\frac{1}{2}\right)^n = \left(\frac{1}{2}\right)^3 = \frac{1}{8} = 0.125$$

72. (A) $E_1 = -13.6$ ev& $E_2 = \frac{13.6}{2^2} = 3.4\,\text{ev}$

$\therefore \Delta E = E_2 - E_1 = 3.4 - (-3.16) = 10.2$ ev

73. (A) Velocity at mean pristine = aw

When the amplitude is doubled, the velocity becomes 2v.

74. (D) Here, in step down transformer $n_p > n_s$

$$\frac{n_s}{n_p} = \frac{E_s}{E_p} \text{ or } n_s = n_p \frac{E_s}{E_p}$$

$$\therefore n_s = 4400 \times \frac{220}{22000} = 44$$

75. (B) $T = 2\pi \sqrt{\frac{I}{M B_H}}$

When length is halved , M is also halved and I becomes 1/8

$$\therefore T' = 2\pi \sqrt{\frac{I \times 2}{8 \times M B_H}} = \frac{1}{2}T = \frac{1.0}{2} = 0.5\text{sec.}$$

76. (C) $U = \frac{1}{2} C V^2 = 0.03$ J

77. (C) $\frac{I_{max}}{I_{min}} = \frac{(a_1 + a_2)^2}{(a_1 - a_2)^2} = \frac{4}{1}$

$a_1 + a_2 = 2a_1 - 2a_2$

$a_1 = 3a_2$

$$\therefore \frac{a_1}{a_2} = \frac{3}{1}$$

78. (D) $M = 20$ & $L = f_0 + f_e = 105$

$$\Rightarrow \frac{f_0}{f_e} = 20 \text{ or } f_o = 20\, f_e$$

Now, $20 f_e + f_e = 105 \Rightarrow f_e = 5$ cm

And $f_0 = 20 \times 5 = 100$ cm

79. (B) $Q = nC_p\Delta T$

$$\therefore C_p = \frac{Q}{n\Delta T} = \frac{70}{2 \times 5} = 7 \text{ cal /K}$$

Further, $Cp - C_v = R$

$\Rightarrow C_v = C_p - R = 7 - 2 = 5$ cal /k

Also $Q = n C_v \Delta T = 2 \times 5 \times 5 = 50$ cal

80. (A) When two gases are mixed, the internal energy of the system is $U = U_1 + U_2$

$(n_1 + n_2) C_vT = n_1 C_v T_1 + n_2 C_v T_2$ (Since both are diatomic gas, C_v is same for both)

$T = \frac{n_1T_1+n_2T_2}{n_1+n_2}$

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

$n_1 = \frac{22}{12+32} = 0.5$ and $n_2 = \frac{16}{32} = 0.5$

$\therefore T = 305 - 273 = 32°C$

81. (A) Excesses of pressure $= \frac{4T}{r} \alpha \frac{1}{r}$

$$P_1 \alpha \frac{1}{2r} \text{ and } P_2 \alpha \frac{1}{r}$$

$$\frac{P_1}{P_2} = \frac{1}{2}$$

82. (D) $U = \frac{YAl^2}{RL}$

$$\Rightarrow \frac{U_1}{U_2} = \frac{A_1 l_1^2}{A_2 l_2^2} = \frac{\pi r_1^2 l_1^2}{\pi r_2^2 l_2^2}$$

Further, initial volume = final volume

$A_1l_1 = A_2l_2$

$$\pi r_1^2 l_1 = A_2 l_2$$

$$\Rightarrow \frac{l_1}{l_2} = \frac{r_2^2}{r_1^2}$$

$$\therefore \frac{U_1}{U_2} = \frac{r_1^2}{r_2^2} \times \left(\frac{r_2^2}{r_1^2}\right)^2 = \frac{r_2^2}{r_1^2} = \frac{D_2^2}{D_1^2} = \frac{4}{1}$$

83. (C) we know that

$v_{es} = \sqrt{2}\ v_0$

K.E. in the orbit E = $\frac{1}{2} M v_0^2$

K.E. to escape = $\frac{1}{2} M v_{es}^2 = \frac{1}{2} M (2 v_0^2)$

$= \frac{1}{2} M v_2^2 \times 2 = 2E$

84. (B) 85. (B) 86. (C) 87. (D)

88. (A) 89. (A) 90. (D) 91. (C)

92. (B) 93. (A) 94. (A) 95. (C)

96. (C) 97. (D) 98. (D) 99. (B)

100.(B)

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