PLATFORM
MEDICAL / IIT JEE / KVPY / BOARDS
the STOP to train minds

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NEET (UG)–2020
MOCK TEST - 04
Solution

ANSWER

1. (3)	2. (2)	3. (2)	4. (4)	5. (1)	6. (1)	7. (2)	8. (1)	9. (1)	10. (3)
11. (3)	12. (2)	13. (2)	14. (1)	15. (2)	16. (3)	17. (1)	18. (4)	19. (1)	20. (4)
21. (3)	22. (2)	23. (1)	24. (3)	25. (3)	26. (4)	27. (1)	28. (1)	29. (2)	30. (2)
31. (3)	32. (4)	33. (3)	34. (4)	35. (1)	36. (1)	37. (4)	38. (1)	39. (1)	40. (1)
41. (2)	42. (3)	43. (2)	44. (3)	45. (2)	46. (2)	47. (4)	48. (1)	49. (2)	50. (1)
51. (2)	52. (1)	53. (4)	54. (2)	55. (4)	56. (3)	57. (3)	58. (2)	59. (3)	60. (4)
61. (2)	62. (1)	63. (3)	64. (1)	65. (3)	66. (2)	67. (4)	68. (2)	69. (2)	70. (2)
71. (1)	72. (1)	73. (3)	74. (3)	75. (1)	76. (4)	77. (3)	78. (1)	79. (3)	80. (3)
81. (4)	82. (3)	83. (4)	84. (2)	85. (2)	86. (1)	87. (3)	88. (1)	89. (1)	90. (2)
91. (3)	92. (2)	93. (2)	94. (1)	95. (2)	96. (3)	97. (1)	98. (4)	99. (1)	100. (1)
101. (1)	102. (3)	103. (3)	104. (2)	105. (2)	106. (3)	107. (3)	108. (4)	109. (2)	110. (1)
111. (3)	112. (4)	113. (1)	114. (3)	115. (2)	116. (3)	117. (1)	118. (3)	119. (3)	120. (1)
121. (2)	122. (3)	123. (3)	124. (1)	125. (1)	126. (2)	127. (3)	128. (3)	129. (2)	130. (2)
131. (2)	132. (2)	133. (4)	134. (4)	135. (2)	136. (3)	137. (3)	138. (3)	139. (3)	140. (2)
141. (2)	142. (3)	143. (3)	144. (1)	145. (2)	146. (1)	147. (1)	148. (3)	149. (4)	150. (4)
151. (2)	152. (4)	153. (4)	154. (4)	155. (4)	156. (1)	157. (4)	158. (2)	159. (2)	160. (2)
161. (3)	162. (1)	163. (3)	164. (2)	165. (2)	166. (1)	167. (4)	168. (3)	169. (4)	170. (1)
171. (3)	172. (2)	173. (1)	174. (1)	175. (2)	176. (3)	177. (1)	178. (4)	179. (4)	180. (4)

ANSWER with EXPLANATIONS

PHYSICS

1. (3) $|A+B|$ = magnitude of the resultant of A and B

$= \sqrt{A^2+B^2+2AB\cos\theta}$

$|A-B|$ = magnitude of the resultant of A and – B

$= \sqrt{A^2+B^2-2AB\cos\theta}$

Given $|A+B| = |A-B|$

$\Rightarrow \sqrt{A^2+B^2+2AB\cos\theta}$

$= \sqrt{A^2+B^2-2AB\cos\theta}$

$\Rightarrow \cos\theta = 0 \Rightarrow \theta = 90°$

2. (2) The position of centre of mass of a system does not depend upon the forces acting on the particles.

3. (2) Angular momentum

4. (4) Minimum energy required to free the electron from the ground state of the hydrogen atom.

5. (1) The experimental arrangement used by Davisson and Germer consists of an electron gum which comprises of a tungsten filament F, coated with barium oxide and heated by a low voltage power supply. Electrons emitted by the filament are accelerated to a desired velocity by applying suitable potential / voltage from a higher voltage power supply.

6. (1) Kinetic energy, $K = \frac{1}{2}mv^2$

$\therefore \frac{\Delta K}{K}\times 100 = \frac{\Delta m}{m}\times 100 + \frac{2\Delta v}{v}\times 100$

= 2% + 2 × 3% = 8%

7. (2) Let the speed of the third part be v_3

Let p_1 and p_2 be the momentum of two parts with equal masses.

Applying the law of conservation of momentum, we have

$\Rightarrow p_1^2 + p_2^2 = p^2 \Rightarrow (m_1v_1)^2 + (m_2v_2)^2 = (m_3v_3)^2$

$\Rightarrow (m\times v)^2 + (m\times v)^2 = (2m\times v_3)^2$

$\Rightarrow m^2v^2 + m^2v^2 = 4m^2v_3^2$

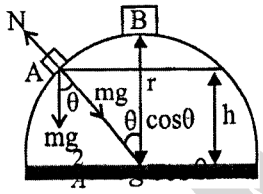
$\Rightarrow 2m^2v^2 = 4m^2v_3^2, \Rightarrow v_3 = \frac{v}{\sqrt{2}}$

8. (1) Lety at A the block loose contact so

$N = 0$

$mg\cos\theta - N = \frac{mv_A^2}{r}$

or

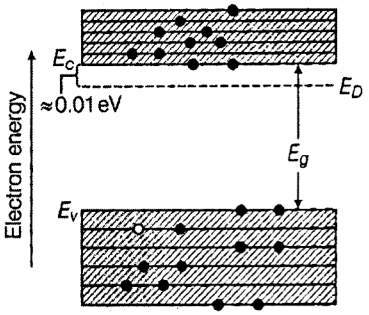


or $mgr = mgh + \frac{1}{2}mrg\cos\theta$

or $r = h + \frac{r}{2}\frac{h}{r}$

$r = \frac{3h}{2}$ $\quad h = \frac{2r}{3}$

9. (1)



Donor energy level is slightly less than energy level lowest to conduction band.

10. (3) 1 atm = 10^5 Nm^{-2}

$\therefore$ 100 atm = 10^7 Nm^{-2} and DV = 0.01% V

$\therefore \frac{\Delta V}{V} = 0.0001$

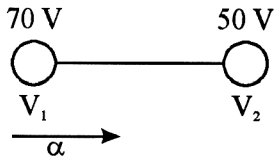
$B = \frac{P}{\frac{\Delta V}{V}} = \frac{10^7}{0.0001} = 1\times 10^{11}\,Nm^{-2}$

11. (3) no heat enters or leaves the system

12. (2) Heat radiations lie in infrared and microwave regions.

13. (2) In parallel V is same, $H = \frac{V^2}{R}t$. Therefore, $H \propto \frac{1}{R}$.

14. (1) Kinetic energy gained by α-particle



$KE = q \cdot \Delta V = q (V_1 - V_2)$

$= 2e (V_1 - V_2)$

$= 2 \times 1.6 \times 10^{-19} (70 - 50)$

$= 40$ eV

15. (2) $X = A \sin wt$ or $10 = 20 \sin wt$

$$wt = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6} \rightarrow \frac{2\pi}{T}t = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}$$

$$t = \frac{T}{12}, \frac{5T}{12}, \frac{7T}{12} \rightarrow \Delta t = \frac{7T}{12} - \frac{T}{12} = \frac{T}{6}$$

16. (3) $\lambda = \frac{12.27}{\sqrt{V}} = \frac{12.27}{\sqrt{100}} = \frac{12.27}{10} = 1.2A^{\circ}$

17. (1) ${}_{72}A^{180} \xrightarrow{\alpha} {}_{70}A_1^{176} \xrightarrow{\beta} {}_{71}A_2^{176} \xrightarrow{\alpha}$

${}_{69}A_3^{172} \xrightarrow{\gamma} {}_{69}A_4^{172}$

18. (4) Velocity of the particle at time t (during upward motion),

$\upsilon = u - gt$

So, velocity decreases linearly with time and finally becomes zero.

Velocity of the particle during the downward motion,

$V = 0 + gt = gt$

So, the velocity increases linearly with time. The correction variation is shown by (4)

19. (1) Given $v = \frac{dx}{dt} = 12 - 3t^2$

When $v = 0$, $t = 2s$

$a = \frac{dv}{dt} = -6t$

$a|_{t=2s} = -12 ms^{-2}$

$\therefore$ Retardation = 12 ms^{-2}

20. 4) $Y = \frac{\text{thermal stress}}{\alpha \Delta T}$ or, $Y \propto \frac{1}{\Delta T}$

Y decreases with increase in temperature.

21. (3) Transistors are mainly used for amplification of the input signals (voltage/power). In fact, a transistor can be used both as amplifier and oscillator.

22. (2) isobaric process

23. (1) When object is at 5m then objective will form image at :

$\frac{1}{v_1} + \frac{1}{5} = \frac{1}{1} \Rightarrow v_1 = 125$ cm

for object at infinity, image will be at focus

$v_2 = 100$ cm

So, movement of eypiece = 25 cm

24. (3) The refractive index of liquid must be equal to 1.5 i.e., equal to that of glass lens.

25. (3) Path difference (Say x)

$= (SS_2 + S_2O) - (SS_1 + S_1O)$

If $x = n\lambda$, the central fringe at O will be bright.

If $x = (2n+1)\frac{\lambda}{2}$, the central fringe at O will be dark.

26. (4) In secondary, e.m.f. induces only when current through primary changes.

27. (1) $P = VI\cos\phi = I^2Z\cos\phi$

$\therefore \cos\phi = \frac{P}{I^2Z} = \frac{2}{4 \times 1} = 0.5$

28. (1) $n_1 > n_2 > n_3$

29. (2) For Moon, $vm = \sqrt{2gR}$

$\therefore vm = \sqrt{2g_mR_m}$

For Earth, $v_e = \sqrt{2(6g)(10R)}$

or, $v_e = \sqrt{120gR}$

$\frac{v_e}{v_m} = \frac{\sqrt{120gR}}{\sqrt{2gR}} = \sqrt{60} \approx 8$

30. (2) $\tan\theta = \frac{v_y}{v_x} = \frac{gt}{20} \Rightarrow gt = 20 \Rightarrow t = \frac{20}{10} = 2\sec$

31. (3) $a = \mu g \cos\theta + g \sin\theta$

$= g(\mu\cos\theta + \sin\theta) = g\left(\frac{1}{2} \times \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}\right) = \frac{3g}{2\sqrt{2}}$

35. (1) The velocity of sound does not depend on pressure.

36. (1) $m_1S_1(100 - \theta) = m_2S_2(\theta - 0)$

$2 \times \frac{S_2}{2}(100 - \theta) = 1 \times S_2 \times \theta$

$100 - \theta = \theta \Rightarrow \theta = 50^{\circ}C$

41. (2) For growth of current in L–R circuit, current is given by– $i = i_0\left(1 - e^{-R\frac{t}{L}}\right)$

$$\therefore \frac{di}{dt} = -i_0\left(-\frac{R}{L}\right)e^{-Rt/L} = \frac{i_0R}{L}e^{-Rt/L}$$

$$\text{At } \frac{di}{dt} = \frac{i_0R}{L} = \frac{E}{L} \Rightarrow 4 = \frac{E}{20}$$

$\therefore$ E = 20 × 4 = 80 V

42. (3) We have

$$\frac{1}{f} = (\mu - 1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right] \Rightarrow \frac{1}{30} = (\mu - 1)\left(\frac{1}{10}\right)$$

The refractive index of the material of the lens

$$\mu = \frac{4}{3} = 1.33$$

43. (2) Velocity of image w.r.t object =2-(-2)=4 m/s

44. (4) $f = \frac{v}{1+m} = \frac{90}{1+2} = 30\text{cm}$

and $m_2 = \frac{f}{x} = \frac{30}{50-30} = \frac{3}{2}$

$$S_I = (m_1m_2)S_O = \left(2 \times \frac{3}{2}\right) \times 5 = 15\text{ cm}$$

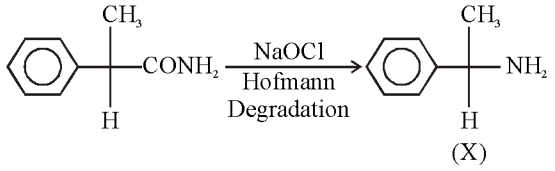
CHEMISTRY

46. (2) $\underset{162\text{ g}}{Ca(HCO_3)_2} + \underset{56\text{ g}}{CaO} \longrightarrow 2CaCO_3 + H_2O$

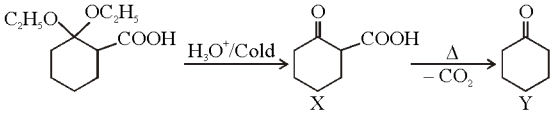
$\Rightarrow$ $Ca(HCO_3)_2$ present in 1000 L water = (1.62 × 1000)g = 1620 g

$\Rightarrow$ 560 g CaO will be required

48. (1) With HBr, the substrates undergo SN1 reaction. Greater stability of intermediate carbocation, greater is the rate of SN1 reaction. Hence correct order of SN1 reactivity $\Rightarrow$ 1> IV > II > III

50. (1) 

(X)

51. (2) 

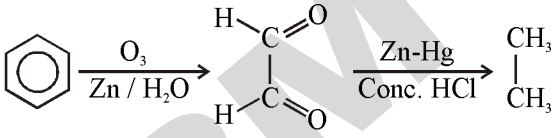
X Y

52. (1) $(E_2)_{Be^{3+}} = (E_1)_H \times \frac{(4)^2}{(2)^2}$

$\Rightarrow (E_1)_H : (E_2)_{Be^{3+}} = 1:4$

53. (4) $XeF_6 + H_2O \rightarrow XeOF_4 + 2HF$

$XeF_6 + 2H_2O \rightarrow XeO_2F_4 + 4HF$

54. (2) 

56. (3) $\begin{matrix} H_3C \\ H_3C \end{matrix}\!\!>\!CH - CHO$ will undergo cannizaro, reaction. It does not give aldol condensation.

57. (3) $A(g) + B(g) \rightleftharpoons C(g) + D(g)$

t = 0 1 mol 1 mol 1 mol 1 mol

At equilibrium, (1 – α) mol (1 – α) mol (1 – α) mol (1 – α) mol

Concentratio : $\frac{1-\alpha}{2}M$ $\frac{1-\alpha}{2}M$ $\frac{1-\alpha}{2}M$ $\frac{1-\alpha}{2}M$

$$\Rightarrow K_C = \frac{[C][D]}{[A][B]} \Rightarrow 100 = \frac{(1+\alpha)^2 \times 4}{4 \times (1-\alpha)^2}$$

$$\Rightarrow (10)^2 = \left(\frac{1+\alpha}{1-\alpha}\right)^2 \Rightarrow 10 = \frac{1+\alpha}{1-\alpha} \Rightarrow \alpha = \frac{9}{11}$$

$$\Rightarrow [C]_{eq} = \frac{1+\frac{9}{11}}{2} = \frac{20}{22} = \frac{10}{11}M$$

58. (2) $\Delta G_3 = \Delta G_1 + \Delta G_2$

$\Rightarrow -3FE° = -Fy_2 + 2Fy_1 = -F(y_2 - 2y_1)$

$$\Rightarrow E° = \frac{y_2 - 2y_1}{3}$$

59. (3) $\pi_{(Na_2SO_4)} = \pi_{Glucose}$

$$\Rightarrow iC_1RT = C_2RT \quad [\alpha = \frac{i-1}{n-1}$$

$$\Rightarrow 0.004 \times (2\alpha + 1) \quad \Rightarrow \alpha = \frac{i-1}{3-1}(\text{for } Na_2SO_4)$$

$$= 0.01 \Rightarrow \alpha = 75\% \quad \Rightarrow i = 2\alpha + 1]$$

61. (2) Partial positive charge (δ^+) on C atom

$\Rightarrow CHF_3 > CHCl_3 > CHBr_3$ ($\because$ Electronegativity order $\Rightarrow$ F > Cl > Br)

$\Rightarrow$ Order of polarity of the bands $\Rightarrow l_1 > l_2 > l_3$

$\Rightarrow$ Order of bond length $\Rightarrow l_3 > l_2 > l_1$

62. (1) For isoelectronic species, ionic radius $\alpha \frac{1}{\text{Atomic Number}}$

$\Rightarrow$ The correct order $\Rightarrow N^{3-} > O^{2-} > F^- > Na^+$

63. (3) P_4O_{10} is a dehydrating agent.

$4HClO_4 + P_4O_{10} \rightarrow 2Cl_2O_7 + 4HPO_3$

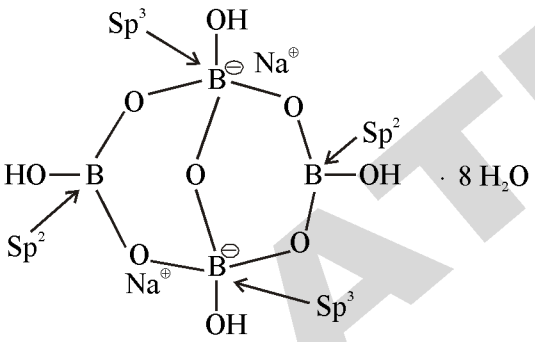
64. (1) 5 ml gold sol requires 0.5 mg of gelatin

$\Rightarrow$ 10 Ml gold sol requires 1 mg of gelatin

65. (3) $\sqrt{\frac{3RT(H_2)}{2}} = \sqrt{7}\cdot\sqrt{\frac{3RT(N_2)}{28}} = \sqrt{\frac{3RT(N_2)}{4}}$

$\Rightarrow T(N_2) = 2.T(H_2)$

66. (2)



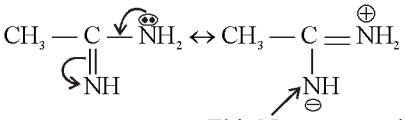
68. (2) Packing fraction = $\frac{4\times\frac{4}{3}\pi\left(\frac{\sqrt{2}a}{4}\right)^3}{a^3} = \frac{\sqrt{2}\pi}{6}$

70. (2) $\left[CO_3^{2-}\right] = 10^{-4}M$

$\Rightarrow \left[Ba^{2+}\right] = \frac{K_{sp}(BaCO_3)}{\left[CO_3^{2-}\right]} = \frac{5.1\times10^{-9}}{10^{-4}}$

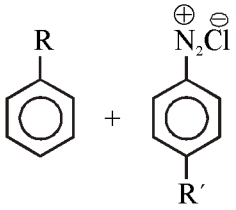
$= 5.1 \times 10^{-5}$ M

72. (1)



This N atom contains –Ve charge and is highly basic

74. (3)



$\Rightarrow$ Diazocoupling reaction is most suitable when R is strong e^- donating group and R′ is strong e^- with drawing group.

75. (1) Amount of A left in n_1 half lives = $[A]_0 \times \frac{1}{2^{n_1}}$

Amount of B left in n_2 half lives = $\frac{[B]_0}{2^{n_2}}$

At the end, $\frac{[A]_0}{2^{n_1}} = \frac{[B]_0}{2^{n_2}}$

$\Rightarrow \frac{4}{2^{n_1}} = \frac{1}{2^{n_2}} \quad \left[\because [A]_0 = 4[B]_0\right]$

$\Rightarrow 2^{n_1-n_2} = 4 = 2^2 \qquad \Rightarrow n_1 - n_2 = 2$

Let, concentration of both become equal after time t

$\Rightarrow t = n_1 \times \left(t_{\frac{1}{2}}\right)_A$ and $t = n_2 \times \left(t_{\frac{1}{2}}\right)_B$

$\Rightarrow \frac{n_1 \times \left(t_{\frac{1}{2}}\right)_A}{n_2 \times \left(t_{\frac{1}{2}}\right)_B} = 1 \Rightarrow \frac{n_1\times5}{n_2\times15} = 1 \Rightarrow \frac{n_1}{n_2} = \frac{3}{1}$

Thus, $n_1 = 3$ and $n_2 = 1$

$\Rightarrow t = (3 \times 5)$ min = 15 min

78. (1) $SF_6 \Rightarrow$ S is sp^3d^2 hybridised $\Rightarrow$ Octahedral

$\Rightarrow$ All six S – F bond lengths are same

81. (4) $\overset{+5}{N}O_3^{\ominus} \rightarrow \overset{0}{N}_2 \Rightarrow$ n-factor = 5

$\Rightarrow$ Equivalent weight = $\frac{62}{5} = 12.4$

83. (4) $\Delta S = nR\ln\frac{V_2}{V_1} = 1\times R\times\ln\frac{V_2}{V_1}$

$= 1\times R\times\ln\frac{3V}{V} = R\ln 3$

86. (1) $\overset{+7}{M}nO_4^- + 5Fe^{2+} \rightarrow Mn^{2+} + 5Fe^{3+}$

1 mol of $FeSO_4$ requires $\frac{1}{5}$ mol of MnO_4^-

$2\overset{+7}{M}nO_4^- + 5\overset{+3}{C}_2O_4^{2-} \rightarrow 2Mn^{2+} + 10\overset{+4}{C}O_2$

1 mol of $C_2O_4^{2-}$ requires $\frac{2}{5}$ mol of MnO_4^-

$\Rightarrow$ Required mole of $KMnO_4 = \left(\frac{1}{5}+\frac{1}{5}+\frac{2}{5}\right)$ mol

$= \frac{4}{5}$ mol

87. (3) Colour in aqueous solution

$Ni^{2+} \Rightarrow$ bright green

$Ti^{3+} \Rightarrow$ purple

88. (1) Isoelectric point $= \frac{pk_{a_1} + pk_{a_3}}{2}$

$= \frac{4+5}{2} = 4.5$

89. (1) Molar conductance increases with dilution.

90. (2)