MAJOR TEST

ALLEN AIIMS # 03 | **DATE : 19 - 05 - 2013**

FULL SYLLABUS

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
A.	1	3	4	3	1	1	2	1	1	4	3	2	3	2	3	4	4	4	3	4	3	4	3	2	3
Q	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
A.	3	1	3	1	2	2	3	1	4	1	4	2	2	2	3	4	2	2	3	4	4	2	2	2	4
Q.	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
A.	2	4	3	3	4	4	3	3	4	3	3	3	1	3	4	3	2	2	3	3	3	2	1	2	2
Q.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
A.	2	2	3	2	1	4	1	3	4	4	3	2	3	3	1	3	1	4	2	3	3	1	3	3	3
Q.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
A.	2	2	4	3	3	2	2	2	4	4	3	4	1	1	2	3	2	2	1	1	4	2	1	2	4
Q.	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
A.	1	4	3	1	3	4	2	1	3	1	2	4	2	1	2	1	2	4	4	3	2	1	4	4	3
Q.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
A.	2	1	2	2	2	1	1	2	1	1	4	1	4	4	4	3	1	1	2	1	3	1	4	4	1
Q.	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
A.	1	1	4	1	3	1	2	3	3	3	1	1	1	1	3	2	2	3	1	2	1	3	3	2	2

HINT – SHEET

1. MnO_4^- will oxidise Cl^- ion according to equation

$$Mn^{7+} + 5e^- \xrightarrow{Red.} Mn^{2+}$$

$$2Cl^- \xrightarrow{ox.} Cl_2 + 2e^-$$

Thus $\quad E^\circ_{cell} = E^\circ_{Mn^{+7}/Mn^{2+}} - E^\circ_{Cl_2/Cl^-}$

$$E^\circ_{cell} = 1.51 - 1.40 = 0.11\ V$$

$\therefore\ \Delta G^\circ = -$ ve or Reaction is feasible

MnO_4^- will oxidise Fe^{2+} to Fe^{3+}

$$Mn^{7+} + 5e^- \xrightarrow{Red} Mn^{2+}$$

$$Fe^{2+} \xrightarrow{OX} Fe^{3+} + e^-$$

$E^o_{cell} = E^o_{Mn^{7+}/Mn^{2+}} - E^o_{Fe^{3+}/Fe^{2+}} = 0.74\ V$

or $\Delta G^o = -$ ve or $\therefore$ Reaction is feasible

Thus MnO_4^- will oxidise not only Fe^{2+} to Fe^{3+} in aq. HCl but it will also oxidise Cl^- to Cl_2 ; suitable oxidant should not oxidise Cl^- to Cl_2 and should oxidise only Fe^{2+} to Fe^{3+} in redox titration)

6. $V_C = 3b = \dfrac{60}{0.8} = 75 cm^3 mol^{-1}$

$\Rightarrow b = 25\ cm^3\ mol^{-1} = 0.025\ L\ mol^{-1}$

$\therefore\ T_C = \dfrac{8a}{27Rb} \Rightarrow a = 3.375$

7. $\Delta_r H$ = Absorbed – Released

$\Rightarrow\ 292 = (4x + 279) - (38 + 85)$

$\Rightarrow\ x = 34$ KCal/mol.

8. $\Delta G = \Delta H - T\Delta S$

$\Rightarrow\ \Delta H = 16$ KJ/mol at = 200 K

$\Delta H_2 - \Delta H_1 = \Delta C_p (T_2 - T_1)$

$\Rightarrow\ \Delta H_{400} = 16 + 4 = 20$ KJ/mol

10. $A \Rightarrow 8 \times \dfrac{1}{8} + 4 \times \dfrac{1}{2} = 3$

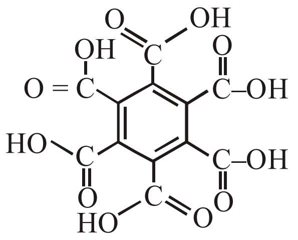
$B \Rightarrow 12 \times \dfrac{1}{4} + 1 = 4$

A_3B_4

18. $S_2O_6^{-2}$ can not oxidised further

$S_2O_6^{-2}$ का आगे ऑक्सीकरण संभव नहीं है।

23. Graphite + $\underset{\text{(सान्द्र)}}{HNO_3} \longrightarrow \underset{\text{(Mallitic acid)}}{C_6(COOH)_6}$

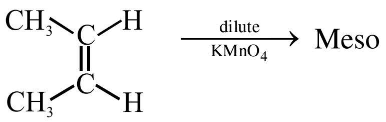


$\Rightarrow 6 + 3 = 9\ \pi$ bond.

24. $3HCl + HNO_3 \longrightarrow NOCl + 2H_2O + 2[Cl]$

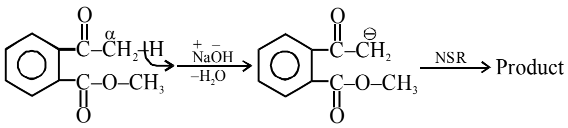
28. $\underset{(A)}{CH_2{=}CH{-}CH{=}CH_2} \xrightarrow{H-Br} B$

29.



(A) Cis

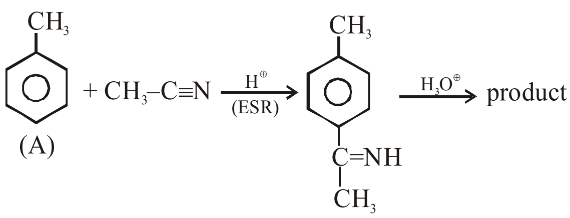
30.



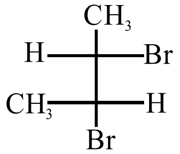
31. $\underset{(B)}{CH_3{-}CH(COOH)_2} \xrightarrow[-CO_2]{\Delta} \underset{(C)}{CH_3{-}CH_2{-}COOH} \xrightarrow{Et-OH}$ ester

32. $\underset{(B)}{CH_3{-}\underset{OH}{CH}{-}CH_2{-}CH_3}$ $\underset{(C)}{CH_3{-}\underset{Cl}{CH}{-}CH_2{-}CH_3}$

33.

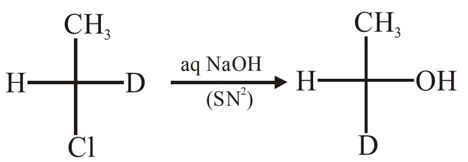


38.



2S, 3R opposite configuration so is Meso

39.



S R

41. NCERT XI Pg. # 19

42. NCERT XI Pg. # 23, 24

43. NCERT XI Option-1 Pg. # 75, 76

Option-2 Pg. # 39

Option-3 Pg. # 96

Option-4 Pg. # 228

44. NCERT XI Pg. # 33, 34

45. NCERT Pg. # 57

50. NCERT Pg. # 100, 103, 279

51. NCERT Pg. # 106, 107, 119, 310

52. NCERT XI Pg. # 166, 169

53. NCERT XII Pg. # 175 Line-10

54. NCERT XII Pg. # 175 Line-11

55. NCERT XII Pg. # 174 Table-9.1

56. NCERT XII Pg. # 140 Line-2

57. gain of ATP from 1 glucose = 36 ATP

8ATP are required for the production of 1 NH_3

[NCERT page-203 equation and page-204 1st two lines]

ATP की प्राप्ति 1 ग्लूकोज से = 36 ATP

1 NH_3 का उत्पादन करने के लिए 8ATP की आवश्यकता होती है।

[NCERT page-204 1st दो लाइन्स]

58. NCERT (E) page-218 1st paragraph

NCERT (H) page-218 3rd last पेराग्राफ

59. For flowering long day plants require duration of light more than their critical photoperiod. [NCERT page-251 last paragraph]

पुष्पन के लिए दीर्घ प्रदीप्तकाली पादपों को अपने क्रांतिक प्रकाशकाल से अधिक अवधि का प्रकाश चाहिए।

60. NCERT (E) page-232 Figure 14.3

NCERT (H) page-232 चित्र 14.3

66. NCERT Pg. # 339

75. NCERT Pg. # 159

76. NCERT, Page No. # 220, 222

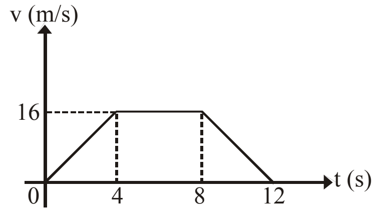
77. NCERT, Page No. # 225

78. NCERT, Page No. # 234, 239

79. NCERT, Page No. # 234, 236, 237

80. NCERT, Page No. # 221, 222

81. Height = area of v – t graph



$= \frac{4+12}{2} \times 16 = 128$ m.

82. $\vec{v} = \vec{u} + \vec{a}t = \vec{u} + \frac{\vec{F}}{m}t$

$= 2\hat{i} + \frac{\hat{i}-\hat{j}}{2} \times t$

$= 2\hat{i} + \frac{t\hat{i}}{2} - \frac{t\hat{j}}{2}$

$= \frac{(4+t)\hat{i}}{2} - \frac{t\hat{j}}{2}$.

83. [Surface tension] = $\left[\frac{\text{Force}}{\text{Length}}\right]$

$= \left[\frac{\text{Force} \times \text{Length}}{(\text{velocity})^2 (\text{time})^2}\right]$

$= \left[\frac{E}{V^2T^2}\right] = [EV^{-2}T^{-2}]$

84. $a_{QP} = a_Q - a_P = \mu g\left(1+\frac{m}{M}\right)$

where, $a_P = -\frac{\mu mg}{m} = \mu g$ & $a_Q = +\frac{\mu mg}{M}$

87. $W_C + W_{nC} + W_{ext} = \Delta K$

$mgh + W_{ar} + 0 = \frac{1}{2}mv^2 - 0$

$W_{ar} = \frac{1}{2} \times 5(10)^2 - 5 \times 9.8 \times 20$

$= 250 - 980 = -730$ J

88. Impulse = 6 – 1.5 = 4.5 N.s = P_f

$W = \frac{1}{2}mv_f^2 = \frac{P_f^2}{2m} = \frac{4.5 \times 4.5}{2 \times 2} = 5.06$ J

90. $x_3 = \frac{3\lambda f}{a}$

91. Difference in P.E. at points A & P will be equal to gain in K.E. at point P.

$mg(8R) - mgR = \frac{1}{2}mv^2\left(1+\frac{2}{5}\right)$

[$\because$ For solid ball $\frac{K^2}{r^2} = \frac{2}{5}$]

$mg(7R) = \frac{1}{2}mv^2 \times \frac{7}{5}$

$\Rightarrow v = \sqrt{10gR}$

92. In circular orbit, veliocty and momentum of rotating particle changes due to change in direction.

93. $\frac{(v_{rms})_{He}}{(v_{rms})_{Ar}} = \sqrt{\frac{(M_w)_{Ar}}{(M_w)_{He}}} = \sqrt{10} = 3.16$

95. For monoatomic $C_V = \frac{3}{2}R$, $C_P = \frac{5}{2}R$

For diatomic $C_V = \frac{5}{2}R$, $C_P = \frac{7}{2}R$

96. $\frac{dQ}{dt} = \frac{KA}{L}(T_1 - T_2)$

$\frac{dQ}{dt} = \frac{0.01 \times 0.8}{2 \times 10^{-2}}(30-0) = 12\,J/s$

97. $\frac{\lambda}{2} = \pi r - 2r = \frac{1.14}{2}$

But v = nλ = (240)(1.14) = 274 m/s

98. Frequency = $\frac{1}{2\ell}\sqrt{\frac{T}{m}} = \frac{1}{2\ell}\sqrt{\frac{T}{\pi r^2 \rho}}$

99. No. of oscillation $\propto \frac{1}{\sqrt{\ell}}$

100. $U(x) = U_0(1 - \cos\alpha x)$

$F = -\frac{dU}{dx} = -U_0\alpha[\sin\alpha] \approx -U_0\alpha^2 x$

Therefore $m\omega^2 = U_0\alpha^2 \Rightarrow \omega = \sqrt{\frac{U_0\alpha^2}{m}}$

$\Rightarrow T = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{m}{U_0\alpha^2}}$

101. Direction of e.m. wave propagation is along the $(\vec{E}\times\vec{B})$

102. Point (–9cm, 0, 0) and (9cm, 0, 0) are situated at equipotential surface then

$$V_{(-9\text{cm},\,0,\,0)} = V_{(9\text{cm},\,0,\,0)} = -\int_{\infty}^{9\times10^{-2}} E\,dr$$

$$= -9\times10^{3}\int_{\infty}^{9\times10^{-2}} r^{-2}\,dr = 10^{5}\ \text{vdt}$$

The mutual interaction potential energy of two charges

$$= \frac{9\times10^{9}\times7\times10^{-6}\times(-2\times10^{-6})}{18\times10^{-2}} = -0.7\ \text{J}$$

The potential energy of interaction of the two charges with the external electric field

$= q_1V(-9\text{cm}, 0, 0) + q_2V(9\text{cm}, 0, 0)$

$= 7\times10^{-6}\times10^{5} + (-2\times10^{-6})\times10^{5} = 0.5\text{J}$

Total electrostatic potential energy

$= -0.7\ \text{J} + 0.5\ \text{J} = -0.2\ \text{J}$

103. $A = \pi r^2 \Rightarrow r = \dfrac{A^{1/2}}{\pi^{1/2}}$

$$B = \frac{\mu_0 I}{2r} \Rightarrow I = \frac{2Br}{\mu_0} = \frac{2B}{\mu_0}\times\frac{A^{1/2}}{\pi^{1/2}}$$

$$\mu = IA = \left(\frac{2BA^{1/2}}{\mu_0\pi^{1/2}}\right)A = \frac{2BA^{3/2}}{\mu_0\pi^{1/2}}$$

105. In steady state current through resistors = V/3R

So P. D. across capacitor = P. D. across R = V/3.

106. $\mu_{21} = \mu_{12} \Rightarrow \dfrac{\phi_2}{I_1} = \dfrac{\phi_1}{I_2} \Rightarrow \dfrac{\phi_1}{\phi_2} = \dfrac{I_2}{I_1}$

107. $Q = \dfrac{fr}{f_2 - f_1} = \dfrac{\sqrt{f_1f_2}}{f_2 - f_1}$

108. $g' = g - \omega^2R\cos^2\lambda$

$$g_{30} = g - \omega^2R\cos^2 30 = g - \frac{3}{4}\omega^2R$$

$$g - g_{30} = \frac{3}{4}\omega^2R$$

109. Orbital velocity $v_0 = \sqrt{\dfrac{GM}{r}}$ and

Escape velocity $= \sqrt{\dfrac{2GM}{R}}$

Applying COME

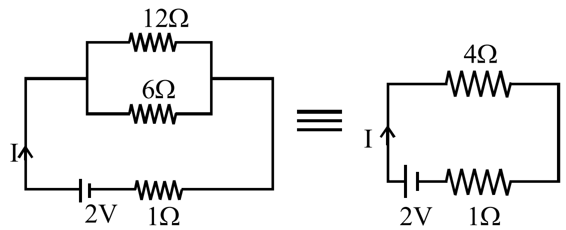
$$\frac{-GMm}{r} + 0 = \frac{-GMm}{R} + \frac{1}{2}mv^2$$

$$\Rightarrow \frac{v^2}{2} = \frac{GM}{R} - \frac{GM}{r}$$

$$\Rightarrow v^2 = \frac{2GM}{R} - \frac{2GM}{r} = v_e^2 - 2v_0^2$$

110. $I^2Rt = ms\Delta\theta \Rightarrow \Delta\theta \propto I^2$

111.



$$I = \frac{2}{5}A$$

112. $$\mu = \frac{\sin\left(\dfrac{A+\delta m}{2}\right)}{\sin\dfrac{A}{2}}$$

113. $R = \dfrac{h}{\sqrt{\mu^2-1}} = \dfrac{4}{\sqrt{\dfrac{25}{9}-1}} = 3\text{m}$

114. $I = \dfrac{E}{At} = \dfrac{nhc}{\lambda At}$

$$\Rightarrow \frac{n}{t} = \frac{I\lambda A}{hc} = \frac{10^{-10}\times5.6\times10^{-7}\times10^{-6}}{2\times10^{-25}} \approx 300$$

115. As $V_1 = \dfrac{150}{\lambda_1^2}$ so $E_1 = 150$ eV

$V_2 = \dfrac{150}{\lambda_2^2} = \dfrac{150}{(0.5)^2}$ so $E_2 = 600$ eV

$\Rightarrow E_2 - E_1 = 450\ \text{eV} = 0.45\ \text{keV}$

116. Released energy $E = \Delta mc^2$

117. $I = \frac{V_z}{R} = \frac{5V}{1k\Omega} = 5mA$

118. $I = \frac{20-0.7}{2\times10^3}A = 9.65mA$

119. If change in temp. is $\Delta\theta$ then $\Delta V = V \propto \Delta\theta$

$$\Rightarrow \frac{\Delta V}{V} = \alpha\Delta\theta$$

$$\beta = \frac{P}{\left(\frac{\Delta V}{V}\right)} = \frac{P}{\alpha\Delta\theta} \Rightarrow \Delta\theta = \frac{P}{\alpha\beta}$$

120. Flow rate = Av

$$\therefore\ v = \frac{70cm^3/s}{1cm^2} = 70\ m/s$$

$$\text{Maximum height} = \frac{v^2}{2g}$$

$$= \frac{70\times70}{2\times980}cm = 2.5cm$$

130. $AgCl + NH_4OH \longrightarrow \underset{\text{soluble complex (घुलनशील संकुल)}}{[Ag(NH_3)_2]OH}$

131. In acidic medium NH_3 given NH_4^+ which does not behave as a ligand and does not form complex compound.

अम्लीय माध्यम में NH_3 का NH_4^+ में परिवर्तन हो जाता है जो लिगैण्ड के समान व्यवहार नही करता एवं संकुल नही बनाता।

132. In P_2O_3 $2P_\pi - 3P_\pi$ bond present but in P_4O_6 all bonds are $2P_\pi - 3d_\pi$

P_2O_3 में $2P_\pi - 3P_\pi$ बंध होते है जबकी P_4O_{10} में सभी $2P_\pi - 3d_\pi$ होते है।

134. Brown ring complex have 3 unpaired e^-.

भूरी वलय संकुल 3 अयुग्मित e^- रखता है।

141. NCERT XI Pg. # 35

145. NCERT Pg. # 312

146. NCERT XI Pg. # 131

150. Substances move in dependently in diffusion not in mass flow.

NCERT (E) page-183 last paragraph

विसरण में पदार्थ स्वतंत्रतापूर्वक गति करते हैं, सामूहिक प्रवाह में नहीं।

NCERT (H) page-184 1st पेराग्राफ

151. Iron is an important constituent of proteins of electron transfer because iron is easily reduced ($Fe^{+3} \rightarrow Fe^{+2}$) and oxidised ($Fe^{+2} \rightarrow Fe^{+3}$) during electron transfer. eg. in cytochromes

[NCERT page-197 topic = Iron]

आयरन, इलेक्ट्रॉन स्थानान्तरण करने वाली प्रोटीन्स का मुख्य घटक है क्योंकि इलेक्ट्रॉन स्थानान्तरण के दौरान आयरन आसानी से अपचयित ($Fe^{+3} \rightarrow Fe^{+2}$) एवं ऑक्सीकृत ($Fe^{+2} \rightarrow Fe^{+3}$) हो जाता है। जैसे - साइटोक्रोम्स में

[NCERT page-197 2nd last पेराग्राफ]

161. NCERT, Part -I, Page No. # 58

162. NCERT, Part-I, Page No. # 100

[Right Columns1-Para]