AVIRAL CLASSES
CREATING SCHOLARS

JEE (ADVANCED), PMT & FOUNDATIONS

UTS- NEET -2020
MOCK TEST-10 SOLUTION

ANSWER KEY

BIOLOGY

1) 4	2) 4	3) 4	4) 3	5) 4	6) 1	7) 4	8) 1	9) 4	10) 4
11) 2	12) 2	13) 2	14) 3	15) 3	16) 4	17) 4	18) 2	19) 2	20) 2
21) 3	22) 2	23) 3	24) 4	25) 4	26) 4	27) 3	28) 1	29) 2	30) 4
31) 4	32) 4	33) 3	34) 1	35) 4	36) 4	37) 4	38) 3	39) 2	40) 2
41) 3	42) 4	43) 3	44) 2	45) 1	46) 2	47) 3	48) 3	49) 4	50) 3
51) 3	52) 4	53) 1	54) 2	55) 2	56) 3	57) 4	58) 2	59) 1	60) 3
61) 4	62) 4	63) 4	64) 3	65) 3	66) 4	67) 4	68) 2	69) 4	70) 1
71) 3	72) 1	73) 4	74) 4	75) 3	76) 4	77) 4	78) 1	79) 4	80) 3
81) 2	82) 3	83) 2	84) 2	85) 4	86) 3	87) 3	88) 2	89) 3	90) 3

CHEMISTRY

91) 1	92) 3	93) 2	94) 1	95) 4	96) 3	97) 2	98) 3	99) 2	100) 4
101) 4	102) 3	103) 3	104) 4	105) 3	106) 2	107) 2	108) 1	109) 3	110) 2
111) 3	112) 3	113) 3	114) 4	115) 4	116) 1	117) 2	118) 2	119) 4	120) 1
121) 2	122) 2	123) 3	124) 1	125) 4	126) 3	127) 4	128) 2	129) 4	130) 2
131) 1	132) 3	133) 3	134) 2	135) 1					

PHYSICS

136) 4	137) 1	138) 3	139) 4	140) 1	141) 3	142) 1	143) 3	144) 4	145) 1
146) 1	147) 1	148) 1	149) 1	150) 4	151) 3	152) 4	153) 4	154) 2	155) 1
156) 4	157) 2	158) 3	159) 2	160) 2	161) 2	162) 1	163) 3	164) 3	165) 2
166) 4	167) 2	168) 4	169) 3	170) 2	171) 4	172) 1	173) 2	174) 2	175) 4
176) 4	177) 2	178) 2	179) 1	180) 2					

[CHEMISTRY]

91. For 's' orbital $\ell = 0,\ m = 0$

92. Total volume of CH_4 and $C_2H_6 = 2.24$ lit

$V \propto n$

$\therefore$ Volume of $CH_4 = 1.12$ lit

Volume of $C_2H_6 = 1.12$ lit

i.e., 22.4 lit $\longrightarrow$ 16g CH_4 22.4 lit $\longrightarrow$ 30 g

1.12 lit $\longrightarrow$? = 0.8 g 1.12 lit $\longrightarrow$? = 1.5 g

$\therefore$ Total weight of a gaseous mixture = 0.8 + 1.5 = 2.3 g

93. $Hg_2^{+2} \longrightarrow 2Hg^{+2}$ $S^{-2} \longrightarrow SO_4^{-2}$

$Hg_2^{+2} \xrightarrow{2e^-} Hg_2^{+4}$ $S^{-2} \xrightarrow{8e^-} S^{+6}$

$\therefore$ n - factor of Hg_2S = 2 + 8 = 10

$$\overset{-4\ +4}{N_2H_4} \longrightarrow \overset{+6\ -6}{N_2O_3} \quad (10e^-)$$

n - factor = 10

94. $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

$P.P_{PCl_5} = T.P \times M.F_{PCl_5} = 3 \times \frac{3}{9} = 1$

$P.P_{PCl_3} = 3 \times \frac{3}{9} = 1$

$P.P_{Cl_2} = 3 \times \frac{3}{9} = 1$

$\therefore K_P = \frac{P_{PCl_3} \times P_{Cl_2}}{P_{PCl_5}} = \frac{1 \times 1}{1} = 1$

95. $\text{Amount left} = \frac{\text{Initial amount}}{2^n}$

n = number of half life periods = $\frac{5}{10} = \frac{1}{2}$

Amount left = $\frac{2}{2^{1/2}} = \frac{2}{\sqrt{2}} = 1.414$ grams

96. $E_{RP} = E^o - \frac{0.059}{n} \log \frac{P_{H_2}}{[H^+]^2}$

$2H^+ + 2e^- \longrightarrow H_2$

$E_{RP} = 0 - \frac{0.059}{n} \log \frac{10}{(10^{-3})^2}$

= 0.21 V

98. $\overset{+7}{KMnO_4} \xrightarrow{5e^-} Mn^{2+}$

$\therefore$ 5 Faradays

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

$\Delta G = 3.3 - 300 \times 2 \times 10^{-2}$

$= 2.7$ K.Cal

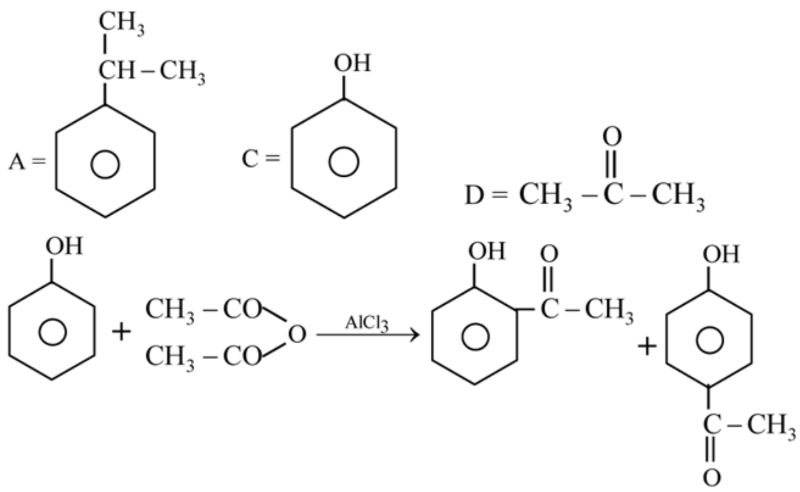
$\Delta S = 20\,cal$ (or) 2×10^{-12} K.Cal

101. PH_3 has lone pair of electrons on 'P' hence acts as nucleophile

102. Conceptual

103. Milk is a oil in water emulsion

104.



is known as Fries rearrangement reaction

105. Conceptual

106. Conceptual

107. PHBV is a copolymer of 3 – hydroxy pentanoic acid and 3 – hydroxy butanoic acid

108. Conceptual

109. $CN^- + H_2O \rightleftharpoons KCN + OH^-$; $K_1 = 10^{-9}$

$HCN + OH^- \rightleftharpoons CN^- + H_2O$; $K_2 = ?$

$\downarrow$

Neutralisation

$$K_2 = \frac{1}{K_1} = \frac{1}{10^{-9}} = 10^9$$

110. Conceptual

111. Conceptual

112. $\Delta E = (E_a)_f - (E_a)_b$

$30 = 42 - (E_a)_b$

$(E_a)_b = 42 - 30 = 12$

113. ΔH_f^0 of water is $H_{2(g)} + \frac{1}{2}O_{2(g)} \longrightarrow H_2O_{(\ell)}, \Delta H = ?$

Latent heat of vapourization is $H_2O_{(\ell)} \longrightarrow H_2O_{(g)}, \Delta H = x_4$

i.e. $\Delta H^0_{f\,(water)} = B.E_R - B.E_P = \left(E_{H-H} + \frac{1}{2}E_{O=O}\right) - \left(2E_{O-H}\right)$

$\Delta H^0_{f\,(water)} = x_1 + \frac{1}{2}x_2 - 2x_3$

But $\Delta H^0_f\ H_2O_{(\ell)} = x_1 + \frac{1}{2}x_2 - 2x_3 - x_4$

115. $r \propto \frac{1}{\sqrt{M.wt}}$

i.e., $r_1 : r_2 : r_3 = \frac{1}{\sqrt{64}} : \frac{1}{\sqrt{32}} : \frac{1}{\sqrt{16}}$

$= \frac{1}{8} : \frac{1}{4\sqrt{2}} : \frac{1}{4}$

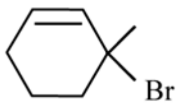
$= \frac{1}{2} : \frac{1}{\sqrt{2}} : \frac{1}{1}$

$= \frac{1}{2} : \frac{\sqrt{2}}{2} : \frac{1}{1}$

$= 1 : \sqrt{2} : 2$

116. $R_f \propto \frac{1}{\text{adsorption power}}$

117. Aldehydes are more reactive for nucleophilic acids than ketones. EWG increases the addition reaction further due to stabilisation of carbocation

118. It is an allylic substitution, hence 

119. 1° R – X and less steric. Alkyl halides are more reactive for SN^2. Hence $CH_3 - I$ is more for SN^2

120. $CH_3 - CH = CH_2 \xrightarrow[H_2O_2]{B_2H_6} CH_3 - CH_2 - CH_2OH$.

It follows antimarkownikoff rule

121.

$$CH_3 - O - \underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}} - CH_3 \xrightarrow{\text{Conc. HI}/\Delta} CH_3 - \underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C^{\oplus}}}}} + CH_3O^-$$

It follows SN^1 mechanism, hence a stable carbocation is formed

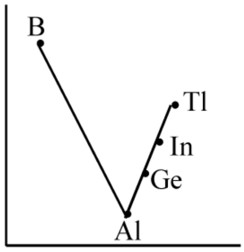
122. $2CH_3Cl + Si \xrightarrow[573K]{Cu} (CH_3)_2SiCl_2$

123. $H_3C - CH = CH_2 + H^+ \longrightarrow \underset{(2^\circ \text{carbocation})}{H_3C - \overset{+}{C}H - CH_3}$

Peroxide effect is shown only by HBr. So electrophilic addition reaction takes place

124. Acidic strength increases with increase in K_a value for 6^{th} group elements.

125.



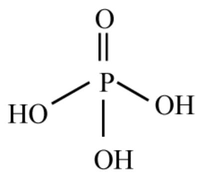
Least EN element = Al

126. $CH_3COOH \xrightarrow{B_2H_6} CH_3CH_2OH \xrightarrow{PCC}$

$$CH_3CHO \xrightarrow{2CH_3OH} H_3C-\underset{\underset{OCH_3}{|}}{\overset{\overset{H}{|}}{C}}-OCH_3$$

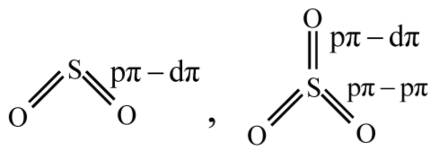
acetal

127.



No P – O – P linkage

128.



In both cases 'S' undergoes sp^2 hybridisation and number of $p\pi - d\pi$ bonds are 1 and 2 respectively

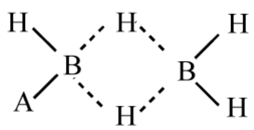
130. In aqueous state
For ethyl : $2^0 > 3^0 > 1^0 > Me$
For methyl : $2^0 > 1^0 > 3^0 > Me$

131.

$$CH_3-CH=CH-CH_2-\overset{\overset{O}{||}}{C}-CH_3 \xrightarrow{NaOCl} CHCl_3 + CH_3-CH=CH-CH_2-COO^{-}Na^{\oplus}$$

It is an iodoform mechanism

132. In B_2H_6, bridges 'H' atom are present and is electron deficient molecule. It cannot possess dative bond



133. Conceptual
134. Conceptual
135. Basic nature$\downarrow$
From Lanthanum to Lutecium

[PHYSICS]

136 Value of scalar is independent of orientation of observer.

138. For above condition to be true, the particle must reach maximum height at t = 5 second

$0 = u - gt$

$\Rightarrow u = gt = 9.8 \times 5$

$= 49$ m/s

139. $a = \frac{dv}{dt} = \frac{dv}{dx}.\frac{dx}{dt} = v\frac{dv}{dx}$

$\therefore a = v\frac{dv}{dx}$

so when $v = 0$ we get $a = 0$

OR

$v = x^2 - 5x + 4$

$\therefore \frac{dv}{dt} = 2x\frac{dx}{dt} - 5\frac{dx}{dt} + 0$

$\Rightarrow$ acc. 'a' = $(2x - 5)v$

$\therefore$ when $v = 0$, $a = 0$

140. Conceptual

142. As initially $v_{cm} = 0$ and $F_{ext} = 0$. So v_{cm} remains same , that is $v_{cm} = 0$

143. Area of graph = Impulse

$\left(\frac{\pi}{2}\frac{f_0T}{2}\right) = (mu - 0) \Rightarrow u = \frac{\pi f_0 T}{4m}$

144. $a_t = K^2rt^2$

as $\frac{dv}{dt} = a_t$

so $dv = K^2rt^2\,dt \Rightarrow \int dv = \int k^2rt^2dt$

$v = k^2r\frac{t^3}{3}$

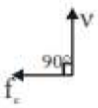
$\boxed{v \propto t^3}$

So centripetal acceleration is variable

$\left[\begin{array}{l}\text{as } a_c \propto v^2 \\ \text{so } a_c \propto t^6\end{array}\right]$

$P_{f_t} = \vec{f}_t.\ \vec{v} \neq 0$

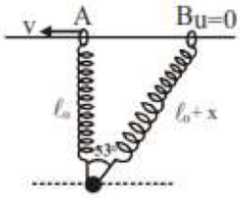
$P_{f_c} = \vec{f}_c.\vec{v} = 0$ as



$\vec{f}_c$ is always $\perp^r$ to $\vec{v}$

145. $\cos 53° = \frac{\ell_0}{\ell_0 + x}$

$\frac{3}{5} = \frac{\ell_0}{\ell_0 + x}$



$x = \frac{2}{3}\ell_0$

from $B \rightarrow A$

$\frac{1}{2}kx^2 = \frac{1}{2}mv^2$

$v = x\sqrt{\frac{k}{m}} = \frac{2}{3}\ell_0\sqrt{\frac{k}{m}}$

146. Electric field at a point is numerically equal to the number of lines of force crossing normally per unit area surrounding that point. Thus electric field at A is stronger than at B.

147. According to Gauss's theorem, the total normal electric flux through the surface is equal to $\frac{1}{\varepsilon_0}$ times the total charge enclosed within the surface.

148. Conceptual

150. If power in R is maximum then

$\boxed{R = r}$ $i = \frac{E}{2R} = \frac{E}{2r}$

Power in R

$P = \left(\frac{E}{2R}\right)^2.\quad R = \frac{E^2}{4R}$

input power.

$P_{in} = \left(\frac{E}{2R}\right)^2.\ 2R = \frac{E^2}{2R}$

Efficiency = $\frac{P_{out}}{P_{in}} \times 100 = 50\%$

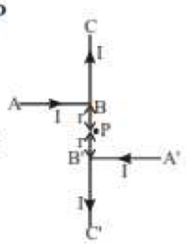
152. Current in the circuit $I = \frac{4E}{4r} = \frac{E}{r}$

Terminal potential $V = E - Ir$

$= E - \frac{E}{r} \times r = 0$

154. The magnetic field at point P due to current I in AB is,

$$B_{AB} = \frac{\mu_0}{4\pi}\frac{I}{r}\otimes$$



The magnetic field at point P due to current I in BC is, $B_{BC} = 0$ (As the point P is along the BC) The magnetic field at point P due to current I in A'B' is.

$$B_{A'B'} = \frac{\mu_0 I}{4\pi r}\otimes$$

The magnetic field at point P due to current I in B'C' is,

$B_{B'C'} = 0$ (As the point P is along the BC)

$\therefore$ The net magnetic field at P is,

$$B = B_{AB} + B_{BC} + B_{A'B'} + B_{B'C'}$$

$$\frac{\mu_0 I}{4\pi r} + 0 + \frac{\mu_0 I}{4\pi r} + 0 = 2\left(\frac{\mu_0 I}{4\pi r}\right) = \frac{\mu_0}{4\pi}\left(\frac{2I}{r}\right)$$

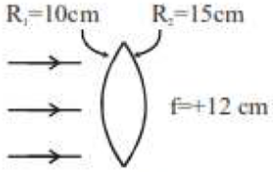
158. $E = \sqrt{V_R^2 + (V_L - V_C)^2}$

$$= \sqrt{(80)^2 + (40-100)^2}$$

$$= \sqrt{6400+3600} = \sqrt{10000}$$

$$= 100V$$

159.



$R_1 = +10cm \quad R_2 = -15cm$

$$\frac{1}{f} = (\mu-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$\frac{1}{12} = (\mu-1)\left[\frac{1}{+10} - \frac{1}{-15}\right]$$

$$\Rightarrow \frac{1}{12} = (\mu-1)\left(\frac{3+2}{30}\right) \Rightarrow \frac{1}{2} = (\mu-1)\left(\frac{5}{5}\right)$$

$$\Rightarrow \mu - 1 = \frac{1}{2} \Rightarrow \mu = \frac{3}{2} = 1.5$$

161. $(\delta_y)_{net} = 0$

$$\delta_{y_1} + \delta_{y_2} + \delta_{y_3} = 0$$

$$\Rightarrow (\mu_y - 1)A + (\mu_y' - 1)(-A') + (\mu_y - 1)A = 0$$

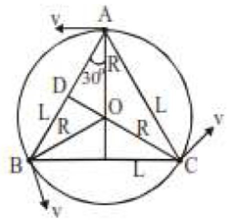
$$A' = \frac{2(\mu_y - 1)}{(\mu_y' - 1)}A \quad \Rightarrow \frac{A'}{A} = \frac{2(\mu_y - 1)}{(\mu_y' - 1)}$$

163. a sinθ = nλ, n = 1, 2,....

a sin 30° = 1 × 6500

a = 13000 Å = 1.3×10^{-6} m = 1.3 μm

164. Consider the circle with centre at O, and having radius R. In it consider three bodies of masses M each moving with velocity v under the action of their gravitational attraction.



$$OD = \frac{L}{2}$$

$$\frac{L}{2} = R\cos 30^\circ \Rightarrow L = R\sqrt{3}$$

Centripetal force on any one mass M

$$= \frac{2GM^2}{L^2}\cos 30^\circ$$

$$\therefore \frac{Mv^2}{R} = \frac{2GM^2}{L^2} \times \frac{\sqrt{3}}{2} \Rightarrow \frac{v^2}{R} = \frac{GM}{(R\sqrt{3})^2}\sqrt{3}$$

$$\Rightarrow v^2 = \frac{GM}{R\sqrt{3}} \qquad \therefore v = \sqrt{\frac{GM}{\sqrt{3}R}}$$

165. Given $\frac{\phi_A}{\phi_B} = \frac{1}{2}$

$E_{K_1} = hf - \phi_A$ .... (1)

$E_{K_2} = 2hf - \phi_B$ .... (2)

from Eq. (1) & (2)

$$E_{K_2} = 2\left[E_{K_1} + \phi_A\right] - 2\phi_A \; [\because \phi_B = 2\phi_A]$$

$$E_{K_2} = 2E_{K_1} + 2\phi_A - 2\phi_A \Rightarrow \boxed{\frac{E_{K_1}}{E_{K_2}} = \frac{1}{2}}$$

166. Activity $R_1 = N_1\lambda$ & $R_2 = N_2\lambda$

$$R_1 = N_1\frac{\ln 2}{T} \;;\; R_2 = N_2\frac{\ln 2}{T}$$

Thus disintegrated amount is $(N_1 - N_2)$

$$N_1 - N_2 = \frac{(R_1 - R_2)T}{\ln 2}$$

as T and ln2 are constants

so $(N_1 - N_2) \propto (R_1 - R_2)$

168. Here D_1 is in forward bias and D_2 is in reverse bias so

$$I = \frac{V}{R} = \frac{5}{10} = 0.5 \text{ A}$$

169. In forward biasing both positive and negative charge carriers move towards the junction.

170. $V_{max} = 4V$

$2\pi f\, y_0 = 4f\lambda$ or $\lambda = \frac{\pi y_0}{2}$

171. $\Delta\phi = \frac{\pi}{2}$ so, $A = \sqrt{a^2 + a^2 + 2a.a\cos 90^\circ}$

$$A = a\sqrt{2}$$

173. Let natural length of string is L and change in length is ℓ

$$Y = \frac{F/A}{\ell/L} \Rightarrow \ell = \frac{FL}{YA} = KF$$

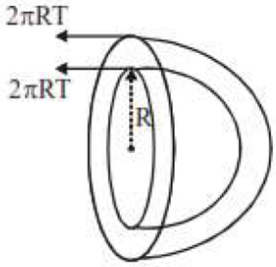
$F = K\Delta\ell \Rightarrow 8 = K(x - L)$ .....(1)

$10 = K(y - L)$ .....(2)

$18 = K(z - L)$ .....(3)

Solve equ. (1), (2) & (3) then $z = 5y - 4x$

174.



F due to S.T. = $4\pi RT$

175.
$$\frac{\left(\frac{Q}{t}\right)_1}{\left(\frac{Q}{t}\right)_2} = \frac{A_1L_2}{A_2L_1} = \frac{1\times 1}{4\times 2} = \frac{1}{8}$$

177. $V = KT^{2/3}$

$$V = K\left[\frac{PV}{nR}\right]^{2/3} \Rightarrow V^{3/2} = K^{3/2}.\frac{PV}{nR}$$

$$\Rightarrow PV^{-1/2} = nRK^{-3/2}$$

$\Rightarrow PV^{-1/2}$ = constant (as PV^x = constant)

$x = -1/2$

$$W = \frac{nR(\Delta T)}{1-x} = \frac{1\times R\times 30}{1-(-1/2)} = 20R$$

178. $\Delta t = \frac{1}{2}\alpha\Delta\theta t$

$5 = \frac{1}{2}\alpha[\theta - 15]\times 1\text{Day}$ ...(1)

$10 = \frac{1}{2}\alpha[30 - \theta]\times 1 \text{ Day}$ ...(2)

Eq. (1) ÷ (2)

$$\frac{1}{2} = \frac{\theta - 15}{30 - \theta} \Rightarrow 30 - \theta = 2\theta - 30 \Rightarrow \theta = 20^\circ C$$

179. $E = \frac{1}{2}KA^2$

and $K.E. = \frac{1}{2}K\left(A^2 - \frac{A^2}{4}\right) = \frac{3}{4}\left(\frac{1}{2}KA^2\right) = \frac{3}{4}E$

180. After removal of 700 g mass

$3 = 2\pi\sqrt{\frac{(500+400)}{K}} \Rightarrow 3 = 2\pi\sqrt{\frac{900}{K}}$ ...(1)

and after removal of 500 g mass

$T' = 2\pi\sqrt{\frac{400}{K}}$ ...(2)

$$\therefore \frac{T'}{3} = \sqrt{\frac{400}{900}}$$

$T' = 2s$