AVIRAL CLASSES
CREATING SCHOLARS

JEE (ADVANCED), PMT & FOUNDATIONS

UTS- NEET -2020
MOCK TEST-09 SOLUTION

ANSWER KEY

BIOLOGY

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

PHYSICS

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

CHEMISTRY

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

[PHYSICS]

91. With each rotation, charge Q crosses any fixed point P near the ring. Number of rotations per second $= \omega / 2\pi$.

$\therefore$ charge crossing P per second = current $= \dfrac{Q\omega}{2\pi}$.

92. The average translational kinetic energy depends on temperature only.

93. Theory point

94. As $\upsilon \propto r^2$ and the mass of the drop $m \propto r^3$, its momentum $p = m\upsilon \propto r^5$. Here, $2^5 = 32$.

95. $\dfrac{B_{centre}}{B_{axis}} = \left(1 + \dfrac{x^2}{R^2}\right)^{3/2}$, also $B_{axis} = \dfrac{1}{8} B_{centre}$

$$\Rightarrow \frac{8}{1} = \left(1 + \frac{x^2}{R^2}\right)^{3/2} \Rightarrow 2 = \left(1 + \frac{x^2}{R^2}\right)^{1/2}$$

$$\Rightarrow 4 = 1 + \frac{x^2}{R^2} \Rightarrow 3 = \frac{x^2}{R^2} \Rightarrow x^2 = 3R^2 \Rightarrow x = \sqrt{3}R$$

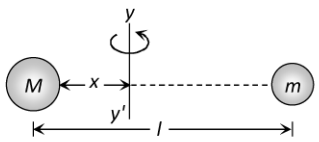
96. Wavelength of photon will be greater than that of electron because mass of photon is less than that of electron $\Rightarrow \lambda_{ph} > \lambda_e$

97. If the both mass are revolving about the axis yy' and tension in both the threads are equal then

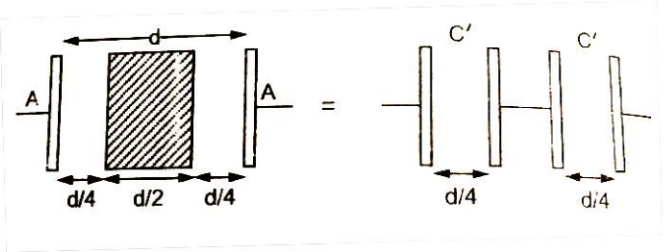
$M\omega^2 x = m\omega^2 (l - x)$

$\Rightarrow Mx = m(l - x)$

$\Rightarrow x = \dfrac{ml}{M + m}$



98.



Method 1

Before the metal sheet is inserted, $C = \dfrac{\varepsilon_0 A}{d}$.

After the sheet is inserted, the system is equivalent to two capacitors in series, each of capacitance $C' = \dfrac{\varepsilon_0 A}{(d/A)} = 4C$.

The equivalent capacity is now 2C.

$$C = \frac{\varepsilon_0 A}{d - t\left(1 - \dfrac{1}{K}\right)}$$

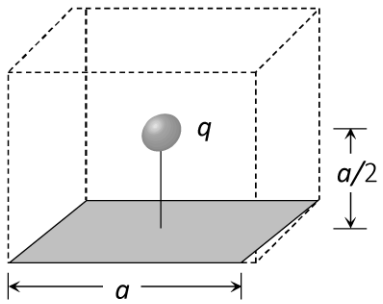
Here, the initial capacitance, $C = \dfrac{\varepsilon_0 A}{d}$.

For the metal sheet, $t = \dfrac{d}{2}, K = \infty$. The new capacitance is

$$C' = \frac{\varepsilon_0 A}{d - \dfrac{d}{2}\left(1 - \dfrac{1}{\infty}\right)} = \frac{\varepsilon_0 A}{\dfrac{d}{2}} = 2\frac{\varepsilon_0 A}{d} = 2C.$$

99. Conceptual

100. An imaginary cube can be made by considering charge q at the centre and given square is one of it's face.



So flux from given square (i.e. one face) $\phi = \dfrac{q}{6\varepsilon_0}$

101. Heat passes quickly from the body into the metal which leads to a cold feeling.

102. $F = k\dfrac{2Q^2}{d^2}$, where d = sepration.

Since charge is shared, the charge on each ball $= \dfrac{1}{2}(2Q - Q) = \dfrac{Q}{2}$.

The force now becomes

$$F' = k\frac{(q/2)^2}{d^2} = \frac{1}{4}.k\frac{Q^2}{d^2} = \frac{F}{8}.$$

103. M – iA

$$= \frac{qv}{2\pi r} = \pi r^2$$

$$= \frac{qvr}{2}$$

$$M \propto vr$$

$$M \propto \frac{Z}{n}.\frac{n^2}{Z}$$

$$M \propto n$$

104. To find the intensity due to interference of two waves whose intensities are know, first find the amplitude of each wave $\left(\propto \sqrt{\text{int}ensity}\right)$. Then find the amplitude due to superposition, using the phase difference between the waves. The square of this amplitude gives the intensity due to interference.

105. Amplitude of damped oscillator

$A = A_0 e^{-\lambda t}$; λ = constant, t = time

For t =1 min. $\frac{A_0}{2} = A_0 e^{-\lambda t} \Rightarrow e^{\lambda} = 2$

For t = 3 min. $A = A_0 e^{-\lambda \times 3} = \frac{A_0}{(e^{\lambda})^3} = \frac{A_0}{2^3}$

$\Rightarrow X = 2^3$

106. V-T graph is a straight line passing through origin. Hence, $V \propto T$ or $P = \text{constant}$

$$\frac{\Delta Q}{\Delta W} = \frac{1}{1 - 3/5} = \frac{5}{2}$$

107. Suppose m rows of given capacitors are connected in parallel and each row contains n capacitors then potential difference across each capacitor $V = \frac{V'}{n}$ and equivalent capacitance of network $C' = \frac{mC}{n}$ on putting the values we get n = 4 and m = 8

$\therefore$ Total capacitors = n × m = 4 × 8 = 32

108. $E = W_0 + eV_0$

For hydrogen atom, $E = +13.6\,eV$

$\therefore$ + 13.6 = 4.2 + eV$_0$

$$\Rightarrow V_0 = \frac{(13.6 - 4.2)eV}{e} = 9.4\,V$$

Potential at anode = – 9.4 V

109. Theory point

110. Conceptual

111. Conceptual

112. The current through circuit

$$i = \frac{P}{V} = \frac{100 \times 10^{-3}}{0.5} = 0.2\,A$$

$\therefore$ voltage drop across resistance = 1.5 – 0.5 = 1 V

$$\Rightarrow R = \frac{1}{0.2} = 5\,\Omega$$

113. GM = $R^2 g$ or $G\left(\frac{4}{3}\pi R^2 \rho\right) = R^2 g$

or $g = \left(\frac{4}{3}\pi G\rho\right) R$

114. $Y = \overline{\overline{A} + \overline{B}}$

According to De morgan's theorem

$Y = \overline{\overline{A} + \overline{B}} = \overline{\overline{A}}.\overline{\overline{B}} = A.B$

This is the output equation of 'AND' gate

115. According to Kepler's third law, the ratio of the squares of the periods of any two planets revolving about the sun is equal to the ratio of the cubes of their average distances from the sun i.e.

$$\left(\frac{T_1}{T_2}\right)^2 = \left(\frac{r_1}{r_2}\right)^3 = \left[\frac{r_1}{\frac{1}{2}r_1}\right]^3 = 8 \Rightarrow \frac{T_1}{T_2} = 2\sqrt{2}$$

$$\therefore\ T_2 = \frac{T_1}{2\sqrt{2}} = \frac{365\ days}{2\sqrt{2}} = 129\ days$$

116. Theory

117. Efficiency of a carnot engine is given by

$$\eta = 1 - \frac{T_2}{T_1}$$

or $\frac{W}{Q} = 1 - \frac{T_2}{T_1} \Rightarrow \frac{W}{6} = 1 - \frac{(273+127)}{(273+227)}$

$\Rightarrow W = 1.2\ k\,cal$

118. Conceptual

119. $\tau_{max} = MB$ or $\tau_{max} = ni\pi r^2 B$. Let number of turns in length l is n so $l = n(2\pi r)$ or $\alpha = \frac{l}{2\pi n}$

$$\Rightarrow \tau_{max} = \frac{ni\pi Bl^2}{4\pi^2 n^2} = \frac{l^2 iB}{4\pi n_{min}} \Rightarrow \tau_{max} \propto \frac{1}{n_{min}} \Rightarrow n_{min} = 1$$

120. theory point

121. $\nu = \frac{1}{2\pi\sqrt{LC}}$ and $\lambda = \frac{C}{\nu}$

122. Breaking stress depends on the material of wire only.

123. $\beta \propto \lambda$. Inside water, λ decreases to λ / μ.

124. Let k = force constant of the spring.

Potential energy of the spring after the first stretching = $= E_1 = \frac{1}{2}kx^2$.

Potential energy of the spring after the second stretching $= E_2 = \frac{1}{2}k(2x)^2$.

$W_1 = E_1, W_2 = E_2 - E_1$.

125. $Q = \sigma A t (T^4 - T_0^4)$

If T, T_0, σ and t are same for both bodies then $\frac{Q_{sphere}}{Q_{cube}} = \frac{A_{sphere}}{A_{cube}} = \frac{4\pi r^2}{6a^2}$ .....(i)

But according to problem, volume of sphere = Volume of cube $\Rightarrow \frac{4}{3}\pi r^3 = a^3 \Rightarrow$

$a = \left(\frac{4}{3}\pi\right)^{1/3} r$

Substituting the value of a in equation (i) we get

$$\frac{Q_{sphere}}{Q_{cube}} = \frac{4\pi r^2}{6a^2} = \frac{4\pi r^2}{6\left\{\left(\frac{4}{3}\pi\right)^{1/3} r\right\}^2}$$

$$= \frac{4\pi r^2}{6\left(\frac{4}{3}\pi\right)^{2/3} r^2} = \left(\frac{\pi}{6}\right)^{1/3} : 1$$

126. As the mass of 10 kg has acceleration 12 m/s^2 therefore it apply 120N force on mass 20kg in a backward direction.

$\therefore$ Net forward force on 20 kg mass = 200 – 120 = 80N

$\therefore$ Acceleration $= \frac{80}{20} = 4\, m/s^2$

127. Intensity of polarized light from first polarizer $= \frac{100}{2} = 50$

$I = 50 \cos^2 60° = \frac{50}{4} = 12.5$

128. $\phi = Li = BAN$.

129. $KE = \frac{L^2}{2I}$

where L is a constant

130. t_1 = 6 sec

t_2 = 4 sec

$\therefore$ h = $\frac{1}{2}$ g t_1 t_2 = 120 m

131. mg - T = ma ---- (1)

$\tau = I\alpha$

$RT = \left(\frac{mR^2}{2}\right)\frac{a}{R}$

$T = \frac{ma}{2}$ ---- (2)

Solving (1) & (2)

A = 2g/3

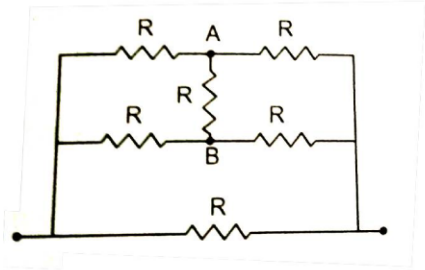
132. Focal length of lens will increase by four times (i.e. 12 cm) while focal length of mirror will not affected by medium.

133. For open pipe $f_1 = \frac{v}{2l}$ and for closed pipe

$f_2 = \frac{v}{4 \times \left(\frac{l}{4}\right)} = \frac{v}{l} = 2f_1 \Rightarrow \frac{f_1}{f_2} = \frac{1}{2}$

134. Conceptual

135. Any circuit element situated between points at the same potential can be removed from the circuit.



By symmetry, points A and B are at the same potential. Thus, removing the resistance R between A and B, the circuit reduces to three resistances of 2R, 2R and R in parallel.

[CHEMISTRY]

137. $H.E \propto \frac{1}{Size}$

F has high H.E and low BDE

139. Gd = 64

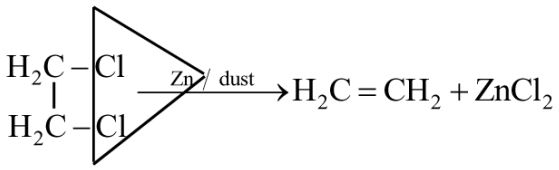
Gd = [Xe] $6S^2 5d^1 4f^7$

141. d^5. Low Spin Complexes

$t_{2g}^5 \; eg^0$

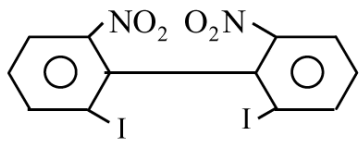
$CFSE = 5 \times (-0.4) = -2\Delta_0$

142.



143. $LiAlH_4$ reduces $-\overset{\overset{O}{\|}}{C}- \rightarrow \overset{\overset{OH}{|}}{CH}$

144.



Biphenyl exhibit optical isomerism when

1) Neither ring should have a plane of symmetry

2) Both rings should be substituted at 0 - position with bulky groups.

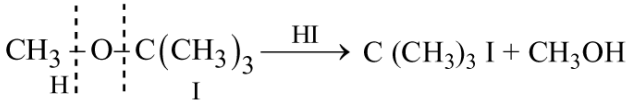
145.

$22400\,C.C \rightarrow 28$ gm

$224\ C.C \rightarrow ?$

$\frac{28 \times 224}{22400} = 0.28 = 28\%$

146.

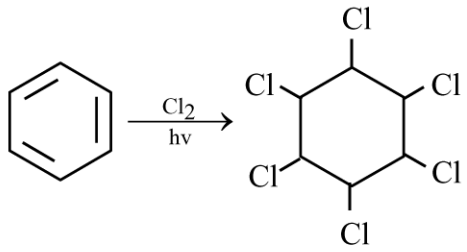


It follows SN^1 mechanism

147. + I groups increase basic nature

148. $H_3C-CH=CH-CH_3 \xrightarrow[KMnO_4]{\text{acidified}} 2H_3C-COOH$

149.



$C_6H_6Cl_6$ - BHC

150. Acidic nature order $sp > sp^2 > sp^3$

(acidic nature $\propto$ E.N)

151. Lithium tetra hydrido aliminate (III)

154. $O_3 + 2Hg \longrightarrow \underset{\text{Mercurous oxide}}{Hg_2O} + O_2$

155. $n_{CH_4} = \frac{x}{16} \quad n_{SO_2} = \frac{x}{64}$

$$P_{SO_2} = P \times \frac{n_{SO_2}}{n_{CH_4} + n_{SO_2}} = 12 \times \frac{1}{5} = 2.4$$

156. $\underset{0.1}{NaCl} \longrightarrow \underset{0.1}{Na^+} + \underset{0.1}{Cl^-}$

$AgCl \longrightarrow Ag^+ + Cl^-$

$1.6 \times 10^{-10} = S \,.\, S$

$1.6 \times 10^{-10} = S \,.\, [0.1]$

$S = 1.6 \times 10^{-9}$

157. Elevation in boiling point is a colligative property

Colligative property $\propto$ No of particles $\times$ concentration

$Al_2(SO_4)_3$ has highest particle concentration so highest B.P.

159. ERG like phenol increases electron density on benzene ring due to which electrophile attacks more readily

160.

$$H_2N-CH_2-COOH+H_2N-(CH_2)_5-COOH \longrightarrow \left(HN-CH_2-\overset{O}{\overset{\|}{C}}-NH-(CH_2)_5-\overset{O}{\overset{\|}{C}}-\right)_n$$

Nylon – 2 – Nylon – 6

161. FCC $\longrightarrow$ 4 atm

$$\left[\underset{A}{\left(8\times\frac{1}{8}\right)}+\underset{B}{\left(6+\frac{1}{2}\right)}\right]$$

$\left(6\times\frac{1}{8}\right)$ $6\times\frac{1}{2}$

$A_{6/8}$ B_3

A_6 B_{24}

AB_4

162. Buffer capacity = $\frac{\text{No. of moles of acid / base added per L}}{\text{Change in p}^H}$

$= \frac{4\times10^{-2}}{10^{-2}} = 4$

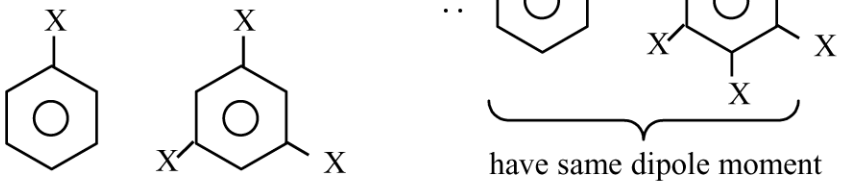
163. No of spectral lines = $\sum n_2 - n_1 = \sum 5-1 = 10$ lines

164. Basic nature $\propto \frac{1}{\text{E.N}}$

$sp^3 > sp^2 > sp$

Aliphatic amines more basic than aromatic amine

165.



166. In a number after the decimal zero's are not significant. Hence for 0.0000135 significant figure is 3

167. $P = P_A^o X_A + P_B^o X_B$

$= (119 \times 0.5) + (37 \times 0.5)$

$= 59.5 + 18.5 = 78$

$Y_{\text{Toluene}} = \dfrac{P_B^o X_B}{P_T}$

$= \dfrac{18.5}{78} = 0.237$

168. $t_{1/2} = \dfrac{0.693}{K}$

$= \dfrac{0.693}{0.1} = 6.93$

$8 \rightarrow 4 \rightarrow 2$

(1) (2)

$2t_{1/2} = 2 \times 6.93$

$= 13.86$ min

170. $T_C \propto$ adsorption

171. Addition of inert gas at constant pressure shifts equilibrium towards more number of moles side

$PCl_5 \longrightarrow PCl_3 + Cl_2$, number of moles are increased on products side hence forward reaction is favourable

172. $E_{RP} = \dfrac{0.06}{1} \log\left[H^+\right]$

$= \dfrac{0.06}{1} \log\left[10^{-2}\right]$

$= -0.12$V

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

$= 150 \times 10^3 - [100 \times 300]$

$= [150 - 30]10^3 = 120KJ$

176. $\Lambda^{o}_{CH_3COOH} = \lambda^{o}_{CH_3COONa} + \lambda^{o}_{HCl} - \lambda^{o}_{NaCl}$

= 91 + 425.9 – 126.4

= $390.5 S cm^2 mol^{-1}$

174. Less EN halogen cannot displace more EN halogen from its salt solution

180. Ambident Ligands exhibit linkage isomerism