PACE-IIT & MEDICAL

ANDHERI / BORIVALI / DADAR / CHEMBUR / THANE / NERUL / KHARGHAR / POWAI

MOCK TEST - 6 -(NEET 2019 Aspirants) - Solutions

(1) - $(\vec{a}_1 - \vec{a}_2)\cdot(2\vec{a}_1 + \vec{a}_2) = 2\vec{a}_1\cdot\vec{a}_1 + \vec{a}_1\cdot\vec{a}_2 - \vec{a}_2\cdot(2\vec{a}_1) - \vec{a}_2\cdot\vec{a}_2$

$= 1 - \vec{a}_1\vec{a}_2 = 1 - a_1 a_2 \cos\theta$

Also $|\vec{a}_1 + \vec{a}_2| = \sqrt{a_1^2 + a_2^2 + 2a_1 a_2 \cos\theta} = 3$

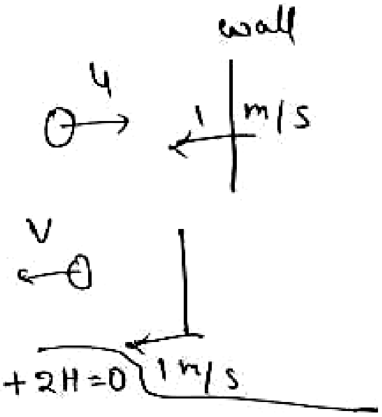
$a_1 a_2 \cos\theta = 1/2$

$\Rightarrow (\vec{a}_1 - \vec{a}_2)\cdot(2\vec{a}_1 + \vec{a}_2) = 1 - 1/2 = 1/2$

(2) - 3

(3). $e = 1 \Rightarrow (4+1) = v - 1$

$v = 6\ m/s$



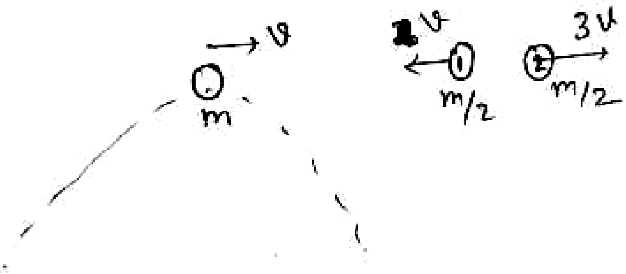
(4) → $H = (u\sin\theta)t - \frac{1}{2}gt^2 \Rightarrow gt^2 - 2u\sin\theta\, t + 2H = 0$

have 2 roots t_1 & t_2. And $t_1 + t_2 = \frac{2u\sin\theta}{g}$

The max^m height is given as : $H_{max} = \frac{u^2\sin^2\theta}{2g}$

$\Rightarrow H_{max} = \frac{(t_1+t_2)^2}{8}$

(5)

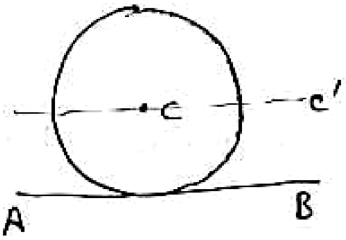


$E_1 = \frac{1}{2}\left(\frac{m}{2}\right)(v)^2 = \frac{mv^2}{4}$

$E_2 = \frac{1}{2}\left(\frac{m}{2}\right)(3v)^2 = \frac{9}{4}mv^2$

$E_2 = 9E_1$

(6) →



$I_{AB} = I_{cc'} + mR^2$

$= \frac{mR^2}{2} + mR^2 = \frac{3MR^2}{2}$

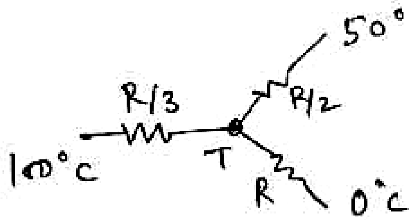
$\left.\begin{array}{l} l = 2\pi R \\ m = \rho l \end{array}\right\} \Rightarrow I_{AB} = \frac{3}{2}\rho l \left(\frac{l}{2\pi}\right)^2$

$= \frac{3}{8}\frac{\rho l^3}{\pi^2}$

(7) – 4

(8) → 3

(9) →



$\Rightarrow T = \frac{\frac{100}{(R/3)} + \frac{50}{(R/2)} + \frac{0}{R}}{\frac{3}{R} + \frac{2}{R} + \frac{1}{R}}$

$= \frac{400}{6} = \frac{200}{3}°C$

(10) · % remain after 5 half lives $= \frac{1}{(2)^5} \times 100 = 3.125\,\%$

(11) · for objective lense : $v = 12$ cm $f = 2$ cm

$\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \Rightarrow \frac{1}{12} - \frac{1}{u} = \frac{1}{2} \Rightarrow u = \frac{-12}{5} = -2.4$ cm

(12) water

water

$\frac{\mu_w}{f} = \frac{\mu_1 - \mu_w}{R} + \frac{(\mu_2 - \mu_1)}{(-R)} + \frac{(\mu_w - \mu_1)}{R}$

$\frac{4}{3(30)} = \frac{(\mu_1 - \mu_2)}{15}$

$\mu_1 - \mu_2 = \frac{2}{3}$

(13) :- $\frac{4}{1.2+2r} = \frac{2}{1.2+r/2} \Rightarrow 4.8+2r = 2.4+4r$

$\Rightarrow 2r = 2.4 \Rightarrow r = 1.2\ \Omega$

(14) $\phi = hf_0$

$h(2f_0) - h(f_0) = \frac{1}{2}m_e(4\times10^6)^2$ —— (i)

$h(5f_0) - hf_0 = \frac{1}{2}m_e(v)^2$ —— (ii)

from (i) & (ii) $\frac{1}{4} = \frac{16\times10^{12}}{v^2} \Rightarrow v = 8\times10^6$ m/s

(15) Voltage Gain $= \frac{(2\times10^3)(10\times10^{-3})}{(200)(10\times10^{-6})} = 10000$

(16). (3)

(17). (4)

(18). $\vec{a} = \frac{-4\hat{i}-8\hat{j}}{4} = -\hat{i}-2\hat{j}$

$\vec{v} = (15\hat{i}+20\hat{j}) + (-\hat{i}-2\hat{j})t$

$= (15-t)\hat{i} + (20-2t)\hat{j}$

When y-component become zero $\Rightarrow 20-2t = 0$

$t = 10$ sec

At that moment x-Component $= 15-10 = 5$ m/s

(19). $\frac{\Delta V}{V} = \frac{\Delta l}{l} + 2\frac{\Delta r}{r}$

$= 2 + 2(0.5 \times 2) = 0\%$.

(20). mass of water rise $= \rho \pi r^2 h = \rho \pi r^2 \left(\frac{2T\cos\theta}{\rho g r}\right)$

(1) $m \propto r \Rightarrow R \to 2R \quad M \to 2M$ ✓

(21) $V_{rms} \propto \sqrt{T} \Rightarrow \frac{v_1}{v_2} = \sqrt{\frac{300}{1200}} \Rightarrow v_2 = 2V_1$

(22) $\frac{\Delta V}{V} = \frac{1}{2}\frac{\Delta T}{T} = 1\%$

$\frac{\Delta f}{f} = \frac{\Delta V}{V} \Rightarrow \frac{5}{f} = 1\% \Rightarrow f = 500\ Hz$

(23) $\phi = \pi R^2 E$

(24) $P_1 = P_2$ & $\lambda = \frac{h}{P} \Rightarrow \frac{\lambda_1}{\lambda_2} = 1$

(25) (3)

(26) $\frac{\Delta T}{T} = \frac{1}{2}\alpha\Delta\theta \Rightarrow \frac{\Delta T}{86400} = \frac{1}{2} \times 12 \times 10^{-6} \times 20 \Rightarrow \Delta T = 10.36$ sec/day

(27) $t = \frac{d_{out} - d_{in}}{2} = \frac{4.23 - 3.89}{2} = \frac{0.34}{2} = 0.17$

$\frac{\Delta t}{B} = \Delta d_{out} + \Delta d_{in} = 0.02$

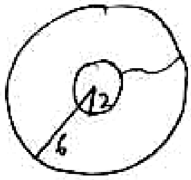
$t = (0.17 \pm 0.02)$ cm

(28) – (1)

(29) $2\lambda \cos\theta = \lambda \Rightarrow \cos\theta = \frac{1}{2} \Rightarrow \theta = 60^\circ$

$\tan 60^\circ = \frac{x}{D} \Rightarrow x = \sqrt{3}\,D$

(30)



$Q = (4\pi\varepsilon_0 r)V \Rightarrow Q = K(2)(120)$

$V' = \frac{K(2)(120)}{K6} = 40\,V$

(31) (3) $V_{capacitor} = \frac{E}{(R_2+r)} R_2$

$Q_{cap} = CV$

$= \frac{CER_2}{R_2+r}$

(32) $_{92}U^{238} \longrightarrow {}_{82}P^{214} \Rightarrow$ Chang in Atomic Weigh = 24

" Number = 10

$6\alpha, 2\beta$

(33) $E_p = \frac{hc}{\lambda}$; $E_e = \frac{1}{2}mv^2 = \frac{p^2}{2m} = \frac{(h/\lambda)^2}{2m_e}$

$E_e : E_p = \frac{(h/\lambda)}{2m_e} : c \approx 1 : 100$

(34) 2 beats

(35) $R_1 = \frac{(220)^2}{100}$; $R_2 = \frac{(220)^2}{60}$

When $||^{rl}$ $R_{eq} = \frac{(220)^2}{160}$; $i = \frac{220}{R_{eq}} = \frac{16\not{0}}{22\not{0}} = 0.73\,A$

(36) $\frac{g}{9} = \frac{GM}{(R+h)^2} \Rightarrow \frac{1}{9}\frac{GM}{R^2} = \frac{GM}{(R+h)^2}$

$R + h = 3R \Rightarrow h = 2R$

(37) 

$t = \frac{2u\sin\theta}{g} = 2 \times (98)(\sin 30^\circ) = 10 \text{ sec}$

after 10 sec the projectile will be on ground

$\Delta p = mv = (0.5)(98) = 49 \text{ N-sec}$

(38) for 1st droplet $r_1 = r$; $m_1 = m$; $V_T = V$

for 2nd droplet $r_2 = 2r$; $m_2 = 8m$ $V_T = 4V$

$P_1 = mV$ & $P_2 = 32mV = 32P_1$

(39) $\mu = \tan\theta = \tan 30^\circ = \frac{1}{\sqrt{3}} = 0.577$

(40) $\lambda \propto \frac{1}{p} \Rightarrow \frac{\lambda_1}{\lambda_2} = \frac{P_2}{P_1} = \frac{m_2 v_2}{m_1 v_1} = \frac{(E_2)^2/2m_2}{(E_1)^2/2m_1}$

$E_1 = E_\alpha = (100)(2q_e)$; q_e = electron charge

$E_2 = E_d = (100)(q_e)$

$\frac{\lambda_1}{\lambda_2} = \frac{(100q_e)^2/2(2m_p)}{(200q_e)^2/2(4m_p)} = \frac{1}{4} \times 2 = \frac{1}{2}$

(41) $B = -V\frac{dP}{dV}$ & $VP^n = \text{Constant}$

$\Rightarrow V(nP^{n-1})\,dP + P^n dV = 0$

$nV\,dP + P\,dV = 0$

$\left[-V\frac{dP}{dV} = \frac{P}{n} = B\right]$

(42). $\varepsilon = -\frac{d\phi}{dt} = -6t + 4$

at $t = 2$ Sec

$$|\varepsilon| = |-6\times2+4| = 8 \text{ Volt}$$

(43) $\vec{v} \parallel \vec{B}$ $\vec{F} = 0$

(44) (1)

(46) $R \propto l$ and Area remain Constant

$$\frac{R_1}{R_2} = \frac{l_1}{l_2} \Rightarrow \frac{R_1}{R_2} = \frac{1}{2} \Rightarrow R_2 = 2R_1 = 4\Omega$$

46. Molarity = $\frac{\text{Moles of solute}}{\text{Volume of solution in litre}}$

Number of moles of urea = $\frac{120}{60} = 2$

Weight of solution = weight of solute + weight of solvent

$= 120 + 1000 = 1120$ g

Volume = $\frac{1120 \text{ g}}{1.15 \text{ g/ml}} \times \frac{1}{1000 \text{ ml/L}} = 0.974$ L

Molarity = $\frac{2}{0.974} = 2.05$ M

47. $3ClO^-_{(aq)} \longrightarrow ClO^-_{3(aq)} + 2Cl^-_{(aq)}$

It is an example of disproportionate reaction because the same species (ClO^-) is being oxidized to ClO_3^- as well as reduced to Cl^-.

48. $PV = nRT = \frac{w}{M}RT$

$PM = \left(\frac{w}{V}\right)RT = dRT$

$d = \frac{PM}{RT}$ (where d = density)

i.e. density will be greater at low temperature and high pressure.

49. Kinetic energy (E) = $\frac{3}{2}$KT

R.MS speed $(u) = \sqrt{\frac{3KT}{m}} = \sqrt{\frac{2E}{m}}$

Or $u = \left(\sqrt{\frac{2E}{m}}\right)^{1/2}$

50. $\lambda = \frac{h}{mv}$

$= \frac{6.625 \times 10^{-34} \times 60 \times 60}{0.2 \times 5} = 2.3 \times 10^{-30}$ m

51. At the critical temperature the meniscus between the liquid and the vapour disappears.

52. For bcc, $d = \frac{\sqrt{3}}{2}a$

$a = \frac{2d}{\sqrt{3}} = \frac{2 \times 4.52}{1.732}$

$= 5.219$ A° = 522 pm

$\rho = \frac{Z \times M}{a^3 \times N_0 \times 10^{-30}}$

$= \frac{2 \times 39}{(522)^3 \times 6.02 \times 10^{23} \times 10^{-30}}$

$= 0.91$ g/cm³ = 910 kgm⁻³

53. Be^- is the least stable ion Be ($1s^2, 2s^2$) has stable electronic configuration hence addition of electron decreases stability.

54.

Species	Hybridisation
NH_3	sp^3
$[PtCl_4]^{2-}$	dsp^2
PCl_5	sp^3d
BCl_3	sp^2

55. The bond order of CO is 3.

NO^+, CN^- and N_2 are isoelectronic with CO hence they have the same bond order as CO.

NO^- ($16e^-$) has bond order of 2.

56. Alkali metal salts are usually more soluble than the salts of transition metals. Also CuS is less soluble than ZnS because of $3d^9$ configuration of Cu^{2+}. Hence the order of solubility is

$$Na_2S > ZnS > CuS$$

57.

	CH_3NH_2	+ HCl →	$CH_3NH_3^+$	+ Cl^-
Initial	0.10	0.08	0	0
Final	0.02	0	0.08	0.08

$$pOH = pK_b + \log\frac{[CH_3NH_3^+]}{[CH_3NH_2]}$$

$$pOH = -\log(5\times10^{-4}) + \log\frac{0.08}{0.02} = 3.9$$

$$pH = 14 - pOH = 14 - 3.9 = 10.1$$

$$[H^+] = 8\times10^{-11}$$

58. Elements in its standard state have zero enthalpy of formation. Cl_2 is gas at room temperature. hence ΔH_f° of $Cl_{2(g)}$ is zero

59. $$\Lambda_m^\circ(MgCl_2) = \lambda^\circ_{Mg^{2+}} + 2\lambda^\circ_{Cl^-}$$

$$= 106.1 + 2\times76.3$$

$$= 258.7\ ohm^{-1}\ cm^2\ mol^{-1}$$

60. When a lead storage battery is discharged, then sulphuric acid is consumed as:

$$Pb + PbO_2 + 2H_2SO_4 \longrightarrow 2PbSO_4 + 2H_2O$$

61. $Fe^{2+} + Ce^{4+} \rightleftharpoons Fe^{3+} + Ce^{3+}$

$$E^\circ = E^\circ_{(Ce^{4+}/Ce^{3+})} - E^\circ_{(Fe^{3+}/Fe^{2+})}$$

$$E^\circ = 1.44 - 0.68$$

$$= 0.76\ V$$

$\because$ $E^\circ = 0.0592 \log K$

$$\log K = \frac{E^\circ}{0.0592} = \frac{0.76}{0.0592} = 12.83$$

$$K = 6.88\times10^{12}$$

62. $$K = \frac{0.693}{10}\ year^{-1}$$

$$K = \frac{2.303}{t}\log\frac{a}{a-0.99a}$$

$$\therefore\ \frac{0.693}{10} = \frac{2.303}{t}\log10^2$$

$$t = \frac{10\times2.303\times2}{0.693}$$

$$= 66.5\ years \approx 67\ years$$

63. Cow milk is an emulsion stabilsed by casein.

64. $$\Delta E = -C\times\Delta t\times\frac{M}{m}$$

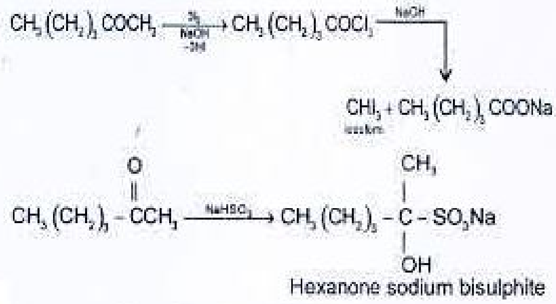
(–sign is used because heat is evolved)

$$= \frac{500\times2\times16}{0.1}$$

$$= -160000\ J$$

$$= -160\ KJ$$

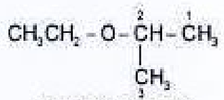
65. Acetaldehyde and methyl ketone gives the iodoform reaction.



66. In aromatic nitration NO_2^+ (nitronium ion) acts as an electrophile.

$$HNO_3 + H_2SO_4 \longrightarrow \underset{electrophile}{NO_2^+} + HSO_4^- + H_2O$$

67.

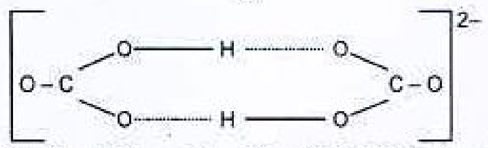


2-ethoxy propane

68. Wolframite is ferrous tungstate $FeWO_4$ which is magnetic in nature.

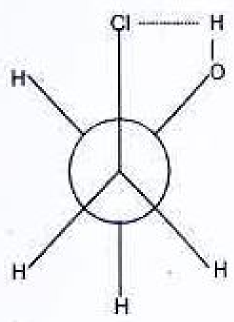
69. Hydrogen burns in air or oxygen with pale blue flame.

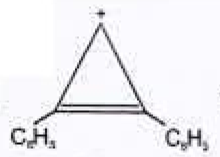
70. The crystal structures of $NaHCO_3$ and $KHCO_3$ both show H-bonding but are different. In $NaHCO_3$, HCO_3^- ions are linked into an infinite chain while in $KHCO_3$ a dimeric anion is formed.



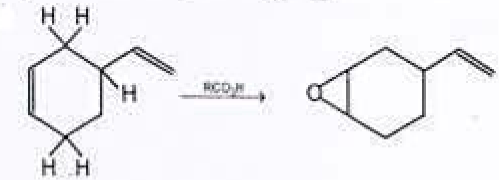
71. Oxalic acid is weak acid and NaOH is strong base hence the suitable indicator phenolphthalein is used for the titration of oxalic acid and NaOH solution.

72. Due to weak H-bonding between H atom of OH group and Cl gauche conformation of chlorohydrin is most stable at room temperature.



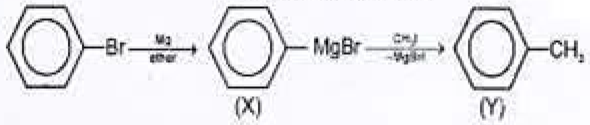
73.  has 2π electrons and all the three C-atom of the ring are sp^2 hybridized. Hence according to Huckel rule it is aromatic.

74. With peracids double bonds which are electron rich preferentially undergo epoxidation



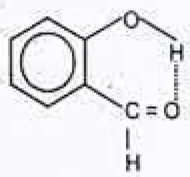
75. $:\overset{-}{C}H_2-\overset{+}{N}\equiv N \xrightarrow{\text{Sun light}} :CH_2 + N_2$
Diazomethane methylene

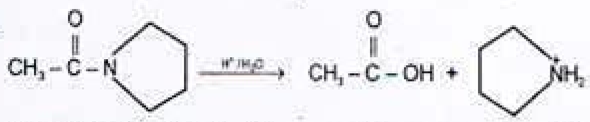

methlcyclopropane

76. 

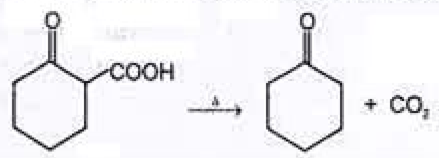
77. Vinyl chloride ($CH_2 = CHCl$) does not undergo hydrolysis and hence does not form white ppt. of AgCl.

78. In salicyaldehyde the OH group is less reactive than in m and p-isomers or benzyl alcohol due to chelation



79. 

80. Only β-keto acids i.e. 2-oxocyclohexane carboxylic acid on heating undergo decarboxylation.



82. P-benzoquinone acts as inhibitor it traps the radical intermediate to form a non-reactive radical which is highly stabilized by resonance.

83. Arsenic drugs such as salvarsan is used for treatment of syphilis.

84. $\underset{(A)}{NH_4NO_3} + NaOH \longrightarrow NaNO_3 + \underset{(B)}{NH_3} + H_2O$

$\underset{\text{Nessler's reagent}}{2K_2[HgI_4]} + NH_3 + 3KOH \longrightarrow \underset{\text{Brown ppt.}}{H_2N\cdot HgO\cdot HgI} + 7KI + 2H_2O$

$NH_4NO_3 \longrightarrow \underset{(C)}{N_2O} + 2H_2O$

N_2O rekindles glowing splinter but is not converted into NO_2 by air oxidation.

85. Co^{3+} will give blue bead in borax bead test.

86. Wilkinson's catalyst, $(Ph_3P)_3RhCl$ is a homogeneous catalyst. In it the hybridization of central metal (Rh) is dsp^2 and the shape of this catalyst is square planar.

87. Molecular weight of $KMnO_4 = 39 + 55 + 64 = 158$

$$2K\overset{+7}{Mn}O_4 \xrightarrow{OH^-} 2K_2\overset{+6}{Mn}O_4$$

Here one electron gain.

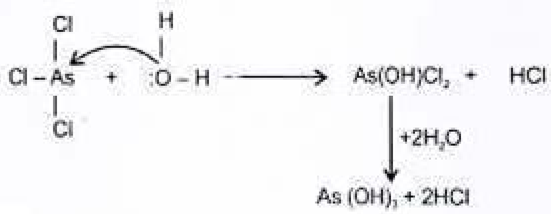
Hence the equivalent weight of $KMnO_4$ is equal to its molecular weight i.e. 158

88. Only He due to its small size can form interstitial compounds. All other noble gases do not form such compounds.

89. F-B bond is the strongest bond due to most effective overlap of the p-orbitals. The bond energies for single bonds in KJ mol^{-1} is as:

Bond	Bond energy
F – B	613
F – Cl	184
F – Br	255
Cl – Br	217

90. $AsCl_3$ due to lower value of electronegativity of As undergoes hydrolysis not through H-bonding mechanism but through nucleophilic attack by H_2O molecule.



91. Cell division Pg no. 168

92. **Organism & Population Pg no. 227**

93. **Mineral Nutrition Pg no. 197**

94. **Photosynthesis Pg no. 218**

95. **Respiration Pg no. 232**

96. **Respiration Pg no. 233**

97. **Repro in org Pg no. 6 & 7**

98. **Repro in org Pg no. 13**

99. **Environmental Pg no. 284**

100. **Sexual reproduction**

Ploidy level of cell in nucleus is 2n

101. **Principles of inheritance**

Aa Bb Cc will form 8 types of gametes

102. **Ecosystem Pg no. 242**

103. **Principles**

Ability of a gene to have multiple phenol typic effect is pleiotropy

104. **Molecular basis**

Splicing a post – transcriptional actinty is seen only in eukaryotes Eg, Chlamydomoras

105. **Biodiversity Pg no. 267**

106. **Strategies Pg no. 175**

107. **Environmental issue – Pg 271, 276**

108. **BIODIV Pg no. 267**

109. **Biological classification Pg no. 23,24**

110. **Cell, the unit**

Lyso somes show extensive polymorphism

111. **MOFP Pg no. 78,79**

112. **Principles**

Law of dominance, shows expression of 1 parental trait

113. **Strategies Pg no. 176**

114. **Molecular**

Time taken to increase from 1.5×10^5 = 42mm

3 generations required = 42 min

1 generation = 14 min

115. **Molecular**

Wt of 1 aa = 100 mu ; MRNA = 600 bases

= 200 codons

200 coolons = 199 amino acid

Iut of 199 aa = 20,000 mu

116. **Biodiversity Pg no. 259**

117. **Biodiversity Pg no. 263**

118. **Ecosystem Pg no. 250**

119. **Biodiversity Pg no. 263**

120. **Sexual repro Pg no. 24 & MOFP Pg no. 80**

121. **Environmental Issues – Pg no 270, 285**

122. **Molecular – Pg no. 99**

123. **Principles –**

Terminal flowers in pea,

Thalassemia 4 vestigeal wings of drosophila are recessive trait

124. **LW Pg no. 13**

125. **Anatomy – Pg no. 89**

126. **Molecular**

C = 42% $\therefore$ **According to chargaff's rules**

C = 42% **T =A = 8%**

127. **Living world Pg no. 5**

128. **PK + B.C**

Nostoc, chara, Porphyra, wolffia are autotrophic

129. **Biological classification Pg no. 24**

130. **MOFP – Pg no. 80**

131. **PK – Pg no. 38, 39**

132. **PK**

Pinus comes under gymnosperm

133. **MOFP – Pg no 71**

134. **Environmental issue – Pg no 273**

135. **Microbes – Pg no 181**

136. **Principles – Pg no 91**

137. **Repro –**

Tapetum provides nourishment

138. **BIODIV**

Pg no. 264,265

139. **Molecular basis – According to Chargaff's rules**

A = 40% $\therefore$ **T = 40%**

G = 10% **C = 10%**

140. **BIODIV - Pg no. 267**

Q. No.	**Solution**
141.	XI, Chapter 18; Pg. 279-280
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