1. (4)
2. (4)
   Charge particles accelerate due to magnetic field in dees and due to electric field in gap.
3. (2)
4. (4)
   \[ f = \frac{1}{2\pi\sqrt{LC}} \]
5. (3)
   \[ \lambda = \frac{12375}{10} \text{ A} = 1237.5 \text{A} \]
6. (1)
7. (3)
8. (1)
   \[ l_{uv} = \left( \int_{T_0}^{T_0} \frac{r^2}{T_0} \, dt \right) \frac{l_0}{\sqrt{3}} \]
9. (1)
   Circuit behaves like pure resistive at resonance
10. (3)
11. (1)
    \[ i = \frac{50}{R} \quad \text{....(i)} \]
    \[ \Rightarrow r^2 = \frac{50}{R\sqrt{2}} \quad \text{....(ii)} \]
    \[ V = iR \]
    \[ \Rightarrow V = 25\sqrt{2} \text{ volt} \]
12. (3)
13. (4)
    \[ 8 = 0.2 \left| \frac{di}{dt} \right| \Rightarrow \left| \frac{di}{dt} \right| = \frac{80}{2} = 40 \text{A/s} \]
14. (2)
    \[ \frac{L_1}{R} < \frac{L_2}{R} \]
    \[ L_1 < L_2 \]
15. (3)
    \[ \omega < \omega_0 \]
    \[ \therefore \text{ Behave like C – R circuit.} \]
16. (4)
17. (3)
When key is shift just after it and before it flux is same.
\[ L_x = \frac{3}{2} L_{x'} \]
\[ \Rightarrow x' = \frac{2}{3} x \]

18. (4)
19. (1)
\[ e = -\frac{de}{dt} \]
\[ \Rightarrow e = -4t \]

20. (2)
21. (2)
22. (3)
In ideal transformer, 
\[ P_{\text{input}} = P_{\text{output}} \] and transformer cannot change frequency.

23. (3)
24. (4)
Uniform magnetic field cannot do work

25. (4)
26. (3)
27. (2)
\[ \phi_m = BA \]
\[ = 4 \times 0.04 = 0.16 \text{ weber} \]

28. (4)
\[ L \propto N^2 A \]
29. (4)
\[ \frac{M}{L} = \frac{-e}{2m} \]

30. (3)
31. (2)
\[ mg = \frac{mg}{2} + iB_0 \]
\[ \Rightarrow \frac{mg}{2} = iB_0 \Rightarrow i = \frac{mg}{2B_0} \]

32. (4)
\[ M = iA \]
\[ \Rightarrow M = \frac{q}{T} \pi r^2 \]
\[ \Rightarrow M \propto \frac{1}{T} \]

33. (2)
34. (3)
In a plane perpendicular to magnetic meridian horizontal component of earth magnetic field is zero.
35. (3)  
36. (1)  
37. (4)  
Circular loop will experience repulsive force.
38. (2)  
39. (4)  
40. (4)  
Velocity will be same after every time period.
41. (3)  
The magnetic field at $O$  
Due to inner straight wires is zero,  
Due to outer straight wires is $\frac{\mu_0 I}{4\pi R}$ each,  
Due to outer circular wire is $\frac{1}{4} \frac{\mu_0 I}{2R}$ and  
Due to inner circular wire is $\frac{1}{4} \frac{\mu_0 I}{2R}$  
The resultant of all these is $2 \times \frac{\mu_0 I}{4\pi R} = \frac{\mu_0 I}{2\pi R}$
42. (4)  
\[
\frac{\mu_0 I}{2r} - \frac{\mu_0 I}{2(2^2 r)} + \frac{\mu_0 I}{2(2^3 r)} - \frac{\mu_0 I}{2(2^4 r)} + \ldots = \frac{\mu_0 I}{2r} \left(1 - \frac{1}{2} + \frac{1}{2^2} - \frac{1}{2^3} + \ldots\right) = \frac{\mu_0 I}{2r} \times \frac{1}{1+1/2}
\]
\[= \frac{\mu_0 I}{3r}\]
43. (3)  
$U = -MB \cos \theta, \quad U_1 = +MB, \quad U_{II} = 0$
$-MB < U_{III} < 0, \quad 0 < U_{IV} < +MB$
\[\therefore U_1 > U_{IV} > U_{II} > U_{III}\]
44. (4)  
The horizontal distance between points $P$ and $Q$ is $l = a$. The p.d. between these points is $\varepsilon = B lv = B va$
45. (4)
46.  
\[ 2\text{CuSO}_4 + K_4\left[\text{Fe(CN)}_6\right] \rightarrow \text{Cu}_2\left[\text{Fe(CN)}_6\right] + 2\text{K}_2\text{SO}_4 \]

47.  
(4)  
\[ 2\text{HGCL}_2 + \text{SnCl}_2 \rightarrow \text{Hg}_2\text{Cl}_2 + \text{SnCl}_4 \]  
White ppt  
\[ \text{Hg}_2\text{Cl}_2 + \text{SnCl}_2 \rightarrow 2\text{Hg} + \text{SnCl}_4 \]  
grey

48.  
(1)  
\[ \text{X} \xrightarrow{\text{NH}_4\text{OH}} \text{White ppt} \]  
\[ \xrightarrow{\text{excess NaOH}} \text{Acidic solution (soluble)} (\text{No.ppt with H}_2\text{S}) \]  
Give reactions (white precipitate when H\textsubscript{2}S in presence of NH\textsubscript{4}OH) indicate that 'X' should be ZnCl\textsubscript{2} which explains all given reactions.
\[ \text{ZnCl}_2 + 2\text{H}_2\text{O} \rightarrow \text{Zn(OH)}_2 + \text{HCl} \uparrow \]  
White fumes  
\[ \text{NH}_4\text{OH} + \text{HCl} \uparrow \rightarrow \text{NH}_4\text{Cl} \uparrow \]  
White fumes  
\[ \text{NH}_4\text{Cl} \rightarrow \text{NH}_3 + \text{H}_2\text{O} \]  
Dense white fumes  
\[ \text{ZnCl}_2 + 2\text{NaOH} \rightarrow \text{Zn(OH)}_2 + 2\text{NaCl} \]  
\[ \text{Zn(OH)}_2 \xrightarrow{2\text{NaOH}} \text{Excess} \rightarrow \text{Na}_2\text{ZnO}_2 + 2\text{H}_2\text{O} \]

49.  
(1)  
Copper sulphate on treatment with excess of KCN forms complex \[ K_3\left[\text{Cu(CN)}_4\right] \text{ or } \left[\text{Cu(CN)}_4\right]^3^- \]
\[ \text{CuSO}_4 + 2\text{KCN} \rightarrow \text{Cu(CN)}_2 + \text{K}_2\text{SO}_4 \]  
\[ 2\text{Cu(CN)}_2 \rightarrow \text{Cu}_2\text{(CN)}_2 + \text{(CN)}_2 \]  
\[ \text{Cu}_2\text{(CN)}_2 + 3\text{KCN} \rightarrow K_3\left[\text{Cu(CN)}_4\right] + \text{CuCN} \]

50.  
(2)  
In potassium ferrocyanide, Fe is in +2 oxidation state. so, its correct formula is \[ K_4\left[\text{Fe(CN)}_6\right]. \]

51.  
(3)  
The coordination number of central metal atom in a complex is equal to number of monovalent ligands, twice the number of bidentate ligands and so on, around the metal ion bonded by coordinate bonds. Hence coordination number = no. of \(\sigma\) bonds formed by metals with ligands

52.  
(4)  
In the formation of a coordinate bond, the ligands donate a pair of electrons to the metal atom. Further nitrogen and oxygen has great tendency to donate the pair of electrons in most of the compounds. Therefore both nitrogen and oxygen are common donor atoms in ligands.

53.  
(1)  
In \[ \text{MnO}_4^- \], Mn is in +7 oxidation state. Electronic configuration of Mn (Z = 25): \[ [\text{Ar}]3d^54s^2 \]  
Electronic configuration of \(\text{Mn}^{7+}\) \[ [\text{Ar}]3d^04s^0 \]  
Central atom in other ions have definite number of d electrons No. of electrons
54. (1) 
Co\((\text{NH}_3)_4\)Br\(_2\)Cl will show both geometrical and ionization isomerism. 

\[\text{[Co(NH}_3\text{)]}_6^{3+}\] and \[\text{[Co(NH}_3\text{)]}_4\text{Br}_2\text{Cl}\] are ionization isomers and geometrical isomers are

55. (3) 

56. (1) 
The complex ions which give maximum ion in solution exhibit maximum ionic conductivity

\[K_4\text{[Fe(CN)}_6\text{]} \rightarrow \text{[Fe(CN)}_6\text{]}^{-4} + 4\text{K}^+ \rightarrow 5\text{ ions}\]
\[\text{[Co(NH}_3\text{)]}_6\text{Cl}_3 \rightarrow \text{[Co(NH}_3\text{)]}_3^{3+} + 3\text{Cl}^- \rightarrow 4\text{ ions}\]
\[\text{[Cu(NH}_3\text{)]}_4\text{Cl}_2 \rightarrow \text{[Cu(NH}_3\text{)]}_2^{2+} + 2\text{Cl}^- \rightarrow 3\text{ ions}\]
\[\text{[Ni(CO)}_4\text{]} \rightarrow \text{NO ions}\]

57. (3) 
O.N. of Ni in \[\text{[Ni(C}_2\text{O}_4\text{)}_3\text{]}^{-4}\]

\[x + 3(-2) = -4 \Rightarrow x = -4 + 6 = 2\]

58. (2) 
In \[\text{[Ag(NH}_3\text{)]}_2^+\] ground state configuration of

\[\text{Ag} = 4d^{10}5s^1\] excited state configuration of \(g = 4d^{10}5s^0\). \textit{sp} hybridization in Ag\(^+\) ion
The two sp hybrid orbitals in Ag⁺ overlap with the filled atomic orbitals of N in NH₃ molecules.

59.  (4) NH₃ does not form complex ion with Pb²⁺ as it is not a d-block element.

60.  (2) Complex compounds do not dissociate into Constituent ions.

\[
\text{K}_4\left[\text{Fe(CN)}_6\right] \rightarrow 4\text{K}^+ + \left[\text{Fe(CN}_6\right]^{4-}
\]

∴ It is a complex because no CN⁻ is formed on dissociation.

61.  (4) Organometallic compounds are those compounds in which metal atom is directly bonded with C-atom. H₃C – Li

62.  (2) The configuration of Ni²⁺ is 3d⁸. For the elements of the first transition series, Cl⁻ behaves as a weak field/high spin ligand. Hence Ni in [NiCl₄]²⁻ is sp³ hybridised leading to tetrahedral shape.

63.  (2) It is optically active when two Cl atoms are in cis position.

64.  (2) Complex Co(en)(NH₃)_2Cl will have four different isomers.
(i) **Geometrical isomers**

![Geometrical isomers](image1)

(ii) **Optical isomers**

![Optical isomers](image2)

65. (1) Chloro diaquatriammine cobalt (III) chloride is $[\text{CoCl}(\text{NH}_3)_3(\text{H}_2\text{O})_2]\text{Cl}_2$

66. (1) According to VSEPR theory, a molecule with six bond pairs must be octahedral.

67. (4) In $[\text{Cr}(\text{NH}_3)_6]\text{Br}_3$, Cr is in +3 oxidation state etc.

![Electron configuration](image3)

Its ion is octahedral in nature. Due to the presence of three unpaired electrons it is paramagnetic.

68. (1) $\text{MA}_3\text{B}_3 - 2$ geometrical isomers  
$\text{MA}_2\text{B}_4 - 2$ geometrical isomers  
$\text{MA}_4\text{B}_2 - 2$ geometrical isomers  
The complexes of general formula $\text{Ma}_6$ and $\text{Ma}_3\text{b}$ octahedral geometry do not show geometrical isomerism.

69. (2) Since $\text{H}_2\text{O}$ is a weak ligand, it will not cause pairing of electrons in the metal ion $\text{Mn}^{2+}$. Thus electronic configuration of the metal (Mn$^{2+}$) in the complex will be $23\text{Mn}^{2+} : 1s^22s^22p^63s^23p^63d^5$

i.e. s unpaired electrons.
70. (2) Since \( \text{Cr}^{3+} \) in the complex has unpaired electrons in the d orbital, hence will be coloured.

\[
\text{Ti} = [\text{Ar}]3d^24s^2; \text{Ti}^{4+} = 3d^0
\]

\[
\text{Cr} = [\text{Ar}]3d^54s^1; \text{Cr}^{3+} = 3d^3
\]

\[
\text{Zn} = [\text{Ar}]3d^{10}4s^2; \text{Zn}^{2+} = 3d^{10}
\]

\[
\text{Sc} = [\text{Ar}]3d^14s^2; \text{Sc}^{3+} = 3d^0
\]

71. (2)  

(a) \( \left[ \text{Ti} \left( \text{NH}_3 \right)_6 \right]^{3+} \): 3d¹ configuration and thus has one Unpaired electron.

(b) \( \left[ \text{Cr} \left( \text{NH}_3 \right)_6 \right]^{3+} \): In this complex Cr is in +3 oxidation state.

Thus, the complex is paramagnetic.

(c) \( \left[ \text{Co} \left( \text{NH}_3 \right)_6 \right]^{3+} \): In this complex are cobalt ion in +3 oxidation state with 3d⁶ configuration.

\[
\text{Co}^{3+}, [\text{Ar}]3d^6.
\]

(d) In this complex Zn exists as

Due to presence of paired electrons complex is diamagnetic in nature.

72. (2)

73. (2)
4-Hydroxy-2-methylnpent-2-en-1-ol

74. (2)

75. (3)

Does not contain benzene nucleus as in other options. Also delocalization of electrons is not possible.

76. (2)

Being immiscible liquids, they form different layers hence can be separated with the help of separating funnel.

77. (1)

N, S and halogens present in organic compounds are converted from covalent form into the ionic form by fusing the compound with Na metal.

\[ \text{Na} + 	ext{C} + 	ext{N} \rightarrow \text{NaCN} \]  (if N is present)

\[ 2\text{Na} + \text{S} + \rightarrow \text{Na}_2\text{S} \]  (if S is present)

\[ \text{Na} + \text{X} \rightarrow \text{NaX} \]  (if X is present)

\[ \text{Na} + \text{C} + \text{N} + \text{S} \rightarrow \text{NaCNS} \]  (if both N & S are present)

78. (2)

79. (4)

BF\textsubscript{3} has electron deficient B, hence it is an electrophile.

80. (1)

Duma’s method is based upon the fact that nitrogenous compound when heated with CuO in an atmosphere of CO\textsubscript{2} yield free nitrogen.

\[ \text{C}_x\text{H}_y\text{N}_z + (\text{CuO}) \rightarrow x\text{CO}_2 + \frac{y}{2}\text{H}_2\text{O} + \frac{z}{2}\text{N}_2 + (\text{Cu}) \]

81. (3)

C\textsubscript{5}H\textsubscript{10} has 1 degree of unsaturation since the isomers are acyclic, all of these are alkenes. For writing the isomers, first introduce the double bond at different possible positions, and then consider the possibility of branching in the alkyl group.

\[ \text{CH}_3\text{CH}_2\text{C}_2\text{CH} = \text{CH}_2 \]

1–pentene (i)

\[ \text{CH}_3\text{CH}_2\text{CH} = \text{CHCH}_3 \]

2–Pentene, (cis – trans) (ii), (iii)
Five chain isomers are possible which are-
(i) \( \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH}_3 \)
    (n-hexane)

(ii) \( \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \)
    (2 methyl pentane)

(iii) \( \text{CH}_3 - \text{CH} - \text{CH} - \text{CH}_2 - \text{CH}_3 \)
    (2, 2 dimethyl butane)

(iv) \( \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_3 \)
    (2, 3 dimethyl butane)

(v) \( \text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH}_3 \)
    (3 methyl pentane)

84. (2)
The possible isomers of the compound with molecular formula \( \text{C}_7\text{H}_8\text{O} \) is 5. These are

\( \text{C}_6\text{H}_5\text{OCH}_3, \text{C}_6\text{H}_4\text{CH}_2\text{OH} \) and

- \( \alpha\)-cresol
- \( \beta\)-cresol
- \( \gamma\)-cresol
85. (3)

More is the electron-deficiency of the carbonyl carbon, greater will be the reactivity of the carbonyl compounds towards nucleophilic addition.

![Diagram of carbonyl compounds]

86. (4)

–Cl atom shows o/p-directive influence but deactivate the benzene ring, while [–OH/–CH₃] groups show o/p influence but activate the benzene ring but in these OH group is more activating than –CH₃. Hence order of electrophilic substitution.

![Diagram of aromatic compounds]

87. (2)

Stability of an alkene depends upon the heat of hydrogenation of an alkene. The lower the heat of hydrogenation of an alkene higher will be stability.

<table>
<thead>
<tr>
<th>Order of stability</th>
<th>Heat of hydrogenation (kJ/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans-2-butene</td>
<td>115.5</td>
</tr>
<tr>
<td>cis-2-butene</td>
<td>119.6 and</td>
</tr>
<tr>
<td>1-butene</td>
<td>126.8 respectively.</td>
</tr>
</tbody>
</table>

88. (1)

![Diagram of various organic compounds]

89. (3)

Phenols are more acidic than alcohol as they are resonance stabilised whereas alcohols are not. Further nitro is an electron withdrawing which increases acidic character and facilitates
release of proton, whereas \(-\text{CH}_3\) is an electron donating group. Which decreases acidic character, thus removal of \(\text{H}^+\) becomes very difficult.

90. (2) Due to +M effect of \(-\text{OH}\) group and hyperconjugation of \(-\text{CH}_3\) group

91. Principles of inheritance and variation NCERT – Pg 72-73
92. Molecular basis of inheritance NCERT – Pg 97
93. Principles of inheritance and variation NCERT – Pg 73
94. Molecular basis of inheritance NCERT – Pg 96
95. Principles of inheritance and variation NCERT – Pg 72-73
96. Molecular basis of inheritance NCERT – Pg
97. Molecular basis of inheritance NCERT – Pg 79
98. Principles of inheritance and variation NCERT – Pg 73
99. Principles of inheritance and variation NCERT – Pg
100. Molecular basis of inheritance NCERT – Pg 99
101. Principles of inheritance and variation NCERT – Pg
102. Molecular basis of inheritance NCERT – Pg 102
103. Principles of inheritance and variation NCERT – Pg 79
104. Principles of inheritance and variation NCERT – Pg 103
105. Principles of inheritance and variation NCERT – Pg 86
106. Molecular basis of inheritance NCERT – Pg 105
107. Principles of inheritance and variation NCERT – Pg 83
108. Molecular basis of inheritance NCERT – Pg 106
109. Molecular basis of inheritance NCERT – Pg
110. Molecular basis of inheritance NCERT – Pg 108
111. Principles of inheritance and variation NCERT – Pg 91
112. Molecular basis of inheritance NCERT – Pg 108
113. Principles of inheritance and variation NCERT – Pg 92
114. Molecular basis of inheritance NCERT – Pg 110
115. Principles of inheritance and variation NCERT – Pg 91
116. Molecular basis of inheritance NCERT – Pg 112
117. Principles of inheritance and variation NCERT – Pg 90
118. Principles of inheritance and variation NCERT – Pg 90
119. Principles of inheritance and variation NCERT – Pg
120. Molecular basis of inheritance – The MRNA seq = AUGUAC CCA GC
tRNA seq = UAC; AUG; GGU; CGG
121. Principles of inheritance and variation NCERT – Pg 83
122. Molecular basis of inheritance NCERT – Pg 117
123. Principles of inheritance and variation NCERT – Pg 89
124. Molecular basis of inheritance NCERT – Pg 96
125. Principles of inheritance and variation NCERT – Pg 88
126. Molecular basis of inheritance
127. Principles of inheritance and variation NCERT – Pg 73
128. Molecular basis of inheritance NCERT Pg – 112
129. Principles of inheritance and variation NCERT – Pg 92
130. Molecular basis of inheritance NCERT Pg – 119
131. Principles of inheritance and variation NCERT – Pg 78
132. Molecular basis of inheritance NCERT Pg – 99
133. Principles of inheritance and variation NCERT – Pg 74
134. Molecular basis of inheritance NCERT – Pg

135. Principles of inheritance and variation
   Total genotype – 9
   Total no. of recombinant genotype – 6
   Total phenotype – 4
   No of parental genotype – 2

136. 70% as bicarbonate

137. The oxygen hemoglobin dissociation curve will shift towards right

139. Scapula is on dorsal side

140. Mandible is a facial bone

142. Macrophages are WBCs

143. Each rib has two articulation surfaces on its DORSAL end and is hence called bicephalic. Only true ribs attach to sternum.

144. Pubic symphysis

145. Mucosa forms finger-like folding called villi in the small intestine.

146. sphenoid, Hyoid, Ribs, Occipital.

147. Upper part of lungs loose elasticity in occupational diseases.

149. Homo erectus- 900 cc

153. Joint between carpal and metacarpal of thumb is SADDLE JOINT.

157. Paramoecium show ciliary movement.

158. FRC = ERV + RV
   TV =IC – IRV
   =(IRV+TV) – IRV

160. A specialised centre present in the medulla region of the brain called respiratory rhythm centre. A chemosensitive area is situated adjacent to the rhythm centre which is highly sensitive to CO₂ and hydrogen ions. Increase in CO₂ in arterial blood stimulates this centre. The role of oxygen is regulating respiratory rhythm is insignificant.

161. Sound heart sound due to the closure of semilunar valves.

162. ST segment represents ventricular depolarization. T wave is for ventricular repolarization and end of ventricular systole.

163. Unit of natural selection is INDIVIDUAL.

166. 60% of seminal plasma is contributed by seminal vesicles.

167. Maintenance of endometrium is by progesterone.

174. Formation of fertilization membrane and bursting of cortical granules occur in slow block.

175. Both ovaries produce 12 eggs in a year.

176. Clitoris is homologous to male penis.

179. All premolars and last molars arise only once i.e. in the permanent set of teeth.

180. Dolphin is a vertebrate.