# 2020-21

***Time - 3 hours***

***Full Marks - 60***

*Answer **all groups** as per instructions.*
*Figures in the right hand margin indicate marks.*

## GROUP – A

1. Answer all questions. [1 × 8

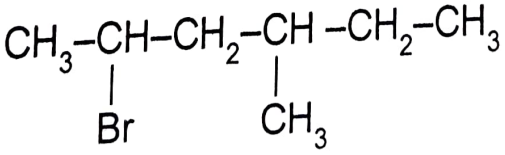
(a) Write the electronic configuration of $Cr^{2+}$ ion.

(b) Which molecule has square planar geometry ?

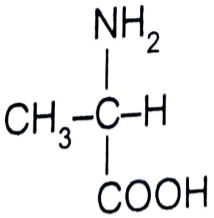
(c) What is the shape of d-orbital ?

(d) What is the expression for de-Broglie wavelength ?

(e) IUPAC name of the following compound is



(f) Assign R and S configuration of –



(g) State Hund's rule.

(h) Give the order of reactivity of hydrogen halides with alkene (HI, HBr, HCl).

## GROUP – B

2. Answer any eight of the following questions within two to three sentences each. [1½ × 8

(a) Write Schrodinger wave equation for H-atom.

(b) Define electrovalency. Write electrovalency of Calcium.

(c) Write the shape and hybridisation of $H_2O$.

(d) Write the possible quantum numbers of an electron in 3d orbital.

(e) What is Pauli's exclusion principle ?

(f) If the first ionisation enthalpy of hydrogen is E, then what is for $He^+$ ?

(g) Write the structural formulae of –

1-Bromo-2-methyl propane.

(h) Define Electrophile and give one example.

(i) What are the intermediates formed during Homolytic and Heterolytic cleavage of a bond ?

(j) LiCl is more soluble in organic solvent. Explain.

## GROUP – C

3. Answer any eight of the following questions within 75 words each. [2 × 8

(a) Which of the following are diamagnetic ?

Mo, Au, Pd, Pt

(b) Draw the shape of the following orbitals :

$3dx^2 - y^2$, $3dz^2$

(c) Why $BF_3$ is planar but $NF_3$ is pyramidal ?

(d) What is the hybridisation and shape of $XeOF_2$ ?

(e) Write Wurtz reaction.

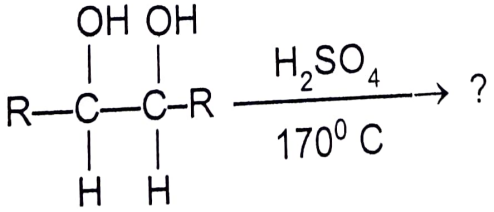
(f) What is Birch reduction ?

(g) State Markownikoff's rule and give an example.

(h) Write molecular orbital configuration of $N_2$.

(i) State Huckel's rule.

(j) Complete the reaction –



## GROUP – D

*Answer **any four** questions within 500 words each.*

4. What is Heisenberg Uncertainty principle ? Explain it. [6

5. Write a note on Molecular Orbital Theory. [6

6. Describe Hybridisation. [6

7. Describe Born-Haber cycle for $NaCl_{(s)}$. [6

8. Write short notes on : [3 × 2

   (a) Inductive effect

   (b) Carbocation

9. Draw the Newmann projections of Cyclohexane. [6

10. How Propylene can be prepared from Propyl chloride ? How does it react with (i) $KMnO_4$, (ii) HCl and (iii) $H_2O$ ? [6