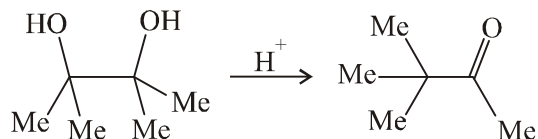


(4)

2. Write down the mechanism of the following reaction. 2



3. Answer *any three* questions : 2×3=6

- (a) How will you prepare benzaldehyde from toluene?
- (b) Prepare isopropanol from acetaldehyde.
- (c) Prepare fluorobenzene from nitrobenzene.
- (d) Prepare phenol from aniline.

4. Arrange 1°, 2°, 3° carbocations in their increasing stability order with proper justification. 2

5. Arrange 1°, 2°, 3° carbocations in their decreasing stability order with proper justification. 2

6. Define electrophile and nucleophile citing one example for each. 2

7. Describe Markownikoff's rule with an example. 2

8. Describe a suitable route to prepare alkyl halide from corresponding alkane. 2

★ ★ ★

Ex/UG/SC/GE/CHEM/TH/01/2025 (OLD)

**B. SC. CHEMISTRY EXAMINATION, 2025
(SUPPLEMENTARY)**

(1st Semester, CBCS Syllabus)

CHEMISTRY (GENERIC ELECTIVE)

PAPER : GE/CHEM/TH/01

Time : Two Hours

Full Marks : 40

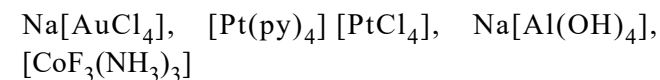
(20 marks for each Unit)

Use a separate Answer Script for each Unit.

UNIT—101G-I

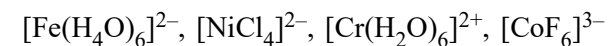
1. Answer *any four* questions : 2½×4

- (a) Write the IUPAC nomenclature of the following complex compounds (*any three*) :



- (b) Hexa-coordinated complexes usually adopt Octahedral shape. How did Alfred Werner establish this?

- (c) Calculate CFSE of the following complex ions (*any three*) :



(2)

- (d) Match the following ligands with most preferred metal oxidation state(s) with justification :

Ligands	Metals	Justification
O^{2-} , CO, H_2O	Cr(0)	
	Cr(III)	
	Cr(VI)	

- (e) Briefly explain the structure and bonding in B_2H_6 .
- (f) Shape of $[Ni(CN)_4]^{2-}$ is square planar, though $[Ni(CO)_4]$ is tetrahedral. Explain.

2. Answer *any two* questions :

- (a) (i) For the molecules or molecular ions in the problem, determine the steric number (SN), indicate the geometry (Example : bent), and give expected bond angles. (*any two*)

- I. PF_5
II. $[XeF_3]^+$
III. $BeCl_2$
IV. SF_4

- (ii) What is the wavelength of an electron moving at 5.31×10^6 m/sec? Given : mass of electron = 9.11×10^{-31} kg, $h = 6.626 \times 10^{-34}$ J.s.

2+3

- (b) (i) Write the uncertainty principle for energy and time.

CHEM-1063

[Continued]

(3)

- (ii) If the position of an electron in an atom is measured to an accuracy of 0.01 nm, what is the electron's uncertainty in velocity?
- (iii) Calculate the ionization energy for H atom.

2+2+1

- (c) (i) Calculate the change in H^+ ion concentration upon changing the pH by 0.3 of HCl solution.
- (ii) For each of the following molecules, write the Lewis structure and predict whether each molecule is polar or nonpolar : (*any three*)

- I. NH_3
II. BF_3
III. OF_2
IV. IF_2

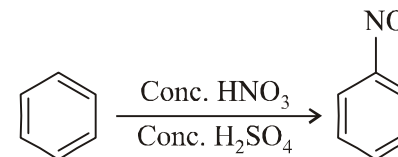
2+3

- (d) (i) Draw MO for O_2 and N_2 . Discuss about their magnetic nature and bond order.
- (ii) Calculate the uncertainty in the momentum of an electron if uncertainty in its position is $0.1 \text{ \AA}$. 3+2

UNIT—101G-O

1. Show the mechanism for nitration reaction of benzene using mixture of concentrated HNO_3 and concentrated H_2SO_4 .

2



CHEM-1063

[Turn Over]