

## U.G. 3rd Semester Examination - 2022

## CHEMISTRY

[HONOURS]

27

Generic Elective Course (GE)

Course Code : CHEM-H-GE-T-01

Full Marks : 40

Time : 2½ Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*1. Answer any **five** from the following:  $2 \times 5 = 10$ 

- ✓ a) State Pauli Exclusion Principle.
- ✓ b) Write down the ground state electronic configuration of  $\text{Fe}^{2+}$  ( $Z=26$ ) and  $\text{Cu}^{2+}$  ( $Z=29$ ).
- c) What is standard electrode potential?
- d) What is meant by the levelling effect of solvent?
- e) Draw the Newman and Fisher projections of erythro 2,3-dibromo butane.
- ✓ f) What are diastereomers?
- g) Why do we fail to prepare methane by Wurtz method of synthesis of alkane?

 $\frac{2}{2}$ 

[Turn over]

2. Answer any **two** questions: 5×2=10

a) i) Radius of the first Bohr orbit of H atom is 0.529Å. Find the radii of 1st and 2nd Bohr orbits of  $\text{Li}^{2+}$  ion.

ii) What is the difference between electron affinity and electronegativity? 3+2=5

b) i)  $\text{NH}_3$  is a Lewis base but  $\text{NF}_3$  has practically no basic character—Explain.

ii) Find the oxidation number of Chromium and Oxygen atom in the following compounds (I)  $\text{K}_2\text{Cr}_2\text{O}_7$  and (II)  $\text{H}_2\text{O}_2$

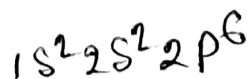
iii) Why any indicator is not used during the titration with  $\text{KMnO}_4$  solution?

$$2+2+1=5$$

c) i) Explain the relative order of stabilities of methyl, primary, secondary and tertiary carbanions.

ii) How will you distinguish between ethane and ethyne by a chemical test?

iii) What conformational isomers are possible for  $\text{C}_2\text{H}_4\text{Cl}_2$ ? 2+2+1=5



3. Answer any **two** questions: 10×2=20

a) i) An electron is present in the 4s sub-shell.  
Find the possible values of n, l and m.

ii) What is Aufbau principle?

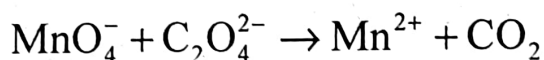
iii) Explain why the first ionization potential of oxygen is lower than that of nitrogen?

iv) Account for the large decrease in electron affinity in going from Li to Be despite the increase in nuclear charge.

v) Which out of Li and Li<sup>+</sup> has smaller size?

$$2+2+2+3+1=10$$

b) i) Balance the following reaction by ion-electron method in acidic medium.



ii) Arrange BF<sub>3</sub>, BCl<sub>3</sub>, BBr<sub>3</sub> and BI<sub>3</sub> in order their Lewis acidity with justification.

iii) Why a meso compound is optically inactive?

iv) Give suitable example of a chiral molecule. 4+3+2+1=10

c) i) Give the mechanism of *cis*-hydroxylation of an alkene by cold, dilute, alkaline KMnO<sub>4</sub>.

ii) Ozonolysis of an alkene [X] gave a mixture of acetone and acetaldehyde. Give the structure of alkene [X].

iii) Write short notes on Markownikoff's rule.

iv) How would you prepare methane from acetylene?

v) Methane does not react with chlorine in the dark. Explain why?

$$3+2+2+2+1=10$$

---