

Roll No.

(12/24)

15024

M. Sc. EXAMINATION

(For Batch 2021 & Onwards)

(Third Semester)

CHEMISTRY

MSc/Chem/3/DSC2-I

Inorganic Chemistry Special-II

Time : Three Hours

Maximum Marks : 70

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory.

1. (i) What are chain silicates and sheet silicates ?
- (ii) Discuss the structures of XeO_2F_2 .
- (iii) Give two examples of mononuclear polyhydrides.

- (iv) Why f^{14} lanthanide complexes are colourless ? Explain.
- (v) What is the electronic structure of actinides ? $2 \times 5 = 10$

Unit I

2. (a) Briefly discuss pyrophyllite by taking suitable examples. 5
- (b) How metal carbide can help in synthesizing metallofullerenes ? 5
- (c) Discuss the synthesis of hyponitrous acid. 5
3. What are the composition and structure of silicones and organosilicones ? Also, discuss the preparation and properties of these. 15

Unit II

4. (a) Discuss the synthesis of transition metal hydrides. Also discuss chemical behavior towards the hydride compounds ? 10
- (b) Write a note on non-classical hydrides. 5

5. (a) Draw the structure of $[\text{HCr}_2(\text{CO})_{10}]^-$ and also discuss the bonding in this complex. 6
- (b) How $\text{HCo}(\text{CO})_4$ complex can act as a pseudohalides ? 4
- (c) Briefly discuss the significance of M-H interactions in chemical reactions. 5

Unit III

6. (a) Write a short note on lanthanide shift reagents. 8
- (b) Briefly explain the origin of colour in lanthanide complexes. 7
7. (a) What is effective magnetic moment (μ_{eff}) ? Calculate μ_{eff} of the $_{62}\text{Sm}^{3+}$ and $_{69}\text{Tm}^{3+}$ ions. 8
- (b) Write short notes on the following : 7
- (i) binary
- (ii) ternary compounds of lanthanides.

Unit IV

8. (a) Which actinide elements are found in earth's crust and what is their value in ppm ? What are control rods ? Give two examples. 8
- (b) Briefly discuss the oxidation state of actinides. Also explain actinides contraction in detail. 7
9. (a) Why the actinides have more tendency of forming complexes than lanthanides ? Give an example of uranium cyclopentadienyl complex and draw its structure. 8
- (b) Discuss radioactive behavior of uranium. 7