

**Ph. D. IN CHEMISTRY  
(PHDCHEM)**

**Term-End Examination  
December, 2025**

**RCHE-002 : ADVANCES IN INORGANIC  
CHEMISTRY**

*Time : 3 Hours*

*Maximum Marks : 100*

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**Note** : Answer all the questions.

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1. Giving suitable examples explain the Jahn-Teller effect. 10
2. (a) Write the configuration of a  $d^6$  metal ion in the octahedral field and calculate the CFSE for the same in both weak field and strong field. What would be the configuration in a tetrahedral field? 10
- (b) Write a short note on Tanabe-Sugano diagrams. 5
3. (a) The magnetic moment of a complex is 4.0 B. M. Assuming that there is no orbital contribution, find out the number of unpaired electrons and its spin multiplicity. 5

- (b) What is meant by the Russell-Saunders symbol of any ion ? Give suitable examples to show the steps involved in arriving at it. 10
4. (a) Predict the  $^1\text{H}$ NMR spectrum of  $\text{Si}(\text{OCH}_2\text{CH}_3)_4$  and justify. 10
- (b) What would be the  $^1\text{H}$ NMR spectrum of  $\text{CF}_3\text{CH}_2\text{OCl}$  ? Compare it with its  $^{19}\text{F}$ NMR spectrum. 10
5. Describe the anisotropic nature of EPR spectra. 10
6. (a) Explain the physiological role of the prosthetic group in cytochromes. 5
- (b) What is photosynthesis ? Describe the  $z$  scheme of photosynthesis. 10
7. (a) What is meant by supramolecular chemistry ? With suitable diagrams explain the descriptive terms to illustrate spatial relationship between host and guest. 10
- (b) Compare the oxygen saturation curves of haemoglobin and myoglobin with the help of a suitable diagram. 5

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