



M.Sc. II Semester Degree Examination, September/October - 2022

INDUSTRIAL CHEMISTRY

**DSC 5 : Coordination Chemistry
(New Syllabus)**

Time : 3 Hours

Maximum Marks : 70

Note : Answer **any five** of the following questions with Question No. **1 Compulsory**. Each question carries **equal** marks.

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| 1. | (a) | Describe the MO diagram of Oh complex having only σ -bonding. | 5 |
| | (b) | Draw and explain crystal field splitting diagram of $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$. | 5 |
| | (c) | What is CFSE ? Calculate CFSE for $[\text{V}(\text{H}_2\text{O})_6]^{3+}$. | 4 |
| 2. | (a) | Explain the Gouy method of determination magnetic susceptibility. | 5 |
| | (b) | Construct the Orgel diagrams for $[\text{NiCl}_6]^{2-}$ and explain the electronic transitions. | 5 |
| | (c) | Derive all possible term symbols for d^2 -metal ion. | 4 |
| 3. | (a) | Explain the factors affecting the stability of metal complexes. | 5 |
| | (b) | Discuss the mechanism of outer sphere electron transfer reactions with a suitable example. | 5 |
| | (c) | What is Jahn-Teller effect ? Discuss J-T distortion taking $[\text{Cu}(\text{H}_2\text{O})_6]$ as an example. | 4 |
| 4. | (a) | Discuss the mechanism of Na^+/K^+ transport across cell membranes. | 5 |
| | (b) | Explain in detail the structure and function of haemoglobin. | 5 |
| | (c) | Explain the significance of the enzyme nitrogenase. | 4 |
| 5. | (a) | Explain with example the nuclear fission reactions. | 5 |
| | (b) | Give a detailed note on Neutron Activation Analysis. | 5 |
| | (c) | Explain the term mass defect and binding energy for stability of nuclides. | 4 |
| 6. | (a) | Explain with examples ferro and antiferromagnetic coupling. | 5 |
| | (b) | Explain the Laporte orbital and spin selection rules for the electronic transitions in metal complexes. | 5 |
| | (c) | What are labile and inert complexes ? | 4 |



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- 7.** (a) Give a detailed note on oxygen binding in non-heme proteins. **5**
(b) Explain the application of radioisotopes in medical field. **5**
(c) Explain the types of radioactive decay series. **4**
- 8.** (a) Explain Tanabe-Sugano diagram for the d^6 complex of CO^{3+} and predict the spin allowed transitions in high-spin and low-spin limits. **5**
(b) Give a detailed note on Z-scheme of photosynthesis. **5**
(c) Give a short note on uses of isotopes in medicine. **4**

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