



Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, November 2015**  
**First Degree Programme under CBCSS**  
**CHEMISTRY**  
**Core Course VI**  
**CH1542 : Inorganic Chemistry – III**  
**(Prior to 2013 Admission)**

Time : 3 Hours

MAx.Weightage : 30

## SECTION – A

(Answer in a word or a sentence)

Answer **all** questions. A bunch of **4** questions carries **1** weightage.

- I. 1) Name the products of hydrolysis of  $\text{TiCl}_4$ .
- 2) Which transition metal is used as a catalyst in the hydrogenation of oils ?
- 3) Name the major natural source of lanthanide elements.
- 4) Which is the most common oxidation state of thorium ?
- II. 5) Write down the IUPAC name of the complex  $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$ .
- 6) What is the effective atomic number of the complex ion  $[\text{Cr}(\text{NH}_3)_6]^{3+}$  ?
- 7) What do you mean by a chelating ligand ?
- 8) Calculate the CFSE of the electronic configuration  $t_{2g}^3 e_g^1$ .
- III. 9) Which is the most abundant transition element in mammals that serves many biological roles ?
- 10) How many heme groups are there in hemoglobin ?
- 11) Give an example of an organometallic compound which does not obey the 18-electron rule.
- 12) How do you get  $\text{Fe}_2(\text{CO})_9$  from  $\text{Fe}(\text{CO})_5$  ?



IV. 13) What is the chemical formula of the pyrosilicate anion ?

14) What are silicones ?

15) Which carborane is isoelectronic with  $[B_{12}H_{12}]^{2-}$  anion ?

16) What are pseudohalogens ?

(4×1= 4 Weightage)

### SECTION – B

#### (Short answer type questions)

Answer **any eight** questions. **Each** question carries 1 weightage.

17) Higher oxidation states (like +4) are rare among lanthanides, while, they are more common among early actinides. Why ?

18) How is potassium permanganate prepared ?

19) The absorption spectra of the lanthanide cations are sharp and line like as compared to the broad absorption bands of the transition metal ions. Why ?

20)  $CuSO_4 \cdot 5H_2O$  is blue while  $ZnSO_4$  is colourless. Why ?

21) What do you mean by spectrochemical series of ligands ?

22) Explain the structure and type of hybridisation in  $[Ni(Cl)_4]^{2-}$  and  $[Ni(CN)_4]^{2-}$ . Comment on their magnetic behaviour.

23) Briefly explain the type of bonding in ferrocene based on MO theory.

24) Briefly discuss the role of chlorophyll in photosynthesis.

25) What are zeolites ? Give an example.

26) What is inorganic graphite ? Give its structure.

27) What is borax ? Mention any one of its use.

28) Give the structures of HOCl and  $HClO_3$ .

(8×1= 8 Weightage)



## SECTION – C

**(Short essay type questions)**

Answer **any five** questions. **Each** question carries **2** weightage.

- 29) Write a note on lanthanide contraction and its consequences.
- 30) How is potassium dichromate prepared ? What are its uses ?
- 31) Determine the number of unpaired electrons in weak field and in strong field in the octahedral complexes of  $\text{Fe}^{3+}$ . Calculate their crystal field stabilization energies.
- 32) Write a note on the application of coordination compounds in qualitative and quantitative analyses.
- 33) How do you prepare the carbonyls,  $\text{Fe}(\text{CO})_5$  and  $\text{Ni}(\text{CO})_4$  ? Write a brief note on their properties.
- 34) Discuss the biochemistry of iron.
- 35) How do you prepare the carbide of Ca ? How does it react with water ?
- 36) Write a note on the different types of glass. **(5×2= 10 Weightage)**

## SECTION – D

**(Long essay type questions)**

Answer **any two** questions. **Each** question carries **4** weightage.

- 37) Write notes on the following.
    - a) The structure and function of hemoglobin and myoglobin.
    - b) The sodium-potassium pump.
  - 38) Discuss the types of isomerism shown by co-ordination compounds with appropriate examples.
  - 39) Write notes on the following
    - a) Oxo-acids of phosphorus
    - b) The preparation and structure of inter-halogen compounds having the general formulae  $\text{AX}_3$  and  $\text{AX}_5$ . **(2×4 = 8 Weightage)**
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