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Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022.**

**First Degree Programme under CBCSS**

**Chemistry**

**Core Course**

**CH 1542 – INORGANIC CHEMISTRY III**

**(2013 – 2016 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Each question carries **1** mark.

1. Write the structure of ferrocene.
2.  $Ti^{2+}$  is purple in colour while  $Ti^{4+}$  is colourless. why?
3. What is the coordination number of  $C_N$  in  $(C_N(en)_2Cl_2]^+$ .
4. The number of unpaired electrons in a transition metal complex with magnetic moment 5.20 BM is \_\_\_\_\_
5. Give the general outer electronic configuration of inner transition elements.
6. What is Zeigler-Natta catalyst?
7. The number of bridging carbonyl group in  $Fe_2(co)_9$  is \_\_\_\_\_

P.T.O.

8. The Homomorphous Co is \_\_\_\_\_
9.  $\text{CrO}_3$  is bright in colour due to \_\_\_\_\_
10. The magnetic nature of  $[\text{Ni}(\text{CN})_4]^{2-}$  is \_\_\_\_\_

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. Each question carries **2** marks.

11. Transition metals are less reactive than alkali and alkaline earth metals. Justify.
12.  $\text{Zn}^{2+}$  salts are colourless while  $\text{Cu}^{2+}$  salts are blue why?
13. Chromium is a typical metal while mercury is a liquid metal. Why?
14. What is meant by secondary valency. What is one secondary valency on the following compound  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ .
15. What are monodentate and bidentate ligands? Give examples.
16. Name the following  
 $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ ,  $[\text{Ni}(\text{CO})_4]$
17. What is Zeise's salt, Give its structure?
18. State whether  $\text{Fe}_2(\text{CO})_9$  and  $\text{Co}_4(\text{CO})_{12}$  follow 18 electron rule or not what will be the electron per metal atom without metal. Metal bond.
19. What are ionophores?
20. What are carboranes?
21.  $2\text{BF}_3 + 6\text{NaH} \rightarrow$  \_\_\_\_\_
22. Explain the following
  - (a) Scandium forms no coloured ions yet it is regarded as transition element
  - (b) Transition elements have many irregularities in electronic configuration.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer **any six** questions. Each question carries **4** marks.

23. What is lanthanide contraction? Explain its consequence.
24. Explain the geometrical isomerism of co-ordination compounds.
25. Which one is diamagnetic  $[Ni(CN)_4]^{2-}$  or  $[NiCl_4]^{2-}$  why?
26. Explain ferromagnetism and antiferromagnetism with examples.
27. Explain why the 4f electrons in lanthanide elements do not affect their chemistry and crystal field stabilisation.
28. Why do actinides show higher oxidation states than lanthanides?
29. Give the structures of oxoacids of phosphorus.
30. Write a note on phosphazenes.
31. Write four uses of noble gases.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. Each question carries **15** marks.

32. Write a note on chemical and physical properties of lanthanides and actinides.
33. Why are different colours observed in octahedral and tetrahedral complexes for the same metal and same ligands?
34. Write an essay on the application of organometallic compounds.
35. Explain the preparation, hybridisation, shape and bonding of interhalogen compounds.

**(2 × 15 = 30 Marks)**