FYUG Odd Semester Exam., 2024

CHEMISTRY

(3rd Semester)

Course No. : CHMDSC-201T

(Inorganic Chemistry—II)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

1. Answer any *two* from the following : 2×2=4

   (a) What are pseudohalogens? How do they differ from interhalogen compound? 1+1=2

   (b) Define diagonal relationship in periodic table with suitable examples.

   (c) What are meant by catenation and allotropy? 1+1=2

2. *(a)* Discuss the postulates of VSEPR theory. What are clathrate compounds? 3+1=4

(b) Discuss the preparation of XeF_2, XeF_4, XeF_6. 3

(c) How are hydrides classified? Explain with examples. 3

OR

3. *(a)* Describe the structures of XeF_6, IF_7, SF_6 and H_2O using VSEPR theory. 4

(b) Draw the structure of boric acid. Write one method of its preparation. Mention its uses. 3

(c) Discuss the structure and bonding in diborane. 3

UNIT—II

4. Answer any *two* from the following : 2×2=4

(a) What is meant by levelling effect of solvents?

(b) Mention two applications of silicates.

(c) Write the conjugate acids and bases of HSO_4^- and NH_3.

5. *(a)* Discuss Brønsted-Lowry concept of acids and bases classification. 3

(b) What are soft and hard acids and bases? Mention few applications of HSAB principle. 4

(c) What is silicone rubber? Write few applications of silicone rubber. 3

OR

6. *(a)* How is borazine prepared? Discuss its structure. Explain its resemblance with benzene. 5

(b) Write one method of preparation of silicones and siloxanes. 3

(c) Discuss the classification of Lewis acids with examples. 2

UNIT—III

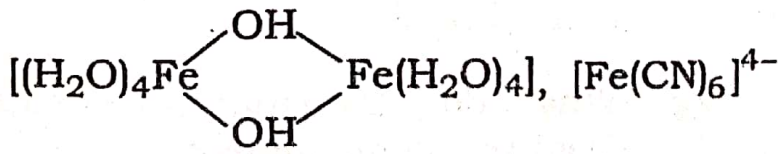
7. Answer any *two* from the following : 2×2=4

(a) Explain linkage isomerism with examples.

(b) State Werner's theory of coordination compounds.

(c) Write IUPAC names of the following :

$[Fe(C_5H_5)_2]^+$, $[Cu(NH_3)(H_2O)(Br_2)]$



$[(H_2O)_4Fe$ $Fe(H_2O)_4]$, $[Fe(CN)_6]^{4-}$

8. *(a)* Discuss crystal field theory of octahedral complexes. 5

(b) Calculate CFSE of—

(i) high spin d^6;

(ii) low spin d^7;

(iii) high spin d^4. 3

(c) What is chelate effect? Give example. 2

OR

9. *(a)* Discuss in brief about Jahn-Teller distorsion. 5

(b) What are meant by labile and inert complexes? 3

(c) Discuss the back bonding in coordination complexes with suitable example. 2

UNIT—IV

10. Answer any *two* from the following : 2×2=4

(a) Write the general electronic configurations of Cr and Cu. 1+1=2

(b) What is meant by lanthanide contraction?

(c) Why do transition elements form coloured compounds?

11. *(a)* Why do transition metals show variable valency? Describe the catalytic properties of transition elements. 2+2=4

(b) Discuss two similarities and differences between lanthanoids and actinoids. 3

(c) Why does $3d^4$ configuration of Cr^{2+} act as a reducing agent but Mn^{3+} act as an oxidising agent? 3

OR

12. *(a)* Discuss separation of lanthanoids via ion-exchange method. 5

(b) Write a short note on oxidation states of lanthanoids. 3

(c) Why are Zn^{2+} salts colourless but Ni^{2+} salts coloured? 2

UNIT—V

13. Answer any *two* from the following : 2×2=4

(a) What is the disease caused by Ca and Mg deficiency in body?

(b) Which metal is present in *(i)* porphyrin ring of blood and *(ii)* vitamin B_{12}? 1+1=2

(c) What are trace elements? Mention one transition metal complex used to treat cancer. 1+1=2

14. *(a)* How does arsenic toxicity affect human health? Mention one method of removal of arsenic contamination. 5

(b) Discuss the role of Zn and Co in biological system. 5

OR

15. *(a)* Describe the concept of deficiency and toxicity of different trace elements in human body. 5

(b) Write the role of chelating agents in medicine. 2

(c) What are the diseases caused by lead poisoning? How are they treated? 3

★ ★ ★