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4 SEM TDC CHMH (CBCS) C 8

2026

(May/June)

CHEMISTRY

(Core)

Paper : C–8

(Inorganic Chemistry)

Full Marks : 53
Pass Marks : 21

Time : 3 hours

The figures in the margin indicate full marks for the questions.

1. Select the correct answer from the following : 1×6=6

(a) Which of the following ligands has the highest crystal field splitting?

(i) NH_3

(ii) NO_2^-

(iii) H_2O

(iv) Cl^-

(b) Which of the following has the highest number of oxidation state?

(i) Mn

(ii) V

(iii) Ni

(iv) Zn

(c) $[Co(NH_3)_6]Cl_3$ complex is

(i) diamagnetic

(ii) paramagnetic

(iii) ferromagnetic

(iv) anti-ferromagnetic

(d) Which of the following is paramagnetic?

(i) Zn^{2+}

(ii) Cu^{2+}

(iii) Au^{+}

(iv) Ag^{2+}

(e) The deficiency of Fe in our body causes

(i) hair loss

(ii) fever

(iii) anaemia

(iv) blindness

(f) Which of the following elements does not belong to lanthanoid series?

(i) Pm

(ii) Tb

(iii) Md

(iv) Yb

UNIT—I

2. Answer the following questions : 2×4=8

(a) Write the IUPAC names of the following : 1+1=2

(i) $Li[AlH_4]$

(ii) $[Pt(NH_3)_4][PdCl_4]$

(b) What is optical isomerism? Why square planar complex does not show optical isomerism? 1+1=2

(c) Define chelating ligand and chelates. Give examples. 2

(d) What is the coordination number of iron in $[Fe(EDTA)]^{-1}$? Why is the complex more stable? 1+1=2

3. Answer any *two* of the following questions : 3×2=6

(a) What are inner- and outer-orbital complexes? Give example of each. 1½×2=3

(b) With the help of VB theory, explain why $[Co(NH_3)_6]^{3+}$ is diamagnetic but $[CoF_6]^{3-}$ is paramagnetic. 3

(c) Explain why $CoCl_3 \cdot 4NH_3$ forms precipitate (ppt) with $AgNO_3$ but $CoCl_3 \cdot 3NH_3$ does not. 3

4. Answer any *two* of the following questions : 4×2=8

(a) Define CFSE and calculate its value for d^5 system in octahedral and tetrahedral field. 1+1½×2=4

(Continued)

(b) Write the difference between the following : 2×2=4

(i) Double salt and Coordination complex

(ii) VBT and CFT

(c) What do you mean by stability of complex ion? Explain the factors which affect the stability of complex ion. 1+3=4

UNIT—II

5. Answer any *three* of the following questions : 3×3=9

(a) Give reason—

(i) why second IE (ionization energy) of Cr and Cu is exceptionally high;

(ii) why Fe^{3+} is more stable than Fe^{2+}. 1½×2=3

(b) How do transition elements act as catalyst? Give two examples of such catalyst which are used in industry. 1+2=3

(c) Name the important oxidation state of Cu. Explain why iodine is liberated when KI is added to solution of Cu^{2+} but chlorine does not liberated when KCl is added to solution of Cu^{2+}. 1+2=3

(Turn Over)

(d) Write the general electronic configuration of second transitional series. Why does the transitional metal show variable oxidation states and form complexes? 1+2=3

6. Give the preparation and properties of any *two* compounds of the following : 2×2=4

(a) V_2O_5 (vanadium pentoxide)

(b) $KMnO_4$ (potassium permanganate)

(c) $K_2Cr_2O_7$ (potassium dichromate)

UNIT—III

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

(a) Write the electronic configurations of the last element of lanthanoid and actinoid series.

(b) Write the similarities of lanthanoids and actinoids.

(c) Why is higher oxidation state of actinoids more stable than lanthanoids?

UNIT—IV

8. Answer any *two* of the following questions : 4×2=8

(a) Define trace and ultra-trace elements and give example. 2+2=4

(b) Describe the toxicity of As and Pb. 2+2=4

(c) Write the functions of myoglobin and haemoglobin. 2+2=4

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