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B. Sc. EXAMINATION

(Third Semester)

CHEMISTRY

CH-201

Inorganic Chemistry

Time : Three Hours *Maximum Marks : 27*

Note : Attempt *Five* questions in all, selecting at least *two* questions from each Section.

Section A

1. (a) Which of the following ions are coloured and why ? 2½

Fe^{2+}, Zn^{2+}, Co^{3+}

(b) Explain the structure of Titanium dioxide and Nickel tetra carbonyl. 3

2. (a) Explain why the complexes of first transition series are high spin while those of second and third transition series are of low spin ? 2½

(b) How is $VOCl_2$ prepared ? Give its important reactions. 3

3. (a) Write down the electronic configuration of the following atoms : 2

(i) Mu(Z = 25)

(ii) Cd(Z = 48)

(iii) Ag(Z = 47)

(iv) Co(Z = 27)

(b) What are transition elements ? Which of the d-block elements are not regarded as transition elements ? 3½

4. (a) Discuss the following properties of transition metals : 3½

(i) The tendency to form coordination compounds

(ii) Ionization energies.

(b) Complete the following reactions :

(i) $FeCl_3 + K_4[Fe(CN)_6] \longrightarrow$ ½

(ii) $CuCl_2 + 2C_5H_5N \longrightarrow$ ½

(iii) $Ni(CO) + Cl_2 \longrightarrow$ ½

(iv) $TiO_2 + 2NaOH \longrightarrow$ ½

Section B

5. (a) On account of valence bond theory, explain why $[Co(NH_3)_6]^{3+}$ is diamagnetic whereas $[CoF_6]^{3-}$ is paramagnetic ? 3½

(b) Complete the following reactions :

(i) $HgI_2 + KI \xrightarrow{liq.\,SO_2}$ ½

(ii) $C_6H_6 + SO_3 \xrightarrow{liq.\,SO_2}$ ½

(iii) $NH_4Cl + NaNH_2 \xrightarrow{liq.\,NH_3}$ ½

(iv) $SiCl_4 + NH_3 \xrightarrow{liq.\,NH_3}$ ½

6. (a) Write a short note on optical isomerism in coordination compounds. 3

(b) Discuss the classification of non-aqueous solvents. 2½

EAN rule : 3½

$[Co(NH_3)_6]^{3+}$, $[Ni(NH_3)_6]^{2+}$, $[Fe(CN)_6]^{3-}$

(b) Explain the following :

(i) Complex formation reactions in liquid SO_2 1

(ii) The electrical conductance of ammonia increases on addition of NH_4Cl in it. 1

8. (a) What do you understand by chelating agent and chelates ? Explain with examples. 3½

(b) Explain the role of the following physical properties of non-aqueous solvent in chemical reaction :

(i) Dipole moment 1

(ii) Melting and boiling point. 1