BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: IMSc **SEMESTER: V**
BRANCH: CHEMISTRY **SESSION : MO/2018**

SUBJECT : IMC5009 INORGANIC CHEMISTRY-II

TIME: 1.5 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1 (a) Describe the structure of $(PNCl_2)_3$. [2]
(b) Discuss the following: [3]
(i) Nesosilicate (ii) Sorosilicate (iii) Inosilicate

Q2 (a) Draw the structure of (i) P_4O_6 and (ii) P_4S_5 [2]
(b) Count the number of electron available for frame work bonds and draw the structure. [3]
(i) $B_5 9_6$ (ii)B_4H_{10}

Q3 (a) What do you mean by optical isomerism? [2]
(b) Write short notes on borazines [3]

Q4 (a) Explain the difference in reactivities of chloride ions in luteo , purpureo , praseo and violeo complexes on the basis of Werners' postulates. [2]
(b) Explain the type of hybridization and magnetic behaviour of the following complexes on the basis of VBT: i. $[Fe(CN)_6]^{3-}$,ii. $[Cr(NH_3)_6]^{2+}$,iii. $NI(CO)_4$ [3]

Q5 (a) Draw the shapes of the various d orbitals and explain how they are split into two groups t_{2g} and e_g in an octahedral ligand field. [1]
(b) Explain the effects of crystal field splitting with respect to the lattice energies of the halides of first row transition metal elements in the divalent state. [1]
(c) Draw an energy level diagram to show the lifting of the degeneracy of the 3d orbitals in a tetrahedral ligand field. Explain why $\Delta_t = 4/9\ \Delta_o$ [3]

Q6 (a) Show by means of a diagram how the pattern of d orbital splitting changes as an octahedral complex undergoes tetragonal distortion and eventually becomes a square planar complex. [1]
(b) Illustrate with example, the phenomenon of Z-in and Z out using Jahn Teller theorem. [2]
(c) Predict the number of unpaired electrons, the spin-only magnetic moments at 25^0C for each of the following: i) $[Fe(CN)_6]^{4-}$ ii) $[Cr(NH_3)_6]^{2+}$ [2]

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