

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

CLASS: IMSc
BRANCH: CHEMISTRY

SEMESTER: V
SESSION : MO/2018

SUBJECT : IMC5007 INORGANIC CHEMISTRY - I

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.

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- Q1 (a) Name the ore of Molybdenum and Iron? [2]
(b) $[\text{Ni}(\text{NH}_3)_6]^{2+}$ is blue, $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ green and $[\text{Ni}(\text{NO}_2)_6]^{4-}$ is brownish red. Why? Discuss the reason for colour variation in these complexes. [3]
- Q2 (a) Explain the structure and bonding in VF_5 / NbF_5 / TaF_5 ? [2]
(b) Discuss the effect of charge transfer phenomenon on colour of complexes giving suitable examples? [3]
- Q3 (a) From the radial wave function (R) for 2s orbital, find the distance of the electron from the nucleus, where $R = 0$ [2]
(b) From Heisenberg uncertainty principle, show that electron can't exist in nucleus. [3]
- Q4 (a) Calculate the number of nodes in the radial wave functions of the following orbitals: 2s, 3p, 4s and 4f. [2]
(b) In a Hydrogen like system, convert the Cartesian coordinates of the electron into Polar coordinates and write the Schrodinger wave equation in polar coordinates. [3]
- Q5 (a) What is Rosset in the Sommerfield model of H like system? [2]
(b) Find the ground state term symbol for the following electronic configurations: p^3 , d^2 , d^9 [3]
- Q6 (a) Find the number of microstates in the following electronic configurations: p^5 , d^5 , d^3 , f^6 [2]
(b) Draw the diagram showing the arrangement of the microstates originated from carbon in increasing order of energy. [3]

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