

12. (a) (i) Discuss FBTR at kalpakkam. (5)  
(ii) Discuss briefly the fusion reactions involved in the release of stellar energy. (5)

Or

- (b) Describe various nuclear reactions that take place in the cosmic furnace. (10)

#### UNIT V

13. (a) What are BCC arrangements? (2)  
(b) What are the three important Crystallographic laws? (2)
14. (a) Give the conditions for the formation of Frenkel and Schottky defects. (6)

Or

- (b) Explain neutron diffraction experiment. (6)

15. (a) Explain with suitable examples of Perovskite structure. (10)

Or

- (b) Explain the work of Sommerfeld in explaining the conductivity of metals. (10)

**5561/MC1**

**MAY 2011**

#### Paper I – INORGANIC CHEMISTRY – I

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(For those who joined in July 2003 and after)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

#### UNIT I

1. (a) What are the steps involved in hybridization process? (2)  
(b) Define overlap integral. (2)
2. (a) Brief an account on lattice energy. (6)
- (b) Explain the concept of three centre two electron bonding and three centre four electron bonding with examples. (6)
3. (a) Compare and contrast the VB and MO approaches to covalent bonding in molecules. Illustrate with examples. (10)

Or

- (b) Discuss in detail about valence shell electron pair repulsion theory. (10)

## UNIT II

4. (a) The lanthanides resemble much the alkaline earth metals than transition metals. Explain. (2)
- (b) How is it possible for uranium to show oxidation states from +3 to +6? (2)
5. (a) How is ion – exchange chromatography useful in the separating lanthanides? (6)

Or

- (b) The ground state term of  $\text{Er}^{3+}$  is  ${}^4\text{I}_{15/2}$ . Calculate the magnetic moment of  $\text{Er}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ . (6)
6. (a) What is separation factor? Discuss the modern methods of separation of lanthanides. (10)

Or

- (b) Calculate  $\mu_{\text{eff}}$  and  $\text{Eu}^{3+}$ . The observed value is 3.4 – 3.6 B.M. Is there any difference between  $\mu_{\text{cal}}$  and  $\mu_{\text{obs}}$  values? If yes give reasons for the difference. (10)

## UNIT III

7. (a) What is meant by Solvate formation? (2)
- (b) Why non – aqueous solvents are needed? (2)

8. (a) Give example for amphotericism in liquid  $\text{NH}_3$  and liquid  $\text{SO}_2$ . (6)

Or

- (b) Explain the solvent system of acid-base concept. (6)

9. (a) Outline the theory behind hard – hard and soft-soft interaction. (10)

Or

- (b) Describe the preparation and properties of sulphuric acid with suitable equations. (10)

## UNIT IV

10. (a) What kind of nuclei have magnetic moments? (2)

- (b) Fission products usually undergo  $\beta$  decay. why? (2)

11. (a) Discuss the Meson theory of binding forces of nucleon. (6)

Or

- (b) Give different nuclear shapes and electric quadrupole moments. (6)

