

# C.U.SHAH UNIVERSITY

## Winter Examination-2015

Subject Name : Inorganic Chemistry

Subject Code : 5SC01ICC1

Branch :M.Sc. (Chemistry)

Semester :1

Date :30/11/2015

Time :10:30 To 1:30

Marks : 70

### Instructions:

- (1) Use of Programmable calculator and any other electronic instrument is prohibited.
  - (2) Instructions written on main answer book are strictly to be obeyed.
  - (3) Draw neat diagrams and figures (if necessary) at right places.
  - (4) Assume suitable data if needed.
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### SECTION – I

- Q-1**      **Attempt the Following questions**      **(07)**
- a. What are the uses of aluminum?      (1)
  - b. Define magnetic permeability.      (1)
  - c. Derive ground state term symbol for  $d^3$  and  $d^8$  configuration.      (1)
  - d. Give the structure of dimethyl glyoxime and oxine.      (1)
  - e. Complete following reaction.      (1)
  
  - f. Give the list of standards used in Guoy's method.      (1)
  - g. Define hybridization.      (1)
- Q-2**      **Attempt all questions**      **(14)**
- a. Derive the secular equations for the wave function of hydrogen molecule ion of the form,  $\psi = c_1\phi_1 + c_2\phi_2$ ; where  $\phi_i$  is the normalized atomic orbital on atom  $i$ , and the  $c_i$  are coefficients.      (7)
  - b. Discuss Mossbauer spectra of  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ .      (4)
  - c. What are the differences between  $\sigma$  and  $\pi$  molecular orbital?      (3)
- OR**
- Q-2**      **Attempt all questions**      **(14)**
- a. Evaluate the coefficient of wave function for  $sp^2$ -hybrid orbitals and show that the angle between two hybrid orbitals is  $120^\circ$ .      (7)
  - b. Explain L-S coupling.      (4)
  - c. Write a note on recoil energy.      (3)
- Q-3**      **Attempt all questions**      **(14)**
- a. Discuss the use of EDTA and DMG in inorganic analysis.      (6)
  - b. Give the uses of Cupferron.      (5)



c. Explain Doppler effect. (3)

OR

Q-3 Attempt all questions (14)

a. Derive Van Vleck equation for paramagnetic susceptibility. (6)

b. Explain Mossbauer spectroscopy in detail. (5)

c. What are the uses of tannin? (3)

SECTION – II

Q-4 Attempt the Following questions (07)

a. What is the relation between magnetic intensity and magnetic moment? (1)

b. Give the structure of  $\text{Fe}_3\text{CO}_{12}$ ? (1)

c. What is spin multiplicity? (1)

d. Define Curie temperature. (1)

e. What is recoilless emission in Mossbauer spectroscopy? (1)

f. Define ferromagnetic substances. (1)

g. Derive ground state term symbol for  $\text{Sc}^{+3}$  and  $\text{Mn}^{+2}$  configuration. (1)

Q-5 Attempt all questions (14)

a. Explain the effect of temperature on different types of magnetic substances (7)

b. Explain Mossbauer spectra of  $\text{K}_4[\text{Fe}(\text{CN})_6]$  and  $\text{K}_3[\text{Fe}(\text{CN})_6]$ . (7)

OR

Q-5 Attempt all questions (14)

a. Describe Gouy's method for the determination of magnetic susceptibility. (7)

b. What is diamagnetism? Derive Pascal's equation for diamagnetic moment. (7)

Q-6 Attempt all questions (14)

a. What are the approximations of Hückel theory? Use Hückel theory to construct the secular equations for the  $\pi$  orbital of ethylene. Determine the molecular orbital energies and the linear combinations of atomic orbitals associated with them. (10)

b. Write different uses of potassium bromate. (4)

OR

Q-6 Attempt all Questions (10)

a. What do you mean by Born-Oppenheimer approximation? Show that, (10)

$$H\Psi(r, R) = E\Psi(r, R)$$

$$H\Psi_N(R) = E\Psi_N(R)$$

b. Give the uses of Ceric sulphate. (4)

