# M. Sc. (Sem. I) (CBCS) Examination

## November / December – 2017

## C-101 : Inorganic Chemistry

**Faculty Code : 003**

**Subject Code : 1101001**

Time : $2\frac{1}{2}$ Hours ]                    [ Total Marks : **70**

**Instructions :** (1) All questions are compulsory.

(2) All questions carry equal marks.

**1** Answer the following : (any **seven**)                    **14**

(a) Explain, why the shape of $H_2O$ is bent ?

(b) Find out the ground state spectral term of the following :
(i) $d^3$     (ii) $d^5$

(c) Write a note on quantum dots.

(d) What do you mean by Hybridization? Explain

(e) Discuss MB spectrum of $Fe(CO)_5$.

(f) Explain Magnetic pole, dipole and unit pole

(g) Define Huckel theory for conjugated systems.

(h) Explain Recoil energy in Mossbauer Spectroscopy.

(i) Draw the structure of Cu-EDTA complex.

(j) Discuss the history of nanomaterials.

**2** Answer the following : (any **two**)                    **14**

(a) Write a note on the following methods for synthesis of nano materials.

(a) Sol-Gel synthesis

(b) Microwave synthesis

(b) Evaluate the Magnetic Moment for Multiple width small compared to kT.

(c) Discuss the stereo chemical applications of magnetic properties of Lanthanides

3  Answer the following : (any **two**)                                    14

    (a)  Derive secular Equation for Hydrogen molecule ion.

    (b)  Discuss the use of the following reagents in Inorganic analysis :

        (1)  $Ce(SO_4)_2$

        (2)  $NH_4VO_3$

    (c)  Discuss the Mossbauer spectrum of following :

        (1)  $K_4[Fe(CN)_6]$

        (2)  $K_3[Fe(CN)_6]$


4  Answer the following : (any **two**)                                    14

    (a)  Explain SEM or TEM in detail.

    (b)  Explain Gouy method for determination of magnetic susceptibility.

    (c)  Discuss the set of Integrals introduced by Huckel.


5  Answer the following : (any **two**)                                    14

    (a)  Evaluate the coefficient of wave function for $sp^2$ hybrid orbitals and show that the bond angle is of 120°.

    (b)  Discuss S-S coupling.

    (c)  Derive Van Vleck formula for susceptibility.

———————