Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS / B.TECH(CT)(N) / SEM-3 / CH(CT)-302 / 2012-13

2012

CHEMISTRY - II

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Milk is an example of

a) pure solution b) emulsion

c) gel d) suspension.

ii) Hybridisation of S atom in SF_4 is

a) sp^2 b) sp^3

c) sp^3d d) sp^3d^2.

iii) The *d*-orbital in sp^3d hybridisation is

a) d_{xy} b) d_{yz}

c) d_{z^2} d) $d_{x^2-y^2}$.

iv) The Lewis acidity order among the boron halides follows

a) $BF_3 < BCl_3 < BBr_3 < BI_3$

b) $BF_3 > BCl_3 > BBr_3 > BI_3$

c) $BF_3 < BCl_3 < BBr_3 > BI_3$

d) $BF_3 > BCl_3 < BBr_3 < BI_3$

v) Which of the following will have the highest coagulating power for As_2S_3 colloid ?

a) PO_4^{3-} b) SO_4^{2-}

c) Al^{3+} d) Na^{+}.

vi) Which one of the following is known as "fluxional copound" ?

a) CH_4 b) PCl_3

c) XeF_4 d) $Fe(Co)_5$.

vii) Dispersion of a solid in a liquid, a liquid in a gas and a liquid in a liquid are respectively known as

a) aerosol, emulsion, sol

b) sol, aerosol, emulsion

c) emulsion, sol, aerosol

d) aerosol, sol, emulsion.

viii) CFSE for d^3 (oh) system is

a) 12 Dq b) 4 Dq

c) 0 Dq d) 6 Dq.

ix) Which of the following is an example of inverse spinel structure ?

a) $CuFe_2O_4$ b) $ZnFe_2O_4$

c) Mn_3O_4 d) Co_3O_4

x) Which one is a flexidentate ligand ?

a) Ethylene diamine b) EDTA

c) Water d) Cyanide ion.

xi) The ability of an ion to bring about coagulation of a given colloid depends upon

a) its size

b) the magnitude of its charge only

c) the sign of its charge alone

d) both magnitude and sign of its charge.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) What is a chelating ligand ? Give an example and its corrosponding complex structure. 3

b) Differentiate between chelate complex and inner-metallic complex. 2

3. a) NH_3 is more basic than PH_3 . Explain. 3

b) Li_3CO_3 is unstable. Why ? 2

4. a) What is sol and gel ? 2

b) What is peptisation ? Give examples. 3

5. Write short notes on :

a) Frenkel defect $2\frac{1}{2}$

b) Schottky defect. $2\frac{1}{2}$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

6. a) Define CFSE. Calculate CFSE value for the following octahedral cases.
   d^4 (*h* . *s*), d^6 (*l* . *s*), d^8 . 2 + 3
   b) Explain the factors upon which CFSE depends. 3
   c) Draw the nature of splitting of *d*-orbitals in octahedral, tetrahedral, tetragonally distorted and square pyramidal cases. 7

7. a) What is spinel ? Explain with example "normal spinel" and "inverse spinel'. 2 + 5
   b) $[Cu (NH_3)_6]^{2+}$ is not stable. Why ? 3
   c) $CoCl_4^{2-}$ is blue, but the colour changes in presence of moisture. Explain. 5

8. Write short notes on the following : 3 × 5
   a) Protective colloids and gold number
   b) Emulsion
   c) Lyophilic and lyophobic colloids.

9. a) Draw the M.O. diagram of halogen molecule (X_2) and explain the following :
      i) Bond order, magnetic property.
      ii) F_2 is greenish yellow while I_2 is violet.
      iii) Stability order of the polyhalides :
      $I_3^- > Br_3^- > Cl_3^- > F_3^-$. 2 + 3 + 3
   b) Draw the orgel diagram of d^2 (octahedral) and d^6 (tetrahedral) cases. 4
   c) *Ortho*-phenanthrolein forms brown complex with Fe^{2+}, but it is colourless with Fe^{2+}. Explain. 3