BR—16—2016
FACULTY OF SCIENCE
M.Sc. (First Year) (First Semester) EXAMINATION
OCTOBER/NOVEMBER, 2016
(CBCS Course)
CHEMISTRY
Paper-I (CH-411)
(Inorganic Chemistry)

(Wednesday, 16-11-2016)   **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 Hours   *Maximum Marks—75*

N.B. :—   (*i*)   Attempt *All* questions.

      (*ii*)   Log table and calculator is allowed.

      (*iii*)   Solve MCQ ones only.

1.   Solve any *three* out of five :   15

   (*a*)   What is SN^1 mechanism ? Give the characteristics of SN^1 mechanism in complexes.

   (*b*)   Explain liability and inertness of the complex on the basis of V.B.T.

   (*c*)   What is ferrocene ? How are they prepared ?

   (*d*)   What are metal nitrosyl compound ? How many ways nitric oxide forms metal nitrosyl compounds ?

   (*e*)   Calculate number of microstates for d^3 and d^5 configurations.

2.   Attempt any *three* out of five :   15

   (*a*)   What are homoleptic carbonyls ? How are they prepared ?

   (*b*)   Explain, "Aqueous Mn(II) ion has dark pink colour".

   (*c*)   Explain in detail the types of electronic transitions.

   (*d*)   The rate of outer sphere electron transfer in $[Fe(CN)_6]^{4-}$ to $[Fe(CN)_6]^{3-}$ is much faster than that from $[Co(NH_3)_6]^{2+}$ to $[Co(NH_3)_6]^{3+}$. Explain.

P.T.O.

(e) What is acid hydrolysis ? Explain how charge on complex affects the rate of acid hydrolysis.

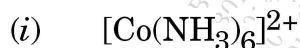3. (a) Explain oxidative addition reactions with suitable examples. 8

Or

Explain structure and bonding in ferrocene.

(b) Draw and explain Tanabe-Sugano diagram for d^2 configuration. 7

Or

Find out number of unpaired electrons and magnetic moments of the following complexions :

(i) $[Co(NH_3)_6]^{2+}$

(ii) $[FeF_6]^{3-}$

4. (a) What is base hydrolysis ? Give evidences in favour in SN^1CB mechanism. 8

Or

Distinguish between inner sphere and outer sphere electron transfer reaction in complexes.

(b) Describe bonding in metal complexes. Explain with suitable examples, how IR is useful to illustrate the structure of metal carbonyl. 7

Or

What is correlation diagram ? Explain it in d^2 octahedral and d^8 tetrahedral systems.

5. (a) Select the *correct* alternative from the following : 5

(i) The Muliken symbol for the spectroscopic term D in octahedral field is :

(A) $T_{2g} + E_g$　　　　　　(B) $T_2 + E$

(C) A_1g　　　　　　(D) T_1g
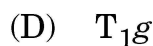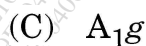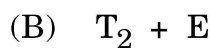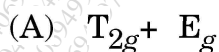
(*ii*) The number of microstate for d^{10} configuration is :

(A) 01   (B) 110

(C) 20   (D) 220

(*iii*) No. of π electrons in ferrocene are ....

(A) 05   (B) 06

(C) 10   (D) 12

(*iv*) π acceptor ligand (s) is/are ....

(A) CO   (B) NO

(C) CNR   (D) All of these

(*v*) The mechanism in which one of ligand in complex is converted into its conjugated base by the action of OH^- is called ....

(A) SN^1CB Mechanism   (B) SN^1 Mechanism

(C) SN Mechanism   (D) SN^2 Mechanism

(*b*) Write short notes on any *two* :   10

(*i*) Taube's explanation of liability and inertness

(*ii*) Racah repulsion parameters

(*iii*) 18 electron rule.