AI—11—2017

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

OCTOBER/NOVEMBER, 2017

(CBCS Pattern)

CHEMISTRY

Paper (CH-411)

(Inorganic Chemistry—I)

(Friday, 10-11-2017)   **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours*   *Maximum Marks*—75

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

      (*ii*)   Use of calculator is allowed.

      (*iii*)   Figures to the right indicate full marks.

      (*iv*)   Solve MCQ ones only.

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

   (*a*)   What is C.F.A.E. ? Explain the relationship of C.F.A.E. with lability and inertness of the complexes.

   (*b*)   What is acid hydrolysis ? Explain effect of solvation of complexes on the rate of acid hydrolysis.

   (*c*)   Explain structure and bonding in ferrocene on the basis of V.B.T.

   (*d*)   Explain reductive elimination reaction with suitable examples.

   (*e*)   Calculate the number of microstate for P^4 and d^3 configurations.

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

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

P.T.O.

(b) Determine term symbol for s^1p^1 and d^1s^1.

(c) State and explain selection rules for electronic spectrum of transition metal complexes.

(d) 'Transfer of electron from $[Cr(H_2O)_6]^{2+}$ to $[Co(NH_3)_6]^{3+}$ in aqueous medium is slower than the transfer from $[Cr(H_2O)_6]^{2+}$ to $[Co(NH_3)_5OH]^{2+}$.

(e) Distinguish between inert and labile complexes.

3. (a) What are metal nitrosyl compounds ? Explain different methods of bonding of NO in metal nitrosyl with appropriate examples.   8

Or

Explain structure and bonding in ferrocene.

(b) What is charge transfer spectra ? Explain its types.   7

Or

Calculate magnetic moment of the following complex ions :

(i) $[Ti(H_2O)_6]^{3+}$

(ii) $[Ni(CN)_4]^{2-}$.

4. (a) Explain mechanism of acid hydrolysis when inert ligand is π-acceptor.   8

Or

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

(b) Explain the use of IR absorption spectra of metallic carbonyls for :   7

(i)   To determine geometry of metallic carbonyls.

(ii)   To determine the bond order of ligated Co.

Or

Draw and explain Tanabe-Sugano diagram for d^2 configuration.

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

(i) Ground state term for d^2 configuration is :

(a) ^3F

(b) ^3P

(c) ^1G

(d) ^1S

(ii) The Mulliken 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}

(iii) The CO stretching frequencies generally follows the order ....

(a) $MCO > M_2CO > M_3CO$

(b) $MCO < M_2CO < M_3CO$

(c) $MCO = M_2CO < M_3CO$

(d) $MCO > M_2CO = M_3CO$

(iv) π-donor ligand is ....

(a) NH_3

(b) CO

(c) H_2O

(d) CNR

P.T.O.

(v) Number of π-electrons in ferrocene are ....

    (a) 5

    (b) 6

    (c) 10

    (d) 12

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

    (i) Taube explanation of lability and inertness

    (ii) 18 electron rule

    (iii) Two-electron transfer reactions.