Registration no: | | | | | | | | | | |

Total Number of Pages: 01 **M.Sc.I**

FCYC503

5th Semester Back Examination 2017-18
Inorganic Chemistry-IV
BRANCH(S): M.Sc.I(AC)
Time: 3 Hour
Max Marks: 70
Q.CODE : B611

Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions :** **(2 x 10)**

a) Describe the structure of ICl_4 using VSEPR theory.
b) Bond angles of $CH_4 > NH_3 > H_2O$ although all of them are tetrahedral. Explain.
c) Describe the structure and hybridization involved in MnO_4^-.
d) What is Bent rule? What are its postulates?
e) What is hybridization index in s and p hybridization? How can you calculate % of s and p character. How θ and hybridization index are linked?
f) Give four drawbacks of CFT.
g) What do you mean by thermodynamic stability? Determine the overall stability constant for
$M + nL \longrightarrow ML_n$
h) How nature of metal affect the stability of complex?
i) Write the ground state term for d^2-metal ion?
j) For an octahedral complex, g→g transition is forbidden. Which selection rule is it?

Q2 **a)** What is d_π-p_π interaction? Explain it through MOT considering π-acceptor and π-donor ligands. **(7)**
b) Why Ti^{4+} cannot back-bond acting as a Lewis base but can act as Lewis acid for π-bond in $[TiF_6]^{2-}$? **(3)**

Q3 **a)** Describe the concept of MOT. **(5)**
b) Give the energy profile diagram of MO's for an octahedral system. **(3)**
c) Give the electron distribution in molecular orbitals for $[Fe(CN)_6]^{3-}$. **(2)**

Q4 **Explain**
a) More is the ionic potential more is the stability of complexes. **(4)**
b) More is the number of chelate ringing, less is the substituent in chelate rings, more is the stability of complexes. **(4)**
c) More is the Lewis basicity of ligands more is the stability of complexes **(2)**

Q5 **a)** Through mechanism prove that square palanar complex follow SN^2 pathway for substitution. **(4)**
b) A thermodynamically stable complex may or may not be kinetically inert. Explain with example. **(3)**
c) Synthesize *cis* and *trans* isomers of $[PtCl_2(NO)_2NH_3]$ from $[PtCl_4]^{2-}$. **(3)**

Q6 **a)** Define the term acid hydrolysis. Describe the mechanism of acid hydrolysis **(7)**
b) Describe three factors which affect the rate of SN^1 mechanism. **(3)**

Q7 **a)** Explain the mechanism through which base hydrolysis occurs? **(7)**
b) What is Berry Pseudo rotation? **(3)**

Q8 **a)** Discuss the Orgel diagram for an octahedral d^1 configuration? **(5)**
b) What is Beer-Lambert's Law? Derive an expression for it? **(5)**