**Bago University**
**Department of Chemistry**
**Second Semester Examination, September 2019**

**Third YearBSc**
**(Chemistry Specialization)**
**Answer *any six* Questions**

**Chem 3107**
**Inorganic Chemistry IV**
**Time Allowed: (3) hours**

1. (a) Fill in the blanks with the correct word(s), unit(s), and etc., as necessary.
   (i) In the pure state the ionizing solvents are ——— conductors of electricity.
   (ii) Classification of ionizing and non-ionizing solvents is based upon the ——— nature of solvents.
   (iii) Solvents with associated structures have high boiling point and ——— liquid ranges.
   (iv) The valence bond theory explains the ——— and magnetic properties of complexes.
   (v) The enthalpy of hydration is inversely proportional to the size of ———.
   (vi) A ——— complex would have a rapid rate of reaction.

   (b) Select the correct statement(s), word(s), unit(s) and etc., given in the followings.
   (i) In pure state, all ionizing solvents are (weak, strong, medium) conductors of electricity.
   (ii) There are (four, five, six) types of reactions in liquid sulphur dioxide.
   (iii) Among the reactions that have been observed in liquid hydrogen cyanide are (two, three, five) types.
   (iv) The $e_g$ set has (lower, higher, equal) energy than the $t_{2g}$ set by an amount of $\Delta_o$, when O stands for octahedral.
   (v) The complex absorbs visible light in yellow region and reflects (green, violet, blue) light.
   (vi) The hybridization of $[Cu(NH_3)_4]^{2+}$ complex is $dsp^2$ and its geometry is (tetrahedral, octahedral, square planar).

2. (a) Define the following.
   (i) Dipole moment (ii) Association
   (b) Describe the advantages of using liquid ammonia as solvent.
   (c) Explain the proton-acceptor property of $CH_3COOH$, $CH_3CONH_2$, $NH_2CONH_2$ and $AgNH_2$ in liquid $NH_3$.

3. (a) Write down the important redox reactions occurring in liquid $NH_3$.
   (b) Describe the various ways in which salts may enter into solution in liquid HF.

4. (a) State the order of conductivity of salt solutions in liquid $SO_2$.
   (b) Describe the precipitation reaction and amphoteric reactions in liq.$CH_3COOH$.

**P.T.O**

5. (a) How does the valence bond theory account for the following facts?
   (i) $[Ni(CN)_4]^{2-}$ is diamagnetic and square planar.
   (ii) $[Ni(CO)_4]$ is diamagnetic and tetrahedral.
   (b) Several square planar complexes are known for gold (III) ion, but none for silver (III) ion. Why?

6. (a) Draw energy level diagram for crystal field splitting in an octahedral crystal field.
   (b) Explain the magnetic properties of transition metal complexes with appropriate examples.
   (c) Define the following.
   (i) Crystal field stabilization energy (ii) Jahn - Teller effect

7. (a) What is ligand field theory? And draw molecular orbital energy level diagram for $[Co(NH_3)_6]^{3+}$ complex ion.
   (b) Discuss the factors affecting the stability of a complex.

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