RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

SECOND YEAR

B.A./B.SC. FOURTH SEMESTER (January – June) 2013

Mid-Semester Examination, March 2013

Date : 06/03/2013 **CHEMISTRY (General)**

Time : 12 noon – 1 pm Paper : IV Full Marks : 25

[Attempt all questions]

1. Explain the followings : [3×2]
   a) Half-life period of a 1st order reaction is independent of the initial concentration.
   b) Hydrolysis of ester (acid catalyzed) involves 3 molecules but it is pseudo unimolecular.
   c) log (rate constant) vs. $\frac{1}{T}$ plot gives idea about activation energy.

Or

2. a) Start with the reaction (hypothetical) $A \rightarrow P$ of nth order. Find out the expression of $t_{\frac{1}{2}}$ for this. [2]
   b) A first order reaction is 50% completed in 60 min. How long will it take for the reaction to go to 90% completion? [2]
   c) Consider reaction of multistep

   $N_2O_5 \rightarrow NO_3 + NO_2$; $NO_3 + NO_2 \rightarrow NO_2 + NO + O_2$; $NO_3 + NO \rightarrow 2NO_2$

   Write down the expression for $\frac{d[NO]}{dt}$, applying steady state approximation. [2]

3. a) Write down the quantitative relation between elevation of boiling point of the solvent due to the dissolution of solute in it, with the concentration of the solution. [2]
   b) Under what condition is this valid for real solutions? [1]
   c) Do you think the interaction between solute and solvent is responsible for the phenomena? [2]

Or

4. a) What is the definition of an ideal solution? [1½]
   b) Give a qualitative plot of partial vapour pressure of the solvent against the mole fraction of the solvent in case of an ideal solution. [1½]
   c) Pressure of an ideal gas and osmotic pressure of an ideal solution obey same type of law. Explain. [2]

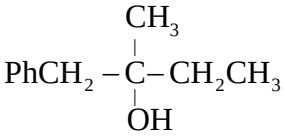
5. a) Arrange in increasing order the Lewis acid character of the following compounds— [4]
      i) BCl_3, BI_3, BF_3, BBr_3
      ii) SiF_4, SiI_4, $SiBr_4$, $SiCl_4$
   b) Identify the conjugate acid (if) and conjugate base (if) of the following species— [2]
   O^{2-}, HS^-, $H_2PO_4^-$ and CN^-

Or

6. a) Explain the acid-base concept in terms of solvent system concept taking a non aqueous solvent and a neutralisation reaction. [3]
   b) Deduce the equation of pH of a salt derived from weak acid and strong base. [3]

7. a) Prepare $PhCH_2CO_2H$ from $PhCH_2Br$ [2]
   b) Explain why RCOOH is more acidic than ROH. [2]
   c) Convert (i) RCOOH to RBr and (ii) RCH_2COOH to RCH(Br)COOH. [2]

d) Give 3 combinations of RMgX and a carbolyl compound that could be used to prepare



[2]

Or

8. a) Synthesize alanine using Gabriel-Phthalimide Synthesis. [2]

b) How will you explain exceptionally high dipole moment of amino acids? [1]

c) What happens when excess phenyl hydrazine is reacted with D-glucose? [2]

d) What do you understand by isoelectric point of an amino acid? Under an electric field, towards which electrode glycine (isolectric point 5·97) will move if it is in a solution of pH 7. [3]