RAMAKRISHNA MISSION VIDYAMANDIRA

(A Residential Autonomous College under University of Calcutta)

First Year, Second Semester (January – June), 2011

Mid-Semester Examination, March, 2011

CHEMISTRY (General)

Date : 10 March 2011 Full Marks : 25

Time : 11am – 12noon

(Use separate answer script for each Unit)

Unit - I

Answer any three questions :

1. a) Give preferable intermediates obtained by fission of following bonds :
   i) Me_3C - Br (heterolytic fission)
   ii) Cl_3C - H (heterolytic fission)
   iii) Me_2CH - H (homolytic fission)
   b) Classify the following as electrophiles and nucleophiles.
   CN^-, H_2O, NO_2^+, ROH [3+2]

2. Define carbocation? Arrange the following according to their increasing stability with explanations.
   (i) $CH_3CH_2CH_2\overset{+}{C}H_2$ (ii) $(CH_3)_3C^+$ (iii) $CH_3\overset{+}{C}HCH_2CH_3$ [1+1+3]

3. a) Give hybridized states and geometries of the following intermediates.
   $Me\overset{+}{C}H_2$ and $H_2\bar{C}-CO-Me$
   b) 'All carbon, oxygen-bond lengths of acetate ion are equal' —why? [3+2]

4. a) Define the term 'resonance' with examples.
   b) The calculated heat of hydrogenation of Kekule' structure of benzene is 85·8 kcal mol^{-1} and the observed value of benzene is 49·8 kcal mol^{-1}. What is the resonance energy of benzene?
   c) $H_2C=CH_2 \leftrightarrow H_2\dot{C}-\dot{C}H_2$ Is this resonance valid? [2+2+1]

5. a) What is inductive effect? Give its type with examples.
   b) Between chloroacetic acid and acetic acid which one is stronger and why?
   c) State which resonance structure of acetone is more stable.
   $Me_2C=O \leftrightarrow Me_2\overset{+}{C}-\bar{O}$ [2+2+1]

Unit – II

Answer any two questions :

6. a) What happens when metal nitrates and nitrites are heated with zinc powder in presence of NaOH.
   b) What happens when Micro cosmic salt is heated and then touched with a copper salt and again heated. [3+2]

7. a) What happens when Al^{3+}, Zn^{2+}, Mg^{2+} salt heated in the oxidising flame in a charcoal groove in the cobalt nitrate test.
   b) What happens when Borax is heated and a transparent bead is obtained; which then touched with a small amount of cobalt (II) salt and again heated in the oxidising flame. [3+2]

8. a) How can you confirm the presence of the following ions (with proper reactions).
   i) Phosphate ion
   ii) Nickel (II) ion.
   iii) Manganese (II or IV) ion.
   b) i) Write down the structure of CrO_5 and the oxidation number of chromium in CrO_5.
   ii) How can you confirm the presence of Fe(III) ion (with proper reactions). [3+(1+1)]