RAMAKRISHNA MISSION VIDYAMANDIRA

(A Residential Autonomous College under University of Calcutta)

First Year, Second Semester (January – June), 2011
Mid-Semester Examination, March, 2011

INDUSTRIAL CHEMISTRY (Honours)

Date : 9 March 2011 Full Marks : 50
Time : 11am – 1pm

(Use seperate answer script for each group)

Group – A

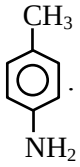
Unit I

Attempt <u>any two</u> questions from the following : [5×2 = 10]

1. a) Write down the relative rate order of mononitration of the following compounds and assign reasons for the order.

   i) $PhCH_3$ ii) $PhNH_2$

   b) Nitrobenzene can be used as solvent in Friedel Craft's reaction. Explain. [3+2 = 5]

2. a) Write down the structure for the main product of nitration of 

. Give reasons.

   b) What do you mean by π complex and σ complex? [3+2 = 5]

3. a) Write down the structure for the main product in the reaction of o-iodonitrobenzene with sodium amide in liquid ammonia. Give reasons.

   b) Compare the dipole moment of cyclopropenone and acetone. [3+2 = 5]

4. a) Compare the rate constants for the following reactions.

   i) $C_6H_6 \xrightarrow[K_H]{\text{Conc. } H_2SO_4 + \text{Conc. } HNO_3 \text{ (1:1)}} C_6H_5NO_2$

   ii) $C_6T_6 \xrightarrow[K_T]{\text{Conc. } H_2SO_4 + \text{Conc. } HNO_3 \text{ (1:1)}} C_6T_5NO_2$

   b) What do you mean by antiaromatic compounds? Give an example. [3+2= 5]

Unit II

Attempt <u>any four</u> questions from the following : [5×4 = 20]

5. a) Write down the postulates of Werner's theory. Explain them using an example.

   b) Write down the IUPAC names for the following compounds.

   i) $[Cr(en)_2(H_2O)_2]Br_3$

   ii) $[CoCl(H_2O)(NH_3)_4]Cl_2$ [3+2 = 5]

6. a) What do you mean by inner metallic complex of—

   i) first order and
   ii) second order?

   Give an example in each case.

   b) Give an example in analytical chemistry where formation of inner metallic complex has been used to estimate a metal ion. [3+2 = 5]

7. Ethylene diamine displaces water molecules easily from a complex $[M(H_2O)_6]^{2+}$— Justify. [5]

8. Explain the phenomenon of demasking using an example. [5]

9. Describe how you can estimate Ca^{2+} in a mixture containing Ca^{2+} and Mg^{2+} using EDTA. [5]

10. What is retention factor? Deduce the relation between retention factor and average linear rate of solute migration in coloumn chromatography. [1+4 = 5]

Unit III

Attempt <u>any one</u> question from the following : [5×1 = 5]

11. a) The conductance of H^+ is much higher compared to alkali metal ions in polar protic solvent. Explain.
    b) The equivalent conductance of NaCl, HCl and CH_3COONa are 108, 254 and 96 unit respectively at infinite dilution. Calculate the same for CH_3COOH. [3+2 = 5]

12. a) Define equivalent conductance.
    b) Describe how equivalent conductance quantity varies with concentration in case of a strong electrolyte.
    c) Mention the different types of forces which are responsible for exerting retarding influence on the mobility of an ion in presence of an external electrical field. [1+1+3]

Group – B

13. Answer **<u>any five</u>** questions from the following : [5×2 = 10]
    a) Differentiate between Recorders and Monitors by explaining their functions.
    b) What are the functions of instrumentation in a process industry?
    c) What are the standard signals in use, in various systems of measurement, for transmitting signals between various instruments?
    d) With the help of a diagram explain the terms Dead Time, Settling Time, Step Response Time as applicable to Dynamic Characteristics of an instrument.
    e) Name two inferential methods and two direct methods of level measurement.
    f) Name and explain the principle on which head flow meters are based?
    g) Explain the terms ‘‘Error’’ and ‘‘Correction’’ giving the relationship between them.
    h) Name three common types of instrument panel boards and describe any one of them.
    i) Differentiate between static and dynamic characteristics of a process instrument.
    j) Write short notes on **<u>any two</u>**.
    (i) Accuracy (ii) Sensitivity (iii) Repeatability.

14. Match side A with side B. [5]

Side A	Side B
a) Graphic	Step change
b) Secondary Instrument	Stream lines flow
c) Dynamic Characteristics	Recorder
d) Orifice plate	Alarm device
e) Annunciator	Panel