# RAMAKRISHNA MISSION VIDYAMANDIRA

**(Residential Autonomous College under University of Calcutta)**

**FIRST YEAR**

**B.A./B.SC. SECOND SEMESTER (January – June), 2012**

**Mid-Semester Examination, March 2012**

Date : 19/03/2012 — **INDUSTRIAL CHEMISTRY (Honours)**

Time : 11 am – 1 pm — Paper : II — Full Marks : 50

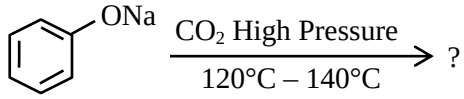
## (Use separate answer scripts for each group)

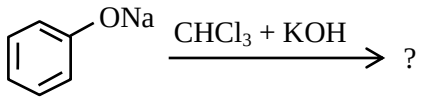
## Group – A

### Unit – I

**Answer any one of the following**

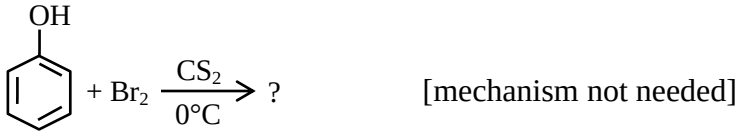
1. a) Predict product with plausible mechanism

i) 

ii) 

b) How will you prepare orthonitrophenol from phenol? [3+2 = 5]

2. a) What happens when—

i)  [mechanism not needed]

ii)  [Show mechanism]

b) How will you prepare fluorobenzene from nitrobenzene? [3+2 = 5]

### Unit – II

**Answer any three questions from the following**

3. a) Name the following compounds according to IUPAC system :
   i) $K_4[Ni(CN)_4]$
   ii) $[Co(H_2O)_2(NH_3)_4]Cl_3$
   b) What do you mean by inner metallic complex of first order? Give an example where the idea of formation of inner metallic complex of first order has been applied in analytical chemistry. [2+3 = 5]

4. a) Discuss the phenomenon of linkage isomerism using an example.
   b) Write down the structures for all the isomers of $cis[Co(en)_2Cl_2]Cl$. [2+3 = 5]

5. a) Show that the overall stability constant of a complex, $ML_6$ can be written as a product of stepwise stability constants.
   b) Ethylenediammine can readily displace water molecules from a complex $[M(H_2O)_6]^{2+}$. Justify [2+3 = 5]

6. a) Hydrazine cannot behave as a didentate ligand. Explain.
   b) Discuss how calcium is estimated using EDTA. [2+3 = 5]

## Unit – III

**Answer <u>any one</u> question from the following**

7. a) Define the following quantities.
   i) Equivalent conductance
   ii) Transport number
   b) Which of the following quantities depend on concentration of electrolyte and how?
   i) Conductance
   ii) Specific conductance
   iii) Equivalent conductance [2+3 = 5]

8. a) Derive the integrated form of the rate equation for first order kinetics.
   b) Show that for any nth order reaction, half life $t_{1/2} \propto \frac{1}{a^{n-1}}$ where 'a' is the initial concentration of the reactant. $[n \neq 0]$ [3+2 = 5]

## Unit – IV

**Answer <u>any one</u> of the following**

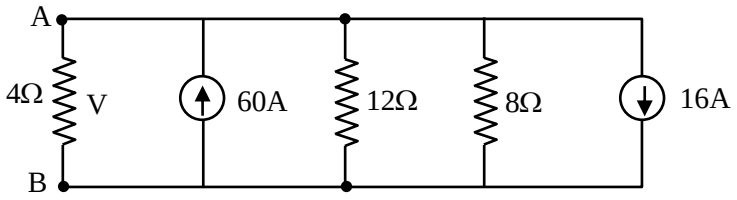
9. a) Explain 'chemical shift' and describe the factors which influence it.
   b) Sketch the expected PMR spectra of the compound 1-bromo-3 chloropropane taking TMS as the standard reference. [3+2 = 5]

10. a) What do you know about spin-spin coupling?
   b) How will you distinguish between cis and trans isomers with the help of nmr spectroscopy?
   c) Write down the symbols with atomic number and mass number for carbon and hydrogen which do not exhibit NMR spectra. [2+2+1 = 5]

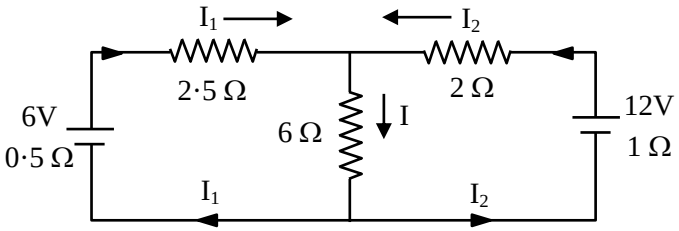
## Group – B

11. Answer **<u>any two</u>** questions :
   a) Name three types of panel boards normally used in industry. Explain what is meant by Central Control Room. [3+2 = 5]
   b) What is dynamic characteristic of an instrument? What are the types of error encountered in an instrument. [2½+2½ = 5]
   c) With a neat labelled sketch explain the working of a displacer type level instrument. [5]

12. Answer **<u>any two</u>** questions : [5+5 = 10]
   a) Using Kirchoff's Current Law and Ohm's law find the magnitude and polarity of voltage V across AB in the following figure. The direction of the two current sources are as shown.



b) In the figure below let the battery emfs be 6V and 12V, their internal resistances 0·5V and 1Ω. The value of the other resistances are as indicated. Find the different currents flowing in the branches and voltage across 6 ohm resistor. Use superposition theorem.




c) Apply Thevenin's theorem to calculate the current through the 4Ω resistor of the circuit below.