RAMAKRISHNA MISSION VIDYAMANDIRA
(Residential Autonomous College under University of Calcutta)

FIRST YEAR
B.A./B.SC. SECOND SEMESTER (January – June) 2013
Mid-Semester Examination, March 2013

Date : 04/03/2013

Time : 11 am – 1 pm

INDUSTRIAL CHEMISTRY (Honours)
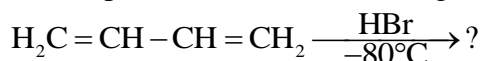
Paper : II

Full Marks : 50

[Use Separate Answer Books for each group]

Group – A

Unit – I
(*Answer **any one** question*)

1. a) Predict product(s) of the following reaction.

   $$H_2C = CH - CH = CH_2 \xrightarrow[-80°C]{HBr} ?$$

   If the product mixture is heated to 40°C in presence of HBr, what will be the fate of the product composition? Justify your answer.

   b) Suggest suitable reagent(s) for the following convertion.

   i)

   ii) $H_3C - C \equiv C - CH_3 \rightarrow$ $\qquad$ [3+(1×2)]
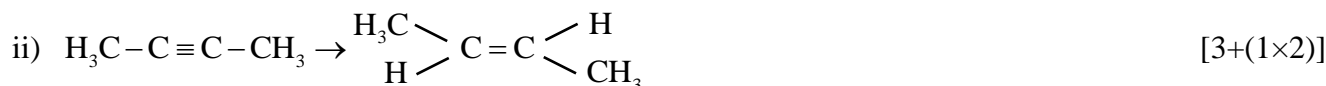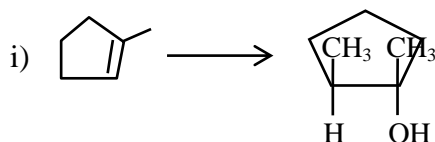
2. a) Two different organic compounds A and B have same molecular formula C_4H_8. Both absorb one mole of Br_2 when treated with Br_2/CCl_4. On ozonolysis, compound A produces two moles of acetaldehyde and compound B produces one mole of propanaldehyde and one mole of formaldehyde. Identify the compounds A and B giving suitable reasons.

   b) Predict the product with plausible mechanism.

   $$Me_3C - CH = CH_2 \xrightarrow{HBr} ? \qquad [3+2]$$

Unit – II
(*Answer **any two** questions*)

3. a) Write down the reasons behind chelate effect.

   b) The number of ions per mole of the complex $CoCl_3.5NH_3$ in aqueous solution will be—

   i) 2 $\qquad$ ii) 3 $\qquad$ iii) 4 $\qquad$ iv) 6

   Choose the correct answer and write down the formula for the complex.

   c) Which among the following exhibits optical isomerism?

   i) Cis-$[Co(NH_3)_4Cl_2]Cl$ $\qquad$ ii) Trans-$[Co(NH_3)_4Cl_2]Cl$

   iii) Cis-$[Co(en)_2Cl_2]Cl$ $\qquad$ iv) Trans-$[Co(en)_2Cl_2]Cl$ $\qquad$ [3+1+1]

4. a) A compound $Co(en)_2(NO_2)_2Cl$ has been prepared in three isomeric forms. Form (A) undergoes no reaction with $AgNO_3$ or en and is optically inactive. A second form (B) reacts with $AgNO_3$ but not with en and is optically inactive. A third form (c) is optically active and reacts with both $AgNO_3$ and en. Write down the structure for all forms and justify.

   b) What do you mean by linkage isomerism? Explain using and example. $\qquad$ [3+2]

(1)

5. a) Discuss the principle behind the estimation of calcium using EDTA.
   b) Cite examples for the use of innermetallic complexes in the field of spectrophotometric estimation of metal ions. [3+2]

Unit – III
(*Answer **any three** question*)

6. a) At 25°C the halflife period for the decomposition of N_2O_5 is $2{\cdot}05{\times}10^4$ sec and is independent of initial concentration of N_2O_5. What is the order of the reaction? What length of time is required for 80% of the N_2O_5 to decompose?
   b) For a first order reaction, proof that $t_{3/4} = 2 \times t_{1/2}$. [(1+2)+2]

7. a) Zero order reaction must be multistep. Justify.
   b) Cite an example of zero order reaction. Write down the integral form and graphical representation of the zero order reaction, $A \rightarrow$ Products. [2+3]

8. State Hardy-Schulze rule for Colloids. Explain the rule in light of zeta potential. [2+3]

9. a) Explain why 100% purification of a lyophobic sol is not possible.
   b) Microemulsion may not exhibit Tyndall effect. Justify.
   c) Gold number of some lyophobic sols are given below—
      i) Casein 0·01
      ii) Haemoglobin 0·03
      iii) Gum Arabic 0·15
      iv) Sodium oleate 0·40
      Which of the above has maximum protective power? [2+2+1]

Unit – IV
(*Answer **any one** question*)

10. Discuss the principle of TLC. Mention its advantages over paper chromatography. [5]

11. What is the retention factor in column chromatography? Derive an expression relating to void time (t_m) and time (t_s) which is the time the solute spent in the stationary phase. [5]
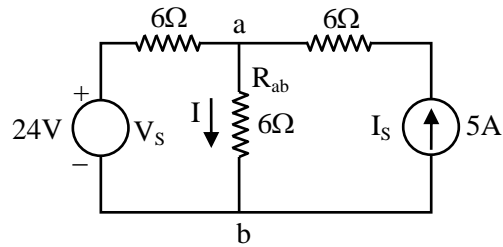
Group – B
(*Answer **any three** questions*)

12. a) State Kirchoff's Law.
    b) What is the value of V_S across the open switch in the following circuit. [2+3]
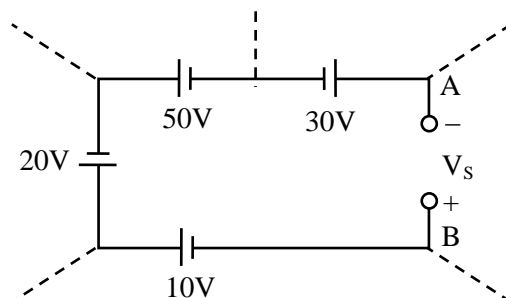
13. a) State the Superposition theorem.
    b) Determine the current I in the network shown in the figure by the principle of Superposition. I is the current in the 6Ω Resistance R_{ab}. [2+3]

14. a) Derive the expression for the maximum power transfer theorem.
    b) In the network shown in the figure, find the value of R_L such that maximum possible power will be transferred to R_L. [2½+2½]
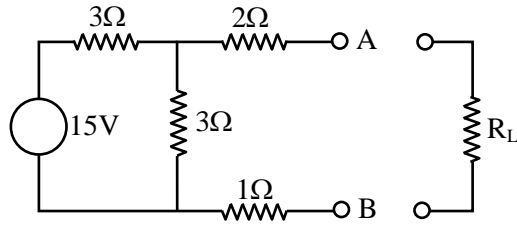
15. a) Draw a neat sketch of a d.c. generator and tag the main parts.
    b) Explain, in short, the function of the brushes and the commutator. [3+2]

16. a) Give the expression for the generated emf for a simplex wave wound generator.
    b) A shunt generator delivers 450A at 225V and the resistances of the shunt field and armature are 45Ω and 0·05Ω respectively calculate the generated emf. [2+3]

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