RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, MAY 2019

FIRST YEAR (BATCH 2018-21)

Date : 29/05/2019 **CHEMISTRY (General)**

Time : 11.00 am – 1.00 pm **Paper : II** Full Marks : 50

[Use a separate Answer Book for each Group]

Group-A

Unit I

Answer **any one** question: [1×13]

1. a) Using VSEPR theory, write the possible structure of ClF_3 and predict the most favoured structure with reason. [3]

   b) Show the limiting radius ratio of a planar trigonal lattice is 0.155. [3]

   c) What is chelate effect? Give example. Why chelate complex is more stable than non-chelated complex? [2+2]

   d) Discuss Werner's co-ordination theory. [3]

2. a) Show and explain the geometry of the following compounds using VSEPR theory —
   i) H_2O ii) SF_6 [2+2]

   b) Give the IUPAC names of the following —
   i) $\left[Co\left(NH_3\right)_5 Cl\right]Cl_2$ ii) $K_3\left[FeF_6\right]$ [2+2]

   c) What do you mean by ambidenatate ligands? Give on examples. [1]

   d) What is radius ratio rule? Mention its two important application and limitation. Calculate the radius ratio values of ionic compound having coordination number 4. [1+3]

Unit II

Answer **any one** question: [1×12]

3. a) Calculate the emf of a cell in which the following reactions take place at different elctrodes. [2]
   $Zn^{2+} + 2e^- \rightarrow Zn(s) \quad E^o = -0.76\ V$
   $Ag^+ + e^- \rightarrow Ag(s) \quad E^o = 0.79\ V$

   b) Explain disproportionation reactions with examples. [2+2]

   c) Indicate the effects of following ionisation processes on bond order and lengths :- [4×1.5]
   i) $O_2 + e \rightarrow O_2^-$
   ii) $N_2 + e \rightarrow N_2^-$
   iii) $O_2 - e \rightarrow O_2^+$
   iv) $N_2 - e \rightarrow N_2^+$

4. a) Draw the qualitative MO diagram of O_2 molecule and hence comment on the bond order and magnetic behavior of O_2, O_2^+, O_2^- and O_2^{2-}. [2+3]

   b) Explain the reaction in terms of Lux Flood definition: [2+2]
   i) $CaO + SiO_2 \rightarrow CaSiO_3$
   ii) $3CaO + P_2O_5 \rightarrow Ca_3\left(PO_4\right)_2$

   c) What is semiconductor? What happens if small amount of As is doped with Si? [3]

Group-B

Unit I

Answer **any one** question: [1×15]

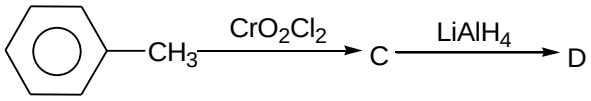
5. a) Which one is more stable radical between the radicals $(CH_3)_3\dot{C}$ and $CH_3\dot{C}H_2$? Give an explanation. [2]

   b) Draw the E and Z isomers of Cinnamic acid $(C_6H_5CH=CH-CO_2H)$. Can these isomers be labelled as cis or trans? Explain. [3]

   c) Predict the products A,B,C and D in the following reaction. [2]

   i) $CH_3CH=CH_2 \xrightarrow[Ether]{B_2H_6} A \xrightarrow[NaOH]{H_2O_2} B$

   ii)



   d) How can you convert the followings? [2+2]

   i) Acelylene → Acetic Acid

   ii) Benzene → Benzoic acid

   e) How can you differentiate between 1-butyne and 2-butyne by a chemical test? [2]

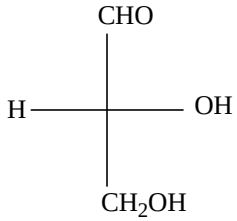
   f) Lactic acid is optically active but propionic acid is not, Explain. [2]

6. a) Identify electrophiles and nucleophiles from the following species. [2]

   NH_3, H_2O, $AlCl_3$, BF_3

   b) Assign R or S –configuration of the following compounds. [2]

   i)



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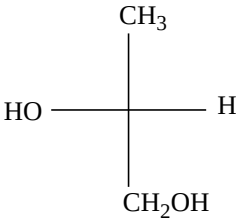
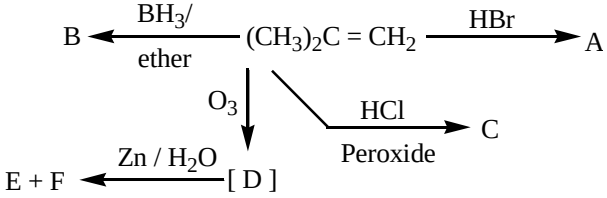


   c) Write the Geometrical isomers of Butenedioic acid. [2]

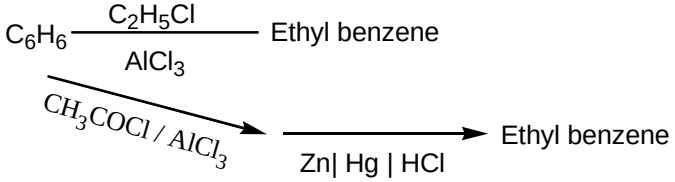
   d) Identify the products A→F in the following reactions. [3]



   e) Write short notes on :

   i) Fridel-Craft's reaction ii) Markowni Koff's rule for peroxide effect. [2+2]

   f) Which one is more favourable? [2]

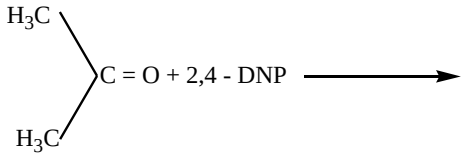


Unit II

Answer **any one** question: [1×10]

7. a) Write short notes on the following reactions [2×3]
   i) Connizzaro reaction
   ii) Aldol condensation
   iii) Ozonolysis

   b) Predict the major product in the following reaction. [2×2]
   i)



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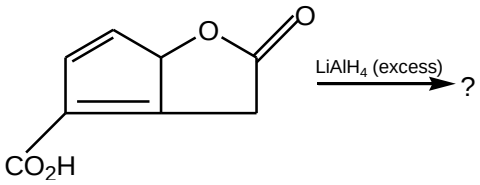
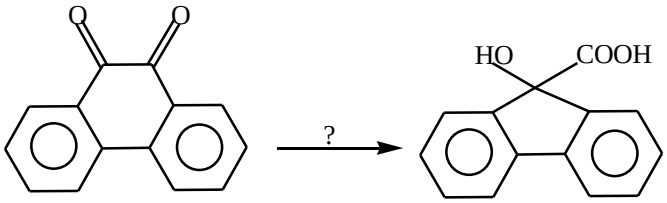


8. a) Write short notes on the following reactions [2×3]
   i) Perkin reaction
   ii) Hoffmann elimination
   iii) S_N1 reaction

   b) Complete the following reaction. [2×2]
   i)



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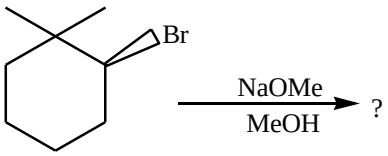

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