BACHELOR OF ENGINEERING IN CHEMICAL ENGINEERING EXAMINATION, 2018

1st Year, 2nd semester-New Syllabus-Regular
ORGANIC CHEMISTRY

Time: 3 hours Full Marks: 100

(50 marks for each Part)
Use separate answer script for each part

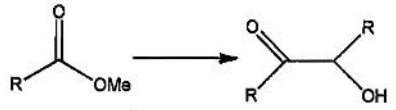
Group-A (50 Marks)

1) Carry out the following transformation (*any four*) with suitable mechanism. 4x4

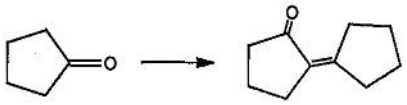
a)

b) PhCHO ⟶ Ph-CH=CH-CO_2H

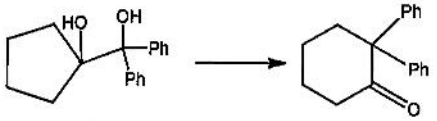
c)



d)



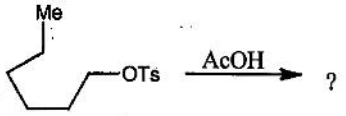
e)



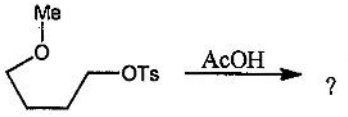
2. Draw the energy profile diagram with all the conformations of 2-amino butanol considering the rotation about C1-C2 bond. 5

3. Predict the products of these reactions and explain why rate of the reaction "a" is 650 times faster than that of the reaction "b"? 4

a)



b)

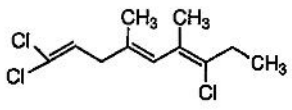


4. The observed rotation of 1.5 gm of a sample in 60 ml of a solution in a polarimeter tube of 18 cm long is +14.8 ^{0}. What is the specific rotation of the sample? The monochromatic light used is sodium D line. 3

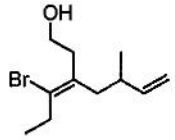
5. "*Cis*-alkenes are not always *Z* and *trans* alkenes are not always *E*". Comment on this statement with suitable examples. 3

6. Write down the E and Z conformation for each double bond. 4

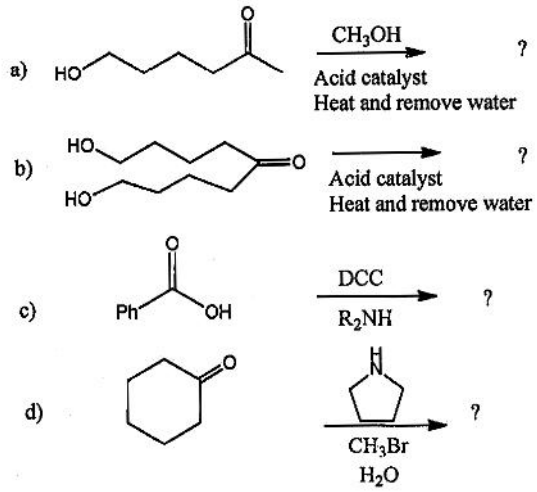
a)



b)



7. Predict the products (*any three*) with suitable mechanism. 3x4



8. What do you mean by Anchimeric assistance? Explain with suitable example. 3

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Group B : Full Marks: 50

Answer any five questions. (5 X 10 = 50)

1) Write the mechanism of electrophilic substitution reaction of Benzene. Draw the energy profile diagram with appropriate labelling. Mention the products of nitration reaction of chlorobenzene and comment on the rate of this reaction.

2) Discuss the structure of Benzene, emphasise on the modern day view. State Huckel's Rule of aromaticity. Designate with reasons which of the following is aromatic, anti-aromatic or nonaromatic.
(i) Cyclopropyl Cation (ii) Cyclopentadienyl Anion (iii) Cyclooctatetraene (iv) Cyclobutadienyldication

3) Explain the following reactions with name and formula of the product in each case.

i) A mixture of Benzaldehyde and aqueous alcoholic solution of KOH is heated under reflux.

ii) Bromine water is added to Aniline.

Iii) Acetylene gas is passed through a hot (80^0 C) aqueous solution (20%) of H_2SO_4 containing Hg_2SO_4

iv) Phenol reacts with $CHCl_3$ in presence of KOH under hot condition

v) HBr reacts with But-1-ene

4) (a) Cite one example for each of three rearrangement reactions where migration of a group takes place to an electron deficient C- atom, N - atom and O - atom. Explain the mechanism of pinacol pinacolone rearrangement reaction.
(b) Write the product/products when p- chloro-toluene is treated with $NaNH_2$ in liquid ammonia. Explain the reaction with mechanism. Can you predict the product which is obtained when 2, 4, 6 - trinitro chlorobenzene is heated with aqueous alcoholic KOH solution?

5) How will you carry out the following transformations?

i) Ph.CHO ----------→ Ph.CO.CO.Ph

iii) Phenol ----------→ Picric Acid

v) Benzene ----------→ Cinnamic Acid

iii) Benzil ----------→ Diphenylacetic Acid

iv) Salicylaldehyde ---------- > 1, 2 Dihydroxy benzene

v) Phenol ----------→ Oil of Winter Green (Methyl Salicylate)

6) Write notes on (any five):

(a) Crossed Cannizzaro Reaction (b) Diazocoupling Reaction (c) Phenolphalene
(d) Vertical Resonance Energy (e) DDT (f) Malachite Green (g) Nylon66 (h) Umpolung
(j) Terelene (i) Coumarin