

(3 Hours)

- N.B.:** 1. All questions are compulsory
2. Answer all sub questions together
3. Figures to right indicate full marks

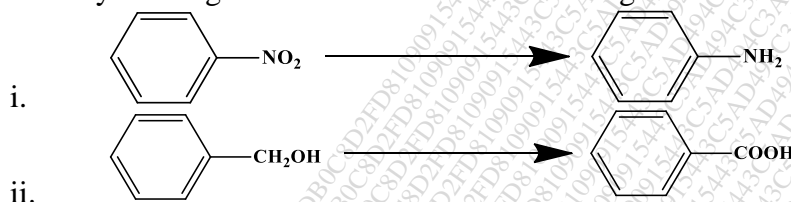
Total Marks: 80

Q1 a. Complete the given table stating the electronic effects of the following functional groups on the benzene nucleus (04)

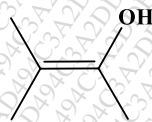
Groups	Inductive effect	Resonance effect
-OCH ₃		
-NHCOCH ₃		
-CN		
-COOH		

Q1b. Answer the following questions (Any Eight) (16)

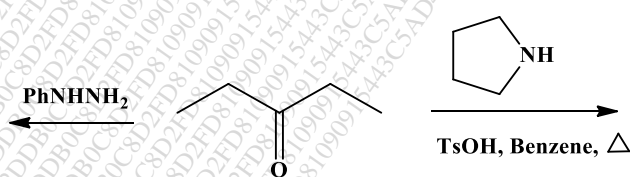
1. Identify the reagents to be used for the following reactions:



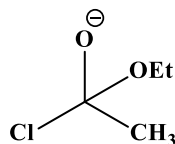
2. Depict the tetrahedral intermediate involved in the reaction between acetone with hydroxylamine and predict the product thus formed:
3. Give the tautomer of the given molecule. State which form is more stable.



4. Justify using suitable examples: Cyclic acetals are more stable than acyclic acetals.
5. Complete the following reactions:



6. Compare the reactivity of the oxonium and iminium ions.
7. Identify the leaving groups in the given molecule. Arrange them in increasing order of leaving group ability:



8. Draw the molecular orbital of a carbonyl group. Explain the polarization seen in this group.
9. Which alkyl halide forms butyric acid after reacting with sodium cyanide and product heated in an acidic solution?

Q.2a. Give the mechanism for the following reactions (Any three) (06)

1. Reimer Tiemann reaction
2. Kolbe's reaction
3. Cannizzaro reaction
4. Wittig reaction
5. Transesterification

b. Give the product when 2,4-dinitrochlorobenzene is treated with (i) NaNH_2 in liq. ammonia and (ii) boiling aq. sodium carbonate at 130°C . (02)

c. Identify which of the following molecules can undergo nucleophilic aromatic substitution reaction: Bromobenzene or p-toluidine. Justify your answer. (02)

d. Identify A and B from the following reaction: (02)



Q.3 a. Compare the reactivity of amides and anhydrides (04)

b. Give the products for the following alkenes with the specified reagents (04)

Alkene	1. $\text{Hg}(\text{OAc})_2$, 2. H_2O , NaBH_4	1. B_2H_6 , 2. H_2O_2 , NaOH

c. Attempt the following conversions (Any Four) (04)

1. Acetaldehyde to 1-Phenylethanol
2. Benzoyl chloride to benzamide
3. Toluene to benzaldehyde
4. 1-pentene to butanoic acid
5. Benzene to acetophenone

Q.4a. Suggest at least two methods using organometallic compounds for the preparation of each of the following alcohols (04)

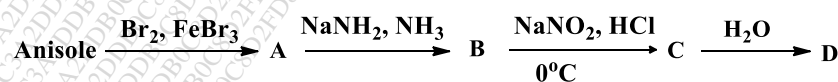
a. 3-methyl-2-pentanol

b. 2-Methyl-2-butanol

b. i) Give the mechanism for nitration of acetanilide (02)

ii) Indicate the position of sulfonation of o-chlorophenol and designate whether the starting material is activated or deactivated relative to benzene (02)

c. Identify A, B, C and D (04)

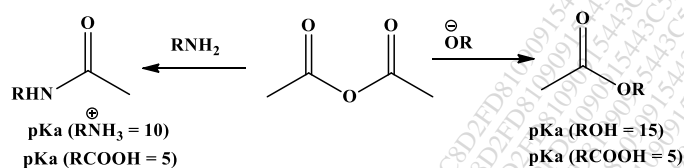


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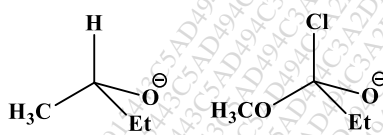
Q.5a. Give the mechanism for acid and base catalyzed hydrolysis of esters. (04)

OR

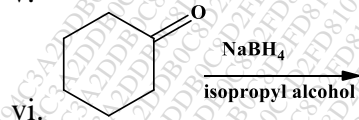
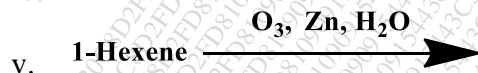
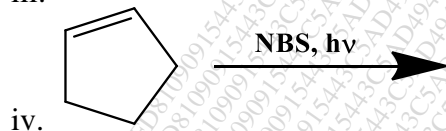
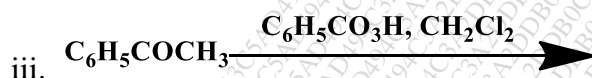
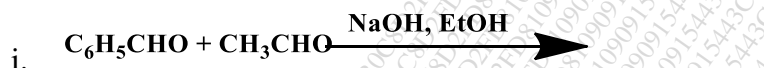
a. Predict which of the given reactions will be completed faster and justify. (04)



b. Predict whether the following intermediates proceed to give substitution or addition products. Justify your answer. (04)

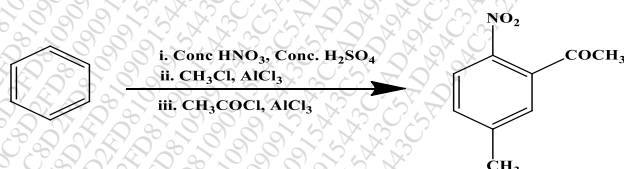


c. Give the products of the following reactions (Any four): (04)



Q.6 a. What is the product obtained when 1-Propene reacts with HBr in presence and absence of peroxides? Give the mechanism for any one of the above reaction. (04)

b. Predict whether the said order of reaction conditions would yield the desired product. Suggest suitable modifications, if necessary: (04)



c. Starting with acetyl chloride, what nucleophile would you use to make each of the following compounds: (04)

(i) $\text{CH}_3\text{COOCH}_2\text{CH}_2\text{CH}_3$ (ii) $\text{CH}_3\text{CON}(\text{CH}_3)_2$ (iii) $\text{CH}_3\text{COOCOCH}_3$ (iv) CH_3COOH
