

3 Hours

Total Marks: 80

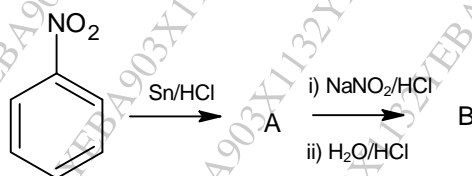
- N.B.:**
1. All questions are compulsory
 2. Answer all sub questions together
 3. Figures to right indicate full marks

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

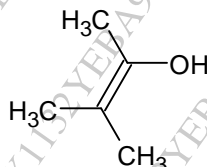
Groups	Inductive effect	Resonance effect
- CONH ₂		
- OH		
- Cl		
-NHCOCH ₃		

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

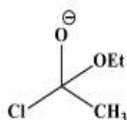
1. Identify A and B for following reaction.



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



4. Justify using suitable examples: Acetals can be hydrolyzed in acid but are stable to bases.
5. Compare the reactivity of oxonium and iminium ions.
6. Lower the pK_a of HX, better the leaving group ability of X- in carbonyl substitution reactions. Justify using a suitable example.
7. Aldehydes are more reactive than ketones in nucleophilic addition reaction; justify.
8. Identify the leaving group in given molecule. Arrange them in increasing order of leaving group ability



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)

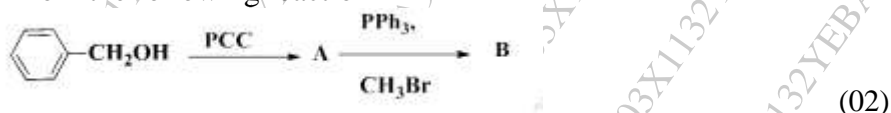
1. Wittig reaction
2. Baeyer Villiger oxidation
3. Mannich reaction
4. Reimer Tiemann reaction

b. 1. Give the product when 2,4-dinitrochlorobenzene is treated with: (02)

- i. NaNH_2 in liq. ammonia
- ii. boiling aq. Na_2CO_3 at 130°C

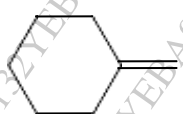

2. Identify which of the following molecules can undergo nucleophilic aromatic substitution reaction: Bromobenzene or 2,6-dimethylbromobenzene. Justify your answer. (02)

3. Identify A and B from the following reaction



Q.3 a Compare the reactivity of amides and acid 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. NBS, 2. EtOH
		
		

c. Attempt the following conversions (Any four): (04)

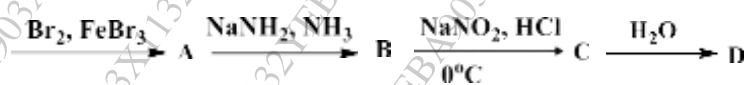
- i. Acetaldehyde to 1-Phenylethanol
- ii. Cyclohexanoyl chloride to N,N-dimethylcyclohexanamide
- iii. 2-Aminobenzoic acid to salicylic acid
- iv. Toluene to benzaldehyde
- v. Benzene to p-nitrotoluene

Q4 a. Using organomagnesium and organolithium compounds, suggest suitable schemes for synthesis of 2-Phenyl-2-butanol and 3methyl-2-Pentanol (04)

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

ii) Indicate the position of nitration of 2-chloroaniline and designate whether the starting aromatic compound is activated or deactivated relative to benzene (02)

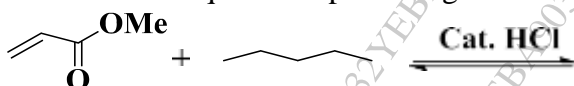
a. Identify A, B, C and D if toluene is the starting material for the following reaction. (04)



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

OR

a. Answer the questions pertaining to following reaction:



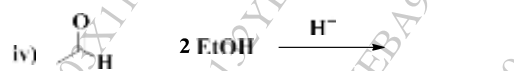
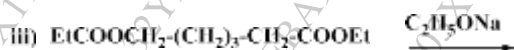
i) Predict the product of reaction.

ii) Write the type of reaction involved.

iii) Write in detail mechanism for the same.

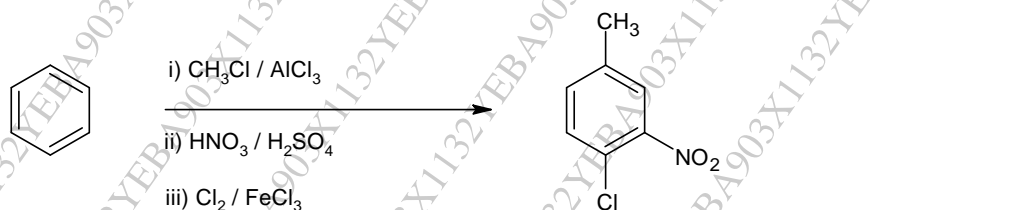
b. Compound A ($C_6H_5O_2N$) reacts with mixture of conc. HNO_3 and H_2SO_4 to give compound B ($C_6H_4O_4N_2$). Compound B is reduced with $(NH_4)_2S$ to compound C ($C_6H_6O_2N_2$). Compound C on treatment with $NaNO_2$ in HCl gives D ($C_6H_4O_2N_3Cl$). Identify A, B, C and D. (04)

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

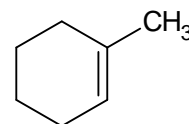


Q6 a. Comment on stereo-chemical outcome of addition of bromine to 2-Butene. Justify your answer by giving the mechanism of the above reaction. (04)

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



b. Identify the product after the reaction of the given compound



with

i. $KMnO_4 / HIO_4$ ii. HBr, H_2O_2 iii. Br_2 / H_2O iv. H_2O / H^+ (04)
