

Total Marks: 80

(3 Hours)

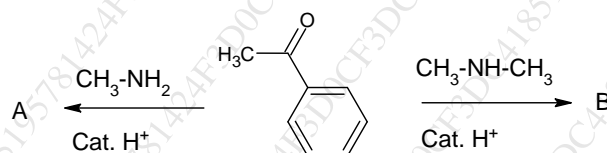
- N.B.: 1. All questions are compulsory**  
**2. Answer all sub questions together**  
**3. Figures to right indicate full marks**

Q1 a. Complete the given table stating the orientation and reactivity of the following functional group substituents present on the benzene nucleus towards further electrophilic substitution reaction (04)

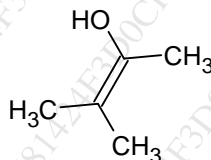
Groups	Directing Effect	Reactivity w. r. t. Benzene
-CN		
-NHCOCH <sub>3</sub>		
-CONH <sub>2</sub>		
-Cl		

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

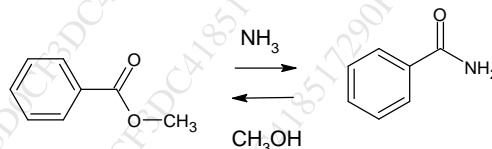
1. Identify A and B for following reaction.



2. Give the tautomer of the given molecule. State which form is more stable.



3. Depict the tetrahedral intermediate involved in the reaction between benzaldehyde with aniline and predict the product thus formed.  
 4. Justify – Imine formation requires acid catalysis.  
 5. Write general reaction for conversion of benzonitrile to benzoyl chloride.  
 6. Alkyl groups are ortho-directing whereas amino group is para directing in EASR. Justify.  
 7. Equilibrium favors formation of aldehyde cyanohydrin than ketone cyanohydrin. Justify.  
 8. In the reaction given below, predict whether the rates of forward reaction and backward reactions are same. Justify your answer.



9. Using phenol, suggest a suitable scheme for synthesis of 5-methylsalicylaldehyde.

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

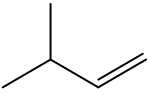
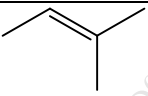
1. Cross Cannizzaro reaction 2. Reimer Tiemann reaction  
 3. Michael Addition 4. Claisen condensation

b. Answer the following

1. Differentiate between Friedel-Crafts alkylation and acylation with examples (04)
2. Give structure of product obtained when chlorobenzene is treated with
  - i. Conc.  $\text{H}_2\text{SO}_4$
  - ii.  $\text{NaOH}$  at high temperature and pressure (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	$\text{HBr}, \text{H}_2\text{O}_2$	$\text{KMnO}_4, \text{HIO}_4$
		
		

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

- i. Phenol to 2-hydroxy benzaldehyde
- ii. Acetophenone to phenylacetate
- iii. 1-pentene to butanal
- iv. Acetanilide to p-bromo acetanilide
- v. Acetaldehyde to Acetyl chloride

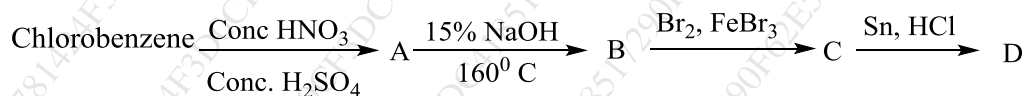
Q4 a. Suggest at least two methods for the preparation of each of the following using organometallic compounds

- i. 2-phenyl-2-butanol
- ii. 2-methyl-2-butanol (04)

b. Match the following in terms of type of reaction involved (04)

Grignard reaction	Nucleophilic aromatic substitution
Kolbe reaction	Nucleophilic addition to $\text{C}=\text{O}$ group
Hydroboration-oxidation	Electrophilic aromatic substitution
Miesner complex formation	Electrophilic addition to alkene

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

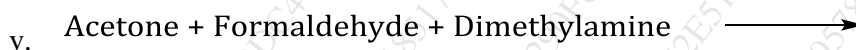
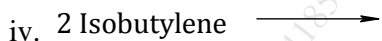
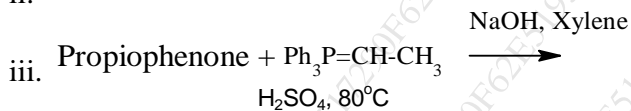
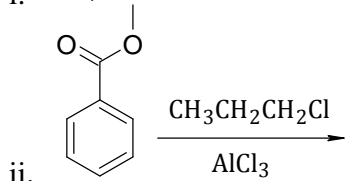
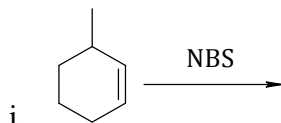


Q 5 a. Answer the following (Any two) (04)

- i. Give the mechanism for nitration of toluene.
- ii. Write a note on Hydroboration – Oxidation for propene. Add a note on their stereochemistry.
- iii. Write a note on Wittig reaction.

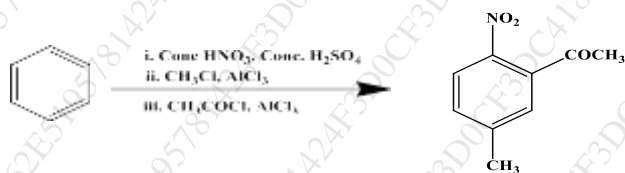
b. Give mechanism for acid and base catalyzed hydrolysis of amides? (04)

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



Q6 a. What is the product obtained when 1-Propene reacts with HBr in presence and absence of peroxides? Give 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. Identify A, B, C and D (04)

