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3 (Sem-4/CBCS) CHE HC 2

2025

**CHEMISTRY**

(Honours Core)

Paper : CHE-HC-4026

(Organic Chemistry-III)

Full Marks : 60

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

1. Answer the following questions :  $1 \times 7 = 7$
- (a) Why does colourless aniline on storage turn brown ?
  - (b) The aliphatic diazonium compound are unstable, why ?
  - (c) What are heterocyclic compounds ?
  - (d) Give one example of quinoline alkaloid.
  - (e) In which class of alkaloid Nicotine belongs to ?



(f) Which position of anthracene undergoes electrophilic substitution reaction under vigorous condition ?

(g) Which monoterpene is present in lemon grass oil ?

2. Answer the following questions :  $2 \times 4 = 8$

(a) How will you distinguish N-methylaniline and N, N-dimethylaniline ?

(b) Why electrophilic substitution of pyridine undergoes at 3-position ?

(c) How will you synthesize TNT from toluene ?

(d) Write the structure of nicotine and mention one of its medicinal use.

3. Answer **any three** questions from the following :  $5 \times 3 = 15$

(a) Why do aliphatic nitro compounds dissolve in aqueous alkali ? How can  $\text{CH}_3\text{CN}$  and  $\text{CH}_3\text{NC}$  be prepared ? What do you get when they are subjected to acid hydrolysis ?

$1+2+2=5$

(b) Why electrophilic substitution of naphthalene predominantly give  $\alpha$ -products ? Write the Haworth synthesis of naphthalene.  $2+3=5$

(c) How is pyrrole synthesized ? What happens when pyrrole is treated with following reagents ?  $2+3=5$

(i) Nitric acid in acetic anhydride at  $-10^\circ\text{C}$

(ii) Sulphur trioxide in pyridine

(iii) Bromine in alcohol

(d) What are alkaloids ? What are the different classifications of alkaloids ? Find the products of the following reactions :  $1+2+2=5$



(e) What is the relationship between geraniol and nerol ? How will you establish the structure of geraniol ?  $2+3=5$



4. Answer **any three** questions from the following :  $10 \times 3 = 30$

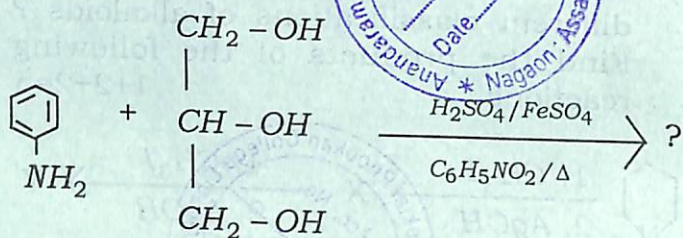
(a) (i) Explain why

(a) Pyridine is more basic than pyrrole.

(b) Pyridine doesn't undergoes Friedel-Crafts reaction.

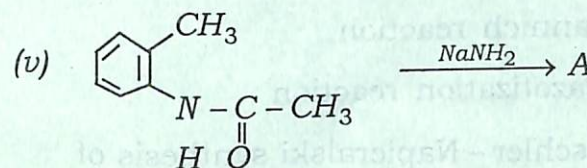
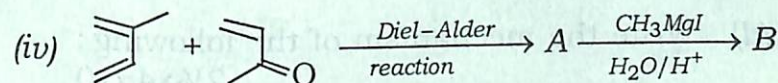
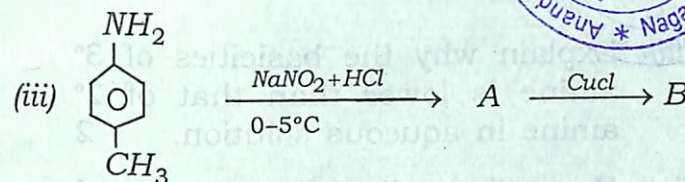
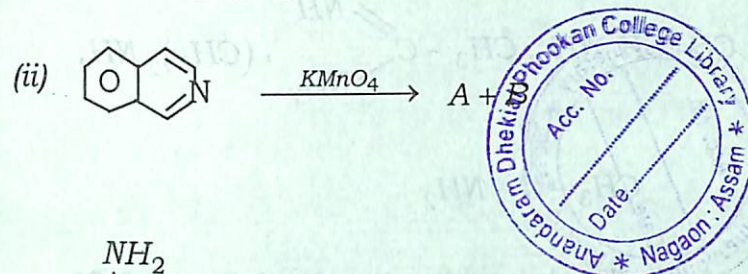
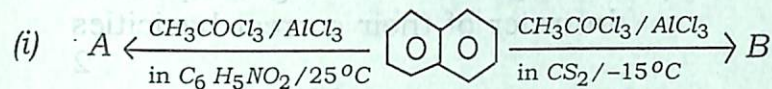
$2+2=4$

(ii) Write the products of the following reaction and also explain the mechanism



What is the role of  $\text{FeSO}_4$  in the above reaction ?  $1+4+1=6$

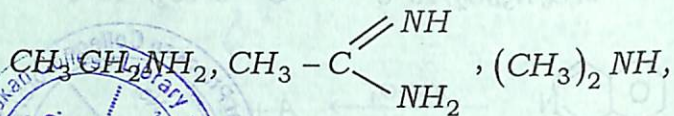
(b) Write the products A and B in the following reactions :  $2 \times 5 = 10$





(c) (i) Write down Hantzsch synthesis of pyridine. 2

(ii) Arrange the following compounds in order of their correct basicities. 2



(iii) Explain why the basicities of 3° amine is lower than that of 2° amine in aqueous solution. 2

(iv) How will you distinguish 1°, 2° and 3° amines using nitrous acid? 4

(d) Write the mechanism of the following:  $2\frac{1}{2} \times 4 = 10$

(i) Gabriel synthesis

(ii) Mannich reaction

(iii) Diazotization reaction

(iv) Bischler-Napieralski synthesis of isoquinoline

(e) (i) Explain the significance of Emde modification with suitable example. What type of alkaloids undergo this modification? 4+1=5

(ii) Why terpenoids are also known as isoprenoids? Discuss the synthesis of  $\alpha$ -terpeniol from ethyl malonate. 1+4=5

(f) (i) What is exhaustive methylation of amines and Hoffmann's elimination? Discuss with suitable examples. 5

(ii) Identify compounds A, B, C, D and E in the following sequence of reactions: 5

