

2018

( May )

CHEMISTRY

( Major )

Course : 403

( Organic Chemistry )

( New Course )

Full Marks : 48

Pass Marks : 14

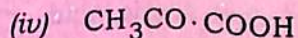
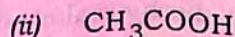
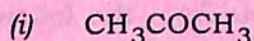
Time : 2 hours

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

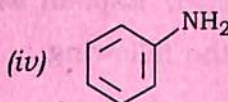
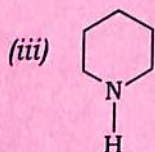
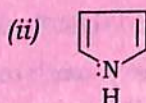
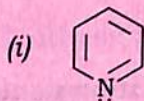
1. Choose the correct answer from the following :

1×5=5

(a) Ethylacetoacetate when boiled with aqueous KOH undergoes hydrolysis to form mainly



(b) The strongest base among the following is



(c) Primary structure of protein refers to

(i) amino acid sequence

(ii) arrangement of peptide chains

(iii) orientation of amino acids

(iv) whether it has  $\alpha$ - or  $\beta$ -helix in space structure



(d) Which of the following gives phthalic acid on oxidation with  $\text{KMnO}_4$ ?

- (i) Naphthalene (ii)  $\alpha$ -naphthylamine  
(iii) *o*-xylene (iv) All of these

(e) The alkaloid obtained from *Rauwolfia serpentina* is

- (i) reserpine (ii) strychnine  
(iii) nicotine (iv) morphine

2. Answer any five from the following :

2×5=10

- (a) Synthesize *n*-butyric acid from ethylacetoacetate.  
(b) Define Herzig-Meyer method in structure determination of alkaloids.  
(c) Synthesize 1-methylisoquinoline with the help of Bischeler-Napieralski reaction.  
(d) Explain, why  $\text{C}_1\text{—C}_2$  bond of naphthalene has greater double-bond character than the  $\text{C}_2\text{—C}_3$  bond.  
(e) Explain geometry and bond lengths of a peptide linkage in a peptide molecule.  
(f) How will you distinguish between cyanides and isocyanides?

#### UNIT—I

3. (a) Starting from ethylacetoacetate, synthesize any one from the following : 2

- (i) 3-ethylheptane-2-one  
(ii) Succinic acid

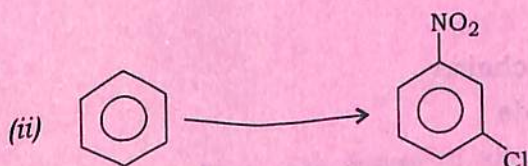
(b) Starting from diethylmalonate, synthesize any one from the following : 2

- (i) Dimethyl acetic acid  
(ii) 2-bromobutanoic acid

#### UNIT—II

4. (a) How can primary, secondary and tertiary amines be distinguished with the help of nitrous acid? Explain with the help of reactions. 2

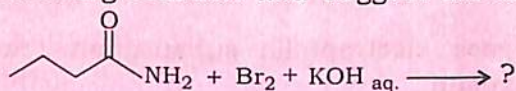
(b) Convert any one of the following : 2





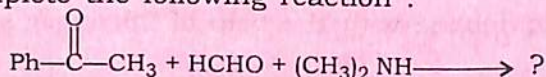
5. (a) Complete the following reaction and suggest the mechanism :

2



(b) Complete the following reaction :

1



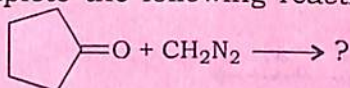
Or

Why is  $-\text{NH}_2$  group of aniline acylated before carrying out nitration?

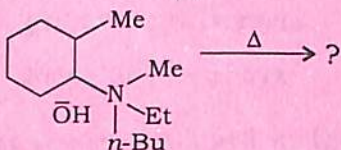
1

(c) Complete the following reactions :

1



Or



### UNIT—III

6. (a) Synthesize glycine with the help of Gabriel's phthalimide synthesis.

2

(b) Explain briefly about the tertiary structure of proteins.

3

Or

Synthesize glutamylglutamic acid, a dipeptide starting from glutamic acid.

3

### UNIT—IV

7. (a) Write down the synthesis of anthracene starting from tetralin.

2

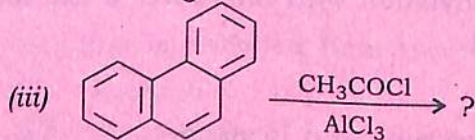
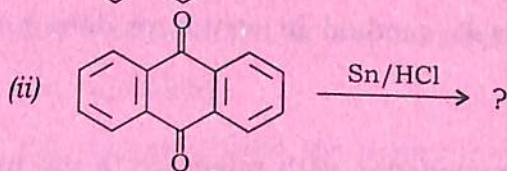
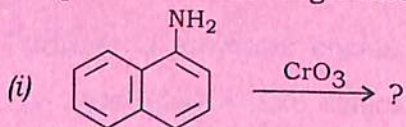
Or

Synthesize 1,4-dimethylnaphthalene starting from benzene.

2

(b) Complete the following reactions (any two) :

1×2=2





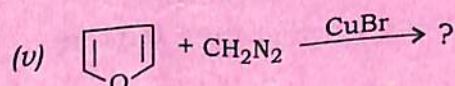
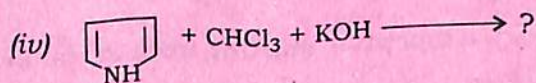
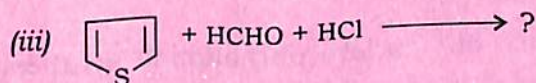
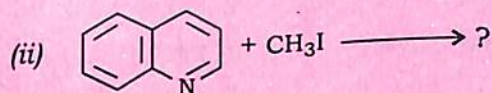
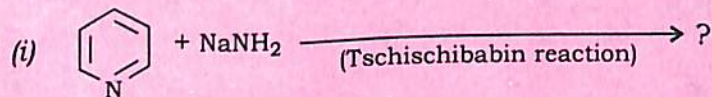
UNIT—V

8. (a) Pyridine undergoes electrophilic substitution reactions preferably at C-3 position. Explain. 2
- (b) Synthesize 2,6-dimethylquinoline with the help of Pfitzinger synthesis. 2

Or

Synthesize 2,4,6-trimethylpyridine with the help of Hantzsch synthesis. 2

- (c) Complete the following reactions (any three) : 1×3=3



UNIT—VI

9. (a) Discuss the importance of Zeisel's method in structure determination of alkaloids. 1
- (b) Explain Hoffmann exhaustive methylation with reference to the nicotine and give the name of the product. 2
- (c) Write one medicinal use each of cocaine and hygiene. 1+1=2



( Old Course )

Full Marks : 48

Pass Marks : 19

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the following : 1×5=5

- (a) Tautomers are
- (i) structural isomers
  - (ii) conformational isomers
  - (iii) geometrical isomers
  - (iv) None of the above
- (b) What reagent is used in the Hinsberg test of amines?
- (i)  $(\text{CH}_3\text{CO})_2\text{O}$  and pyridine
  - (ii)  $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$  in aq. NaOH
  - (iii)  $\text{NaNO}_2$  in aq. HCl
  - (iv)  $\text{CH}_3\text{I}$  (excess) followed by AgOH
- (c) At the pH of seven, amino acids are
- (i) acidic
  - (ii) cationic due to the amino group
  - (iii) anionic due to the acidic group
  - (iv) zwitterionic due to both the amino and carboxylic groups being charged
- (d) Pyridine is aromatic because its lone pair of N-atom is
- (i) included in the delocalized  $\pi$ -electron system
  - (ii) not included in the delocalized  $\pi$ -electron system
  - (iii) unpaired
  - (iv) removed from the molecule
- (e) Quinine is obtained from the bark of which of the following trees?
- |                |                 |
|----------------|-----------------|
| (i) Banyan     | (ii) Eucalyptus |
| (iii) Cinchona | (iv) Redwood    |



2. Answer any five from the following :

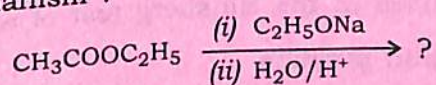
2×5=10

- Naphthalene undergoes electrophilic substitution reaction at C-1, but not at C-2. Explain.
- How will you synthesize *n*-butyric acid from ethylacetoacetate?
- What is 'zwitterion' of an amino acid? Explain with the help of an example.
- Pyrrrole shows resemblance to phenol and aromatic amines. Explain with the help of examples.
- Explain Herzig-Meyer method in the structure determination of alkaloids.
- Explain why C—N single bond is stronger and shorter than the usual C—N single bond.

UNIT—I

3. (a) Define active methylene group. Complete the following reaction and suggest the mechanism :

1+2=3



Or

Synthesize the following from diethylmalonate :

1½×2=3

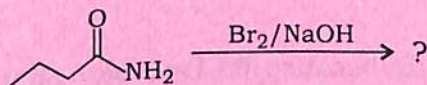
- Glycin
  - Barbituric acid
- (b) How can you synthesize pentane-2,4-dione from ethylacetoacetate?

1

UNIT—II

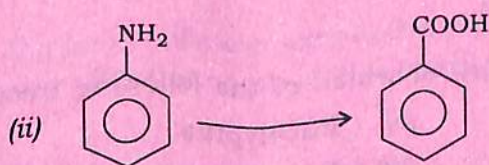
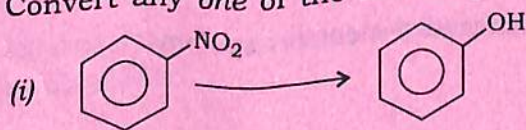
4. (a) Complete the following reaction and suggest the mechanism :

2



- (b) Convert any one of the following :

2





5. (a) Give one method of preparation of diazomethane. What happens when diazomethane reacts with (i) acid chloride and (ii) phenol? 1+(1/2×2)=2

Or

Write one method of preparation of (i) alkyl cyanides and (ii) alkyl isocyanates. 1+1=2

- (b) What happens when a primary amine reacts with nitrous acid? Give reactions. 1

### UNIT—III

6. (a) How can you synthesize phenylalanine with the help of Strecker's synthesis? 2

Or

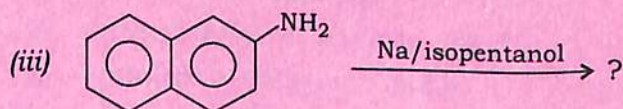
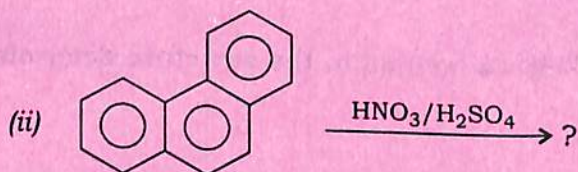
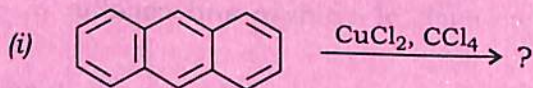
Synthesize alanine with the help of Gabriel's phthalimide synthesis. 2

- (b) Define polypeptide. Give one example of a tripeptide showing N-terminal end and C-terminal end. 1+2=3

### UNIT—IV

7. (a) Synthesize phenanthrene with the help of Haworth synthesis. 2

- (b) Complete the following reactions (any two) : 1×2=2





UNIT—V

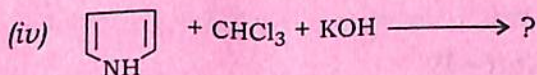
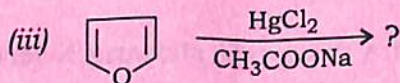
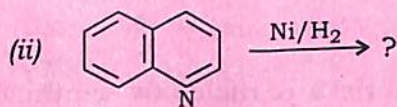
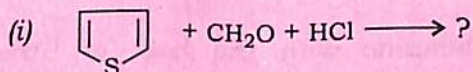
8. (a) Synthesize 1-ethylisoquinoline with the help of Bischler-Napieralsky synthesis. 3

Or

Synthesize 2,4,6-trimethylpyridine with the help of Hantzsch synthesis. 3

- (b) Pyridine is a stronger base than pyrrole but weaker than aliphatic amines. Explain. 2

- (c) Complete the following reactions (any three) : 1×3=3



UNIT—VI

9. (a) Write one medicinal importance each of quinine and cocaine. 1

- (b) Explain Hoffmann's exhaustive methylation considering the example of nicotine and give the name of the product obtained. 2

- (c) Explain the importance of Zeisel's method in the structure determination of alkaloids. 2

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