

6/CHE-351 Syllabus-2023

2026

(May-June)

FYUP : 6th Semester Examination

CHEMISTRY

(Organic Chemistry—III)

(CHE-351)

Marks : 75

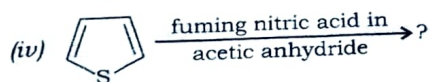
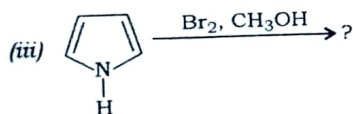
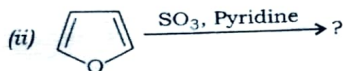
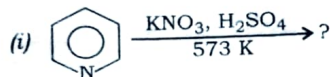
Time : 3 hours

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

1. (a) Define the term heterocyclic compounds.
Give an example each of—
- (i) a heterocyclic compound with one ring;
 - (ii) a fused two-ring heterocyclic compound. 1+½+½=2
- (b) How is furan synthesised by Paal-Knorr method? 2

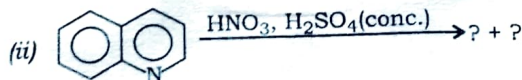
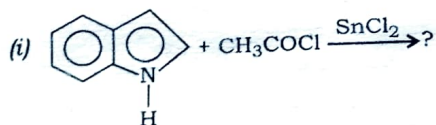
(2)

- (c) Write the correct products of the following reactions : $1 \times 4 = 4$



- (d) Write the various steps with necessary mechanism in the preparation of indole by Fischer indole method. 5

- (e) Complete the following reactions : $1 \times 3 = 3$

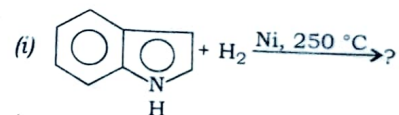


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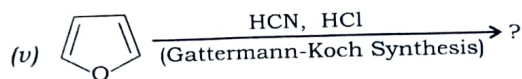
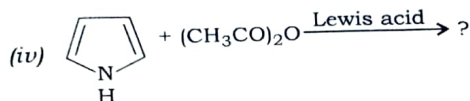
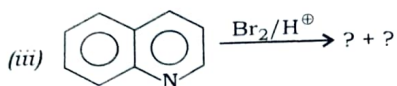
- (f) "Pyrrole is more reactive than pyridine towards electrophilic substitution reactions." Explain the statement. 2

OR

2. (a) Which molecule is more basic, pyridine or piperidine? Give suitable reason to support your answer. 2
- (b) Give the method of preparation of quinoline by Skraup's method with proper mechanism wherever applicable. 5
- (c) Draw the molecular orbital diagram of pyrrole. 2
- (d) Explain why electrophilic substitution in pyrrole takes place at C-2 whereas in pyridine it takes place at C-3. 2
- (e) Why is furan more reactive than benzene towards electrophilic reactions? 2
- (f) Complete the following reactions by writing the correct products : $1 \times 5 = 5$



(4)



3. (a) "Green chemistry reactions are better than conventional reactions." Justify your answer. 2½
- (b) What are solvent-free reactions? How can you carry out Reformatsky reaction by green chemistry method? 2½
- (c) What is 'isoprene rule'? Give a suitable example. 2
- (d) Give a method of synthesis of citral. 4
- (e) Write the mechanism of enzyme action on a substrate explaining the various steps involved. 3
- (f) Write short notes on (any one) : 3
- (i) Lipoic acid
- (ii) Co-enzyme A
- (g) What do you mean by conjugate base pairing in DNA? 2

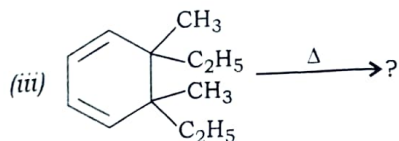
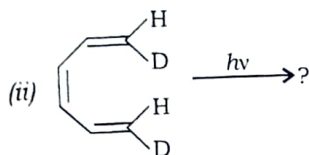
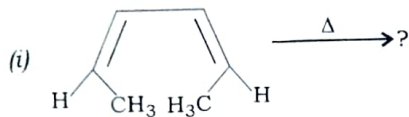
(5)

OR

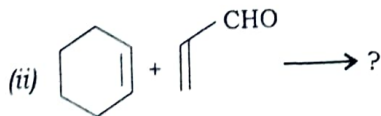
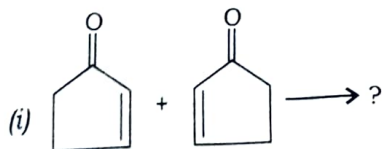
4. (a) State any three principles of green chemistry. 3
- (b) Give an account of microwave-assisted reaction with a suitable example. 2
- (c) Give a method of synthesis of nicotine. 4
- (d) What happens when citral is heated with KHSO_4 ? Write all relevant reactions. 2
- (e) Write a short note on glycolysis. 3
- (f) Give three points of difference between RNA and DNA. 3
- (g) What are individual units obtained when a nucleotide undergoes complete hydrolysis? 2
5. (a) Define pericyclic reactions and classify them into various types. 2
- (b) What are 'dienes' and 'dienophiles'? Give an example of each. 2
- (c) What is meant by quantum yield of a photochemical reaction? Describe the mechanism of photoreduction of benzophenone to benzopinacol. 1+2=3
- (d) What do you mean by 'singlet' and 'triplet' states? 2
- (e) What is Paterno-Buchi reaction? 2

(6)

- (f) Write the correct product, mode of cyclisation and stereochemistry of the following reactions : $2 \times 3 = 6$



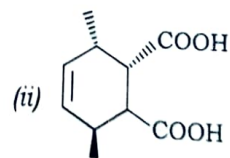
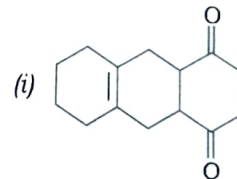
- (g) Write the products of the following photochemical reactions : $1 \times 2 = 2$



(7)

OR

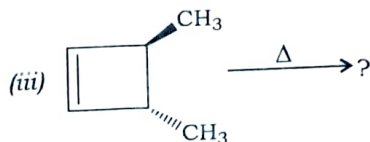
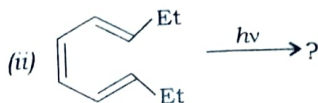
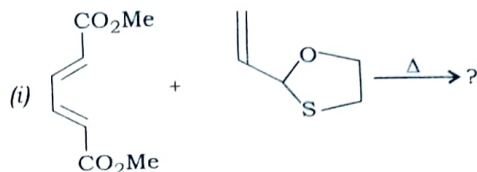
6. (a) Draw the Jablonsky diagram and explain the various terms involved. 4
- (b) What is Norrish type-I reaction? Explain with a suitable example. 3
- (c) What is meant by Quenching? Show with a suitable example how benzophenone acts as an excellent quencher in photochemical reactions. 2
- (d) Explain why a (4+2) cycloaddition reaction is allowed thermally. 3
- (e) Write the structures of diene and dienophile which will be used to prepare the following molecules : $1 \times 2 = 2$



- (f) State Woodward-Hoffmann rule. 2

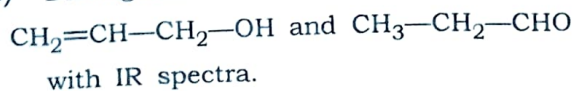
(8)

- (g) Write the products of the following reactions with proper stereochemistry :
1×3=3

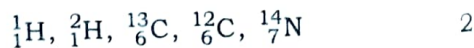


7. (a) What are the various types of electronic transition that take place when acetone is irradiated with light? Also arrange them in order of increasing energy. 2+1=3

- (b) Distinguish between



- (c) Which of the following is/are NMR active?



(9)

- (d) What are equivalent and non-equivalent protons? Give example of each. 2

- (e) A molecule having molecular formula $\text{C}_9\text{H}_{10}\text{O}_2$ shows the following spectral data :

IR : 1719 cm^{-1} , 1280 cm^{-1}

$^1\text{H-NMR}$: $\delta 7.4-8.0$ (m, 5H), 4.3 (q, 2H)
 1.3 (t, 3H)

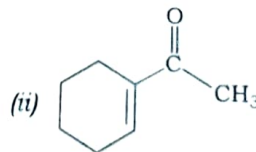
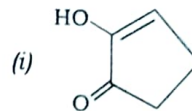
Predict the structure of the compound. 2

- (f) Give the approximate NMR splitting-pattern of propan-1-ol. 1

- (g) What is meant by the terms 'base peak' and 'metastable ion' in mass spectroscopy? 1+1=2

- (h) Suggest a probable fragmentation pattern of pent-2-ene. 2

- (i) Calculate λ_{max} of the following compounds using Woodward's rules :
 $1\frac{1}{2} \times 2 = 3$

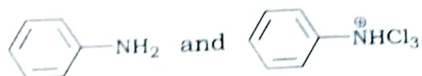


OR

8. (a) Explain the following terms : 1×3=3

- (i) Chromophore
- (ii) Auxochrome
- (iii) Red shift

(b) Which among the following molecules will have a higher value of $\lambda_{\max}$? 2



(c) How can you use IR-spectroscopy to distinguish between $\text{CH}_3\text{—O—CH}_3$ and $\text{CH}_3\text{—CH}_2\text{—OH}$? 2

(d) When propan-2-ol is oxidised, propanone is formed. How will you use IR-spectroscopy to establish the above conversion? 2

(e) What do you mean by the terms 'shielded' and 'deshielded' protons giving correct examples of each? 2

(f) Identify the different types of protons in ethylbromide. 1

(g) Suggest a structure on the basis of the following NMR data :
Molecular formula $\text{C}_3\text{H}_7\text{Br}$; δ 1.7 (d, 6H); δ 4.3 (septet, 1H). 2

(h) State the N-rule for the parent ion as applicable in mass spectroscopy. 2

(i) What is McLafferty rearrangement? How can you apply this to butanol? 1+2=3