

6/CHE-351 Syllabus-2023

2026

(May-June)

FYUP : 6th Semester Examination

CHEMISTRY

(Organic Chemistry—III)

(CHE-351.)

Marks : 75

Time : 3 hours

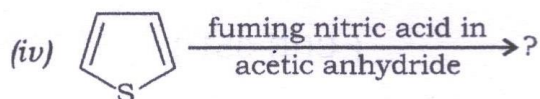
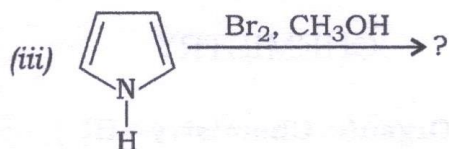
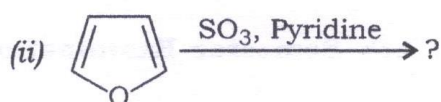
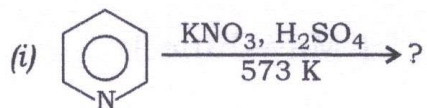
*The figures in the margin indicate full marks
for the questions.*

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

26D/1822

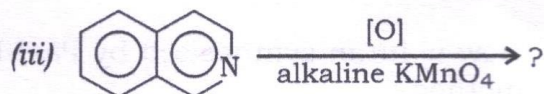
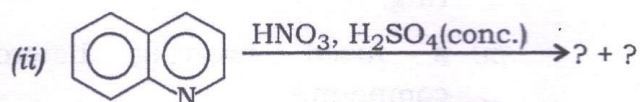
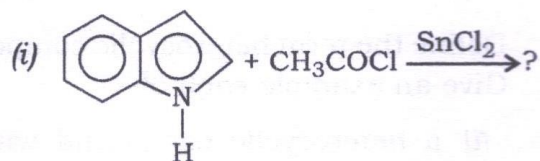
(Turn Over)

- (c) Write the correct products of the following reactions : 1×4=4



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

- (e) Complete the following reactions : 1×3=3

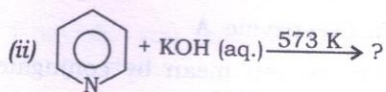
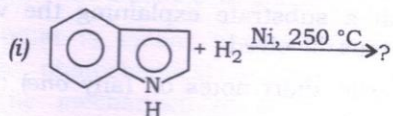


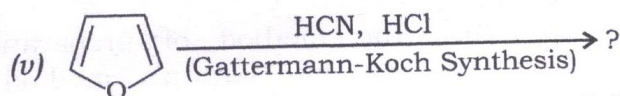
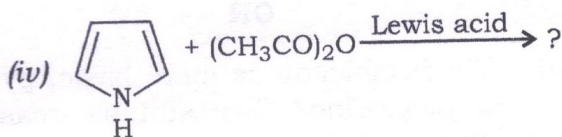
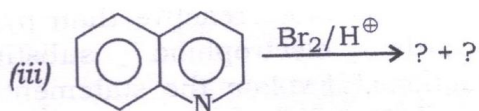
(3)

- (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 : 1×5=5





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

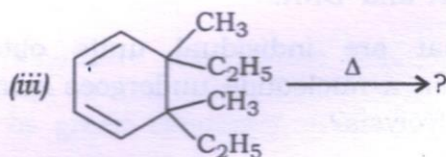
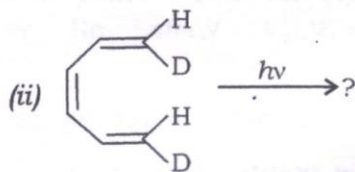
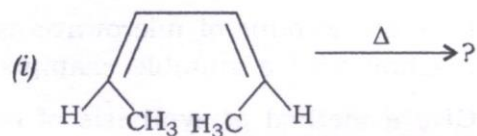
(5)

OR

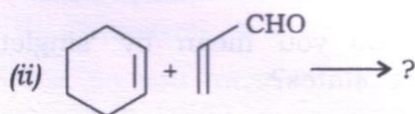
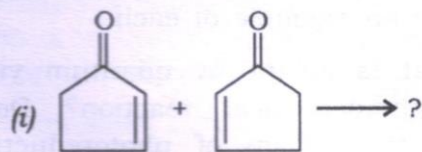
4. (a) State any three principles of green chemistry. 3
- (b) Give an account of microwave-assisted reaction with a suitable example. 2
- (c) Give a method of synthesis of nicotine. 4
- (d) What happens when citral is heated with KHSO_4 ? Write all relevant reactions. 2
- (e) Write a short note on glycolysis. 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 : 2×3=6



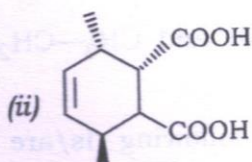
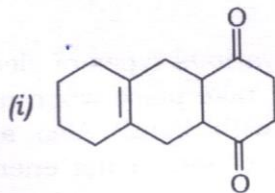
- (g) Write the products of the following photochemical reactions : 1×2=2



(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 : $1 \times 2 = 2$

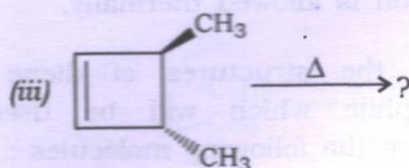
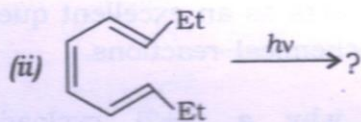
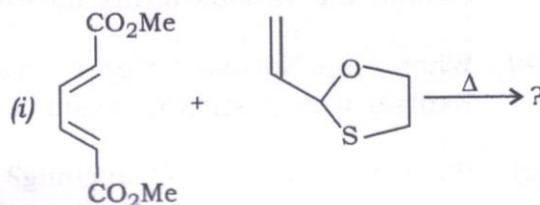


- (f) State Woodward-Hoffmann rule. 2

(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

$\text{CH}_2=\text{CH}-\text{CH}_2-\text{OH}$ and $\text{CH}_3-\text{CH}_2-\text{CHO}$ with IR spectra. 2

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

^1_1H , ^2_1H , $^{13}_6\text{C}$, $^{12}_6\text{C}$, $^{14}_7\text{N}$ 2

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

(e) A molecule having molecular formula $C_9H_{10}O_2$ 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)

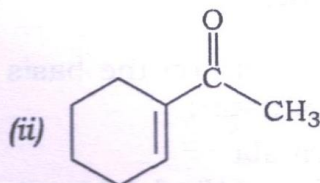
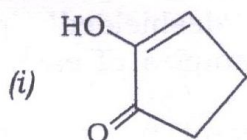
Predict the structure of the compound. 2

(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 : $1\frac{1}{2} \times 2 = 3$



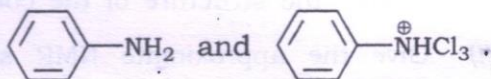
OR

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? $1+2=3$

4/CHE-250 Syllabus-2023

2026

(May-June)

FYUP : 4th Semester Examination

CHEMISTRY

(Inorganic Chemistry—I)

(CHE-250)

Marks : 75

Time : 3 hours

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

1. (a) Calculate the solubility product of PbCl_2 (solubility of PbCl_2 is $1.7 \times 10^{-3} \text{M}$). 2
- (b) Explain the impact of ionic product and solubility product on precipitation. 2
- (c) What is fractional precipitation? 2
- (d) What are the different types of EDTA titrations? Write a note on EDTA back titration. 1+3=4
- (e) What are titrations involving KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ known as? 1
- (f) What is an acid-base indicator? Why are these indicators usually weak acids or weak bases? 3