

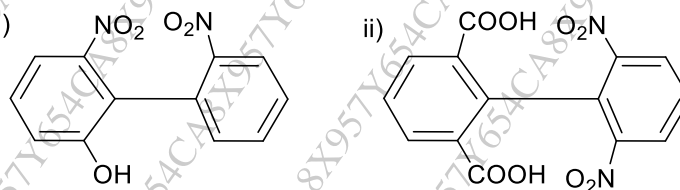
[Time: 3 Hours]

[Marks: 100]

- All questions are compulsory.
- All questions carry equal marks.
- Figures to the right indicate full marks.
- Use of log table/ non-programmable calculator is allowed.

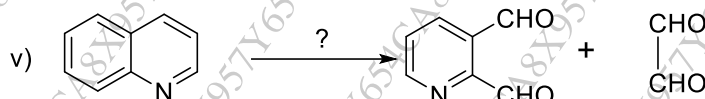
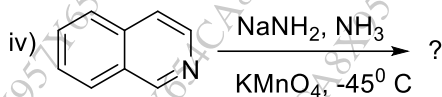
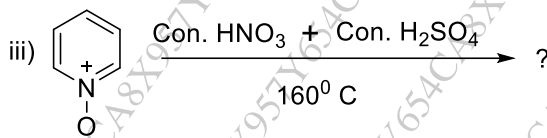
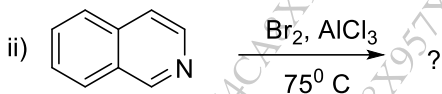
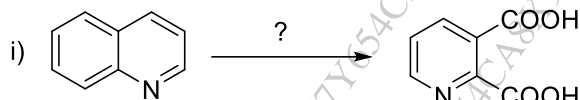
- Q.1 Attempt any four of the following. 20**
- A) a) Discuss the B<sub>AC</sub>2 mechanism of hydrolysis of esters. 3  
 b) Explain the Chugaev reaction with a suitable example. 2
- B) a) Discuss the stereochemistry of NGP with a suitable example. 3  
 b) Complete the following reaction and name the reaction involved. 2
- $$\text{H}_3\text{C}-\overset{\text{H}_2}{\underset{\text{H}_2}{\text{C}}}-\text{C}(\text{O})-\text{S}-\text{CH}_3 \xrightarrow{150^\circ\text{C}} ? + ?$$
- C) Distinguish between: 5  
 i) Nucleophilicity and basicity  
 ii) Transition state and Reaction intermediate
- D) What are pericyclic reactions? List how they are classified? Explain electrocyclic reactions with a suitable example. 5
- E) With the help of a well labelled Jablonski diagram explain any three relaxation (decay) processes which an electronically excited molecule undergoes to loose energy. 5
- F) a) Explain the Norrish type-I reaction at room temperature. 3  
 b) Distinguish between thermal and photochemical reactions. 2

- Q.2 Attempt any four of the following. 20**
- A) Write a note on stereochemistry of allenes. 5
- B) a) State whether the following compounds are optically active or optically inactive. Justify your answer. 3



- b) Define centre of symmetry with an example. 2
- C) Give the Skraup synthesis for the preparation of quinoline. Write the reaction of quinoline with nitrating mixture. 5
- D) Convert pyridine to pyridine-N-oxide. Draw its resonating structures. What is the action of pyridine-N-oxide on: 1) SO<sub>2</sub>Cl<sub>2</sub> and 2) NaNH<sub>2</sub> in Liq.NH<sub>3</sub> 5

E) Complete the following reactions: -



F) What are Agrochemicals? How are they classified? Write the synthesis of Indole-3-acetic acid.

Q.3. Attempt any four of the following.

A) a) Explain chemoselective reaction with a suitable example.

b) How is the theoretical yield calculated?

B) a) Define multicomponent synthesis? Write the Biginelli pyrimidone synthesis.

b) Mention any two criteria for an ideal organic synthesis.

C) a) Explain how adipic acid is prepared from D-glucose using green chemical reactions.

b) Calculate the percentage atom economy of the following reaction?



(Atomic Weights: C=12, H=1, O=16, K=39, Br=80)

D) Give the synthesis of the following compounds using a suitable starting material.

a) o-nitroaniline and p-nitroaniline.

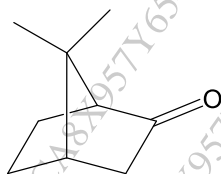
b) Tert-butyl alcohol using a suitable Grignard reagent.

E) Write the structural formula for each of the following compounds:

1. Bicyclo [3.3.0] octane.
2. Spiro [2.4] hept-4, 6-diene.
3. 6, 6'-difluorodiphenyl-2, 2'-dicarboxylic acid.
4. 1-chloro-1, 2-pentadiene.
5. Quinoline-3-carboxaldehyde.

F) Give the IUPAC names for each of the following compounds. 5

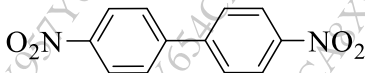
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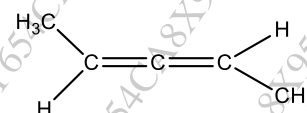
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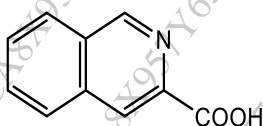
3.



4.



5.



Q.4 Attempt any four of the following. 20

- A) a) Give the synthesis of citral from methyl heptenone. 3  
 b) Give analytical evidence to prove that both the nitrogen atoms in nicotine are tertiary. 2
- B) a) Give the reaction for Hofmann exhaustive methylation and degradation of pyrrole. 3  
 b) How will you prove that the side chain in nicotine is a pyrrolidine nucleus? 2
- C) a) Give the Ott's synthesis of Adrenaline. 3  
 b) Give any one analytical evidence to prove that citral is an  $\alpha, \beta$ -unsaturated aldehyde. 2
- D) a) Give the synthesis of nicotine from nicotinic acid. 3  
 b) Give analytical evidence to prove that Citral has a carbonyl group. 2
- E) a) Explain chromophore-chromophore interaction with a suitable example. 3  
 b) State the effect of solvent on  $\lambda_{max}$  values with a suitable example. 2
- F) a) Explain the fragmentation of the 2- methyl pentane. 3  
 b) What is molecular ion peak? Give its importance. 2

Q.5 A) Select the correct option and complete the following statements: (any five) 5

- a) Cope elimination is observed in.....  
 i) N-substituted amide ii) Aromatic ketoxime  
 iii) Tertiary amine oxide iv) N-substituted amine
- b) All nucleophiles are.....  
 i) Lewis acids ii) Lewis bases  
 iii) Neutral iv) Electron pair acceptor
- c) In NGP the stereochemistry of product is.....  
 i) Changed ii) Retained  
 iii) Inverted iv) None of the above
- d) .....is a thermodynamic term.  
 i) Electrophilicity ii) Nucleophilicity  
 iii) Basicity iv) Transition state
- e) Which of the reaction is a thermal decomposition of xanthate esters?  
 i) Cope ii) Chugaev  
 iii) Pyrolysis of acetates iv) Favorski

- f) Benzophenone reacts with isopropyl alcohol in presence of light to form benzpinacol is an example of.....
- |                         |                    |
|-------------------------|--------------------|
| i) Photoreduction       | ii) Photooxidation |
| iii) Photosensitization | iv) Isomerization  |
- g) In which of the following reaction carbon monoxide is eliminated as a by-product.
- |                                       |  |
|---------------------------------------|--|
| i) Norrish type-I at room temperature | ii) Norrish type-I at elevated temperature |
| iii) Norrish type-II                  | iv) Di-pi methane rearrangement            |
- h) What does ISC stands for?
- |                             |                            |
|-----------------------------|----------------------------|
| i) Internal System Crossing | ii) Inter-System Crossing  |
| iii) Intra-System Crossing  | iv) Internal Soft Crossing |

**Q.5 B) State whether true or false: (Any five)**

**5**

- Cumulenes having odd number of double bonds shows geometrical isomerism.
- Trans-1,3-Dimethyl cyclobutane is achiral.
- DDT is an organic insecticide.
- Active component of neem oil is Azadirachtin.
- In quinoline electrophilic substitution takes place at 2- position.
- Isoquinoline is also known as 2-azanaphthalene.
- The dipole moment of pyridine N-Oxide is more than pyridine.

**Q.5 C) Fill in the blanks with correct alternatives given in the bracket: (Any five)**

**5**

(linear, green catalyst, super critical CO<sub>2</sub>, covalent bond, ultra sound, larger, smaller, Cumulene, dimethyl carbonate, convergent.)

- Synthesis of benadryl is an example of ----- synthesis.
- Sonication is the term used for the reaction carried out using -----
- The green reagent used for the selective methylation of active methylene compounds is -----
- In biphenyl two phenyl rings are bonded by a single -----
- In 6-methoxy spiro [3.4] octane the substitution is on the ----- ring
- Butatriene is classified as -----
- Enzymes are examples of -----
- Dry cleaning of the clothes can be carried out using -----

**Q.5 D) Match the columns: (Any five)**

**5**

**Column A**

**Column B**

- |                     |      |                              |
|---------------------|------|------------------------------|
| a) $\alpha$ -Pinene | i    | -OH group                    |
| b) Atropine         | ii   | 2-methyl butadiene           |
| c) Hormones         | iii  | Belladonna alkaloid          |
| d) Citral-a         | iv   | Secretion of ductless glands |
| e) Isoprene         | v    | Monoterpenoids               |
| f) Base peak        | vi   | Geranial                     |
| g) Auxochrome       | vii  | Neral                        |
|                     | viii | >C=O group                   |
|                     | ix   | Highest peak                 |

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