

[Time: 3 Hours]

[Total Marks: 100]

Please check whether you have got the right question paper.

N.B.

1. All Questions are compulsory.
2. Figures to the right indicate full marks.
3. The use of log-table/non-programmable calculator is allowed.
4. Answers for the same question as far as possible should be written together.

Q.1Answer **ANY FOUR** of the following:

- A** Give the full form of NGP. Explain with a suitable example the effect of NGP on kinetics and stereochemistry of the reaction. **5**
- B** Explain the following terms: **5**
- i) pyrolytic elimination
 - ii) A_{Ac2}
 - iii) heterolytic fission
 - iv) basicity
 - v) saponification
- C** 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**
- D** What are pericyclic reactions? List how they are classified? Explain Electrocyclic reactions with a suitable example. **5**
- E** What is photoreduction? Explain the mechanism of photoreduction of benzophenone. **5**
- F** Distinguish between the following:
- i) acidity and electrophilicity **3**
 - ii) transition state and reaction intermediate **2**

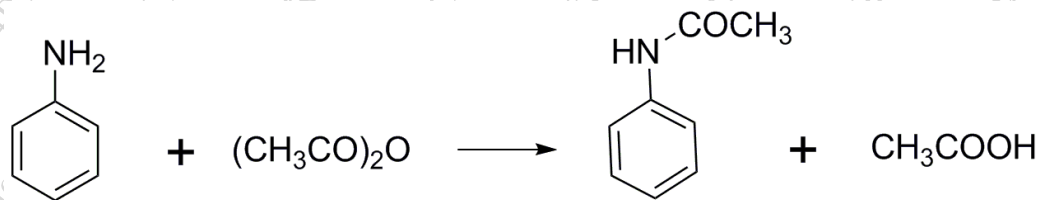
Q.2Answer **ANY FOUR** of the following:

- A** Write a note on the following- **5**
- a. Centre of symmetry,
 - b. Plane of symmetry
 - c. Atropisomerism
- B** Write a note on stereochemistry of allenes. **5**
- C** Define: Agrochemicals. Give advantages and disadvantages of Agrochemicals. **5**
- D** (a) Give synthesis of indole-3-acetic acid. **3**
(b) Give preparation of pyridine-N-oxide from pyridine. **2**
- E** Write the reaction of following reagents with quinoline- **5**
- (a) bromine in concentrated H_2SO_4 at $75^\circ C$,
 - (b) fuming HNO_3 and concentrated H_2SO_4 at $0^\circ C$
 - (c) H_2 , Pt in methanol
- F** Write Bischler-Napieralski synthesis for 1-methyl isoquinoline. **5**

Q.3

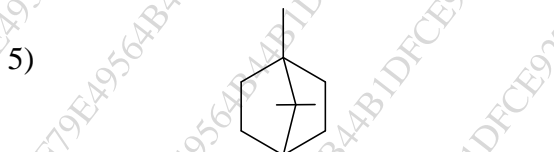
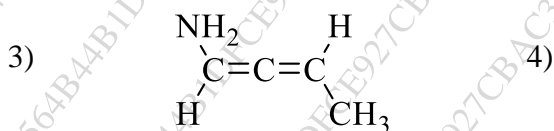
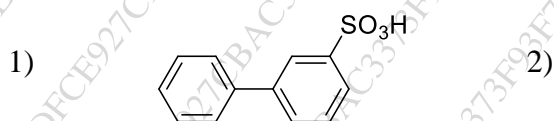
Answer any **four** of the following :

- A** a. Define Regioselectivity? Give an example of Chemoselectivity? **3**
 b. What is E-factor? Give its significance. **2**
- B** a. Give an example of Multicomponent synthesis? **3**
 b. Give the preparation of adipic acid from D-glucose using green chemistry reactions? **2**
- C** Define Atom economy? Calculate the percentage atom economy of the following reaction? **5**



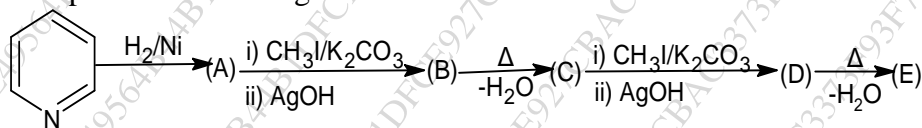
Atomic Weights: C=12, H=1, O= 16, N=14

- D** Give the synthesis of the following from a suitable starting compound: **5**
 1) 2-pentanol using a suitable Grignard reagent
 2) p-nitroaniline
- E** Write the structural formula for each of the following compounds: **5**
 1) 4,4'- dimethyl diphenyl
 2) 4-chloro-benzo[b] pyridine
 3) Penta-2,3-diene-1-oic acid
 4) Spiro [4.4] non-1-ene
 5) 2-methyl bicyclo [4.2.0] oct-3-ene
- F** Give IUPAC names for each of the following compounds: **5**



Q.4 Answer **any four** of the following:

- A** Explain the following terms used in uv-visible spectroscopy with example: **5**
 a) Chromophore- Chromophore interactions
 b) Various possible electronic transitions
- B** a) Explain the mass spectral fragmentation pattern of 2-methyl pentane. **3**
 b) Discuss in brief the principle of mass spectrometry. **2**
- C** Give the synthesis of: **5**
 a) Adrenaline by Ott's synthesis method
 b) Citral from 6-Methyl hept-5-en-2-one
- D** a) What are alkaloids? Write any two class of alkaloids with suitable example. **3**
 b) State isoprene rule. **2**
- E** Complete the following reaction. **5**



- F** Give analytical evidence to prove the following: **5**
 a) Citral is acyclic monoterpenoids.
 b) Presence of isopropylidene group in citral.

Q.5 Do as Directed

- A** Choose the most appropriate option (answer **any 5**): **5**

i) Which of the following reactions is a thermal decomposition of xanthate esters?

- a) Cope elimination
 b) Chugaev reaction
 c) Sigmatropic reaction
 d) Pyrolysis of acetates

ii) How is an electrophile defined?

- a) Electron deficient species
 b) Negatively charged species
 c) Electron rich species
 d) Lewis base

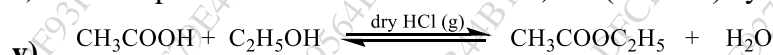
iii) Which of the following is not a nucleophile?

- a) OH^-
 b) $\text{R}\ddot{\text{O}}\text{H}$
 c) R_3C^+
 d) $\text{H}_2\ddot{\text{O}}$



Identify the reaction.

- a) Cheletropic reaction
 b) $(2\pi + 2\pi)$ Cycloaddition
 c) Group Transfer reaction
 d) $(4\pi + 2\pi)$ Cycloaddition



Classify the above reaction.

- a) Acyl Electrophilic substitution
 b) Alkyl Electrophilic substitution
 c) Acyl Nucleophilic substitution
 d) Alkyl Nucleophilic Substitution

vi) In which of the following reactions is carbon monoxide eliminated as a by-product?

- | | |
|---------------------------------------|---|
| a) Norrish Type I at room temperature | b) Norrish Type I at elevated temperature |
| c) Norrish Type II | d) Cope Elimination |

vii) What does ISC stand for?

- | | |
|----------------------------------|--------------------------|
| a) Internal System Crossing | b) Inter-System Crossing |
| c) Internal Sensitised Crossover | d) Intra-System Crossing |

viii) Pick the correct statement with respect to photoisomerisation of stilbene.

- It is a direct reaction that takes place via the Singlet state.
- It is a direct reaction that takes place via the Triplet state
- It is a photosensitised reaction that takes place via the Singlet state
- It is a photosensitised reaction that takes place via the Triplet state

B State whether following are True or False- (**ANY FIVE**)

5

- Always an optically active compound must contain at least one chiral carbon atom
- Alternating axis of symmetry is also known as rotation-reflection axis.
- Endosulfan is a plant growth regulating hormone.
- Fungicides are the chemicals that destroy, prevent or inhibit the growth of weeds.
- Electrophilic substitution reactions on isoquinoline takes place preferably at positions 5 and 8.
- Isoquinoline is also known as 2-azanaphthalene.
- Pyridine-N-oxide is less basic than pyridine.

C Fill in the blanks (Answer **any five**)

5

- There are _____ principles of Green Chemistry
- The concept of Atom economy was developed by _____.
- In a greener pathway to synthesize Adipic acid, the starting material used is _____.
- Synthesis of p-bromoaniline from Aniline is a _____ synthesis.
- In the reduction of m-dinitrobenzene to m-nitroaniline the chemoselective reagent used is _____.
- In spiro [2.3] hexane, the smaller ring contains _____ number of carbon atoms.
- To name the fused and bridged ring systems the numbering starts from the _____ carbon atom.
- Two phenyl rings bonded by a single covalent bond is called a _____.

D Match the following columns. (Attempt any five)**5**

Column P	Column Q
a. Codenine	1. Insulin
b. Citral	2. Mass spectrometry
c. Peptide	3. Endocrine glands
d. Adrenaline	4. Lemon grass oil
e. Hormones	5. -NH ₂ group
f. Auxochrome	6. Epinephrine
g. m/z value	7. Opium poppy