Time: 3Hours **Marks: 100**

N.B.: (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) Use of log table/ non-programmable calculator is allowed.

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

A) What is saponification? Explain its mechanism. **5**

B) List the characteristics of pericyclic reactions. Explain cycloaddition reactions with suitable examples. **5**

C) Distinguish between:
i) acidity and electrophilicity **3**
ii) transition state and intermediate **2**

D) What does NGP stand for? Explain with a suitable example its effect on stereochemical outcome and kinetics of the reaction. **5**

E) Using a neat labelled Jablonski diagram, explain ISC and vibrational relaxation. **5**

F) What is a photochemical reaction? Explain di-π-methane reaction. **5**

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

A) Write a note on the following- **5**
a) Plane of symmetry
b) Centre of symmetry

B) Explain the optical isomerism in cumulenes with even number of double bonds (Allenes). **5**

C) Give the Skraup synthesis for the preparation of quinoline. Write the reaction of quinoline with the nitrating mixture. **5**

D) What is the action of following reagents on given heterocyclic compounds? **5**
a) H_2O_2/CH_3COOOH on pyridine.
b) $SOCl_2$ on pyridine-N-oxide.
c) $NaNH_2$ in Liq.NH_3 on pyridine-N-oxide.

E) What are Agrochemicals? Give two advantages of it. Write the synthesis of Indole-3-acetic acid. **5**

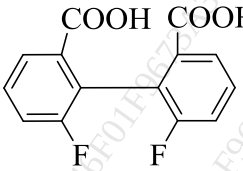
F) a) What are the properties of ideal pesticides? **3**
b) Draw the resonating structure of pyridine-N-Oxide **2**

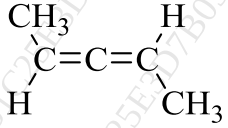
Q.3. **Attempt ANY FOUR of the following:**

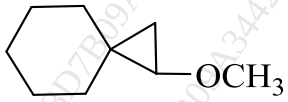
A) Write the structural formula for each of the following compounds: **5**

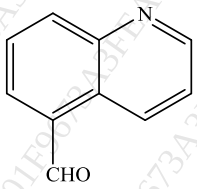
1) Bicyclo[2.2.1] hept-2,5-diene
2) Isoquinoline-1-carboxylic acid
3) 1-methylspiro [3.3] heptane
4) 2'-nitrodiphenyl-4-carboxylic acid
5) 1-chloro-1,2-pentadiene

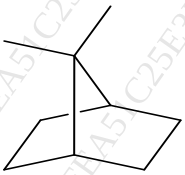
B) Give the IUPAC names of the following: **5**

1) 

2) 

3) 

4) 

5) 

C) **a)** Explain Linear synthesis with a suitable reaction? **3**

b) Give an example of regioselectivity? **2**

D) Give the synthesis of the following from a suitable starting compound? **5**

1) 2-methyl-2-propanol using a suitable Grignard reagent.
2) p-nitroaniline from aniline.

E) **a)** Calculate the percentage atom economy for the following reaction? **3**

b) Give the use of dimethyl carbonate as a selective methylating agent **2**

F) **a)** Explain multicomponent reaction with a suitable example? **3**

b) How is theoretical yield calculated? **2**

Q.4 **Attempt ANY FOUR of the following:**

A) **a)** Explain Chromophore theory in UV-visible spectroscopy **3**

b) Explain effect of solvent in UV-visible spectroscopy. **2**

B) **a)** Explain the mass spectral fragmentation pattern of ethyl methyl ketone **3**

b) Give the importance of molecular ion peak. **2**

C) **a)** Give analytical evidence to prove the following:

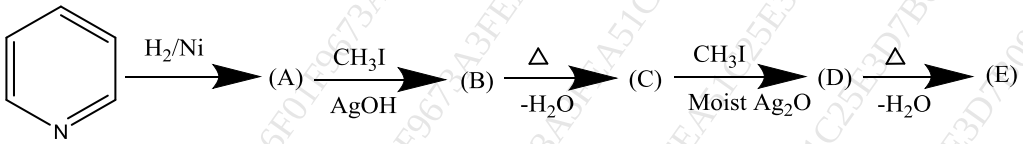
1. Citral is an acyclic monoterpenoid
2. The presence of an aldehydic group in Citral

3

b) What is Geminal dialkyl rule ? **2**

D) Give the synthesis of Nicotine from Nicotinic acid. **5**

E) **a)** Complete the following reaction **3**



b) Write the structures of Geranial and Neral. **2**

F) **a)** Give Ott's synthesis of adrenaline **3**

b) What are the harmful effects of Nicotine? **2**

Q.5 **A)** **Select the correct option and complete the following statements: (ANY FIVE)** **5**

a) Thermal decomposition of ……. having β-hydrogen to form alkenes is called Chugaev reaction.

i) xanthate esters ii) tertiary amine oxide

iii) tertiary amine iv) acetates

b) Acid catalysed esterification is a ……reaction that follows…….. mechanism.

i) irreversible; $A_{Ac}2$ ii) irreversible ; $A_{Ac}1$

iii) reversible ; $A_{Ac}2$ iv) reversible ; $A_{Ac}1$

c) The products of Cope elimination are …….

i) alkene + tertiary amine ii) alkene + substituted hydroxyl amine

iii) alkane + tertiary amine iv) alkane + substituted hydroxyl amine

d) …….. is an electron deficient species that attacks at positions of ……. electron density

i) Nucleophile; high ii) Electrophile; high

iii) Nucleophile; low iv) Electrophile; low

e) …….. reactions involve formation of two sigma bonds to the same carbon atom.

i) Electrocyclic ii) Group Transfer

iii) Sigmatropic iv) Cheletropic

f) Phosphorescence has …….wavelength and …… energy than incident radiation.

i) shorter; more ii) longer; more

iii) shorter; lesser iv) longer; lesser

g) Photochemical conversion of benzophenone to benzpinacol is an example of ……

i) photoisomerisation ii) photochemical rearrangement

iii) photoreduction iv) photochemical substitution

h) Carbonyl compounds having ϒ-hydrogen under photolytic conditions prefer to undergo …….. reaction.

i) Norrish Type I ii) Norrish Type II

iii) photochemical oxidation iv) photoreduction

Q.5 B) **State whether the following statements are TRUE or FALSE: (ANY FIVE)** **5**

a) Cumulenes with even number of double bonds and unsymmetrical substitution on terminal carbons will not show optical isomerism.
b) Always an optically active compound must contain at least one chiral carbon atom.
c) Centre of symmetry is also known as Inversion Centre.
d) In quinoline electrophilic substitution takes place at position 2.
e) Glycerol is reactant used in Skraup quinoline synthesis.
f) The dipole movement of pridine-N-oxide is more than pyridine.
g) Fungicides are the chemicals that destroy, prevent or inhibit the growth of weeds.

Q.5 C) **Fill in the blanks with the correct alternative given in the bracket: (ANY FIVE)** **5**

[Atom economy, smaller, two, isolated, Roger. A.Sheldon, E-factor, fossil, green, Barry troast , cumulative, one, larger, catalytic]

a) In Bicyclo [4.2.1] nonane, there exists _____ number of carbon atom between the two bridged carbon atoms
b) In 6-chlorospiro [4.5] decane , the substitution is on the _____ ring
c) Allene has …….cummulative double bonds.
d) Petroleum is an example of ---------- fuel
e) -------- reagents are superior to stoichiometric reagents
f) Reactions with lower ---------- are desirable
g) The concept of atom economy was developed by ----------
h) Liquid CO_2 is an example of a ---------- solvent

Q.5 D) **Match the columns and rewrite the matched pairs: (ANY FIVE)** **5**

Column A		**Column B**
a) Citral	**(i)**	Highest peak in mass spectrum
b) Adrenaline	**(ii)**	Tobacco leaves
c) Nicotine	**(iii)**	Stops blood haemorrhage
d) Base peak	**(iv)**	Lemon grass oil
e) Hormones	**(v)**	Hypsochromic shift
f) Isoprene	**(vi)**	Monoterpenoid
g) Shift of absorption to lower wavelength	**(vii)**	Ductless glands
	(viii)	Bathochromic shift
	(ix)	C_5H_8

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