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) Write short notes on the following:
i) Cheletropic reactions **3**
ii) Electrophilicity **2**

B) Complete the following reaction and name the product. Explain the mechanism of the reaction. **5**

$$CH_3COOH + C_2H_5OH \underset{}{\overset{\text{dry HCl gas}}{\rightleftharpoons}} ?$$

C) Explain the following terms: **5**
i) ligand ii) $B_{Ac}2$ iii) pericyclic reaction iv)nucleophile
v) synartetic acceleration

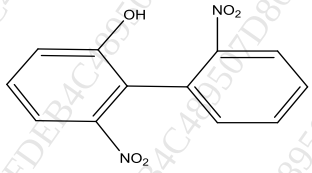
D) Using suitable examples explain sigmatropic and group transfer reactions. **5**

E) Distinguish between the following:
i) Fluorescence and Phosphorescence **3**
ii) Singlet and Triplet state **2**

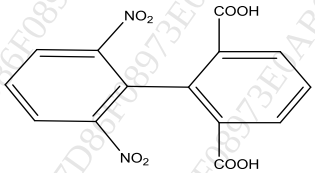
F) What is photosensitisation? Explain the photochemical reduction of benzophenone. **5**

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

A) a) State whether following compounds are optically active or optically inactive. Justify your answer. **3**



i)



ii) **2**

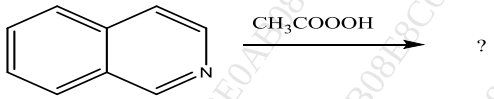
b) Define centre of symmetry with an example.

B) Write a note on stereochemistry of allenes. **5**

C) a) Give synthesis of indole-3-acetic acid. **3**
b) Give preparation of pyridine-N-oxide from pyridine. **2**

D) Complete the following reactions. **5**

a)



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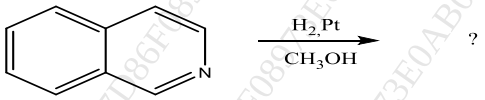

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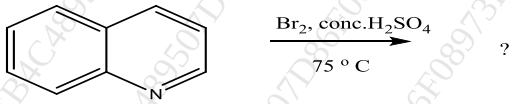

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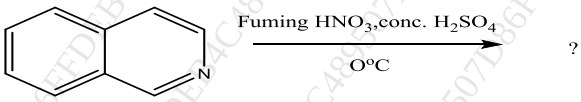

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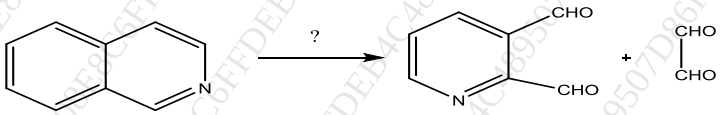


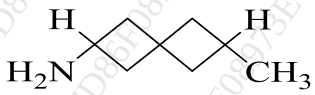
E) What are Agrochemicals? Give advantages of using agrochemicals. Write the synthesis of Endosufan.

F) Give the Bischler-Napieralski synthesis for the preparation of Isoquinoline. Write the reaction of isoquinoline with alkaline $KMnO_4$

Q.3. Attempt ANY FOUR of the following:

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

1)



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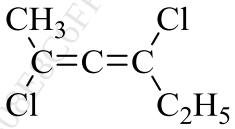

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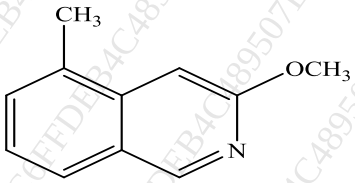

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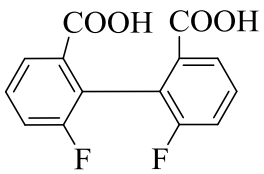
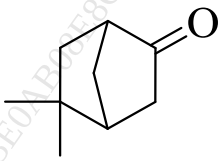


5)



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

1. 1-chloro-6-methoxyspiro [3.4] octane
2. Bicyclo [3.3.0] octan-3-carboxylic acid
3. 2,2'-difluoro-6,6'-dinitrodiphenyl
4. 2-methoxy quinoline
5. Penta-2,3-diene-1-oic acid

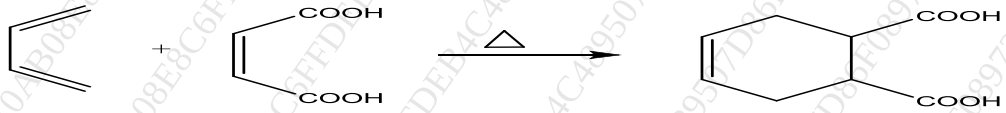
C) a) Explain convergent synthesis with a suitable reaction? **3**
b) Define chemoselectivity with a suitable example? **2**

D) a) Explain multicomponent synthesis with a suitable example? **3**
b) What is E-factor? Give its significance? **2**

E) Give the synthesis of the following from a suitable starting compound. **5**

1) 1-phenyl ethanol using a suitable Grignard reagent.
2) n-pentane using a suitable Organolithium compound

F) a) Define atom economy? Calculate the percentage atom economy of the following reaction? **3**



[Given Atomic Weights: C=12, H=1, O=16]

b) Give any two applications of biocatalyst in green chemistry? **2**

Q.4 Attempt ANY FOUR of the following:

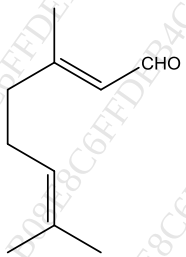
A) a) Explain the following terms used in spectroscopy with suitable example **3**

i) Chromophore ii) Auxochrome

b) Give the shifts in absorption bands in UV- visible spectroscopy. **2**

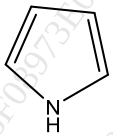
B) a) Explain the fragmentation of the 2- Methyl pentane **3**
b) Define Base peak and Isotopic peak **2**

C) a) What are terpenoids? Give products of ozonolysis of the following terpenoid? **3**



b) State Special isoprene rule with suitable example. **2**

D) Give the reaction for Hofmann exhaustive methylation and degradation of **3**



b) What are harmful effects of nicotine? **2**

E) **a)** Give the synthesis of citral from 6- methyl hept-5-en-2-one. **3**

b) Give analytical evidence that nicotine has pyridine ring with a side chain containing > N-CH_3 group. **2**

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

b) Give any one analytical evidence to prove that citral is an α, β- unsaturated aldehyde? **2**

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

a) Base catalysed hydrolysis of esters is called …….

i) Esterification iii) Cope Elimination

ii) Chugaev reaction iv) Saponification

b) Nucleophilicity is a …….. and …….. term.

i) relative ; thermodynamic iii) relative; kinetic

ii) absolute; thermodynamic iv) absolute; kinetic

c) Transition state is a ……. characterised by partial bonds.

i) low energy, definite molecular species

ii) low energy, indefinite molecular species

iii) high energy, definite molecular species

iv) high energy, indefinite molecular species

d) NGP assisted nucleophilic substitution reactions show ……..in rate of reaction with ……. of configuration.

i) decrease; retention iii) decrease; inversion

ii) increase; retention iv) increase; inversion

e) ……. is a 4+2 π cycloaddition reaction.

i) Cope reaction iii) Diel's Alder

ii) Chugaev reaction iv) Saponification

f) Transfer of radiant energy from donor to acceptor molecule is called .....

i) photoreduction iii) photoisomerisation

ii) photorearrangement iv) photosensitisation

g) ……. is an allowed electronic transition.

i) $S_1 \rightarrow T_1$ iii) $T_1 \rightarrow S_1$

ii) $S_1 \rightarrow T_2$ iv) $S_1 \rightarrow S_2$

h) Photochemical cleavage of carbonyl compounds to form alkane and carbon monoxide are called …….. reactions.

i) di-π-methane iii) Norrish Type I

ii) eletrocyclic iv) Norrish Type II

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

a) Trans-1,3-Dimethyl cyclobutane is chiral.
b) Cumulenes having odd number of double bonds shows geometrical isomerism.
c) Alternating axis of symmetry is also known as rotation reflection axis.
d) Electrophilic substitution reactions on isoquinoline takes place preferably at position 5 and 8.
e) Isoquinoline is also known as 2-azanaphthalene.
f) Gibberelins belong to the class of Plant Growth Regulators.
g) Endosulfan is a plant growth regulating hormone.

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

[quinoline, chemoselective, $LiAlH_4$, dimethylsulphate ,larger, bridged head, smaller, isoquinoline, renewable, dimethylcarbonate, supercritical CO_2, regioselective, tert.butyl hydroperoxide]

a) Addition of halogen acid to an unsymmetrical alkene is an example of -------- reaction.
b) Methane is an example of ---------- raw material
c) ------- causes selective methylation of active methylene compounds
d) Oxidation of aldehydes can be carried out with benign reagents like ----------
e) Dry cleaning of the clothes can be done using ------- instead of carbon tetrachloride.
f) benzo[c]pyridine is also called ----------
g) For the nomenclature of spirans the -------- ring is given preference
h) To name the fused and the bridged ring systems the numbering starts from one of the --------- carbon atoms.

Q.5 D) **Match the columns: (ANY FIVE)** **5**

Column A		**Column B**
a) Citral-b	**(i)**	Odd mass number
b) >N-CH_3	**(ii)**	Nicotine
c) Epinephrine	**(iii)**	Hypochromic shift
d) Pinner	**(iv)**	Geranial
e) Odd number of nitrogen atom	**(v)**	Laevorotatory
f) β- carotene	**(vi)**	Neral
g) Citral-a	**(vii)**	λmax= 452nm
	(viii)	Protein hormone
	(ix)	Herzig Meyer method

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