[Time: 2 $\frac{1}{2}$ Hours] **[Marks: 75]**

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. Use of non-programmable calculators or log tables is allowed.

Q.1 Answer any three:

A) Explain the Benzilic rearrangement reaction with mechanism and two applications. 05

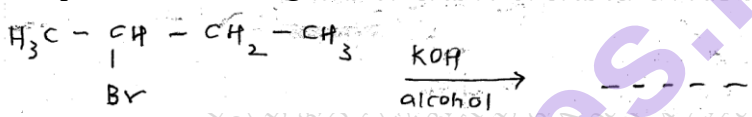
B) a) Discuss the stereochemistry of Beckmann rearrangement. 03
b) Write any two applications of the Wittig reaction. 02

C) a) Explain the term 'nucleophilicity'. How does it differ from basicity 03
b) What is E_2 reaction? Give its mechanism. 02

D) Explain the following reactions with one example and give the relevant mechanism 05
a) Esterification
b) Pyrolysis of acetates

E) An active methylene compound adds to the double bond of an α,β-unsaturated carbonyl compound in the presence of a basic catalyst. Name the reaction and give its mechanism. 05

F) a) Complete the following reaction. Write the mechanism involved. 03



02

b) What is NGP reaction? What is the importance of the neighbouring group?

Q.2 Answer any three:

A) Explain the term molecular chirality with suitable examples. What are elements of symmetry? Explain rotation - reflection axis. 05

B) Discuss the stereochemical features of a biphenyl system with suitable examples. 05

C) What are the different types of strains in cycloalkanes? Explain them. 05

D) Discuss the following: 05
a) Geometrical isomerism in 1,3-Dimethyl cyclohexane
b) Enantiotopic atoms and faces.

E) Explain why bromination of olefins is a stereospecific process. 05

F) Discuss the stereochemistry of SN^2 reaction at a chiral carbon with a suitable example. 05

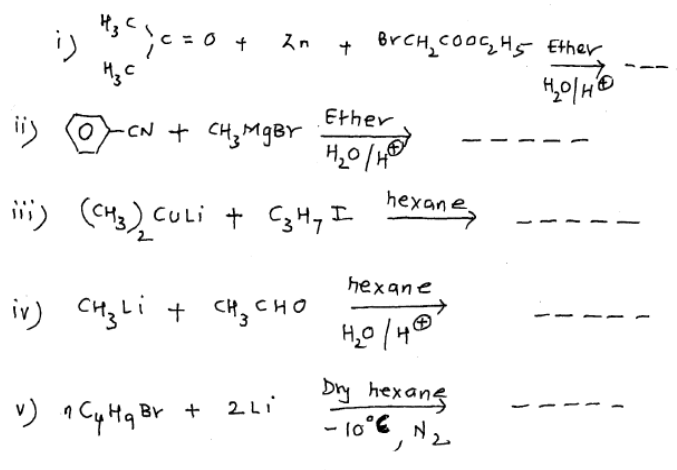
Q.3 Answer any three of the following:

A) Explain Simmon-Smith reaction. Discuss its mechanism and applications. 05

B) How is Phenyl lithium prepared? What is the action of following on Phenyl lithium? 05
i) CH_3COCH_3 ii) C_2H_5I iii) CH_3CN

C) Give the preparation of ethyl magnesium bromide. How are the following compounds prepared using ethyl magnesium bromide? 05
i) Propanoic acid ii) 1 – Propanol iii) 2 – Butanol

D) Complete the following reactions: 05



E) a) Explain Di-π methane rearrangement with mechanism. 03
b) With a neat and labelled Jablonski diagram and explain the process of inter system crossing. 02

F) a) Explain Norrish type II reaction using a suitable example. 02
b) Explain the photoreduction of Benzophenone to Benzpinacol. 03

Q.4 Answer any three:

A) Explain the following with suitable examples. 05
i) Regioselectivity ii) Chemoselectivity

B) a) Explain in brief using suitable examples: 03
i) Linear synthesis ii) Convergent synthesis
b) Write the multicomponent synthesis of Mannich base. 02

C) What are the various types of catalysts used in green chemistry? What are their advantages? 05

D) a) Give any three principles of green chemistry. 03
b) Define: i) Synthetic equivalent 02
ii) Retro synthesis

E) a) Explain the use of functional group interconversion (FGI) in retro analysis. 03
b) Calculate the percentage atom economy for the following reaction: 02

$$CH_3CH_2CH_2Cl + KOH \rightarrow CH_3CH=CH_2 + KCl + H_2O$$

1- chloro propane (alc) propene

[Atomic weight: C=12; H=1; O=16; K=39; CL=35.5]

F) a) Write the synthesis of Paracetamol. 03
b) Give the advantages of ultra sound in organic synthesis. 02

Q.5 A) State whether the following statements are True or False: 04
a) The Pinacol-pinacolone rearrangement reaction involves a 1,4 shift of the alkyl group.
b) Pinacols are highly substituted diols.
c) Urea reacts with halogens in the presence of a strong base to form hydrazine.
d) Nitrene possesses a positive charge.

OR

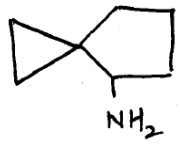
A) Choose the correct option and rewrite the statement: 04
p) Base hydrolysis of oil is called _____
(esterification, etherification, saponification)

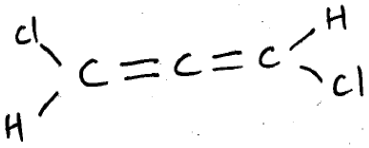
q) Acidity is the extent to which a compound accepts _____.
(protons, electrons, positions)

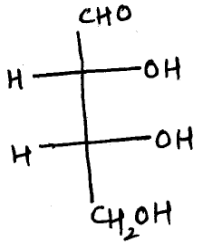
r) The formation of a carbene from chloroform in the presence of a base is an example of _____ reaction.
(α-elimination, γ-elimination, β-elimination)

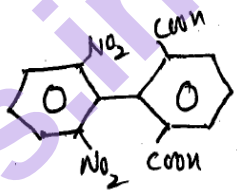
s) The Wittig reaction leads to the formation of substituted _____.
(amines, ketones, alkenes)

Q.5 B) State whether the following molecules are chiral or achiral. 04

a) 

b) 

c) 

d) 

OR

B) State whether the following are true or false: 04

p) A chiral molecule is dissymmetric.

q) All stereoselective reactions are enantioselective.

r) Biphenyl-2, 2^1-disulphonic acid can be resolved.

s) Boat form of cyclohexanol has greater energy than the chair form.

Q.5 C) Write the structure of the following compounds: 04

a) 3-Methyl bicyclo [4.2.0] octane

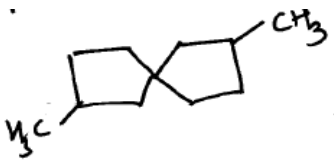
b) 6-Methoxy spiro [3.5] nonane

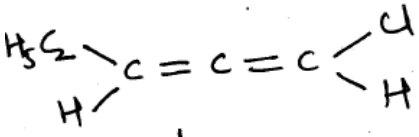
c) 1-Bromo-1, 2-penta diene

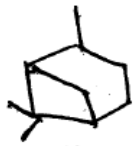
d) 4, 4^1- Dimethyl-2, 2^1-dinitro diphenyl.

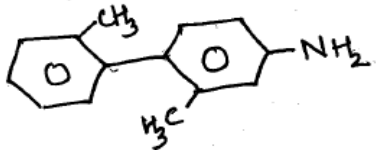
OR

C) Write the IUPAC name of the following structures: 04

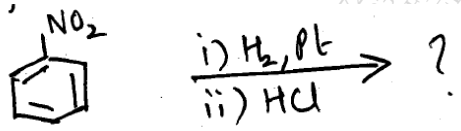
p) 

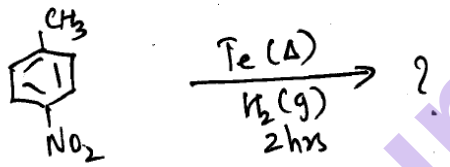
q) 

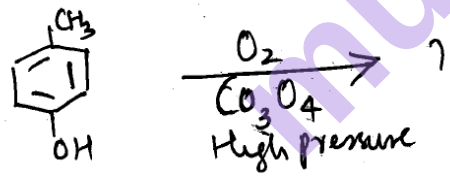
r) 

s) 

D) Complete the reaction: 03

a) 

b) 

c) 

OR

D) Match the columns appropriately: 03

A	B
p) Choline chloride and glycerol	1) Phase transfer Catalysts
q) Dimethyl carbonate	2) Heterogenous Catalyst
r) Crown ethers	3) Green starting materials
	4) DES
	5) Green reagents