[Time: 3 Hours] **[Marks:70**

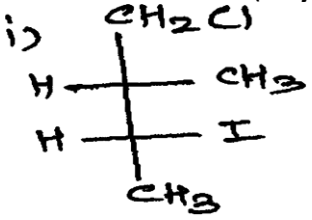
Please check whether you have got the right question paper.

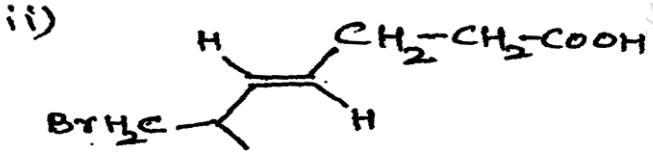
N.B: 1. **All questions are compulsory**
2. **Figures to the right indicate full marks**

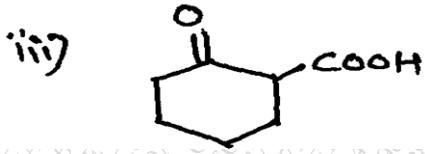
Q. 1 (A) Answer the following questions:- **12**

a) Give the suitable structures for the following compounds (**Any two**)
   i) Pent-3yn-1-al
   ii) l-cyclobutenyl-1,3-cyclohexadiene

b) Assign E/Z or R/S or D/L notation and nomenclate the following as per IUPAC rules (**Any two**)





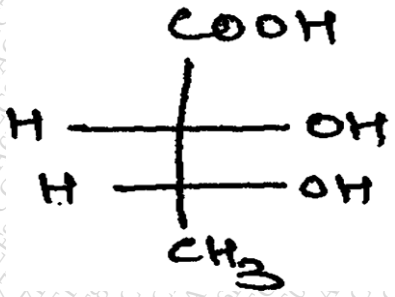


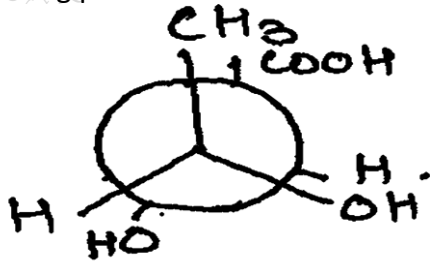
c) Draw possible resonating structures for the following compounds
   i) Chlorobenzene ii) p-nitrophenol

d) Arrange the following in increasing order of acidity and justify
   Phenol, p-chlorophenol and benzoic acid

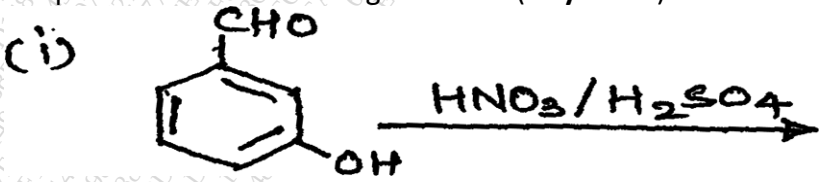
e) Arrange the following in increasing order of basicity and justify
   aniline, m-nitroaniline, cyclohexylamine

f) Establish the relationship between following pair of molecules





(B) Give product for the following reactions (**Any three**) 3



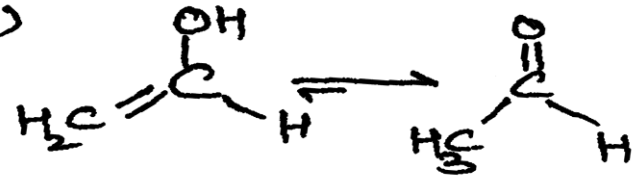
(ii) acetone + ethylbromide $\xrightarrow[NaH]{Ph_3P}$

(iii) $CH_3-CH_2-\underset{CH_3}{CH}-CH=\underset{CH_3}{C}-CH_2CH_2-CH_3 \xrightarrow{O_3/Zn}$

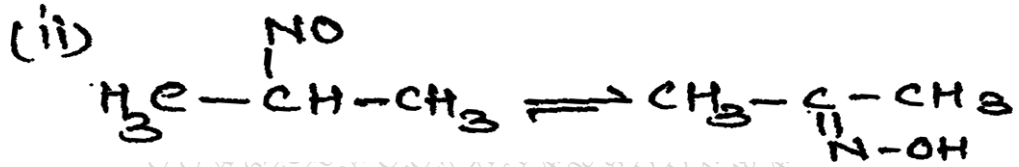
(iv) $CH_3-CH_2-CH=CH_2 \xrightarrow{Br_2/H_2O}$

Q. 2 (A) Identify tautomeric system present in the following pair of molecules 2

(i)



(ii)



(B) Arrange the following carbanions in increasing order of stability and justify 2

$C_6H_5-\overset{\ominus}{C}H_2$, $CH_2=CH-\overset{\ominus}{C}H_2$, $(C_6H_5)_3-\overset{\ominus}{C}$

(C) Give the products when the intermediate formed from reaction of propene and BH_3 reacts with 4

I. $H_2O_2 + \overset{\ominus}{O}H$

II. Br_2

III. Name each type of above reaction and what is the net regiospecificity of the reaction

(D) Discuss stereochemistry of S_N1 reaction with appropriate example 4

Q. 3 (A) Discuss stereochemistry of E_2 elimination with projection formula (Newmann/Sawhorse) for the following reaction 4

1, 2- dibromo-1, 2- dimethyl 1-butane $\xrightarrow{\text{Alc KOH}}$

(B) Compare S_N1 and S_N2 reaction 4

(C) Explain the following terms with suitable examples 3

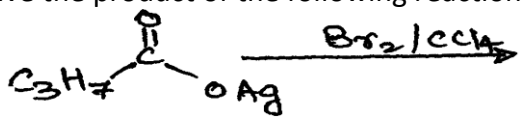
i. Meso isomer ii. Atropisomer iii. Chiral molecule

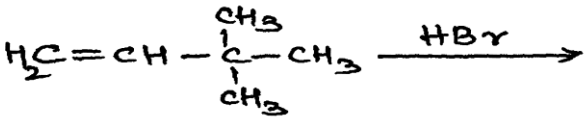
Q. 4 (A) Arrange the following compounds in increasing order of reactivity towards electrophilic aromatic substitution reaction and justify your answer by giving reason 2

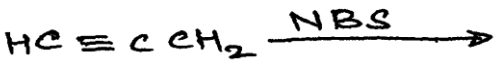
Bromobenzene, Acetanilide, Benzene, Benzoic acid

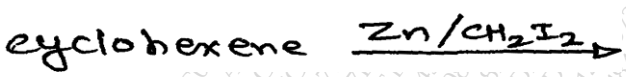
(B) "Chloro group in chlorobenzene is deactivating but o/p directing towards electrophilic aromatic substitution reaction". Justify the above statement 2

(C) Give the product of the following reactions (**any three**) 3

(i) 

(ii) 

(iii) 

(iv) 

(D) Attempt the following conversions (**any four**) 4

i) n-propane ⟶ proyne

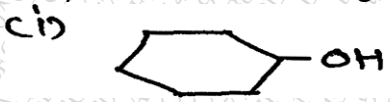
ii) Toluene ⟶ p-methyl acetophenone

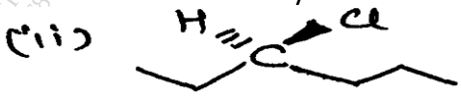
iii) 2,4- dinitro chloro benzene $\xrightarrow{C_2H_5ONa}$

iv) 2-chloro butane ⟶ butane-2-ol

v) 1-propene ⟶ propyleneglycol

Q. 5 (A) Identify whether the following molecules are chiral or achiral. Justify 2

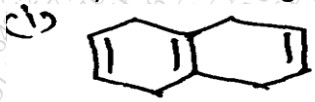
(i) 

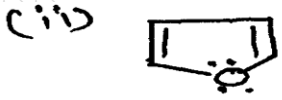
(ii) 

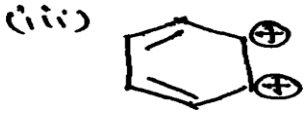
(B) Suggest a suitable method to resolve a racemic mixture of basic organic compound 2

(C) State Huckel's rule of aromaticity. 4

Identify whether the given molecules are aromatic, antiaromatic and non-aromatic

(i) 

(ii) 

(iii) 

(D) Discuss with suitable example nucleophillic aromatic substitution reaction proceeding with elimination-addition mechanism 3

Q. 6 (A) Explain why alkynes are less reactive than alkene towards addition of bromine 2

(B) Compare the stabilities of 1,3,5- heptatriene and 1,3,6,- heptatriene. Justify 2

(C) Attempt the following conversions (**any three**) 3

I. Acetylene $\longrightarrow$ 2-hexyne

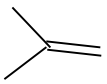
II. 1- butene $\longrightarrow$ 1, 3-butadiene

III. $(CH_3)_2$- CH Br $\longrightarrow$ 2 – methyl pentane

IV. Isobutylene $\longrightarrow$ acetone

(D) Give the product of the following reactions (**any two**) 2

i) Z-but-2-ene peracetic acid

ii)  $\xrightarrow[NaBH_4]{Hg(OAc)_2,\ H_2O}$

iii) 3-hexyne $\xrightarrow{H_2\ /\ \text{Lindlar Catalyst}}$

(E) Write a note on chlorination of ethane 2
