[Time: 2 and 1/2 Hours] **[Total Marks: 60]**

Please check whether you have got the right question paper.

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

Q.1(A) Attempt any **two** of the following :

(a) Explain the following. **4**
i) Compare the basicity of *p*-toluidine and *p*-chloroaniline.
ii) Piperidine is more basic than pyridine explain.

(b) Explain the following. **4**
i) Principle of microscopic reversibility.
ii) Trapping of intermediates.

(c) Using suitable example distinguishes between Kinetic and thermodynamically controlled products in reaction. **4**

(d) Explain primary and secondary Kinetic isotopic effect using suitable example. **4**

(B) Attempt any **one** of the following:

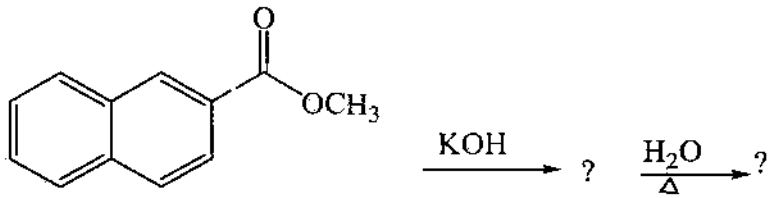
(a) Explain why does Nitration of naphthalene gives two different products at different temperature. **4**

(b) Arrange the following in decreasing order of acidity and justify your answer. **4**
i) Phenol ii) o-nitrophenol iii) *m*-nitrophenol iv) *p*-nitrophenol

Q.2(A) Attempt any **two** of the following :

(a) Discuss the mechanism of SN reaction involving neighbouring group participation by Aryl ring. **4**

(b) Complete the following reaction, give the mechanism and type of reaction. **4**



(c) Write a short note on **4**
i) Hard and soft nucleophiles.
ii) Aromaticity of Furan

(d) Draw Frost-Musulin diagram for Tropyliumcation. Show distribution of electron in MO's and comment on its aromaticity **4**

(B) Attempt any **one** of the following:

(a) Explain SNAr mechanism with a suitable example. **4**

(b) Compare the aromaticity of [14] and [18] annulenes. **4**

Q.3(A) Attempt any **two** of the following :

(a) Explain the stereochemistry of tri- and tetra- coordinate Sulphur compounds **4**

(b) Explain the optical activity of the following with one example each. **4**
i) BINOls ii) *trans*-Cyclooctenes

(c) i) Write one example of *Erythro-Threo* system. **4**
ii) Draw the structures of (R)-BINAP and (2S, 3S)-tartaric acid.

(d) Explain the following with one example each **4**

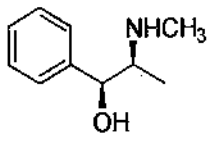
i) Homotopic ligand and faces ii) Diastereotopic Ligand and faces

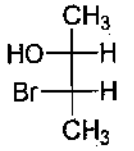
(B) Attempt any **one** of the following:

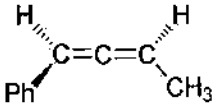
(a) Explain with suitable examples **4**

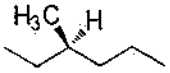
i) Optical activity of Ansa compounds ii) Optical activity of Spirans

(b) Assign configuration descriptor to the following molecules. **4**

i) 

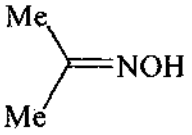
ii) 

iii) 

iv) 

Q.4(A) Attempt any **two** of the following :

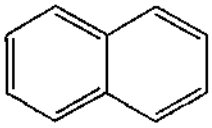
(a) Predict the products in the following reactions. **4**

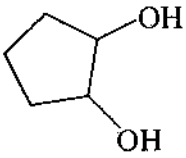
i) 

$\xrightarrow{NaBH_3CN}$?

ii) 

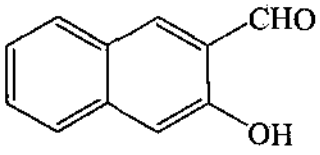
$\xrightarrow{Na/\ Liq\ NH_3}$?

iii) 
$\xrightarrow{Ni\ /\ H_2}$?

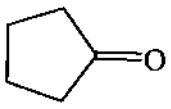
iv) 

$\xrightarrow[H_2SO_4]{HIO_4}$?

(b) Complete the following reactions and name them. **4**

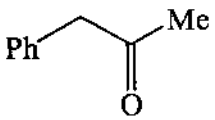
i) 

$\xrightarrow[ii)\ Hydrolysis]{i)\ H_2O_2/NaOH}$?

ii) 

$\xrightarrow{CH_3CO_3H}$?

(c) Complete the following reaction, name it and give its mechanism. **4**

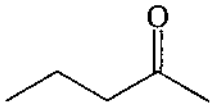


$\xrightarrow[HCl]{Zn\ /\ Hg}$?

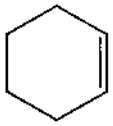
(d) What is Oppenauer oxidation? Explain using suitable example and give its mechanism. **4**

(B) Attempt any **one** of the following:

(a) Complete the following reactions and give the mechanism of any one. **4**

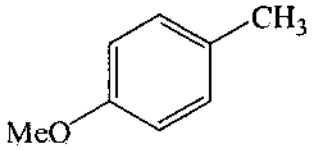
i) 

$\xrightarrow[\text{iii) NaOH}]{\text{i) } NH_2NH_2 / \Delta}$?

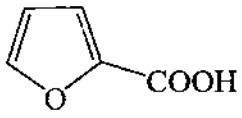
ii) 

$\xrightarrow[\text{ii) } H_2O]{\text{i) Alkaline } KMnO_4}$?

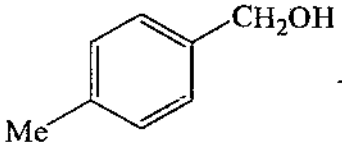
(b) Complete the following equations. **4**

i) 

$\xrightarrow[\text{ii) } H_2O]{\text{i)} CrO_2 / CCl_4}$?

ii) 

$\xrightarrow[H^+]{LiAlH_4/\text{ Ether}}$?

iii) 

$\xrightarrow{PDC}$?

iv) $CH_3CHO \xrightarrow{SeO_2}$?

Q.5 Attempt any **four** of the following :

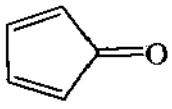
A Explain Hammont postulates. **3**

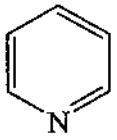
B Compare the acidity of *ortho* and *para*-hydroxybenzoic acid. **3**

C Ethyl iodide reacts with hydroxide ion faster in dimethyl sulfoxide than in water. Explain. **3**

D Which of the followings are aromatic or non-aromatic and Why? **3**

i) 

ii) 

iii) 

E Write one example of *syn-anti* system **3**

F Explain the chirality of allenes. **3**

G What is Swern oxidation? Give two applications. **3**

H Give the synthetic application of DMSO reagent. **3**