Q.P. Code : 29459

[Time: 2½ Hours] **[Marks:60]**

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.

1. A Answer **any two** of the following:-

a) Explain primary and secondary kinetic isotope effect, using suitable examples. **04**

b) Explain the use of the following techniques as mechanistic evidence: **04**
i) Isotopic Labelling
ii) Cross – over experiment

c) Write a note on Curtin – Hammett principle. **04**

d) With the help of a potential energy diagram, explain kinetic vs. thermodynamically controlled products using sulphonation of naphthalene as an example. **04**

B) Answer **any one** of the following:-

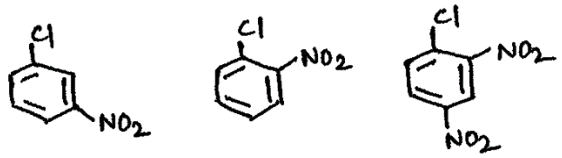
a) Comment on the role of solvent in determining the strength of a base. **04**

b) Arrange the following in decreasing order of acidity and justify your answer: **04**
phenol, o–nitrophenol, m–nitrophenol, p-nitrophenol.

2. A) Answer **any two** of the following:-

a) Write a note on: **04**
i) Walden Inversion
ii) Ion-pair effect

b) **04**



Which of the above compounds undergoes nucleophilic substitution with OH^- most readily? Justify your choice and give the mechanism of the reaction.

c) Explain the mechanism of S_N reactions involving neighbouring group participation by aryl rings. **04**

d) Draw the Frost-Musulin diagram of cyclooctatetraene and show the distribution of electrons in MO s. Comment on its aromaticity. **04**

B) Answer **any one** of the following:-

a) Give the $A_{AL}1$ mechanism for ester hydrolysis. Which type of substrates undergo this mechanism? **04**

b) Explain the aromaticity of: **04**
i) Pyridine
ii) Ferrocene

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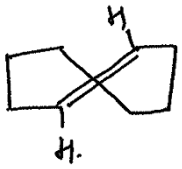
3. A) Answer **any two** of the following:-

a) Explain the optical activity of trans cyclooctene and assign configurational descriptor to the following compound: **04**



b) i) Explain the elongated tetrahedron approach with suitable example. **04**

ii) Draw the structure of the following compounds:

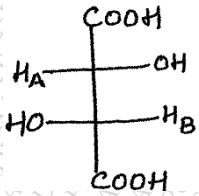
i) S – BINOL

ii) S-2-nitro-6′-methoxybiphenyl-6-carboxylic acid.

c) i) Define constitutionally unsymmetrical molecule. Give an example. **04**

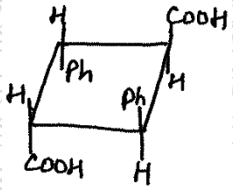
ii) Write the structure of a molecule with a pseudoasymmetric center and assign its configurational descriptor.

d) Define homotopic ligand. Identify the relationship between H_A and H_B in the following compound and explain the symmetry criteria employed to determine the topicity of H_A and H_B. **04**



B) Answer **any one** of the following:-

a) Explain $\mathbf{S_n}$ axis with suitable example. Label the elements of symmetry in the following examples: **04**

I) 

II) 

b) Explain the enantiomerism in the following compounds with suitable examples: **04**

i) Quaternary phosphonium compounds

ii) Silanes

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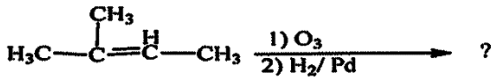
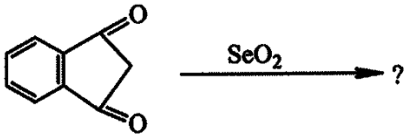
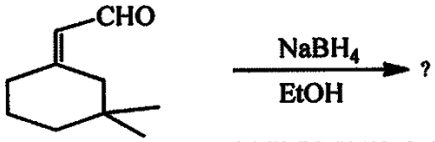
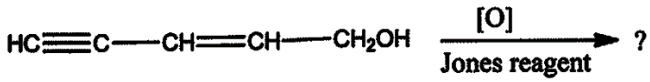
4. A) Attempt **any two** of the following:-

a) Predict the products in the following reactions: **04**

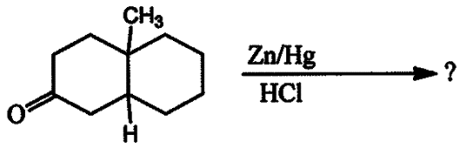
i) 

ii) 

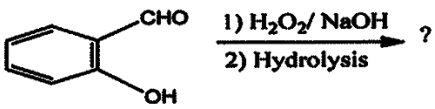
iii) 

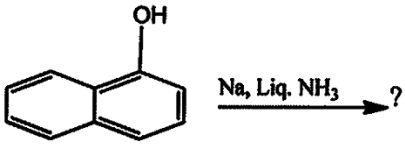
iv) 

b) Complete the following reaction, name it and give its mechanism: **04**



c) Complete the following reactions and name them: **04**

i) 

ii) 

d) What is Collins reagent? Give two applications. **04**

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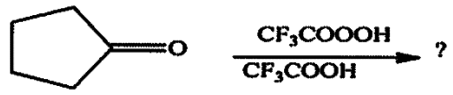
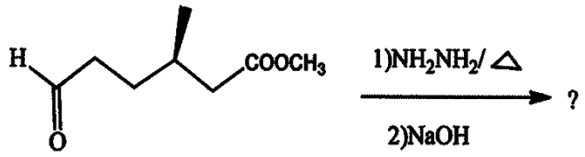
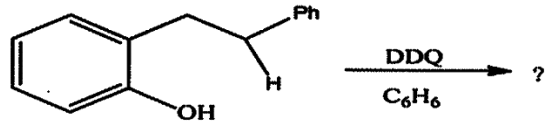
B) Attempt **any one** of the following:-

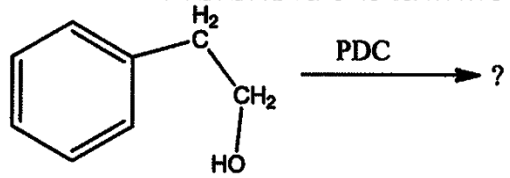
a) Complete the following reactions and give the mechanism of any one: **04**

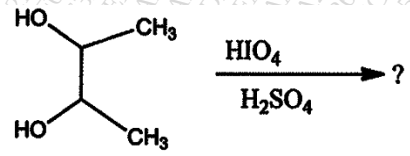
i) 

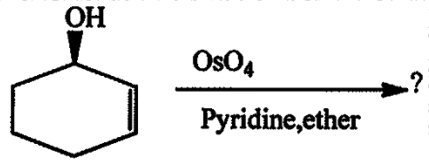
ii) 

b) Complete the following equations: **04**

i) 

ii) 

iii) 

iv) 

5. Answer **any four** of the following questions: **12**

A) Explain Hammond's postulate.

B) Explain the characteristics of specific acid catalysis. Illustrate using a suitable example.

C) What are ambident nucleophiles? Give two examples.

D) Explain:
[10]-Annulene is not aromatic.

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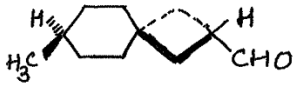
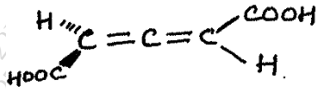
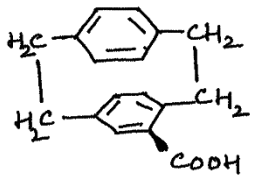
E) Assign configurational descriptors to the following molecules.

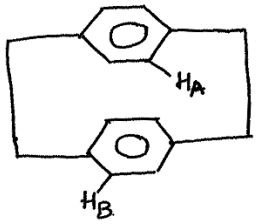
I) 

II) 

III) 

F) i) Explain chiral axis with a suitable example.

ii) Identify the topic relationship between H_A and H_B in the following compound.



G) Give the synthetic applications of $LiAlH_4$.

H) What is Swern oxidation? Give two applications.
