

[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) a) Ethyl bromide reacts with KOH / alcohol. Write the reaction and give the mechanism. 03  
 b) What are the factors affecting the E<sub>1</sub> mechanism. 02  
 B) What are electrophiles? State whether the following are electrophiles or nucleophiles. 05  
 i) carbocation ii) NH<sub>3</sub> iii) H<sub>2</sub>O iv) carbanion  
 C) Explain the Pinacol-pinacolone rearrangement reaction with one example and mechanism. 05  
 D) Syn methyl phenyl ketoxime reacts with conc. sulphuric acid. Identify the reaction. Write the product and mechanism. 05  
 E) Convert benzamide to aniline in the presence of halogens and a strong base. Name the reaction and give its mechanism. 05  
 F) a) How is benzoic acid converted to an ester? Write the mechanism. 03  
 b) State and explain the Saytzev's rule. 02

Q.2 Answer any three:

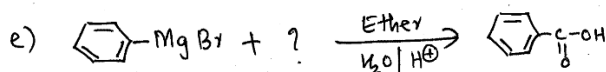
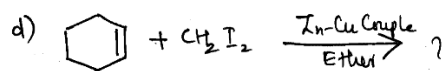
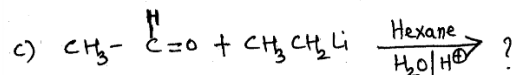
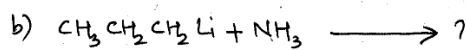
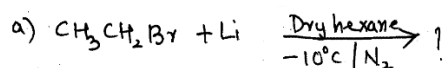
- A) Discuss molecular chirality in substituted cummulenes with suitable examples. 05  
 B) What are elements of symmetry? Explain mirror plane and inversion centre with proper illustrations 05  
 C) Discuss the conformation of 1, 4-dimethyl cyclohexane. Label them as cis or trans and point out the most stable and least stable conformer. 05  
 D) Discuss angle strain and torsional strain in cycloalkanes. 05  
 E) Give an example of a S<sub>N</sub><sup>1</sup> reaction at a chiral carbon and explain the stereochemistry involved. 05  
 F) Discuss the stereospecificity of the dehydrohalogenation of 1-bromo-1, 2-diphenyl propane. 05

Q.3 Answer any three:

- A) a) Give the preparation of 03  
 i) n-Butyl lithium  
 ii) Lithium dimethyl cuprate  
 b) What is the action of Lithium dimethyl cuprate on: 02  
 i)  ii)  $\text{CH}_2 = \text{CH} - \text{Cl}$   
 B) Explain Reformatsky reaction. Discuss its mechanism and application. 05  
 C) a) What are Grignard reagents? Give the preparation of Methyl magnesium iodide. 03  
 b) Using suitable Grignard reagent, prepare 02  
 i) Ethanoic acid ii) 2-Hexanol

D) Complete the following reactions:

05



E) a) With a neat and labelled Jablonski diagram, explain the phenomenon of fluorescence and phosphorescence. 03

b) What is intersystem crossing? Is it an allowed or forbidden transition? Why? 02

F) a) Explain Norrish Type I reaction of Acetone at  $100^\circ\text{C}$  03

b) What is Photosensitisation? Explain with an example. 02

Q.4 Answer any three:

A) Explain the following with suitable examples. 05

i) Enantioselectivity ii) Regioselectivity

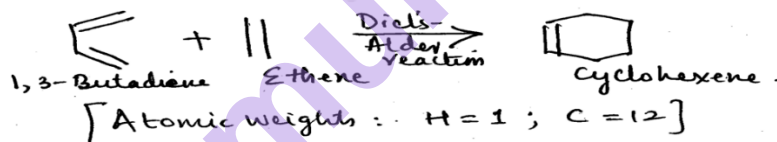
B) a) Define: 03

i) target molecule ii) synthon iii) disconnection

b) Write the retro synthesis of Limonene. 02

C) What are linear synthesis and multi component synthesis? Give the Hantzsch synthesis of Pyridine. 05

D) a) Calculate the percentage atom economy for the following reaction: 03



02

b) Define E-factor and Atom economy.

E) Explain the use of the following: 05

i) Supercritical  $\text{CO}_2$  as solvent

ii) Dimethyl Carbonate as methylating agent

iii) Biocatalysts

F) Explain the advantages of microwave assisted reactions in organic synthesis with suitable examples. 05

Q.5 A) State whether the following statements are True or False: 04

a) Diethyl malonate is a reactive methylene compound.

b) Acrolein is an  $\alpha, \beta$  - unsaturated aldehyde.

c) The carbocation is  $\text{sp}^2$  hybridised.

d) Benzilic acid rearrangement yields benzoic acid as one of the products.

OR



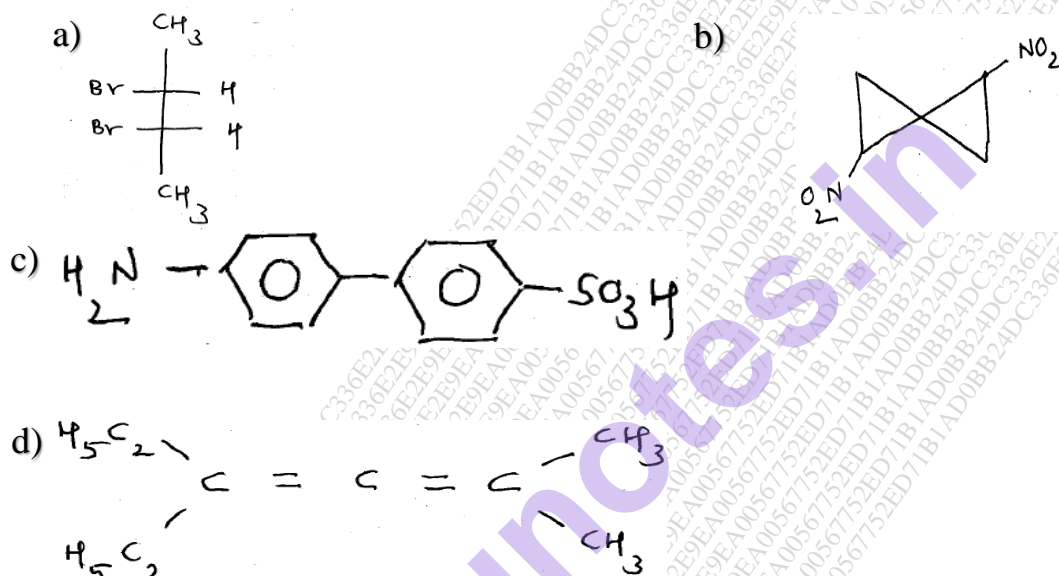
A) Choose the correct option and rewrite the statement:

04

- p) The E<sub>2</sub> mechanism takes place in \_\_\_\_\_ step.  
(one, two, multiple)
- q) Basicity is the extent to which a base accepts a \_\_\_\_\_.  
(electron, neutron, proton)
- r) Nucleophilicity is a \_\_\_\_\_ term.  
(kinetic, thermodynamic, non-relative)
- s) Favorski rearrangement reaction mechanism proceeds via the formation of a \_\_\_\_\_  
as an intermediate.  
(carbonium ion, free radical, carbanion)

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

04



OR

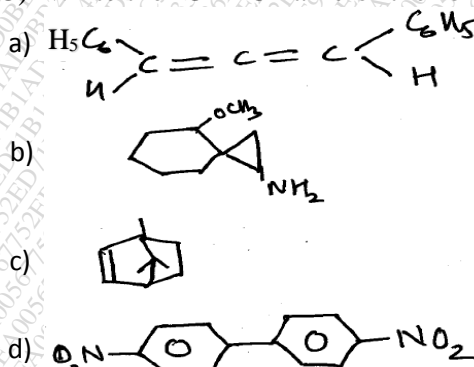
B) State whether the following are true or false:

04

- p) Stereoselective reactions are not stereospecific.
- q) Cyclobutane is more stable than cyclopropane.
- r) All chiral molecules should contain one or more asymmetric carbon atoms.
- s) Cumulenes containing odd number of double bonds exhibit geometrical isomerism.

Q.5 C) Write the IUPAC name of the following structures:

04



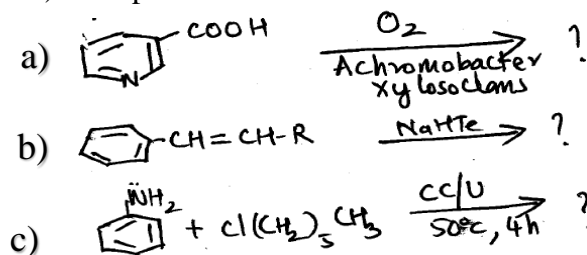
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C) Write the structure of the following compounds:

- Hepta-2,3,4-triene
- 2, 2'-Diphenyl disulphonic acid
- 1-Methyl bicyclo [4.1.0] heptane
- Spiro [3.4] octa-5, 7-diene.

04

D) Complete the reaction:



03

OR

D) Match the columns appropriately:

- |                  |                       |
|------------------|-----------------------|
| p) Baker's yeast | 1) Deprotecting group |
| q) BOC           | 2) Green reagent      |
| r) DES           | 3) Protecting group   |
|                  | 4) Biocatalyst        |
|                  | 5) Green solvent      |