(2½ Hours) **(Total 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 :
i) Explain the mechanism of a reaction involving carbene as an intermediate. **(04)**
ii) Justify the following : **(04)**
I) Reaction of 2-bromopropanoic acid with dilute alkali results in the formation of product with retention of configuration.
II) The rate of acetolysis of trans-2-iodocyclohexylbrosylate is much faster than the acetolysis of its cis-isomer.
iii) Discuss the role of FMO in reactions involving hard and soft nucleophiles and electrophiles. **(04)**
iv) Draw the molecular orbitals of 1,3,5-hexatriene and comment upon their symmetry properties. **(04)**

b) Answer **any ONE** of the following :
i) Explain molecular orbital basis for the α-effect. **(04)**
ii) Give any two methods of generations of ketenes. How do ketenes react with acetic acid and ammonia? **(04)**

2. **a)** Answer **any TWO** of the following :
i) Explain Diels-Alder Reaction. What are the effects of substituents on the reaction. **(04)**
ii) Using correlation diagram, explain whether ring closing reaction of 1,3-butadiene can take place thermally or photochemically. **(04)**
iii) Give the synthesis of Vitamin-D from 7-dehydrocholesterol. **(04)**
iv) What are cheletropic reactions? Explain giving examples. **(04)**

b) Answer **any ONE** of the following :
i) Give an account of claisen rearrangement. **(04)**
ii) What are ene reactions? Explain with examples. **(04)**

3. **a)** Answer **any TWO** of the following :
i) Assign the point groups to the following molecules : **(04)**
Chloroform, Benzene, Spiro [3.3] heptane and Ferrocene.
ii) Discuss the conformational features of cyclodecane ring system. **(04)**
iii) Draw all the possible planar and three dimensional structures of diasteresisomers of perhydroanthracenes. **(04)**
iv) Explain – Substituted cyclohexanes with axial –OH group undergoes oxidation at a faster rate than the equatorial isomer. **(04)**

b) Answer **any ONE** of the following :
i) Discuss transannular reactions giving examples. **(04)**
ii) Explain the structural features of cis and trans-hydrindanes. **(04)**

4. a) Answer **any TWO** of the following :

i) Draw and explain Jablonski diagram. **(04)**

ii) What is Barton reaction? Discuss its mechanism and give one application. **(04)**

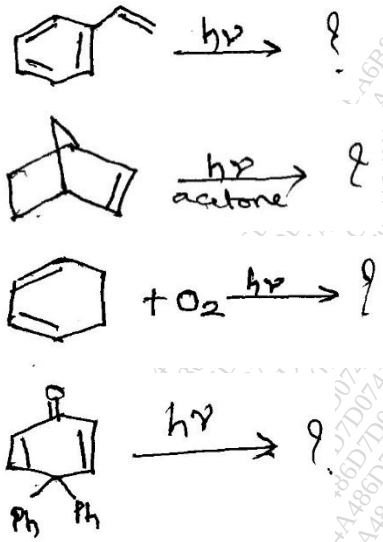
iii) Explain photochemical cross coupling and photodimerization of alkenes. **(04)**

iv) Write a note on chemiluminescence. **(04)**

b) Answer **any ONE** of the following :

i) Explain photocycloaddition reactions of aromatic rings. **(04)**

ii) Complete the reactions : **(04)**



5. Answer any FOUR of the following :

a) Give any two methods of preparation of benzyne. **(03)**

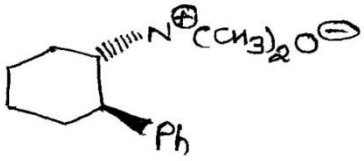
b) Complete the reaction and name the reactive intermediate **(03)**

$$N_2CH-COOC_2H_5 \xrightarrow{hr} A \xrightarrow{\text{Benzene}} B.$$

c) Explain retro-Diels Alder Reaction. **(03)**

d) What are 1,3-dipolar cycloadditions? Give two examples. **(03)**

e) Explain the stereochemistry and the formation of major product by cope elimination of following compound : **(03)**



f) State Bredt's rule. Bicyclo [3.3.2] dec-1-ene does not follow Bredt's rule - Explain. **(03)**

g) Explain - cis trans isomerization and hydrogen abstraction. **(03)**

h) What is Photo-fries rearrangement? Give examples. **(03)**
