

Time: 2.5 hrs]

[Marks: 70

- N.B. (i) Attempt all questions  
(ii) All questions carry equal marks

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- Q. 1. (A) Explain [1,5] Sigmatropic shift of Hydrogen in 5-methylcyclopentadiene. 6  
(B) Discuss electro cyclic conversion of 1,3,5-hexatriene to 1,3-cyclohexadiene (ring closer) by correlation diagram method in detail. 8
- OR
- Q.1. (A) Discuss [4+2] cycloaddition reaction between 1,3-butadiene and ethene molecules by correlation diagram method. 6  
(B) Answer the following: 8  
(1) Draw ONLY lobes signs of four sets of atomic orbitals of 1,3-butadiene and give the table showing their symmetry properties with respect to  $M$  and  $C_2$ .  
(2) Explain the terms "Conrotation" and "Disrotation" in context of Pericyclic reaction with figure.
- Q.2. (A) Draw different conformations of perhydro phenanthrene and explain their relative stability. 8  
(B) With appropriate examples explain 'steric approach control' and 'product development control'. 6
- OR
- Q2. With suitable illustrations discuss effect of H-bonding, dipole-dipole interactions and electrical forces on conformational stability. 14
- Q.3. Explain: Carbocations, carbonium ions and carbenium ions. What are super acids? Discuss their role in the study of carbocations. 7  
(B) Answer the following: 7  
(1) Explain the Terms "Fluorescence" and "Phosphorescence" in brief.  
(2) Explain Photo reduction of Benzophenone to give Benzpinacol in brief.
- OR
- Q.3. (A) Answer the following: 7  
(1) Explain Norrish type I reaction mechanism with suitable example in brief.  
(2) Explain photo isomerization with suitable example in brief.  
(B) Give an account of: (i) Free radicals (ii) Nitrenes. 7
- Q.4. Define: Heterocyclic chemistry. Discuss the utility of heterocyclic chemistry in day to day life. Give synthesis and chemical properties of: (i) Quinolene (ii) Imidazole (iii) benzthiazole. 14
- OR
- Q.4. Discuss the classification and nomenclature of heterocyclic compounds. (b) Give methods of preparations and chemical reactions of the following compounds:  
(i) Isoquinoline (ii) Thiazole (iii) Indole. 14
- Q.5. Answer the following: 14  
(A) Explain non-aromaticity and antiaromaticity with proper illustrations.  
(B) Explain the aromaticity of azulene.
- OR
- Q.5. Answer the following: 14  
(A) Apply Huckel's rule to polycyclic benzenoid aromatic compounds with the explanation of peripheral  $\pi$  electrons.  
(B) Explain the aromaticity of cycloheptatrienyl cation.