THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

CHE/CHS 3612 **ORGANIC CHEMISTRY-V** **Time: 3 Hours**

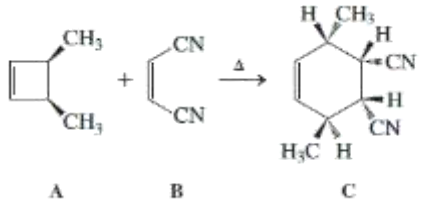
Max Marks: 75

Answer any FIVE Questions: (5 X 15 = 75)

1. a) What is Diels-Alder reaction? Explain the reaction using FMO theory under thermal and photochemical conditions. (10)

   b) Draw the structure of trans, cis, cis-2,4,6-octatriene. Explain its reaction under thermal condition using FMO theory. (5)

2. a) Heating cis-3,4-dimethylcyclobutene, A, in the presence of dienophile B gave exclusively the diastereomer C. Explain by a mechanism. (5)



A B C

   b) Write detailed notes on [1,3] and [1,5] sigmatropic rearrangement. (10)

3. Describe the following with examples. (5+3+3+4)

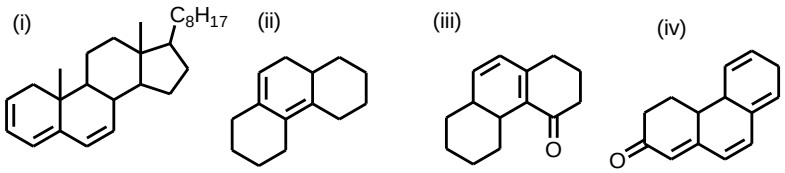
   (i) Spin-spin splitting

   (ii) Off-resonance decoupling

   (iii) Broad band decoupling

   (iv) Electromagnetic spectrum

4. a) Calculate the λ_{max} for the following compounds. (4x3)



   b) Define the terms base peak, finger print region and bathochromic shift. (3)

5. How can you differentiate the following compounds using ^{1}H & ^{13}C NMR? Write the spitting pattern and number of signals obtained in each case. [7+4+4]

   i) o, m and p dichlorobenzene

   ii) $C_6H_5CH=CHCHO$ and $CH_3CH=CHCHO$

   iii) $CH_3CH_2CH_2COCH_2CH_2CH_3$ and $CH_3CH_2CH_2COOCH_2CH_2CH_3$

6. a) Classify the dyes on the basis of its structure and mode of application on fabrics. (10)

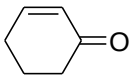
b) Give the preparation and applications of Phenolphthalein. (5)

7. a) Complete the following reactions with proper equation. (10)

i) $CH_3MgBr + CS_2$ ⟶

ii) $C_2H_5MgBr + PbCl_2$ ⟶

iii) CH_3MgBr + RNC ⟶

iv) $(CH_3)_2CuLi$ +  ⟶

v) $(C_2H_5)_2Cd + C_6H_5COCl$ ⟶

b) Starting from diethyl malonate, how can you prepare the cyclohexanecarboxylic acid. (5)

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