This question paper contains 4+2 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **1627**

Unique Paper Code : **217603** **C**

Name of the Paper : **CHHT-616 : Organic Chemistry V**

Name of the Course : **B.Sc. (Hons.) Chemistry**

Semester : **VI**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Instructions for Candidates :

(1) Answer *six* questions in all.

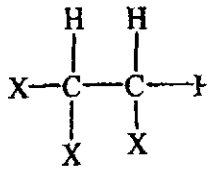
(2) Question No. **1** carries **15** marks.

1. Answer any *five* parts :

(*a*) What is the difference between the NMR spectra of CH_3CH_2Cl and CH_3CHDCl ?

(*b*) Differentiate between chromophore and auxochrome by taking suitable example.

(*c*) Draw high resolution NMR spectrum of the following compound showing J value also :



J = 7 Hz

where X = Electron withdrawinggroup.

P.T.O.

(*d*) Which out of the following two compounds will show > C = O stretching vibration at higher frequency ? Give reason also :

$RCOCH_2CH_3$ and RCOCl.

(*e*) What is the significance of polydispersity index ?

(*f*) What are addition and condensation polymers ? Explain by giving suitable example.

(*g*) State the condition for the changes taking place in the following : 3×5

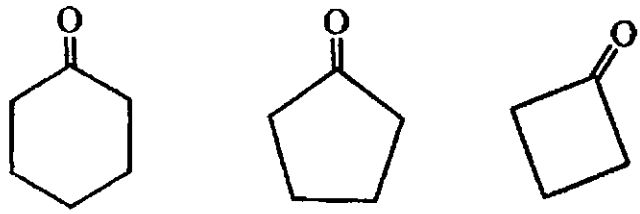
Leucobase $\rightleftharpoons$ Colour Base $\rightleftharpoons$ Dye.

2. (*a*) How will you differentiate between :

$HC \equiv CH$ and $CH_3CH_2CH_2CH_2CH \equiv CH$

using IR spesctroscopy. Give reason also.

(*b*) Arrange the following compounds in increasing order of carbonyl absorption frequency. Give reason also :



(*c*) Calculate the approximate wave number of the fundamental absorption peak due to the stretching vibration of the O-H group.

Force constant for O-H group = 7.7×10^5 dyne/cm

Reduced mass = $9.41 \times 1.67 \times 10^{-24}$ gm. 4×3

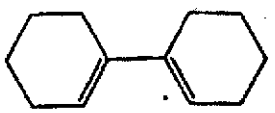
3. (*a*) (*i*) In a 60 MHz spectrophotometer, protons in an Iodomethane absorb at a position 130 Hz downfield from the TMS, when the field strength is 14092 gauss. What is the chemical shift of these protons ?

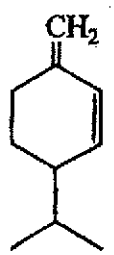
(*ii*) The molecular formula of a certain dichloro compound is found to be $C_2H_4Cl_2$. Write *two* possible isomers for this formula, and show how the two structures could be distinguished by NMR.

(*b*) Acetylenic hydrogens absorb at relatively high field in NMR. Explain.

(*c*) Draw NMR spectrum of ordinary sample of ethanol giving reason for your answer. 4×3

4. (*a*) Calculate λ_{max} (nm) for the following compounds :





Base value for :

Acyclic/heteroannular diene = 214 nm

Homoannulardiene = 253 nm

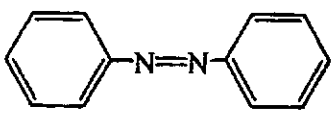
Increment for each substituent :

Alkyl substituent or ring residue = 5 nm

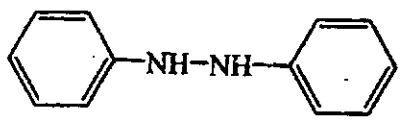
Exocyclic double bond = 5 nm

Double bond extending conjugation = 30 nm.

(*b*) Azobenzene is deep orange red while hydrazobenzene is colorless compound. Explain :



Azobenzene



Hydrazobenzene

(*c*) How will you differentiate the following two compounds using UV spectroscopy ? cis-cinnamic acid and trans-cinnamic acid. 4×3

5. An organic compound with molecular formula $C_6H_{12}O$ showed the following data :

UV (λ_{max}) 288 nm, ε = 24

IR very strong band at 1715 cm^{-1}

NMR : δ2.0(3H, s), 1.0(9H, s)

(*i*) Calculate double bond equivalent.

(*ii*) Explain :

(1) UV transition :

(2) IR absorption band

(3) NMR peaks along with splitting pattern.

Give the structure of the compound. 12

6. (*a*) *p*-Nitrobenzene diazonium cation is much more reactive than *p*-methoxybenzene diazonium cation in coupling reaction. Explain with its mechanism.

(*b*) Give *one* synthesis of Indigo from anthranilic acid or aniline.

(*c*) Explain the yellow green fluorescence produced by fluorescein dye. 4×3

7. (*a*) Explain the following terms with example :

(*i*) Mordant dyes

(*ii*) Triphenyl methane dyes.

(*b*) Differentiate atactic and Isotactic polymers taking polypropylene as an example.

(*c*) Write down mechanism for the formation of resol resin from phenol and formaldehyde. 4×3

8. (*a*) Discuss the following terms :

(*i*) Triblock copolymers

(*ii*) Weight average molecular weight.

(*b*) How would you synthesize Nylon 6 ? Also give the synthesis of its monomer.

(*c*) Write down anionic mechanism for polymerization of acrylonitrile in the presence of butyl lithium catalyst. 4×3