**LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034**

**B.Sc., DEGREE EXAMINATION – CHEMISTRY**

**SIXTH SEMESTER – APRIL 2011**

**CH 6609/6603 – SYTHETICS ORGANIC CHEMISTRY AND SPECTROSCOPY**

**DATE:11-04-2011 MAX:100 MARKS**

**TIME:1:00 – 4.00**

**PART A**

**Answer ALL Questions (10 x 2 = 20)**

1. What are activating groups? Give examples.
2. Suggest any two criteria for choosing protective groups?
3. Complete the following reactions

O

1. H2

Pd / C

1. COOH

Na

Liq. NH3

1. Mention the role of DMSO in oxidation reactions
2. What is the structure of aldol product from propanal?
3. What is the significance of active methylene group?
4. Calculate the λmax for the following

O

1. C – CH3
2. The λmax of benzene is 256nm whereas aniline is 280nm – Give reason.
3. Predict the structural formula for the compound with the following molecular formula showing only one NMR signal a) C2H6O b) C5H12
4. Define nitrogen rule. Give an example.

**PART B**

**Answer any EIGHT Questions (8 x 5 = 40)**

1. Explain Retrosynthetic analysis.
2. What do you understand by linear and convergent synthesis? Explain.
3. Discuss synthon approach in construction reactions.
4. Discuss the mechanism of Clemmenson reduction and mention its significance.
5. Explain hydroboration reaction and mention the utility of the rection.
6. Explain Diels Alder reaction. Give any two examples.
7. Complete the following reaction

O



+ C6H5CHO NaOH

CHO

1. NaBH4

OCH3  CH3OH

1. B2H6

1. CH3 – (CH2)7 – CH = CH2

2. H2O2

1. What are chromophores and auxochrome? Give examples.
2. Discuss the factors which affect the IR absorption frequency of a functional group.
3. Define chemical shift. Why is TMS a good reference standard in NMR spectroscopy.
4. How will you distinguish 2-pentanone and 3-pentanone using mass spectroscopy.
5. Explain shielding and deshielding mechanism.

**PART C**

**Answer any FOUR Questions (4 x 10 = 40)**

1. a) Explain umpolung synthesis. (5)

b) Using umpolung synthesis convert the following reaction. (5)

O O

nC5H11 – C - H C5H11 – C – CH2 - R

1. a) How will you distinguish the following pairs using IR spectroscopy. (6)
2. CH3 – CO – CH3 and CH3 – CH = CH – CH2OH

ii. O-hydroxy benzaldehyde and m- hydroxy benzaldehyde

b) Draw the structure of each of the following compounds which meets the given requirements in the NMR spectrum. (4)

i. C3H3Cl5 (one doublet and one triplet) ii. C3H7Cl (one doublet and one septet)

1. a) Explain spin-spin spliting with a suitable example. (6)

b) A compound with molecular formula C8H8O gives the following NMR spectrum - multiplet   
δ 7.28 (5H), Doublet δ 2.88 (2H), Triplet δ 9.87 (1H). Determine its structure (4)

1. Using malonic ester how will you synthesis the following.
2. Succinic acid iv. Adipic acid
3. Cinnamaldehyde v. n-Valeric acid.
4. Barbituric acid.
5. a) An organic compound with molecular weight 72 absorbs at 274 nm.

In IR the bands are formed at 1715 cm-1 (s), 2941 – 2857 cm-1(m) and 1460 cm-1 (m).

In NMR the signals formed are 2.48 δ quartet (2H), 2.12 δ singlet (3H), 1.07 δ triplet (3H). Determine the structure of the compound.

b)Define the following terms and mention its significance (4)

i. Base Peak ii. Metastable peak

1. a) Discuss the instrumentation of UV –Visible spectrophotometer with the block diagram.(6)

b) How are the following groups protected and deprotected during organic synthesis (4) i. – NH2 ii. C = O iii. – OH iv. - COOH