THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
ORGANIC CHEMISTRY (CB-005)
End Semester Examination 14th Dec., 2006

Time: 3 Hrs | Max Marks: 72

Note: Attempt any six questions in the given sequence.
All parts of a question must be attempted at one place.
Evaluated answer sheets can be seen on 18th Dec., 2006 at 11.00 a.m. in Chemistry Lab

1. **(i)** Describe rules for R,S system of nomenclature
   (ii) Discuss Meso compounds
   (iii) Describe separation of enantiomers (4 x 3)

2. Write short notes on:
   (i) Terpenes **(ii)** Steroids
   (iii) Anomers of D-Glucose **(iv)** Sucrose (3 x 4)

3. Discuss the following:
   (i) Chichibabin reaction
   (ii) Sodium borohydride reduction
   (iii) Wittig reaction
   (iv) Structure of furan (3 x 4)

4. **(i)** Explain important cleavages in the mass spectrum of 2-pentanone along with m/z values.
   (ii) Discuss the effects of solvent to αβ-unsaturated carbonyl compounds in UV-Vis spectroscopy.
   (iii) What is the essential condition for a compound to be IR active? The IR stretching frequency for O-H bond is _____?_____ (higher/lower) than stretching frequency of O-D bond. Explain.
   (iv) A signal has been reported to occur at 120 Hz downfield from TMS in an NMR spectrometer with a 300-MHz operating frequency. What is its chemical shift? How many hertz downfield from TMS would the signal be in a 100-MHz spectrometer? (3 x 4)

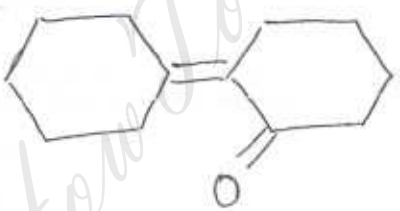
5. Give a structure(s) consistent with each of the following set of NMR data:

(i) $C_3H_3Cl_5$	a triplet, δ 4.52, 1H b doublet, δ 6.07, 2H	**(ii)** $C_3H_5Cl_3$	a singlet, δ 2.20, 3H b singlet, δ 4.02, 2H
(iii) C_4H_9Br	a doublet, δ 1.04, 6H b multiplet, δ 1.95, 1H c doublet, δ 3.33, 2H	**(iv)** $C_{10}H_{13}Cl$	a singlet, δ 1.57, 6H b singlet, δ 3.07, 2H c singlet, δ 7.27, 5H

(3 x 4)

6. **(i)** How does partition chromatography differ from adsorption chromatography?
(ii) In a GC experiment in which the liquid stationary phase is polar, which would have a shorter retention time – a nonpolar mixture component with a high vapour pressure or a polar mixture component with a low vapour pressure? Explain.
(iii) Which zones are heated in a GC instrument and why does each of these need to be heated?
(iv) What is the difference between retention time and adjusted retention time?
(v) What is gradient programmer?
(vi) Distinguish between isocratic elution and gradient elution. (2 x6)

7. **(i)** Give two reasons why an injection system similar to that in GC would not work in HPLC.
(ii) Distinguish normal-phase HPLC from reverse-phase HPLC.
(iii) Will ethanol dissolved in CS_2 or an undiluted sample of ethanol show an O-H stretch at a higher frequency in IR spectrum?
(iv) Write the resonance contributions of pyrrole
(v) What do you understand by enantiotopic hydrogens
(vi) Calculate λ_{max} for $\pi \rightarrow \pi^*$ transition for the following in hexane (2x6)



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