EASTERN UNIVERSITY, SRI LANKA

FOURTH EXAMINATION IN SCIENCE-2010/2011

SPECIAL DEGREE IN CHEMISTRY

CHS 06 Organic Chemistry II

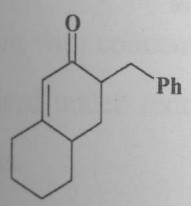
swer all questions **Time Allowed: Two hours**

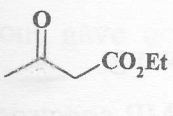
nswer **all** the parts (a), (b) and (c).

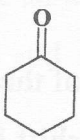
) Define the following terms used in retrosynthetic analysis:
   i) Disconnection
   ii) Synthon
   iii) Functional Group Interconversion

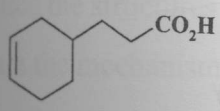
) Give three criteria for a good disconnection in retrosynthetic analysis.

Using retrosynthetic analysis, devise synthetic strategies for the following target molecules and show how the syntheses could be effected from the suggested starting materials:

(i) 

from 

and 

(ii) 

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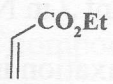
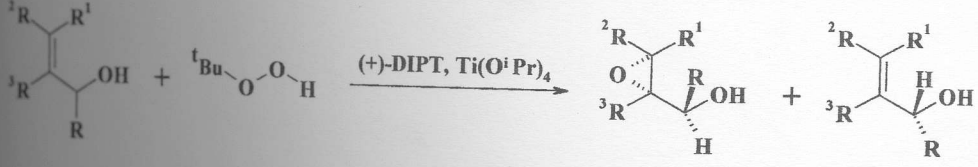
and 

swer **all** the parts (a), (b) and (c).

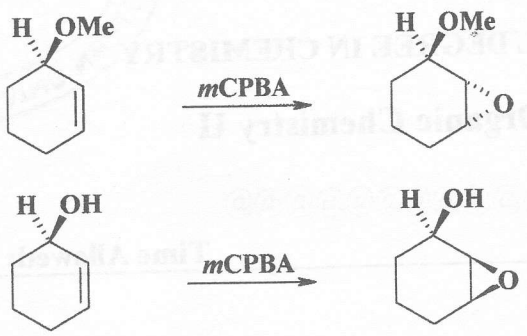
Briefly explain how kinetic resolution could be achieved in the Sharpless Asymmetric Epoxidation given below:



Contd..

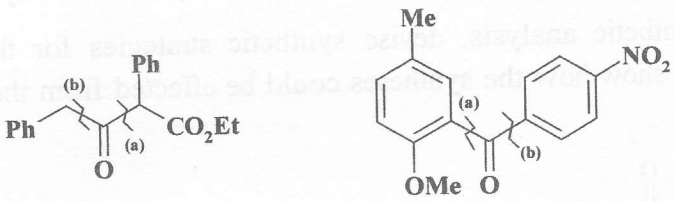
b) Considering 'Felkin-Ahn' model, how you would predict the stereoselecti nucleophilic addition to a carbonyl group having an adjacent stereogenic Briefly explain.

c) Explain the following observations:



3) Answer **Both** parts (a) and (b).

(a) Two possible disconnection approaches are suggested for the synthesis of ea following molecules. Giving reasons, select the preferred approach in each ca



(b) Explain **any five** of the following:

(i) Chemical shift δ in NMR spectroscopy

(ii) Coupling constant *J* in NMR spectroscopy

(iii) Spin-lattice relaxation in NMR spectroscopy

(iv) Double resonance or spin decoupling in NMR spectroscopy

(v) Proton noise decoupled spectrum in ^{13}C-NMR spectroscopy

(vi) Symmetric stretching vibration in IR spectroscopy.

(vii) Bending vibrations (scissoring and twisting) in IR spectroscopy.

Answer **all** the parts (a), (b) and (c).

(a) What is/are the information obtained from the following 2-D NMR methods for a particular organic compound?

i) ^{1}H-^{1}H COSY ii) HMQC iii) HETCOR iv) HMBC

(b) Two isomeric compounds **A** and **B** with molecular formula $C_5H_{10}O$ have the following ^{1}H and ^{13}C NMR data. Both compounds have a strong IR absorption band in the region 1710-1740 cm^{-1}. Elucidate the structures of **A** and **B** and interpret the spectral data.

Compound **A**: ^{1}H NMR (δ in ppm): 2.55 (septet,1H), 2.10 (s,3H) and 1.05 (d,6H)

^{13}C NMR (δ in ppm): 212.6, 41.5, 27.2 and 17.8

Compound **B**: ^{1}H NMR (δ in ppm): 2.38 (t,2H), 2.10 (s,3H) and 1.57 (m,2H) and 0.88 (t,3H)

^{13}C NMR (δ in ppm): 209.0, 45.5, 29.5, 17.0 and 13.2

(c) A compound **C** showed three singlets with area ratio 9:2:1 in its ^{1}H-NMR spectrum. The weakest singlet disappeared with the addition of D_2O. On treatment with concentrated H_2SO_4 at 180 °C, **C** gave an olefin **D** which when ozonolised under reducing conditions gave acetone and acetaldehyde as the products.

(i) Deduce the structures of **C** and **D**.

(ii) Write the mechanism for the formation of compound **D** from compound **C**.

(iii) Draw a rough sketch of the ^{1}H-^{1}H COSY spectrum of compound **C**.

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