EASETRN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE – REPEAT

SECOND SEMESTER 2004/2005 (OCTOBER 2006)

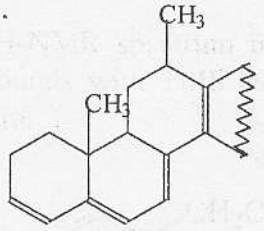
CH 203 SPECTROSCOPIC METHODS

Time allowed: **ONE Hour**

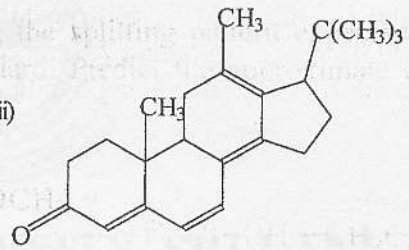
Candidate must NOT start writing their answers until told to do so

1) a) Using Woodward-Fieser-Scott rule, calculate the λ_{max} value of the UV absorption band of the following compounds.

i)



ii)



(22 marks)

b) C=O stretching frequency in carboxylic acids increases with dilution. Explain.

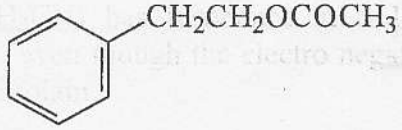
(16 marks)

c) The mass spectrum of 4-methylpentanol showed fragmentations at m/e 102, 84, 56 and 31. Give the structures of these fragmentated ions and indicate the possible pathways for their formations.

(32 marks)

d) Sketch the ^{1}H-NMR spectrum including the splitting pattern expected for each of the following compounds with TMS as a standard. Predict the approximate chemical shift in each of the spectra.

i)



ii) $Cl-\underset{\displaystyle Cl}{\underset{|}{CH}}-CH_2Cl$

(30 marks)

2) a) The chemical shift of protons in benzene is 7.2 ppm. Would the ^{1}H NMR signals for aniline appear at up field or down field from that of benzene? Explain your answer.

(20 marks)

b) The Infra Red spectrum of a compound **A** ($C_8H_8O_2$) showed weak absorption at about 3000 cm^{-1}, 2850 cm^{-1}, 2750 cm^{-1} and strong absorption at 1680 cm^{-1}, 1260 cm^{-1}, 1030 cm^{-1} and 840 cm^{-1}. ^{1}H NMR spectrum of the compound **A** had signals at δ 10.0(s, 1H), δ 7.5 (dd, 4H), δ 3.9(s, 3H). Interpret the spectral data and deduce the structure of the compound **A**.

(60 marks)

c) Acetonitrile (CH_3CN) has resonance at δ 1.97 while methyl chloride (CH_3Cl) has resonance at δ 3.05, even though the electro negativity of cyano group is larger than that of the chlorine atom. Explain

(20 marks)

End