Reg. No. | | | | | | | | | |

THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. Degree Programme and

Stand Alone Courses in Science - 2015/2016

CMU2221/CME4221 - Organic Chemistry 1

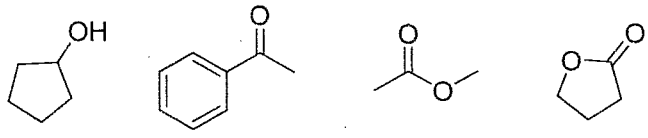
CONTINUOUS ASSESSMENT TEST 1

Ques No.	Max.	Marks
1	30	
2	20	
3	20	
4	30	
Total	100	

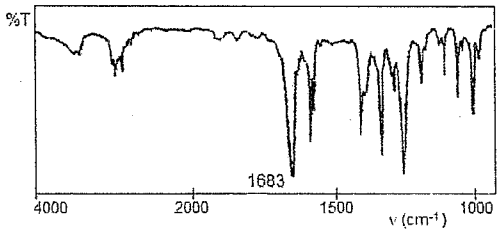
Date: Saturday, 9th April 2016 **Time:** 14.30 - 15.30 hrs.

Write answers only in the space provided.

1. Giving reasons assign the correct compound out of the following (**A-D**) to its IR spectrum.



A **B** **C** **D**

i. 

Compound ☐

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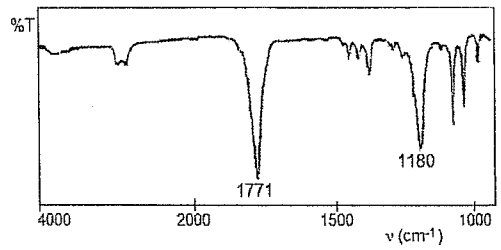
ii. 

Compound ☐

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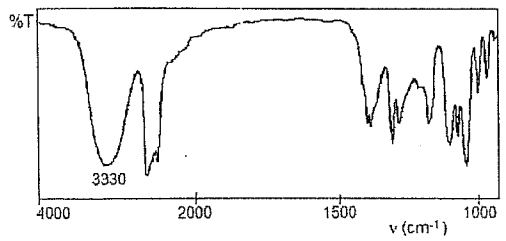
iii 

Compound ☐

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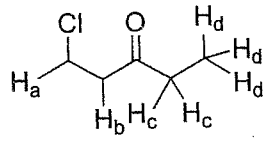
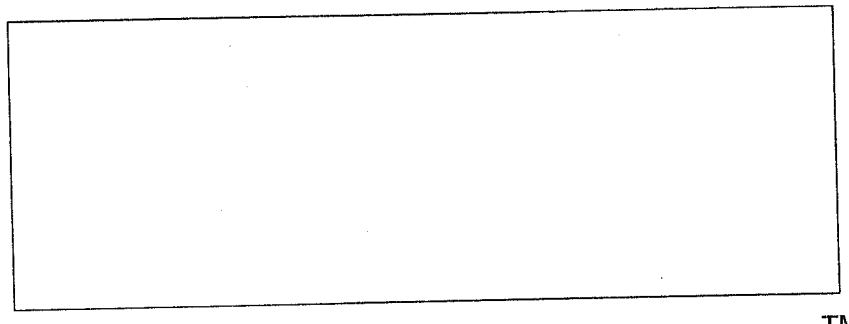
(30 marks)

Reg. No. | | | | | | | | | |

2. Draw the ^{1}H NMR spectrum you would expect for the compound **E** showing multiplicities and relative positions of the signals from TMS (*δ values not necessary*). Label all the peaks.



Compound **E**



(20 marks)

3. CH_3CHO shows a UV absorption at 190 nm ($\log \varepsilon = 2.0$) and at 290 nm ($\log \varepsilon = 1.0$).

   i. Indicate the electronic transitions responsible for the above absorptions.

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   ii. Explain the observed differences in wave lengths of these two absorptions.

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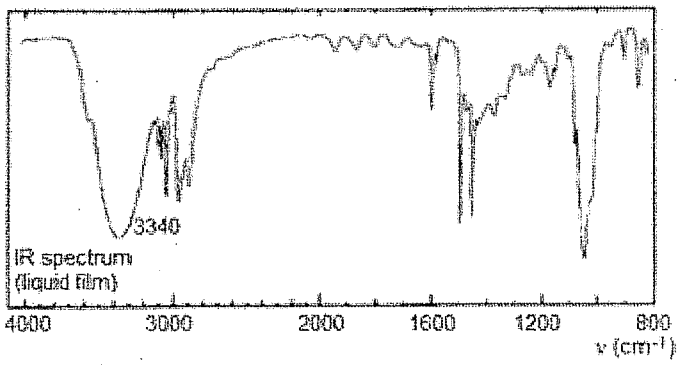
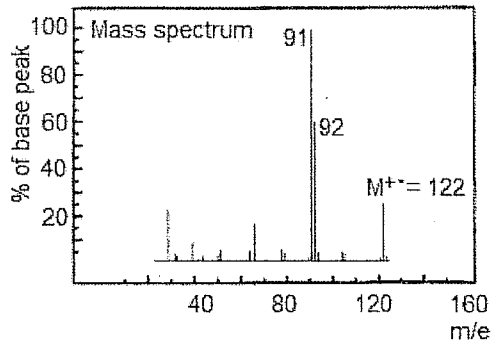
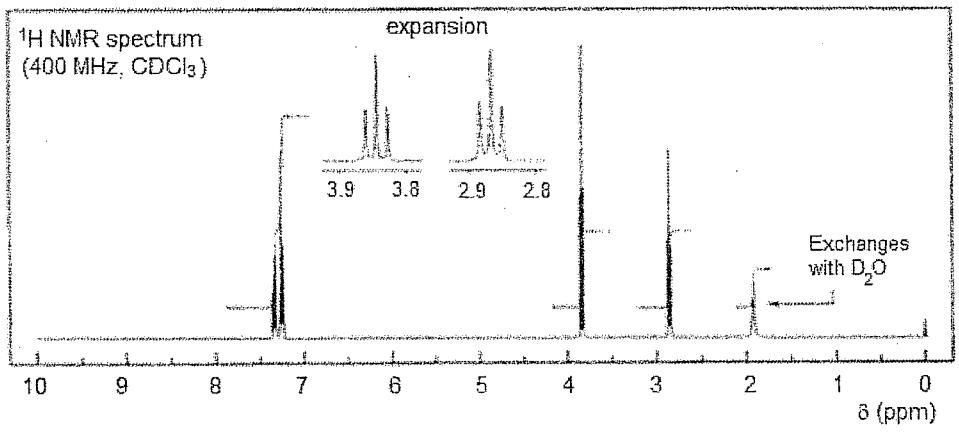
(20 marks)

Reg. No. | | | | | | | | | |

4. **F** is an organic compound containing eight carbon atoms. IR, Mass and ^{1}H NMR spectra of **F** are given below.







i. What is/are the functional group/s present in **F**?

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ii. What are the different spin systems present in **F**?

iii. Give the structure of **F**.

iv. Draw the fragmentation pattern for the formation of the molecular fragment responsible for the peak at m/e 91.

v. Give reason why it forms the base peak in the mass spectrum.

(30 marks)

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Name :.....

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B.Sc. Degree Programme and Stand Alone Courses in Science – 2015/2016
CMU2221/CME4221 – Organic Chemistry I
CAT 2- Answer Guide

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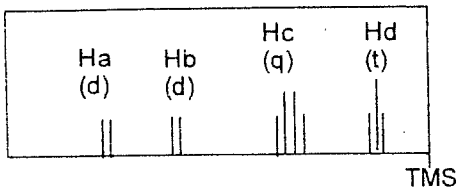
1. i. Compound B : Sharp absorption band at 1683 cm^{-1} is due to C=O stretching. . Lower carbonyl frequency than normal value indicates a conjugated carbonyl group.
   ii. Compound D : Band at 1771 cm^{-1} due to C=O str. and the band at 1180 cm^{-1} for C-O str. suggests an ester group. Ester carbonyl appears at a higher frequency than for a normal acyclic one when they are in a strained ring. ∴ The compound cannot be C, but D.
   iii. Compound A : Broad band at 3330 cm^{-1} indicates a presence of a –OH group. Only cpd. having -OH is A.

2.



3. i. $n \longrightarrow \pi^*$ (290 nm), $\pi \longrightarrow \pi^*$ (190 nm)

   ii. $n \longrightarrow \pi^*$ electronic transitions require less energy than $\pi \longrightarrow \pi^*$ electronic transitions. When energy (E) is lesser λ will be higher as $E \propto 1/\lambda$.

4.

i. –OH

ii. –OH , $-CH_2CH_2-$,

iii. CH_2CH_2OH

iv. CH_2CH_2OH -e → $CH_2-CH_2-\overset{+}{O}H$ → CH_2^+ m/e 91

v. Benzyl cation is resonance stabilized.

CH_2^+ rearrangement → ≡ tropilium ion