Name : .....
Roll No.: .....

NATIONAL INSTITUTE OF TECHNOLOGY CALICUT

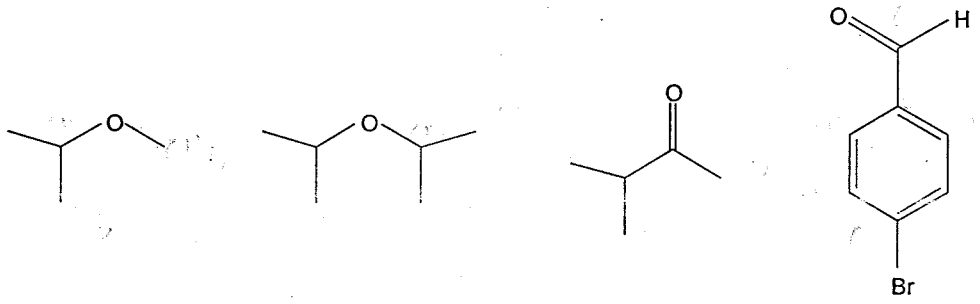
DEPARTMENT OF CHEMISTRY
S2 B. Tech Winter Semester, Test II, March 2013

CY1001 – Chemistry

Time: 1 hour **Max. Marks: 20**

Answer All Questions

1. Which of the following compound gives three peaks in the ^1H NMR spectrum and does NOT have a peak at 1700-1750 cm^{-1} in the IR spectrum? **(2 Marks)**

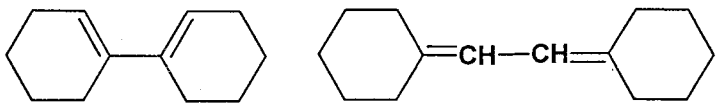


(a) (b) (c) (d)

2. Account for the differences in the $n \rightarrow \sigma^*$ transitions in CH_3Br (λ_{max} = 205 nm; ε = 200) and CH_3I (λ_{max} = 255 nm; ε = 360) in their electronic spectra. **(2 Marks)**

3. In a mass spectrum, a peak at an m/z value of 28 is observed. How will you identify whether it is due to $CO^{\bullet+}$ or $C_2H_4^{\bullet+}$ radical cation? **(2 Marks)**

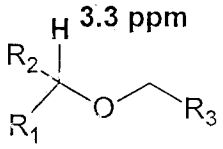
4. In the electronic spectral measurements, λ_{max} for compound **I** is observed at a lower wavelength than that of compound **II**. Why? **(2 Marks)**



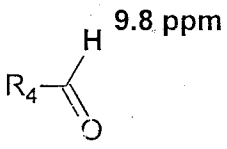
I **II**

(P. T. O.)

5. Account for the ^1H NMR chemical shift values for the marked protons in the compounds **A** and **B**. **(2 Marks)**



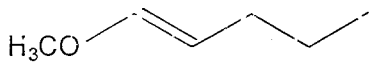
A



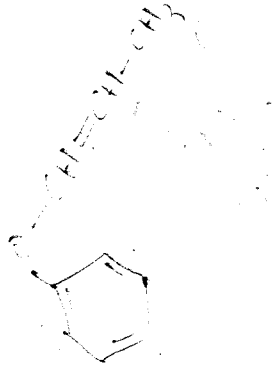
B

6. The vibrational frequencies of CO and NO are 2141 and 1776 cm^{-1}, respectively. Calculate the force constants and compare the bond strengths of the two molecules. **(3 Marks)**

7. Predict the ^1H NMR spectrum, with appropriate splitting patterns and chemical shift positions for the compound given below: **(3 Marks)**



8. An organic compound with molecular formula $C_9H_{10}O$ absorbs strongly in the IR region at 1687 cm^{-1}. Its ^1H NMR spectrum consists of four signals, *viz.*, δ = 2.21 ppm (singlet); δ = 2.32 ppm (singlet); δ = 7.18 ppm (doublet) and δ = 7.83 ppm (doublet).
   (i) Identify the molecule, and
   (ii) Predict its major mass fragmentation peaks. **(4 Marks)**



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