

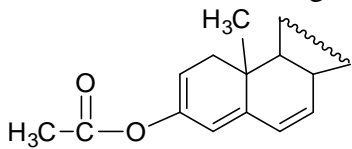
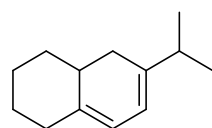
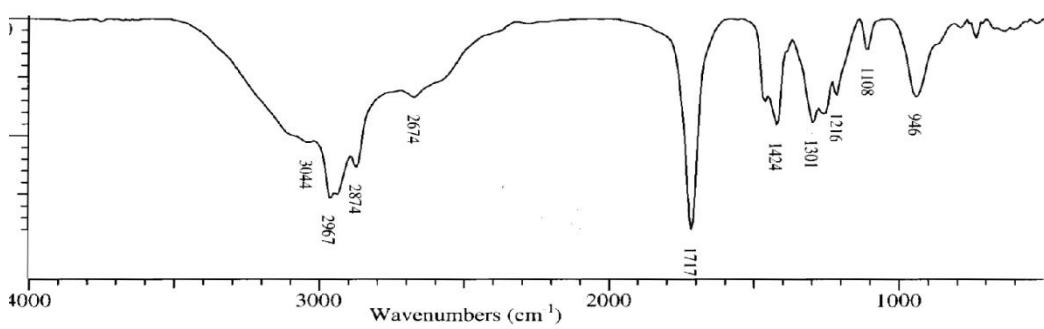


End Semester Examination – Nov/Dec – 2016

Code : **15CH3019**
Sub. Name : **Spectroscopic methods for structural elucidation**

Semester : **2016-17 ODD**
Duration : **3hrs**
Max. marks : **100**

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	What is cotton effect? Explain with an example.	CO1	8
	b.	Discuss octant rule with an example.	CO1	7
	c.	Calculate the absorption maximum for the following compound. <div style="text-align: center;">  </div>	CO3	5
(OR)				
2.	a.	Discuss the principle and instrumentation of UV Visible spectrophotometer.	CO1	15
	b.	Calculate the absorption maximum for the following compound. <div style="text-align: center;">  </div>	CO3	5
3.	a.	Explain the factors influencing vibrational frequencies in FTIR spectroscopy.	CO1	15
	b.	From the following IR spectral data, identify the functional groups present in the compound. Give reasons for the assignment. Peaks details: 1424 cm ⁻¹ , 1717 cm ⁻¹ , 2874 cm ⁻¹ , 2967 cm ⁻¹ , 3044 cm ⁻¹ . <div style="text-align: center;">  </div>	CO3	5
(OR)				
4.	a.	What are the different modes of stretching and bending vibrations in the molecules. Explain with examples.	CO1	10
	b.	Write short notes on combination bands and over tones in IR spectroscopy.	CO1	5
	c.	From the following IR spectral data, identify the functional groups present in the compound. Give reasons for the assignment. Peaks details: 1422 cm ⁻¹ , 1715 cm ⁻¹ , 2918 cm ⁻¹ , 2964 cm ⁻¹ , 2995 cm ⁻¹ .	CO3	5

5.	a.	What is meant by proton decoupling technique? Explain with an example.	CO2	5
	b.	Discuss spin spin relaxation and spin lattice relaxation in NMR spectroscopy.	CO2	10
	c.	The ^1H NMR spectral data of a compound with the formula C_9H_{12} is given below. Elucidate the structure of the compound and assign the chemical shift values. ^1H NMR (δ) ppm: 1.25 (d, 6H); 2.99 (septet, 1H), 7.32 (s, 5H)	CO3	5
(OR)				
6.	a.	Discuss the factors influencing chemical shift in NMR spectroscopy.	CO2	15
	b.	A compound with formula $\text{C}_5\text{H}_{10}\text{O}_2$ shows bands at 3450 cm^{-1} and 1713 cm^{-1} in the infrared spectrum. Its ^1H NMR spectral data are as follows. Identify the structure of the compound and give reason. ^1H NMR (δ) ppm: 1.35 (s, 6H); 2.25 (s, 3H); 3.85 (s, 1H)	CO3	5
7.	a.	What are the necessary requirements for McLafferty rearrangement to occur? Explain with two examples.	CO2	10
	b.	Differentiate base peak and molecular ion peak in mass spectrum with one example.	CO2	5
	c.	Identify the compound from the following mass spectral data. Write the fragmentation pattern and give reason. Formula: $\text{C}_5\text{H}_{10}\text{O}$; m/z : 86, 57 (most abundant), 29	CO3	5
(OR)				
8.	a.	Explain the MALDI technique in mass spectroscopy.	CO2	10
	b.	Write short notes on chemical ionization method in mass spectroscopy.	CO2	5
	c.	Identify the compound from the following mass spectral data. Write the fragmentation pattern and give reason. Formula: C_6H_{14} ; m/z : 86, 71, 57 (most abundant), 43, 29.	CO3	5
Compulsory:				
9.	a.	Explain the fragmentation pattern of thiols and thioethers with examples.	CO2	10
	b.	Explain the fragmentation pattern of alkyl chlorides and alkyl bromides with examples.	CO2	10

ALL THE BEST