

Reg No:

--	--	--	--	--	--	--	--	--	--	--

**D.K.M.COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1**

**SEMESTER EXAMINATIONS**

**NOVEMBER - 2017**

**15CPCH3A**

**SPECTROSCOPY**

\*\*\*\*\*

**Time: 3 Hrs**

**Max.Marks : 75**

**SECTION-A (5x 6 =30)**

**Answer ALL the questions.**

1. (a) What are the degeneracies ( $g_j$ ) of the following diatomic rotational energy levels ( $E_j$ )?  
(where  $g_j = 2J+1$ ).

(i) 0

(ii)  $h^2/4\pi^2I$

(iii)  $6h^2/4\pi^2I$

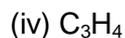
(Or)

- (b) Explain the various types of electronic transitions that occur in organic molecules?  
Arrange them in the decreasing order of energy.

2. (a) Compare Rayleigh Scattering with Stoke's and AntiStoke's line of Raman Scattering.

(Or)

- (b) Compounds with the following molecular formulae show only one signal in the  $^1\text{H-NMR}$  .  
Spectra. Predict their structural formulae.



.

3. (a) Distinguish between Cis and Trans-2-Butenes on the basis of  $^{13}\text{C-NMR}$  Spectroscopy?

(Or)

- (b) Write a note on NMR Shift Reagents?

4. (a) Write a note on 'g' value and hyperfine splitting?

(Or)

- (b) Explain the Auger Spectrometer with a neat diagram.

5. (a) Predict the structure of the compound which shows  $m/e$  peaks at 88,70,55,42,31(much intense) and 29.

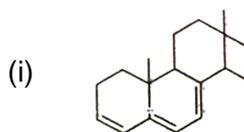
(Or)

- (b) How has the Mossbauer spectra helped in distinguishing Fe(II) & Fe(III) Complexes?

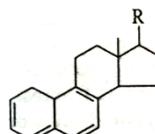
**SECTION-B (3x15 =45)**

**Answer any THREE of the following questions.**

6. a) Using Woodward-Fieser rules calculate the absorption maximum ( $\lambda_{\text{max}}$ ) for the following compounds. (8)



(ii)



- (b) Explain the instrumentation of an IR Double beam spectrophotometer?

(7)

7. (a) Explain the instrumentation of an NMR spectrometer with a neat diagram? (10)
- (b) Write a note on Nuclear overhauser effect? (5)
8. (a) (i) Discuss the  $^{31}\text{P}$ -NMR Spectrum of  $\text{HPF}_2$  if  $J_{\text{PH}} > J_{\text{PF}}$  and  $J_{\text{PF}} > J_{\text{PH}}$  (4)
- (ii) Discuss the  $^{19}\text{F}$ -NMR Spectrum of  $\text{ClF}_3$  and  $\text{ClF}_5$ . (4)
- (b) Explain in detail about the NQR spectroscopy. (7)
9. (a) Explain Zero-field splitting and Kramer's degeneracy. How many lines are expected in the ESR spectrum of bis (salicylaldimine) copper(II) complex (10)
- (b) Explain how photoelectron spectra are interpreted in terms of koopman's theorem. (5)
10. (a) Explain the instrumentation and working of Mass Spectrometer. (10)
- (b) Explain the application of Mossbauer spectroscopy to deduce the structure of certain compounds using some examples. (5)

\* \* \* \* \*