14CHP16

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2018
(Third Semester)

Branch – **CHEMISTRY**

MOLECULAR SPECTROSCOPY & APPLICATIONS

Time : Three Hours Maximum : 75 Marks

Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 15 = 75)

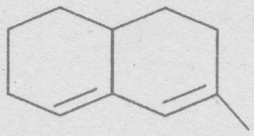
1 a Explain the term 'Transition Probability'. (3)

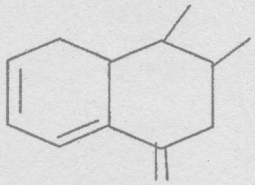
b Discuss the different types of electronic transition. (5)

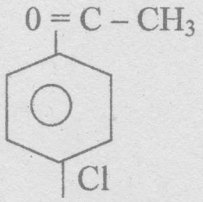
c Explain the solvent effects in $\pi \rightarrow \pi^*$ and n $\rightarrow \pi^*$ transitions. (7)

OR

d Calculate the λ max for the following molecules : (6)

i) 

ii) 

iii) 

e Write a short notes on absorption and intensity shifts. (5)

f Discuss any four applications of UV – visible spectra to organic compounds. (4)

2 a Explain the various factors influencing vibrational frequency. (5)

b Define Fermi Resonance. (3)

c Discuss the number of fundamental vibrations of H_2O and CO_2 Molecules. (7)

OR

d Explain stoke and antistoke lines. (3)

e Bring out the differences between IR and Raman spectroscopy. (5)

3 a Define chemical shift. (3)

b What are the factors influencing chemical shift? (5)

c Give a detailed account of spin-spin interaction with an example. (7)

OR

d Explain Nuclear Overhauser effect. (3)

e Write short notes on chemical shift reagents. (5)

f Discuss the geminal and vicinal coupling with an example. (7)

4 a Explain the salient features of 'off-resonance decoupling'. (5)

b How will you determine the structure of complexes of WF_6 and structure of BOF_4? (5)

c Write short notes on '2D NMR' (5)

4 Cont...

e Explain the basic principle of ^{13}C NMR spectra. (5)

f Discuss the applications of NMR spectra in the structural determination of AsF_3 and SO_3. (5)

5 a Discuss the basic principle of ESR spectra. (8)

b Explain zero field splitting and Kramer's degeneracy with an example. (7)

OR

c What is isomer shift? (3)

d Explain the quadrupole splitting with an example. (5)

e Discuss the applications of ESR spectra in structural determination of complexes $[Fe(CN)_5NO]^{3-}$ and $CuSiF_6.6H_2O$. (7)

Z-Z-Z END