

M.Sc. Semester - 4 (CBCS) Examination

May/June-2021 (OLD COURSE)

ADVANCE SPECTROSCOPIC TECHNIQUES(CORE)

Time: 1:30 Hours

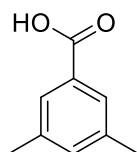
Marks: 42

Instructions:

1. Figures to the right indicate marks.
2. There are five questions in the question paper.
3. Answer any three of the following questions.

Q.1 (a) Answer the following question 4 Marks

- (1) Give the principle of UV-Viz spectroscopy. 2
- (2) Calculate the wavelength ($\lambda_{\max}$) for following compound. 2

**Q.1 (b) Answer any two questions out of three 10 Marks**

- (1) Describe types of electronic transitions in UV-visible range and discuss its energy order 5
- (2) Explain different types of absorption and intensity shift observed in UV spectroscopy 5
- (3) Give the principle of EPR spectroscopy and discuss any one application with example. 5

Q.2 (a) Answer the following questions 4 Marks

- (1) Calculate fundamental mode of vibrations for BeCl_2 and PCl_3 2
- (2) Give the Principle of Raman Spectroscopy. 2

Q.2 (b) Answer any two questions out of three 10 Marks

- (1) Discuss the factors affecting the IR spectra. 5
- (2) Explain bending vibrations in IR spectroscopy with suitable diagram. 5
- (3) Give account of Raman Spectroscopy and discuss the difference between Raman and Infrared spectroscopy. 5

Q.3 (a) Answer the following question 4 Marks

- (1) Define the following terms: (i) Base peak (ii) Molecular ion peak 4

Q.3 (b) Answer any two questions out of three 10 Marks

- (1) Explain various ionization techniques in Mass spectrometry. 5
- (2) Discuss instrumentation of Mass Spectroscopy with diagram. 5
- (3) Draw the mass fragmentation pattern for picric acid and n-pentane. 5

Q.4 (a) Answer the following question 4 Marks

- (1) Which nuclei will give ^{13}C NMR Spectrum? Give any two examples. 4

Q.4 (b)	Answer any two questions out of three	10 Marks
(1)	Explain various region of chemical shifts for ^{13}C NMR Spectrum.	5
(2)	What is ^{13}C Decoupled Spectra? Give various range of δ ppm for aromatic and aliphatic regions.	5
(3)	Distinguish between ^{13}C and ^1H NMR Spectroscopy.	5
Q.5 (a)	Answer the following questions	4 Marks
(1)	Give name and structure of TMS and explain why TMS is used as reference in NMR spectroscopy	4
Q.5 (b)	Answer any two questions out of three	10 Marks
(1)	Differentiate following pair of compounds using ^1H NMR Spectroscopy. (i) Ethanol & Diethyl ether (ii) 3-chloropenten & 2-chloropenten	5
(2)	Discuss Shielding and De-shielding effect in PMR spectroscopy.	5
(3)	Explain spin-spin coupling with example.	5
