

M.Sc.(Chem.) Semester - 4 (CBCS) Examination
April/May-2022 (OLD COURSE)
ADVANCE SPECTROSCOPIC TECHNIQUES(CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

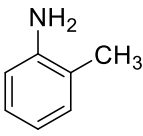
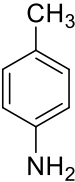
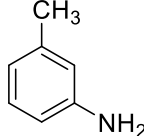
1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1. Answer any seven of following ten questions**(14)**

1. Write the units of UV-Visible and IR Spectroscopy.
2. State the basic difference between ^{13}C and ^1H NMR Spectroscopy.
3. Write Stevenson's Rule with example.
4. Calculate fundamental mode of vibrations for CO_2 and PCl_3 .
5. Write the frequency for following in IR: Alkenes, Nitriles, Ketones, Nitro compounds
6. Draw schematic diagram of photomultiplier tube.
7. Write principle of Raman Spectroscopy.
8. What is metastable ion peak?
9. Briefly explain the use of AR grade potassium bromide and sodium chloride in IR.
10. Which nuclei will give ^{13}C NMR Spectrum?

Q.2. Answer any two of the following three questions.**(14)**

1. Discuss ESR spectrum of $\text{K}_3\text{Fe}(\text{CN})_6$.
2. Give the principle, applications and limitations of ESR spectroscopy
3. Answer the following questions.
 - a) Draw all the possible fragmentations of ethylbenzene.
 - b) Match the correct pairs (bending vibration of aromatic) of following compounds:

 (1)	 (2)	 (3)
(A) 830 cm^{-1}	(B) $780 \text{ \& } 880\text{ cm}^{-1}$	(C) 750 cm^{-1}

Q.3. Answer the following questions**(14)**

1. Explain instrumentation of mass spectrometer.
2. Discuss the basic instrumentation of IR spectroscopy.

OR

Q.3. Answer the following questions

(14)

1. Discuss types of shifts in UV-Vis spectroscopy.
2. Discuss possible electronic transitions in UV-Vis spectroscopy.
3. Briefly explain following: (i) Chromophore (ii) Auxochrome

Q.4. Answer any two of the following three questions.

(14)

1. Explain Shielding and Deshielding effect in PMR spectroscopy.
2. Explain various region of chemical shifts for ^{13}C NMR Spectrum.
3. Give principle and short introduction of Raman Spectroscopy.

Q5. Answer any two of the following four questions.

(14)

1. How will you distinguish between o, m and p Cresol using PMR spectroscopy?
2. Write a note on sample preparation techniques for IR spectroscopy.
3. Name the various ionization techniques for mass, explain any one in detail.
4. Discuss with suitable example: β – cleavage of double bond and aryl double bond.
