Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 08

M.Sc. (Ph. Chem) (Sem.–1)

SPECTRAL TECHNIQUES

Subject Code : MSPC-105

M.Code : 20503

Date of Examination : 19-01-23

Time : 3 Hrs. **Max. marks : 80**

INSTRUCTIONS TO CANDIDATES :

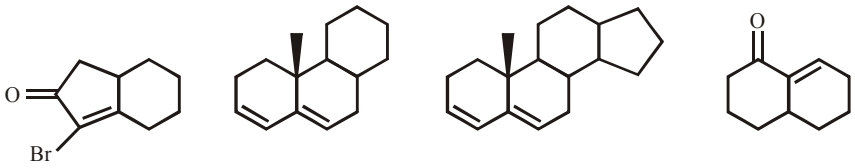
1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries SIXTEEN marks.**

1. a) What do you mean by transition of electronic states? Write about different type of electronic transition of UV-visible spectroscopy. Why σ to σ* transition is forbidden transitions. (8)

   b) Describe the construction and working of photomultiplier tube. (8)

2. Define fundamental vibration and Fermi resonance. Describe in detail about the double beam IR spectrophotometer. (16)

3. a) Calculate the λmax of the following using wood-ward rules. (8)



   b) Discus the major IR peaks to be observed in the spectrum of $CH_3(CH_2)_8CH_3$.

(8)

4. a) What are fragmentations in Mass spectrometry? Discuss the principle and instrumentation of mass spectrophotometer. Also write about basic fragmentation patter of MS. (12)

   b) Write a note on chemical shift and coupling constant. (4)

5. a) Discuss the principle, instrumentation and working of continuous wave NMR instruments. (10)

b) Write a note on NOE. (6)

6. Define Hyphenation. Write the principle and instrumentation of GC-MS. Discuss various type of fragmentation techniques to use in GC-MS instruments. (16)

7. a) Elaborate, how solvent can affect the UV spectrum of an compounds? (4)

b) Comment on various type of vibrations observed in IR spectrum. (8)

c) Write about the IR spectrum of anhydrides using suitable example. (4)

8. a) What is relaxation of nuclei. Elaborate, different relaxation processes observed in NMR and their importance in ^{13}C NMR. (8)

b) Describe various factors affecting chemical shift of a nuclei. (8)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.