

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**B.PHARM - SEMESTER- 8 EXAMINATION – SUMMER-2024**

**Subject Code:BP811TT****Date: 13/05/2024****Subject Name: Advanced Instrumentation Techniques****Time: 10.30 a.m. to 1.30 p.m.****Total Marks: 80****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

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|-------------|-----|--|-----------|
| <b>Q.1</b>  | (a) | Draw block diagram of mass spectrometer. What is the role of vacuum system in MS? Discuss time of flight as a mass analyzer in MS. | <b>06</b> |
|             | (b) | Discuss Ionisation Techniques of MS.   | <b>05</b> |
|             | (c) | Which are the various modes of fragmentation in MS? Explain McLafferty rearrangement.  | <b>05</b> |
| <b>Q.2</b>  | (a) | Give a schematic diagram of NMR spectrometer and explain the principle of NMR.   | <b>06</b> |
|             | (b) | Define splitting. Which are the causes of splitting? Explain rules for splitting of proton signals in PMR.                         | <b>05</b> |
|             | (c) | Explain principle of <sup>13</sup> C-NMR.  | <b>05</b> |
| <b>Q.3</b>  | (a) | Discuss the general principle and procedure involved in liquid-liquid extraction.  | <b>06</b> |
|             | (b) | What are the requirements of radioimmunoassay? Discuss the principle of RIA.   | <b>05</b> |
|             | (c) | What is coupling constant in NMR?  | <b>05</b> |
| <b>Q.4</b>  | (a) | What is the theoretical basis of DTA? Explain the difference between DTA and DSC.  | <b>06</b> |
|             | (b) | Discuss factor affecting thermogravimetric curve.  | <b>05</b> |
|             | (c) | Discuss Principle and Instrumentation of DSC.  | <b>05</b> |
| <b>Q.5</b>  | (a) | Discuss various validation parameters as per ICH guideline.  | <b>06</b> |
|             | (b) | How validation is different from calibration? Discuss calibration of UV-Visible spectrophotometer.                                 | <b>05</b> |
|             | (c) | What is Validation? Explain types of validation.   | <b>05</b> |
| <b>Q. 6</b> | (a) | What are hyphenated techniques? Which are different interface used in LCMS?  | <b>06</b> |
|             | (b) | Discuss factors influencing chemical shift. Give reasons for taking TMS as a reference compound.                                   | <b>05</b> |
|             | (c) | Discuss types of ions produced in MS.  | <b>05</b> |
| <b>Q.7</b>  | (a) | Discuss applications of X-ray diffraction.   | <b>06</b> |
|             | (b) | What is Bragg's Law? Derive Bragg's equation.  | <b>05</b> |
|             | (c) | Discuss various components of RIA.   | <b>05</b> |

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