

GUJARAT TECHNOLOGICAL UNIVERSITY
B. Pharm. - SEMESTER-VIII • EXAMINATION – SUMMER - 2022

Subject Code: BP811TT**Date: 06/06/2022****Subject Name: Advanced Instrumentation Techniques****Time: 10:30am to 01:30pm****Total Marks: 80****Instructions:**

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

- Q.1** (a) Draw schematic diagram of modern thermobalance. Discuss factor affecting thermogravimetric curve. **06**
 (b) What are the requirements of radioimmunoassay? Discuss the principle of RIA. **05**
 (c) Describe the difference between gaseous field ionization sources and field desorption sources. What are the advantages of each? **05**
- Q.2** (a) Draw a typical DSC thermogram. Explain various stages of DSC thermogram. **06**
 (b) Discuss various validation parameters as per ICH guideline. **05**
 (c) Enumerate types of ions produced in MS. Write in detail about molecular ion and isotope ion. **05**
- Q.3** (a) Define splitting. Which are the causes of splitting? Explain rules for splitting of proton signals in PMR. **06**
 (b) What is the theoretical basis of DTA? Explain the difference between DTA and DSC. **05**
 (c) Draw block diagram of mass spectrometer. What is the role of vacuum system in MS? Discuss triple-quadrupole as a mass analyzer in MS. **05**
- Q.4** (a) Give a schematic diagram of NMR spectrometer and explain the principle of NMR. **06**
 (b) Elaborate the general rules for interpretation of mass spectra. **05**
 (c) Define hyphenated techniques. Write in detail about LC-MS/MS or HPTLC-MS. **05**
- Q.5** (a) Discuss the general principle and procedure involved in liquid-liquid extraction. **06**
 (b) What is HDI? Write formula for calculating HDI. How are HDI and nitrogen rule helpful in interpretation of mass spectrum? **05**
 (c) Draw a block diagram of GC-MS. Write in detail about interfaces used in GC-MS. **05**
- Q.6** (a) Elaborately explain applications of mass and NMR spectrometry in characterization of compound. **06**
 (b) What are the differences between power compensation and heat-flux DSC? Enlist the limitations of TGA. **05**
 (c) How validation is different from calibration? Discuss calibration of UV-Visible spectrophotometer. **05**
- Q.7** (a) Which are the various modes of fragmentation in MS? Explain McLafferty rearrangement and scrambling. **06**
 (b) Discuss factors influencing chemical shift. Give reasons for taking TMS as a reference compound. **05**
 (c) How single crystal diffraction differs from powder diffraction? Write the applications of X-ray diffraction technique. **05**
