

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**M.PHARM - SEMESTER-2 EXAMINATION – SUMMER-2019**

**Subject Code: MPA201T****Date: 27/05/2019****Subject Name: Advanced Instrumental Analysis****Time: 10:30 AM TO 01:30 PM****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) Explain the terms of Van-de meter equation. Describe Eddy and Longitudinal diffusion in detail.  | <b>06</b> |
|             | (b) Describe the difference between Gradient and Preparative HPLC methods with proper examples.  | <b>05</b> |
|             | (c) Describe principle of affinity chromatography. Discuss ligands used in affinity chromatography with its characteristics.   | <b>05</b> |
| <b>Q.2</b>  | (a) Define Chemical Shift. Describe Factors affecting to the Chemical Shift.   | <b>06</b> |
|             | (b) Why C13 NMR spectra are more difficult to record than PMR?   | <b>05</b> |
|             | (c) Explain principle and working of Quadrupole Mass analyzer.   | <b>05</b> |
| <b>Q.3</b>  | (a) Explain the following statements<br>(i) MALDI is used to determine the molecular weight of proteins.<br>(ii) TMS is used as reference compound in NMR.<br>(iii) Reverse phase chromatography is more commonly used in analysis of drugs and pharmaceuticals. | <b>06</b> |
|             | (b) What detectors are used in Gas chromatography? Explain working of any one detector.  | <b>05</b> |
|             | (c) What is Ion exchange chromatography? Discuss the factors affecting to the separation in Ion exchange chromatography.   | <b>05</b> |
| <b>Q.4</b>  | (a) Discuss in detail HPTLC.   | <b>06</b> |
|             | (b) Explain in detail Mc-lafferty rearrangement.   | <b>05</b> |
|             | (c) Write short notes on (Any One)<br>i. MS/MS System                      ii. LC-MS   | <b>05</b> |
| <b>Q.5</b>  | (a) Enlist the Ionization techniques used in Mass Spectroscopy. Discuss APCI and ESI technique.  | <b>06</b> |
|             | (b) Write short note on any one<br>i. Q-TOF                      ii. NOESY   | <b>05</b> |
|             | (c) Give the fragmentation pattern of the following compounds<br>(i) Benzyl alcohol (ii) Acetophenone  | <b>05</b> |
| <b>Q. 6</b> | (a) Give principle of NMR spectroscopy. How NMR spectroscopy helps in the structure elucidation of compounds.  | <b>06</b> |
|             | (b) Explain the principle of Size Exclusion Chromatography. Describe the stationary phases used in SEC.  | <b>05</b> |
|             | (c) Define the following terms : (Any Two)<br>(i) Time of Flight (ii) Spin-spin coupling<br>(iii) Shielding effect   | <b>05</b> |
| <b>Q.7</b>  | (a) Enlist the factors affecting the efficiency of chromatographic separation. Discuss longitudinal diffusion.   | <b>06</b> |
|             | (b) Give chemical shift values and spin-spin splitting for the following compounds:<br>i. Ethanol    ii. Benzyl acetate    iii. Ethyl methyl ether   | <b>05</b> |
|             | (c) Write a short note on Partition Chromatography.  | <b>05</b> |