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**1505E556**  
**M.Phil Science Examination**  
**Paper-II : Chemistry**  
**May-2017**

Candidate's Seat No : \_\_\_\_\_

**Time : 3 Hours]**

**[Max. Marks : 70**

**Q1. Answer the following: 14 marks**

(a) Discuss in detail various applications of mass spectrometry.

OR

(a) Explain the basic principle and working mechanism of differential thermal analysis.

(b) Describe the working mechanism of any two soft ionization techniques in mass spectrometry.

OR

(b) Discuss the principle and applications of thermo-gravimetric analysis.

**Q2. Answer the following: 14 marks**

(a) Compare and discuss important features of scanning electron microscopy and atomic force microscopy.

OR

(a) State the basic principle and applications of NMR spectroscopy.

(b) Discuss the principle and advantages of transmission electron microscopy.

OR

(b) Explain in detail: chemical shift, shielding and deshielding effect in NMR spectroscopy.

**Q3. Answer the following: 14 marks**

(a) Discuss the basic principle of polarography and its instrumentation.

OR

(a) Describe the various components of an infrared spectrometer.

(b) How the sensitivity increases from Normal Pulse Polarography to Differential Pulse Polarography?—Explain in detail.

OR

(b) Explain the basic principle and applications of Infrared spectroscopy.

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**Q4.** Answer the following:

**14 marks**

(a) Discuss and compare Raman spectroscopy with Infrared spectroscopy, and give various applications of Raman spectroscopy.

OR

(a) Signify the difference between a single-beam and double beam UV-Visible spectrophotometer with their neat diagrams?

(b) Explain the basic principle and working mechanism of Raman spectroscopy.

OR

(b) Write a brief note on fluorescence spectroscopy along with "Jablonski diagram".

**Q5.** Answer the following:

**14 marks**

(a) Discuss the basic principle and applications of LC-MS.

OR

(a) Explain in detail working mechanism of X-ray diffraction.

(b) Describe the principle of GC-MS and give its applications.

OR

(b) Explain Bragg's law, and give important applications of X-ray diffraction in solid state analysis.