

(4 Lect./Week)  
(4 hrs. Lab/Week)  
(1 Student's presentation /Week)

(Total Credits -7)

## **Paper 7: Polymer Characterization**

1. Basic principles of spectroscopy, molecular and atomic spectra, Lambert-Bear law, Frank-condon principal, electromagnetic radiation, properties of electromagnetic radiation, interaction of radiation with matter: A classical picture, uncertainty and the question of time scale.
2. Applications of spectroscopy: IR, UV, ESR, Raman, NMR and mass spectroscopy of polymers.
3. Chromatography: Thin layer chromatography, high performance liquid chromatography, gel permeation chromatography (GPC), gas chromatography
4. Applications of optical microscope, SEM, TEM and XRD in polymers.

### **Practical - Polymer V:**

1. Verify the Lambert-Beers law.
2. Estimate the qualitative and quantitative presence of polymeric samples.
3. Analyze the thermal behavior of polymers.
4. Determination of Percentage crystallinity of polymeric sample by XRD.
5. Identification of polymer components by Chromatography.
6. FTIR and Raman analysis of polymers.

### **Suggested Readings:**

1. Instrumental method of analysis, by H. H. Willard, Wadsworth Publishing Co. Inc. (1988).
2. Principle of Instrumental Analysis, by D. A. Skoog, F. J. Holler, S. R. Crouch, Harcourt College (1997).
3. Handbook of Plastic Testing & Technology by V. Shah, Wiley-Interscience (2007).
4. Experimental Methods in Polymer Sciences by T. Tanaka, Academic Press (1999).
5. Spectrometric identification of organic compounds. Silverstein, Robert M John Wiley (2005).
6. A complete introduction to NMR spectroscopy by R. S. Macomber, Wiley-Interscience (2008).