SARDAR PATEL UNIVERSITY
Programme: MSC (Applied Science)
Semester: II
Syllabus with effect from: December 2013

Paper Code: PT02CASC03	**Total Credits: 4**
Title Of Paper: Characterization Techniques	

Unit	Description in detail	Weightage (%)
1	X-ray spectrum, instrumentation of X-ray spectrometry, X-ray diffractometers, X-ray absorption meter,, X-ray fluorescence spectrometry, Electron probe microanalyzer, Qualitative analysis : basic principles, powder diffraction file, Hanawalt method, Fink method, procedure, Examples of analysis : single phase, mixture of phases, computer searching, practical difficulties, Quantitative analysis : single phase, multiphase, external standard method.	**25 %**
2	Optical microscopy, Transmission electron microscopy, Field ion microscopy, Scanning Electron Microscopy, Scanning tunneling microscopy, atomic force microscopy: principles and their applications, Specimen preparation techniques for microscopy, X-ray photoelectron spectroscopy, Auger electron spectroscopy, and Secondary ion mass spectrometry: principle and applications.	**25 %**
3	Thermogravimetric analysis, differential thermal analysis, differential scanning calorimetry, thermomechanical analysis and dilatometry: Principles, instrumentation and applications, Electrophoresis techniques: paper electrophoresis- methods of zone localization, quantitative considerations, evaluation of the curves, electrophoresis apparatus, capillary electrophoresis. Types of NMR spectrometers, constructional details of NMR Spectrometer, Detailed description of ESR Spectrometer.	**25 %**
4	Spectrophotometers: single beam, double beam, microprocessor based Spectrophotometer, Perkin Elmer LAMDA 9 Double beam Spectrophotometer, high performance spectrophotometers, dual wavelength spectrophotometer basic components of infrared spectrophotometers, Fourier transform infrared spectroscopty (FTIR), Attenuated total reflectance (ATR) technique, Fluorescence Spectroscopy: Microprocessor based Spectrofluorometer, Raman Spectrometer, PC-based Raman spectrometer.	**25 %**

Basic Text & Reference Books:

- Elements of X-ray diffraction, B. D. Cullity, Addison-Wesley Publishing Company Inc
- A Guide to Materials Characterization and Chemical Analysis, John. P. Sibilia, Wiley Blackwell Publishers
- Introduction to Nanotechnology, Charles P. Poole Jr. and Frank J. Owens.
- Characterization of Materials, Vol. 2, Elton N. Kaufmann. A Wiley-Interscience Publication
- Modern Physical Techniques in Materials Technology, T. Mulvey and R. K. Webster, Oxford University Press