SARDAR PATEL UNIVERSITY
Programme: MSC (Integrated Biotechnology)
Semester: V
Syllabus with effect from: June 2012

Paper Code: PS05CIGB05	**Total Credits: 3**
Title Of Paper: Bioinstrumentation	

Unit	Description in detail	Weightage (%)
1	**pH Meter and Centrifuge:** pH meter: Principle and Operation of pH meter, Calomel Electrode, Glass Electrode, Combined Electrode, Methods of determining pH, colorimetric determination of pH, Potentiometric and Conductometric titration, Factors affecting pH measurement and its Applications. Centrifuge: Introduction, Principles of Sedimentation, Types of centrifuge, Types of Rotors, Types of centrifugation (Analytical and Preparative), Safety Aspects in the use of Centrifuges and its Applications.	
2	**Microscope:** Light Microscope: Types of optical light microscopes, Optical system and the optic principle of the Light Microscope, Working of an Optical Light Microscope, Bright Field Microscopy, Phase Contrast Microscopy, Fluorescence Microscope. Electron Microscope: Components of Electron Microscope, Image formation in Electron Microscope, Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM), Flow cytometer	
3	**Chromatography:** Introduction, classification of separation methods, Principles, methodology and applications of chromatography: Paper, Thin layer, High Performance thin layer, Column (gel filtration, ion exchange and affinity), HPLC, FPLC & GC	
4	**Electrophoresis:** Introduction, Gel matrices – Polyacrylamide & Agarose, applications of electrophoresis for Proteins: PAGE – Native & SDS, Gradient gel, Two dimensional electrophoresis – IEF and Nucleic acids (DNA & RNA): Pulse-field gel electrophoresis, Electrophoresis of DNA & RNA.	
	Practical:	
	• Microscopy: demonstration of bright field, fluorescence and phase contrast microscopy • Demonstration of TEM & SEM • Density gradient separation of yeast cells by centrifugation • Preparation of different buffers and calibration of pH meter • pI value of amino acid • Paper Chromatography for separation of chlorophyll pigments • TLC for separation of amino acids • Demonstration of HPTLC • Demonstration of :GC and HPLC • SDS PAGE • Native PAGE	

Basic Text & Reference Books:

- Instrumental Analysis: Douglas A Skoog, F. James Holler and Timothy A. Nieman, Saurabh Printers Pvt. Ltd., 3rd eds. 2009. (ISBN – 13:978-81-315-05427)
- Biophysical Chemistry (Principles and Techniques) Upadhaya, Upadhaya & Nath, Himalaya Publishing House Pvt. Ltd. 4th eds. 2008.
- Quantitative analysis of pharmaceuticals formulations: Sethi PD (1996), CBS Publishers and Distributors. (ISBN 81-239-0439-8)
- Instrumental Methods of Anlaysis: Willard, Merritt, Dean and Settle, CBS Publishers & Distributors. (ISBN 81-239-0943-8).
- Instrumental methods of chemical analysis: Chatwal and Anand, Himalaya Publishing House Pvt. Ltd. 5th eds. (ISBN 978-81-8318-802-9)
- Physical Biochemistry Principles and techniques of practical biochemistry and Molecular Biology: Wilson & Walker, Cambridge University Press, Cambridge, 6th eds. 2005. (ISBN 0-521-69180-X).
- Bioanalytical Techniques: Halme and Peck
- Microscopy and Micro-technique: R. Marimuthu