GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI

Bio – Medical Engineering

Subject Name: **Analytical & Optical Instrumentation**
Subject Code: **160302**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (I)**
4	0	2	6	70	30	50

Section: A: - Analytical & Optical Diagnostic Techniques

Sr. No	Course Content	Total Hrs.
1.	Principle involved in Biochemical, Pathological & microbiological laboratory techniques in clinical diagnosis.	6
2.	Instrumentation techniques:- a. Use of general instruments like Incubators, autoclaves, centrifuges, hot air oven, Balances, Auto pipettes. b. Microtome, Processing like automatic tissue processing ("Histokinette") c. Laboratory counters; anaerobic apparatus, Laminar flow tables, Culture Techniques, Blood banking procedure & Instruments.	6
3.	Analytical techniques like Spectrophotometry, Colorimetry, Auto analysis, Semi auto analysis, gas & electrolyte analysis, flame photometry, chromatography, Chromatography, Electrophoresis, Glucometry, Measurement of pH, RIA units. PCR units, ELISA reader, Dispenser & washer, Pulse-oxymetry, Capnography, Arterial blood analysis etc and their significance in different diagnosis and prognosis of various clinical disorders.	6
4.	Microscopy - simple, compound, binocular, trinocular, dark ground microscopy Phase contrast microscopy, electron microscopy, CCTV, microphotography & projection etc & their importance in clinical diagnosis. Special microscopy like endoscopy. use of fiber optics.	6

SECTION: - B Analytical & Optical Diagnostic Equipments

Study of principle of operation, Block-diagram; Circuit diagram, Control panel, specification, Design aspects & Applications of the following Equipments:

Sr. No	Course Content	Total Hrs.
1.	Incubators, autoclaves, centrifuges, hot air oven, Balances, Auto pipettes, microtome, Processing like automatic tissue processing ("Histokinette"), Laboratory counters; Anaerobic apparatus, Laminar flow tables, Spectrophotometer, Colorimeter, Auto analyzer, Semi auto analyzer, flame photometer, Glucometer, pH meter, RIA units. PCR units, ELISA reader, Dispenser & washer, Pulse-oxymeter, Arterial blood analyzer.	12
2.	Endoscopes.	3
3.	Microscopes of various types including electron microscope.	3
4.	Chromatograph.	3
5.	Electrophoresis apparatus.	2
6.	Blood Gas Analyzers:	3
7.	Blood PCO2 Measurement; Measurement of blood PCO2; Complete Blood Gas Analyzer.	3
8.	Blood cell counter : Method of cell counting, coulter counter, automatic recognition and differential counting of cells.	3

The Practical and Term work will be based on the topics covered in the syllabus.

Text Books:

1. Bio-medical Instruments & Measurement - Cromwell.
2. Bio-medical Instrumentation- R S. Khandpur
3. Medical laboratory technology (Methods & Interpretation) - Ramnik sood, 5th Edition .jaypee

Reference Books:

1. Wildman's: Clinical interpretation of laboratory tests- By Sacher, 10th edition. Jaypee
2. The text book of Blood bank and transfusion medicine.-By Satish Gupta. 1st edition, Jaypee
3. Principle clinical Biochemistry –By Chavda R,
4. Clinical diagnosis and management by laboratory methods- By Henry, 19thEdition, Anuja book Company
5. Medicine and clinical engineering –By Bertil Jacobson & john Webster.