

4192 - MEDICAL INSTRUMENTS - I									
Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)				
Lectures	Practical	Credits			Theory		Practical Ex.	Total	
3	3	6	25	25	3 Hrs	100	50	200	
Pre-requisite		Source	Semester						
Nil		MEX		Theory	Test	Total	TW	PR	Gr Total
				75	25	100	25	50	175

Rationale: The course describes the principles, applications and design of medical instruments most commonly used in the pathology department of any hospital. Because equipments change with time, we lay stress on fundamentals principles of operation and general types of equipments avoiding detailed circuit diagrams and analysis of special models and because medical electronics is an inter disciplinary field, it requires good communication with health care personnel. The course is provided with main applications for each type of instrument.

COURSE CONTENTS		Hrs	Mks
1. INSTRUMENTATION FOR THE CLINICAL LABORATORY		24	50
Blood:- Tests on blood cells, haematocrit determination, blood cell counter (Coulter counter, Dark field microscope), and block diagram of blood cell counter.			
Chemical Tests: Serum, Lambert Beers Law, Basic principles of colorimeter and spectrophotometer, power sources, wavelength selectors, applications of visible light spectrophotometer and colorimeter.			
Automation of chemical tests: Operation of clinical laboratory, flow of information to and from the clinical laboratory, computers in clinical laboratory, basic knowledge used in Autoanalysis, general block diagram of a continuous flow analyser.		12	25
2. STERILISATION			
Agents of sterilisation, hot air oven, steamer, autoclave radiation, ultrasonic vibration, alcohols, gases and testing of disinfection		12	25
3. ELECTRODES			
Basic electrode theory, Nemst equation, brief overview of biopotential electrodes, biochemical transducers, pH meter, blood gas electrodes, general block diagram of Pco ₂ and Pco ₂ electrode, diagram showing construction of flow through liquid membrane specific ion electrode.		48	100
Total			

PRACTICALS The following tests will be performed by the students

1. Blood cell counting by Coulter counter.
2. Determination of pH of a solution by a pH electrode after calibration.
3. Study of physical layout and circuit tracing of a colorimeter.
4. Study of a physical layout and circuit tracing of a spectrophotometer.
5. Estimation of blood glucose using a colorimeter.
6. Estimation of blood calcium using a spectrophotometer.
7. Estimation of blood glucose using cholesterol, urea, etc using a Autoanalyser.
8. Demonstration of the use of : a) Autoclave, b) Steriliser c) Ultrasonic cleaner.
9. Study of the physical layout and circuit tracing of an ultrasonic cleaner.

PROJECT: The students will construct on the bread-board and produce satisfactory results of any medical electronic equipments, based on the circuit diagram given by the teacher.

REFERENCE BOOKS:

1. Handbook of Medical Instruments by Khandpur
2. Medical Instrumentation by John Webster