

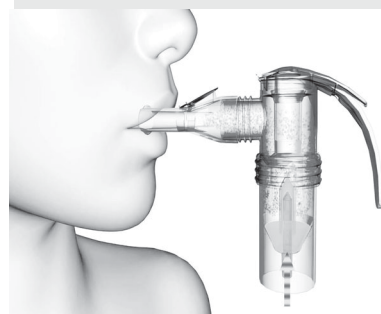
# 16BM401 DIAGNOSTIC AND THERAPEUTIC EQUIPMENTS-II

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	20	48	6	12	3	2



## Course Description and Objectives:

This course offers the concepts of human-instrument system and problems encountered in obtaining measurements from a living body. The objective the course is to understand the basics of measuring the parameters in respiratory system, learn measurement techniques of sensory responses and understand different types and uses of diathermy units.

## Course Outcomes:

The student will be able to:

- understand the importance of patient safety against electrical hazard.
- explain about measurements of parameters related to respiratory system.
- describe the measurement techniques of sensory responses.
- analyze different types and uses of diathermy units.
- discuss ultrasound imaging techniques and its usefulness in diagnosis.
- outline the importance of patient safety against electrical hazard.

## SKILLS :

- ✓ Differentiate various instruments in hospitals.
- ✓ Determine diagnostic techniques used in health care.
- ✓ Identify the principles in transmission of bio signals in telemetry.
- ✓ Identify procedures for safely carrying out therapeutic process.

**ACTIVITIES:**

- Analyze principles behind holter monitoring, defibrillators and other monitoring systems.
- To develop new therapeutic equipment in hospital management.
- Identify sources of leakage current and method of monitoring it.
- Analyse the criticality of an instrument and trouble shoot it economically.

**UNIT - 1****L-10**

**RESPIRATORY MEASUREMENT SYSTEM:** Instrumentation for measuring the mechanics of breathing, Spiro meter - Lung Volume and vital capacity, Measurements of residual volume, pneumotachometer, Airway resistance measurement, Whole body plethysmography, Intra-Alveolar and Thoracic pressure measurements, Apnea Monitor; Types of Ventilators – Pressure, Volume, Time controlled; Flow, Patient Cycle Ventilators, Humidifiers, Nebulizers, Inhalators.

**UNIT - 2****L-9**

**SENSORY MEASUREMENT:** Psycho Physiological Measurements for testing and sensory Responses, Electro oculograph, Electro retinograph, Audiometer-Pure tone, Speech; EGG (Electrogastrograph), galvanic skin resistance (GSR).

**UNIT - 3****L-9**

**DIATHERMY:** IR and UV lamp and its application, Short wave diathermy, Ultrasonic diathermy, Microwave diathermy, Electro surgery machine - Current waveforms, Tissue Responses, Electro surgical current level, Hazards and safety procedures.

**UNIT - 4****L-9**

**ULTRASONIC TECHNIQUE:** Diagnosis, Tissue Reaction, Basic principles of Echo technique, Display techniques A, B and M mode, B Scan, Application of ultrasound as diagnostic tool, Echocardiogram, Echoencephalogram, Abdomen, Obstetrics and Gynecology, Ophthalmology.

**UNIT - 5****L-9**

**PATIENT SAFETY:** Physiological effects of electricity, important susceptibility parameters, Macro shock, Micro shock hazards, Patient's electrical environment, Isolated Power system, Conductive surfaces, Electrical safety codes and standards, Basic Approaches to Protection against shock, Protection equipment design, Electrical safety analyzer, Testing the Electric system.

**LABORATORY EXPERIMENTS****Course outcomes:**

- analyze the Bio medical signals.
- check the safety of any medical equipments and to have the knowledge about therapeutic equipments.

**Students will be able to**

- practice on recording and analysis of different Bio potentials.
- know the function of different Therapeutic equipments.

**LIST OF EXPERIMENTS:**

Total hours-30

1. Simulation of ECG – detection of QRS complex and heart rate.
2. Analyze shortwave and ultrasonic diathermy.
3. Examine biotelemetry.
4. Electrical safety measurements.
5. Measurement of Respiratory parameters using spirometry.
6. Examine medical stimulator.
7. Inspection ESU – cutting and coagulation modes.
8. Record Audiogram.
9. Design of ECG amplifier, recording and analysis using LabView

### **LAB REQUIREMENTS FOR 30 STUDENTS**

Multioutput power supply (+15v, -15v, +30V variable, +5V , 2A) 2 Nos.

Short wave Diathermy 1 No.

Ultrasound diathermy 1 No.

Single parameter biotelemetry system 1 No.

Electrical Safety Analyser 1 No.

Spirometry with associated analysis system 1 No.

ECG Simulator 1 No.

Medical stimulator 1 No

Surgical diathermy with analyzer 1 No

Audiometer 1No

Lab View.

### **TEXT BOOK:**

1. Khandpur R.S, "Handbook of Biomedical Instrumentation", 2<sup>nd</sup> edition, Tata McGraw Hill, New Delhi, 2003.

### **REFERENCE BOOKS:**

1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", 2<sup>nd</sup> edition, Prentice Hall of India, New Delhi, 2007
2. John G. Webster, "Medical Instrumentation Application and Design", 4<sup>th</sup> edition, John Willey and Sons, 2009.
3. Joseph J. Carr and John M. Brown, "Introduction to Biomedical Equipment Technology", 4<sup>th</sup> edition, Pearson Education, 2004.
4. Richard Aston "Principles of Biomedical Instrumentation and Measurement", Merril Publishing Company, 1990.
5. L.A Geddas and L.E.Baker, "Principles of Applied Biomedical Instrumentation" 2004.
7. Myer Kutz "Standard Handbook of Biomedical Engineering & Design", McGraw-Hill Publisher, 2003.