

## **OIC551 BIOMEDICAL INSTRUMENTATION**

### DETAILED SYLLABUS

#### **OBJECTIVES:**

- To Introduce Fundamentals of Biomedical Engineering
- To study the communication mechanics in a biomedical system with few examples
- To study measurement of certain important electrical and non-electrical parameters
- To understand the basic principles in imaging techniques
- To have a basic knowledge in life assisting and therapeutic devices

#### **UNIT I HUMAN BODY SUBSYSTEM AND TRANSDUCERS**

Brief description of muscular, cardiovascular and respiratory systems; their electrical, mechanical and chemical activities. Principles and classification of transducers for Bio-medical applications. Electrode theory, different types of electrodes; Selection criteria for transducers and electrodes.

#### **UNIT II NON ELECTRICAL PARAMETERS MEASUREMENT**

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound - Pulmonary function measurements – spirometer – Blood Gas analysers, pH of blood – Measurement of blood pCO<sub>2</sub>, pO<sub>2</sub>.

#### **UNIT III ELECTRICAL PARAMETERS MEASUREMENT AND ELECTRICAL SAFETY**

ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current - Instruments for checking safety parameters of biomedical equipments.

#### **UNIT IV IMAGING MODALITIES AND BIO-TELEMETRY**

Diagnostic X-rays - Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography – Different types of biotelemetry systems.

#### **UNIT V LIFE ASSISTING AND THERAPEUTIC DEVICES**

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators - Heart Lung machine – Dialysers - Diathermy – Lithotripsy.

#### **OUTCOMES:**

- Ability to understand communication mechanics in a biomedical system.
- Ability to understand and analyze measurement of certain electrical and non-electrical parameters.
- Ability to understand basic principles of imaging techniques, life assisting and therapeutic devices.

SSLC, HSE, DIPLOMA, B.E/B.TECH, M.E/M.TECH, MBA, MCA

*Notes*

*Syllabus*

*Question Papers*

*Results and Many more...*

*Available @*

[www.Binils.com](http://www.Binils.com)

**TEXT BOOKS:**

1. Leslie Cromwell, Biomedical Instrumentation and Measurement, Prentice hall of India, New Delhi, 2007.
2. Joseph J.carr and John M. Brown, Introduction to Biomedical Equipment Technology, John Wiley and sons, New York, 4th Edition, 2012.
3. Khandpur R.S, Handbook of Biomedical Instrumentation, , Tata McGraw-Hill, New Delhi, 2<sup>nd</sup> Edition, 2003.

**REFERENCES:**

1. John G. Webster, Medical Instrumentation Application and Design, John Wiley and sons, New York, 1998.
2. Duane Knudson, Fundamentals of Biomechanics, Springer, 2nd Edition, 2007.
3. Suh, Sang, Gurupur, Varadraj P., Tanik, Murat M., Health Care Systems, Technology and Techniques, Springer, 1st Edition, 2011.
4. Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, Third Edition, Boca Raton, CRC Press LLC, 2006.
5. M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.