

Advances in Biomedical Instrumentation

(Elective – I)

B.E. Sem. VII [ETRX]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	25
Term Work	–	25

Objective : To understand importance of pathological and diagnostic equipments in Medical Electronics. The material and working of prosthetic and intensive care unit. Different imaging techniques in detail and Drug Delivery and Hospital Information System.

Pre-requisite : Knowledge of generation of electrical signal after studying anatomy and physiology of human body and different systems. Basic working and design of biomedical instruments.

SYLLABUS

1. Basic principle of Photometry

Beer Lambertz's Law, Photoelectric Colorimeter, Spectrophotometer, Flame photometer, Autoanalyzer.

2. Blood Gas Analyzers

Blood PO₂, PCO₂ and PH measurement; Complete Blood Gas Analyzer; Blood cell Counter : Methods of Cell counting-Coulter Counters; Automatic recognition and Differential counting of cells.

3. Foetal Monitoring Instruments

Cardiotocograph, Foetal heart rate measurements, Foetal scalp pH monitoring.

4. Orthotic and Prosthetic Engg.

Definition, Need and Classification; Normal Human Locomotion – Gait Cycle; Biomaterials : Definition, Need and Classification; Biological Testing and Biocompatibility; Upper and Lower limb Prosthetic devices; Upper and Lower limb Orthotic devices; Study of various biomaterials and applications : Metallic Implants, Composites, Ceramics, Polymers. Heart Lung Bypass machine and artificial heart valves.

5. Fundamentals of medical imaging

X-ray computed Tomography, Spiral or Helical C T: Slip Ring Technology, C T Angiography. Clinical use & Biological effects and safety, Magnetic resonance imaging Biological effects and safety. Nuclear medical imaging Biological effects and safety., Infrared imaging, Liquid crystal thermography. Microwave thermography. Endoscopy, gastroscope, bronchoscope, cystoscope, colonoscope, Enteroscope Lithotripsy.

6. Advances in Biomedical Systems

Introduction to Nanotechnology and its use in Drug Delivery System, Hospital Information system: Role of database in HIS. Need of Networking in HIS. Overview of Networking, topologies and its configuration. Structuring medical record to carry out functions like admissions, discharges, treatment history etc. Computerization in pharmacy & billing. Automated clinical laboratory systems & radiology information system.

References :

1. Handbook of Biomedical Instrumentation (*Khandpur R. S.*) Tata McGraw Hill, second edition, 2003
2. Introduction to biomedical equipment technology (*Carr and Brown*) fourth edition, Pearson press, 2003
3. Biomaterials (*Sujata V. Bhat*) Narosa Publishing House, 2002.
4. Medical Imaging Physics (3rd eds), (*W.R.Hendee & E.R.Ritenour*) Mosbey Year-Book, Inc., 1992.
5. Bioinstrumentation (*John G. Webster*) John Wiley and Sons, 2004
6. Handbook of Biomedical Engineering (*Joseph Bronzino*, (Editor-in-Chief)) CRC Press, 1995.
7. Biomedical nanotechnology (*Neelina Malsch*) by CRC press release, Malsch TechnoValuation, Utrecht, The Netherlands.
8. Principles of Applied Bio-Medical Instrumentation (*L.A.Geddes and L.E.Baker*) John Wiley & Sons 1975.
9. Handbook of Analytical Instrumentation (*Khandpur R S.*) Tata Mc Graw Hill
10. Hospital Management Engineering – A guide to the improvement of hospital management system (*Harold E. Smalley*) PHI. C. A. Caceras ,”Clinical Engineering”

