

# SYLLABUS FOR THE POST OF SENIOR INSTRUCTOR



## BIOMEDICAL ENGINEERING SYLLABUS

1.0 Biomedical Engineering applications, Computer applications in Biomedical Engineering.

2.0 X-rays, Photography and film image, Fluoroscopy and angiography, Infrared Imaging, Special imaging techniques, Radioactivity, Radiation effects, Nuclear medicine system. Electrical and patient safety, safety standards in working environment.

Semiconductor Materials, Intrinsic and extrinsic semiconductors, P-N junction diode, Bipolar Junction Transistor (BJT), Field Effect Transistor (FET), Operational Amplifier (OPAMP).

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator. Filters: low pass, high pass, band pass and band stop filters with medical applications.

### 3.0 ELECTRONIC DEVICES:

Metal - Oxide - Semiconductor (MOS). Biosensors and bio-amplifiers, Virtual Instrumentation.

### 4.0 BIOMATERIALS:

\* Metallic implant materials, stress-corrosion cracking, creep-recovery, stress-relaxation, strain rate sensitivity. Ceramic and Composite implant materials. Bioresorbable and bioactive ceramics. wear resistance and low fracture toughness. Composite theory of fiber reinforcement. Biocompatibility and toxicological screening of biomaterials as well as Testing of biomaterials/Implants.

### 5.0 HUMAN ANATOMY AND PHYSIOLOGY:

Cardiovascular, Respiratory and Nervous Systems, Alimentary and Excretory Systems, Endocrine and Reproductive Systems.

### 6.0 MEDICAL MICROBIOLOGY AND BIOCHEMISTRY:

Microbiology, Infection due to microbes, Sterilization process. Biochemistry and Medicine, Proteins, Enzymes, Diagnostic enzymes, Urine chemistry. Metabolism: Catabolic and anabolic pathways, Applications of isotopes in life sciences and medicine

### 7.0 BIOMEDICAL INSTRUMENTATION:

Bioelectric Amplifiers, Biomedical Transducers and Bio electrodes, Patient Monitoring System, Analytical and Diagnostic Instruments.

### 8.0 TISSUE ENGINEERING AND ARTIFICIAL ORGANS:

Soft and hard tissue, wound healing, Cell migration, Cell culture, Cell storage and cell characterization, Cell signalling molecules, Growth factor delivery in tissue engineering. Engineering biomaterials for Artificial Organ, Degradable materials, Mechanical strength, 3-D architecture, Printing and cell incorporation. Engineering tissues for replacing





bone, Cartilage, Tendons, Ligaments, Skin and liver. Basic transplant, Immunology, Stems cells.

#### 9.0 BIOMEDICAL SIGNALS AND SYSTEMS:

Signals and systems, Signal Representation, Network Analysis, Discrete – Time Signals and Systems.

#### 10.0 BIO-TRANSPORT PROCESS:

Blood and gaseous transport, Structure and operation of kidney.

#### 11.0 BIOMECHANICS:

Tissue Biomechanics, Movement Biomechanics, Rehabilitation Engineering.

X-ray and Computed Tomography, Ultrasonic and Magnetic Resonance Imaging, Digital Image Processing, Image Transforms, Nano engineered Biosensors, Nanoparticles for Drug Delivery, Fuzzy system and Algorithms, MEMS and Microsystems, Optic Fiber and its Properties.

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