

With effect from the academic year 2012-2013

**SCHEME OF INSTRUCTION & EXAMINATION  
B.E. III/IV  
(BIOMEDICAL ENGINEERING)**

**SEMESTER II**

S. NO	Syllabus Ref. No	SUBJECT	SCHEME OF INSTRUCTION		SCHEME OF EXAMINATION			CREDITS
			PERIODS PER WEEK		DURATION IN HOURS	MAXIMUM MARKS		
			L/T	D/P		UNIV. MARKS	SESSIONALS	
<b>THEORY</b>								
1.	BM 351 UE	Basic Clinical Sciences Th-I (Nephrology, Neurology)	4	-	3	<b>100</b>	20	4
2.	BM 352 UE	Basic Clinical Sciences Th-II (Gastroenterology, General Surgery)	4	-	3	<b>100</b>	20	4
3.	BM 353 UE	Basic Clinical Sciences Th-III (Pathology and Blood Bank, Anaesthesia)	4	-	3	<b>100</b>	20	4
4.	BM 354 UE	Basic Clinical Sciences Th-IV (Imaging Sciences, Radio therapy)	4	-	3	<b>100</b>	20	4
5.	BM 355 UE	Basic Clinical Sciences Th-V (Cardiology, Orthopaedics)	4	-	3	<b>100</b>	20	4
6.	BM 356 UE	Digital Signal Processing	4	-	3	75	25	4
<b>Demonstrations</b>								
1.	BM 391 UE	Basic Clinical Sciences Pr-I (Nephrology, Neurology)		2	-	Grade*	-	-
2.	BM 392 UE	Basic Clinical Sciences Pr-II (Gastroenterology, General Surgery)		2	-	Grade*	-	-
3.	BM 393 UE	Basic Clinical Sciences Pr-III (Pathology and Blood Bank, Anesthesia)		2	-	Grade*	-	-
4.	BM 394 UE	Basic Clinical Sciences Pr-IV (Imaging Sciences, Radio therapy)		2	-	Grade*	-	-
5.	BM 395 UE	Basic Clinical Sciences Pr-V (Cardiology, Orthopaedics)		2	-	Grade*	-	-

\*. Grade: Excellent/Good/ satisfactory/ Unsatisfactory

<b>PRACTICALS</b>								
1.	BM 396 UE	Microprocessors and Microcontrollers Lab	-	3	3	50	25	2
2.	BM 397 UE	Matlab & Virtual Instrumentation Lab	-	3	3	50	25	2
		<b>TOTAL</b>	<b>24</b>	<b>16</b>		<b>675</b>	<b>175</b>	<b>28</b>

With effect from the academic year 2012-2013

BM 351 UE

## **BASIC CLINICAL SCIENCES THEORY-1**

### **PART-1-NEPHROLOGY**

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

Anatomy of Kidney. Renal function. Laboratory evaluation. Diagnostic application of Radio Nuclides in Renal Medicine. Acute Renal failure. Chronic Renal Failure.

Principles of dialysis: Haemodialysis, Acetate dialysis. Bicarbonate dialysis. Peritoneal dialysis. Chronic Ambulatory peritoneal dialysis. Haemoperfusion, sequential ultra filtration. Haemofiltration, Adequacy of dialysis. Clearance, Dialysance.

Components of dialysing system. Dialysate, composition of dialysate. Types of dialysers. Controls and monitoring devices of dialysers. Clinical significance.

Renal transplantation. Basic Principles, Cadaver and donor types of transplantation, Tissue typing tests.

Treatment of city water for Haemodialysis usage. Types of water, purification systems. Water softeners. De-ionisers. Reverse osmosis.

#### **Suggested Reading**

1. Strass and Welt, *Diseases of Kidney*, Vol.1 and 2, Little Brown
2. Salmon and Paper, *Clinical Nephrology The Kidney Diseases*.

## **PART-II-NEUROLOGY**

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

Review of the structure and function of the nervous system. Central nervous system. Peripheral nervous system. Autonomic nervous system.

Parts of the brain. Brain structure. The motor system. Sensation. Cranial nerves. Functional topography of the brain.. Electrophysiology of eye. EOG. ERG. Spinal cord. Consciousness. Higher Functions. Speech.

Diseases of nervous system. Diagnostic investigations. Spinal Cord Lesions. Motor neuron disease. Prolapsed intravertebral disc. Neuropathis. Myasthevia gravis. Disease of muscle.

Diagnostic investigations. Electro Encephalography. Computerized Axial Tomography. Radio-active Brain Scanning. Angiography. Pneumoencephalography. Recording.

The motor unit. The methods of Electro-diagnosis. Neuromuscular stimulation. Electromyography, Clinical applications. Diseases of muscle. Motor neuron disorders. The electrical study of reflexes. Disorders of neuromuscular transmission.

### **Suggested Reading:**

1. Adams and Victor-*Principles of Neurology*
2. Brodal-*Neuroanatomy*
3. Lance and Mcleod-*Physiological approach to clinical Neurology*

BM 352 UE

## BASICAL CLINICAL SCIENCES THEORY-II

### PART-I GASTROENTEROLOGY

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

Anatomy and Physiology and G.I.T diseases: Stomach(ulcers), Liver(jaundice), Gall Bladder(gall stone). Disease diagnosis and treatment. Juices-Gastric, Bile, Pancreatic, Intestinal, including their functions and clinically significant symptoms-signs and diseases.

Digestion of Carbohydrates, Proteins and Fats. Nutritional support and parental nutrition. Height and weight estimations according to age.

Colonoscopy, Ryles's tube, Laparoscopy, C.T scan & ultrasound of Abdomen, Liver Biopsy.

Endoscopy: Video endoscopy, fiber optic endoscopy, various endoscopic procedures, indications for E.R.C.P, therapeutic uses of endoscope in gastroenterology.

Intravenous cannulae. I.V. sets. Infusion pumps, stomach wash tubes, Nebulizers-types of humidifiers, sterilization of the equipment.

#### **Suggested Reading:**

1. Dent. Stodel, Turcoffe-*Surgical Endoscopy*
2. Bouchire, Allan-*Text Book of Gastroenterology*

BM 352 UE

### **PART-II-GENERAL SURGERY**

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

Surgical Patient, Clinically significant Investigations. Preoperative care, Post operative care and complications. Preoperative investigations for Hernia surgery. Nutritional support before and after operation. Consent by patient. Distribution of water in the body

Shock and wound healing: Account of shock. Various kinds of shock. Neuro endocrine response of trauma. Types of hemorrhage. Causes of shock. Hypokalaemia. Dehydration. Metabolic acidosis. Acidosis and alkalosis. Cardiac arrest.

Process of wound healing: Collagen. Ground substance. Epithelial covering. Scar formation Factors modifying wound healing. Nosocomial infection. Oterectasis.

Study and operation and surgical equipment. Method of sterilization. Types of endoscopes. Laparoscopy and its use in various surgeries, Micro surgical equipment. Role of cautery. Diathermy. Suction apparatus.

Surgical equipment: Tissue forceps. Atraumatic needle. Oat gut. Stethoscope. Self retaining retractors. Staples. Prolene mesh, cold light sources. Fiber optic Instruments.

#### **Suggested Reading:**

1. Farguhersons, *Textbook of Operative Surgery*
2. Tean W. Salesh, *Laparoscopy*
3. Schwartz, *Principles of surgery*

BM 353 UE

### **BASIC CLINICAL SCIENCES THEORY-III**

#### **PART-I-PATHOLOGY & BLOOD BANK**

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

Blood Bank: Blood groups. ESR. Electrolyte-estimation of normal values. HIV test-ELISA, Dot Method. Cross matching of blood. Cell counter. Normal blood coagulation factors. Normal bilirubin. Cells and their function. VDRL.

Blood Transfusions. Exchange transfusions. Estimation of haemoglobin. Estimation of PCV. Estimation of creatinine, chemotaxis. Estimation of HbsAg. Laminar flow. ABG. Estimation of urea. Estimation of cholesterol.

Urine: Estimation of proteins in urine. Specific gravity of urine-its estimation. Estimation of sugar in urine.

Tissue processing: Various culture media. Automatic tissue processor. Micro tomes. Fixatives used in fixing a tissue. Microscopes-their uses. Method of processing a tissue. Metzler Balance, Micropipette, Plasmaphoresis. Sterilization techniques-Autoclave, hot air oven, Gas and chemical sterilization.

#### **Suggested Reading:**

1. Haraold R. Schumacher, *Clinical Pathology and Blood Bank Guide*
2. Haraold R. Schumacher, *Hand book of Hematalogic Pathology*

BM 353 UE

### **PART-II-ANAESTHESIA**

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

General anaesthesia. The uptake of anaesthetic gases and vapours. Pre-anaesthetic care and preparation. Clinical signs of anaesthesia. Post operative care. Laws of gases. Fires and Explosions. Recommendations for prevention.

Anaesthetic gases. Equipment. Components. Gas delivery systems. Testing Choice of anaesthetic hypnosis. Electrical anaesthesia. Regional Spinal. Care and sterilization of equipment. Patient monitoring during surgery. Monitoring of respiration and temperature. Invasive and non invasive monitoring-recent trends. Organization of theaters.

Mechanism of respiration. Gas exchange. Hypoxia, Artificial respiration. Diagnostic and therapeutic indications. Study of ventilators. Humidifiers. Constant pressure and constant volume types. Selection Criteria. Premature baby incubators.

Gas pipe lines. Gas flow meters of various types. Boyles machine. Warning devices. Anaesthesia circuits. Vaporizers. Principles of operation. Calibration. Repairs. Recalibration. Scavenging systems. Oxygen therapy and blood gas analysis.

Measurement of Intra-vascular pressures. Blood flows. Plethysmography. Humidity and temperature measurements. Clinical significance.

#### **Suggested Reading:**

1. Sykes M. K and Vickers M. D., *Measurement in Anaesthesia*, Blackwell, 1981
2. Mushin. *Automatic Ventilation of Lung*, Blackwell, 1976
3. Miller R. D., *Text book of Anaesthesia*

BM 354 UE

## BASIC CLINICAL SCIENCES THEORY-IV

### PART-I-IMAGING SCIENCES

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

Production & properties of Cathode rays. The simple Gas X-Ray tube. The modern X-Ray tube(Hot Cathode Tube), its parts. Choice of target materials. Focal spot and its size. Shape of filament. Rotating anode. Methods of cooling the target. Tube rating. The X-Ray Beam. Continuous and characteristic Rays. Controlling factors.

Intensity of X-rays. Roentgen. Rad RBE and Rem. The standard ionization chamber, integrating and rate meters. Interaction of X-Ray with matter. Linear attenuation coefficient and mass attenuation coefficient, Photoelectric effect. Compton effect. Pair production.

Use of filters in radiology. Quality of X-Ray diagnosis. Photographic effect of X-Ray films. Density, definition, contrast and distortion. Controlling factors. Speed of X-Ray films. Half value layer.

Physical principles of X-Ray diagnosis. Photographic effect of X-Ray films. Density, definition, contrast and distortion. Controlling factors. Speed of X-Ray films. Fluorescence, fluorescent and intensifying screens. Scattered Radiation and use of cones and grids. High KV technique. Tomography, image intensification and cine radiography.

Introduction of Ultra-sonography and computerized Tomography. Principles of MRI. Digital subtraction Angiography. Radiation protection. Effect of over exposure. Maximum permissible dose. Use of film badge. Methods of protection. Protective measures. Diagnostic department. Radio Isotope Studies. Fiber Optic and Endoscopic instruments.

#### **Suggested Reading:**

1. Meredith and Massey, *Fundamental Principles of Radiology*



## PART-II- RADIOTHERAPY

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

Principles of radiation oncology and cancer radiotherapy. Perspective, Radio-sensitivity and Radio-resistance of tumours and tissues. Classification of tumours according to cell radio-sensitivity. Cell survival theory. Cell repair radio-curability of tumours. Therapeutic ratio. Normal tissue tolerance dose. Modification of radiation response. Physical, chemical and biomedical modifiers.

Tele-therapy Equipment. Selection of treatment method. Indications. X-Ray therapy machines-Kilo-Voltage, super-voltage, Mega-Voltage. Telecobalt and Caesium machines. Linear accelerator. Electron therapy. Rotational therapy. Beam definition and beam direction devices. Wedge filters. Compensators. Beam flattening devices. Brachy therapy. Sealed radio active sources. Radium dosage system. Interstitial implantation. Planner implants. Volume implants.

Radiation Biology. Stages of radiation actions-4 R's of radio therapy. Oxygen effect. Biological effects of radiation, principles of radiation protection, Tolerances doses for skin burns, eye damage in ultra irradiation, Somatic effects. Cause of radiation death, Genetic effects. Maximum permissible occupational doses. Protective measures. Physical measurements and medical tests.

Nuclear Medicine. Nuclear Medicine Instrumentation. Radiation detectors. Auxiliary instruments. Quantitative measurements in vitro, in vivo. Determination of distribution of radioactive material within the body. Mass spectrometer, rectilinear scanner, renograph, Gamma Camera. Use of radioactive detectors- for health protection. Therapeutic uses of radio Isotopes(Unsealed)

Organ imaging procedures. Central nervous system. Cardio Vascular System. Respiratory System. The thyroid. The liver, the spleen. The pancreas. The skeletal system. The kidney. Thyroid functional studies. Tests for renal function. Body spaces. Haematological procedures. Blood flow. Gastro intestinal function. Radioimmunoassay. Hyperthermia.

### Suggested Reading:

1. Meredith and Massay, *Fundamental Physics of Radiology*
2. Johns and Cunningham, *The physics of Radiology*
3. Ramesh Chandra, *Introduction to Nuclear Medicine*

BM 355 UE

## BASIC CLINICAL SCIENCES THEORY-V

### PART-I-CARDIOLOGY

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

Heart structure and function. Cardiac cycle. Various valves and their functions. IABP. Cardio vascular measurements. Prosthetic devices. Monitors. Heart lung machine. Applications. Clinical significance. CVP and SWAN Catheters.

Electrocardiography: Sources of ECG potentials. Dipole theory. Conduction system. Normal and abnormal ECGs. Diagnostic applications. Interpretation of ECG. Cardiac pacing. Diagnostic indications. Criteria for selection. Therapeutic indications. Complications. Nursing management of the patient with pacemaker. Temporary pacing. Permanent pacing.

Fibrillation: Atrial and ventricular, Application of cardiac Assist Devices. Cardiac Catheterization. Echo Cardiography. Cine Angiography. Treadmill, Ergo meter. Applications, Clinical significance.

Diagnostic usage of ultrasound scanners. Doppler ultrasound measurements. Clinical significance.

Open heart surgery grafts. By pass surgery. Instrumentation used for open-heart surgery. Organization of ICCU. Clinical aspects.

#### **Suggested Reading:**

1. Ruch Patton, *Biophysics/ Physiology in Volumes*.
2. Glasser, *Medical Physics*
3. *Cardiovascular Assist Devices*
4. Rushmer, *Cardiovascular Dynamics*
5. Burton, *Cardiovascular Physiology/Bio-Physics*

## **PART-II-ORTHOPAEDICS**

Instruction:	2 Periods per week
Duration of University Examination:	1 ½Hours
University Examination:	50 Marks
Sessional :	10 Marks
Credits:	4

Bone: Structure. Type of material. Remodelling and growth(used for Internal Fixation. Stress and Strain at fracture site.) Fractures: Normal Healing. Materials Stress and strain at fracture site.

Dislocations: Classification of Joints. Reduction. Replacements. Muscle power of grading. Balance achieved at foot. Knee and hand.

Supports and Prosthesis. Hospital Review. Materials and their use. Engineering considerations in the design of Orthopaedic appliances. Tools and Machinery used. Supports and Braces for spine and trunk. Upper extremity appliances. Lower extremity appliances.

Measurements. Range of joint motion. Marking of joint areas. Measurements of upper extremity, lower extremity, body girths. Shoe measurements.

Physiotherapy. Short wave diathermy. Microwave diathermy. Ultrasonic diathermy. Cervical traction. Dynamic and Static exercises. Arthroscopy of Orthotics workshop.

Electro Induction for bone growth. Ultrasound and other methods. Role of external fixtures in the orthopaedic Surgery.

### **Suggested Reading:**

1. Wilton H. Bunch and Robert D. Kaegy, *Principles of Orthetic treatment.*
2. John Crawford Adams Churchill, *Outline of Orthopaedics and outline of fractures.*
3. Frankel and Nordin, *lea and Basic Biomechanics of the Febiger: skeletal system.*
4. Pauline M. Scott: Clayton's *Electrotherapy and Action therapy.*

BM 356 UE

## DIGITAL SIGNAL PROCESSING

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination	75 Marks
Sessional:	25 Marks
Credits	4

### OBJECTIVES:

- To know the difference between DFT and FFT
- Differences between FIR and IIR.
- Design of FIR and IIR filters.
- Architecture s of DSP processors and types of DSP processor.

### UNIT I

The Discrete Fourier Transform: Discrete Fourier Transform, Fast Fourier transform; Properties of Discrete Fourier Transform. Linear convolution using Discrete Fourier Transform. Periodic convolution.

### UNIT II

Computation of Discreet Fourier Transform, Fast Fourier transform; decimation-in-time and decimation-in frequency. FET algorithms for radix-2 case, in place computation, bit-reversal. Finite word length effect in FET algorithms.

### UNIT III

FIR Digital Design Techniques. Properties of FIR Digital filters. Design of FIR filters using windows. Realization diagrams of IIR and FIR filters, Finite word length effects.

### UNIT IV

Butterworth and Chebyshev approximations. IIR digital filter design techniques. Impulse invariant techniques. Bilinear transform techniques. Digital Butterworth filters. Comparison of FIR and IIR filters. Frequency transformations.

### UNIT V

DSP Processors: Computer architecture for signal processing, general purpose DSP processors, TMS 320C6713 processor – Architecture, addressing modes, Instruction set

### Suggested Readings:

- Emanuel C.Ifeachor, Barrie W.Jervis, *Digital Signal Processing-A, practical approach*, Pearson Education, 2<sup>nd</sup> Ed., 2002.
- C.T.Chen, *One –dimensional Digital Signal Processing*, Marcel Dekker Inc., 1979
- Avtar Singh, S.Srinivasan, *Digital Signal Processing – Implementations using DSP Processors*, Thomson-Engineering, 2004

BM 391 UE

**BASIC CLINICAL SCIENCES PRACTICE-I**

Instruction: 2 Periods per week  
Examination: Grade: Excellent/Good/  
Satisfactory/Unsatisfactory  
Credits:

**PART I-NEPHROLOGY**

Demonstration /Practicals

1. Dialysers
2. Dialysate preparation
3. Haemodialysis machine.
4. Peritoneal dialysis
5. Water treatment Plant.

**PART II-NEUROLOGY**

Demonstration /Practicals

1. EMG recorder
2. EMG stimulators
3. EEG recorder
4. Special techniques in EEG
5. Cerebral angiography
6. Myelograph

BM 392 UE

## **BASIC CLINICAL SCIENCES PRACTICE-II**

Instruction: 2 Periods per week  
Examination: Grade: Excellent/Good/  
Satisfactory/Unsatisfactory  
Credits:

### **PART I-GASTROENTEROLOGY**

Demonstration/Practicals  
Study and operation of:

1. Infusion pumps
2. IV sets
3. Endoscopic Instruments
4. Stomach wash tubes

### **PART II- GENERAL SURGERY**

Demonstration/Practicals  
Study and operation of:

1. Surgical equipment-Adult and pediatric
2. Suction apparatus
3. Cautery
4. Light Sources
5. Laparoscopic Instruments
6. Micro Surgical Equipments.

BM 393 UE

**BASIC CLINICAL SCIENCES PRACTICE-III**

Instruction	2 Periods per week
Examination	Grade: Excellent/Good/ Satisfactory/Unsatisfactory
Credits	

**PART I-PATHOLOGY & BLOOD BANK**

Demonstration/Practicals  
Study and operation of:

1. Blood gas analyzer
2. Auto analyzer
3. Cell counter
4. Blood tests
5. Mettler balance
6. Biopsy
7. Blood Storage
8. Electron Microscope
9. HIV tests

**PART II-ANAESTHESIA**

Demonstration/Practicals  
Study and operation of:

1. Endotracheal tubes
2. Electro-surgical generators
3. Cold light sources
4. Servo Ventilators
5. Boyles apparatus
6. Spinal and epidural needles
7. Pulse oximeter
8. Ventilators
9. CSSD equipment
10. Cylinders for anaesthetic gases

BM 394 UE

**BASIC CLINICAL SCIENCES PRACTICE-IV**

Instruction: 2 Periods per week  
Examination: Grade: Excellent/Good/  
Satisfactory/Unsatisfactory  
Credits:

**PART I-IMAGING SCIENCE**

Demonstration/Practicals  
Study and operation of:

1. X-Ray plant
2. X-Ray film developing technique
3. Ultrasound scanning
4. Echocardiograph
5. CAT
6. Spiral CT
7. MRI
8. DSA

**PART II-RADIO THERAPY**

Demonstration/Practicals  
Study and operation of:

1. Co-60 Teletherapy unit
2. Linear accelerator
3. Gamma camera
4. Scintillation counters
5. Ionization chambers



BM 395 UE

**BASIC CLINICAL SCIENCES PRACTICE-V**

Instruction: 2 Periods per week  
Examination: Grade: Excellent/Good/  
Satisfactory/Unsatisfactory  
Credits:

**PART I-CARDIOLOGY**

Demonstration/Practicals  
Study and operation of:

1. ECG recorder and monitor
2. Holter monitor
3. Stress test
4. Pacemakers
5. Defibrillators
6. Heart lung machine
7. Hypothermia Unit
8. Oxygenators
9. Blood gas analyzers
10. Electrolyte analyzer etc.

**PART II-ORTHOPAEDICS**

Demonstration/Practicals  
Study and operation of:

1. Orthotics
2. Splints
3. Prosthetic devices
4. Fracture fixation devices
5. Short wave diathermy
6. Microwave diathermy
7. Ultrasound diathermy

**MICROPROCESSORS AND MICROCONTROLLERS LAB**

Instruction:	3 Periods per week
Duration of University Examination:	3 Hours
University Examination	50 Marks
Sessional	25 Marks

1. Basic Assembly Programs in 8085 microprocessor and 8051 microcontroller.
  - a) 8-bit Arithmetic operations (Addition, Subtraction, Multiplication, Division)
  - b) 16-bit Arithmetic operations (Addition, Subtraction, Multiplication, Division)
  - c) Moving an array from one memory location to another.
  - d) Arranging an array in ascending and descending order.
  - e) Maximum and Minimum values pickup from an array.
  - f) Program to generate delays.
2. Interfacing with 8085 microprocessor and 8051 microcontroller
  - a) Traffic light controller
  - b) 7-segment display
  - c) Analog to Digital Converter
  - d) Matrix keyboard
  - e) LCD display
  - f) Digital to Analog Converter
  - g) Stepper motor
  - h) DC- motor

## **MATLAB & VIRTUAL INSTRUMENTATION LAB**

Instruction:	3 Periods per week
Duration of University Examination:	3 Hours
University Examination	50 Marks
Sessional	25 Marks

### **Virtual Instrumentation Lab (Mat Lab)**

#### **1. Implementation in Mat Lab**

- (i) Generation of basic signals.
  - (ii) Linear and circular convolution
  - (iii) Realization of FIR and IIR filters
  - (iv) Finding DFT, IDFT, STFT, WT of given sequence
  - (v) Plotting the power spectral density.
2. Computation of convolution and correlation sequences.
  3. Noise reduction techniques.
  4. Design of IIR and FIR Filter
  5. PSD Estimation

### **Labview based Instrumentation Lab**

1. Introduction to Lab VIEW and Data Acquisition
2. Simulation of Bio signals Using Lab view
3. Design of a Bio Signal Logger.
4. Design of an Analog ECG Signal Generator
5. Acquisition of Bio potentials using Bio signals
6. Time domain and Frequency Domain Measurement of Real Time Bio signals.
7. Spectrum analysis of ECG and PCG signal
8. Design of Heart Rate Analyzer
9. Extraction of Brain Waves from EEG
10. Design of a Demand Pacemaker using Lab VIEW
11. GPIB Communication using Lab VIEW
12. Instrumentation of an amplifier to acquire an ECG Signal
13. Signal Processing of an ECG signal and measuring the Heart Rate
14. Implementation of Digital Filter to remove noise in bio signals
15. Spectrum analysis of Noisy and pure Biosignal
16. Acquire, Analysis and Present an EEG using Virtual Instrumentation
17. Extraction and Analysis of Brainwaves from an EEG Signal
18. Biofeedback system on EMG
19. Acquisition of PCG signal