With effect from the academic year 2012-2013

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

**SEMESTER II**

<table>
<thead>
<tr>
<th>S. NO</th>
<th>Syllabus Ref. No</th>
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<tr>
<td>1.</td>
<td>BM 351 UE</td>
<td>Basic Clinical Sciences Th-I (Nephrology, Neurology)</td>
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<td>2.</td>
<td>BM 352 UE</td>
<td>Basic Clinical Sciences Th-II (Gastroenterology, General Surgery)</td>
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<td>3.</td>
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<td>Basic Clinical Sciences Th-III (Pathology and Blood Bank, Anaesthesia)</td>
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<td>Basic Clinical Sciences Th-IV (Imaging Sciences, Radio therapy)</td>
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<td>5.</td>
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<td>Basic Clinical Sciences Th-V (Cardiology, Orthopaedics)</td>
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<td>6.</td>
<td>BM 356 UE</td>
<td>Digital Signal Processing</td>
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**Demonstrations**

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<td>Basic Clinical Sciences Pr-I (Nephrology, Neurology)</td>
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<td>Basic Clinical Sciences Pr-V (Cardiology, Orthopaedics)</td>
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*. Grade: Excellent/Good/ satisfactory/ Unsatisfactory

**PRACTICALS**

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<td>1.</td>
<td>BM 396 UE</td>
<td>Microprocessors and Microcontrollers Lab</td>
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<td>2.</td>
<td>BM 397 UE</td>
<td>Matlab &amp; Virtual Instrumentation Lab</td>
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<td>24</td>
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BM 351 UE

BASIC CLINICAL SCIENCES THEORY-1

PART-1-NEPHROLOGY

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


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


Suggested Reading

PART-II-NEUROLOGY

Instruction: 2 Periods per week
Duration of University Examination: 1 ½ Hours
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.


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 ½ Hours
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
With effect from the academic year 2012-2013

BM 352 UE

PART-II-GENERAL SURGERY

Instruction: 2 Periods per week
Duration of University Examination: 1½ Hours
University Examination: 50 Marks
Sessional: 10 Marks
Credits: 4


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 ½ Hours
University Examination: 50 Marks
Sessional: 10 Marks
Credits: 4

Blood Bank: Blood groups. ESR. Electrolyte-estimation of normal values.
Normal bilirubin. Cells and their function. VDRL.


Metzler Balance, Micropipette, Plasmaphoresis. Sterilization techniques-Autoclave, hot air oven, Gas and chemical sterilization.

Suggested Reading:

BM 353 UE

PART-II-ANAESTHESIA

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


Suggested Reading:

BM 354 UE

BASIC CLINICAL SCIENCES THEORY-IV

PART-I-IMAGING SCIENCES

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


Suggested Reading:

1. Meredith and Massey, *Fundamental Principles of Radiology*
PART-II- RADIOTHERAPY

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


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**

<table>
<thead>
<tr>
<th>Instruction:</th>
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<tbody>
<tr>
<td>Duration of University Examination:</td>
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<td>University Examination:</td>
<td>50 Marks</td>
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<td>Sessional:</td>
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<tr>
<td>Credits:</td>
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</table>


**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 ½ Hours
University Examination: 50 Marks
Sessional: 10 Marks
Credits: 4


Suggested Reading:

3. Frankel and Nordin, *lea and Basic Biomechanics of the Febiger: skeletal system*.
4. Pauline M. Scott: Clayton’s *Electrotherapy and Action therapy*. 
With effect from the academic year 2013-2014

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:
a. To know the difference between DFT and FFT
b. Differences between FIR and IIR.
c. Design of FIR and IIR filters.
d. Architecture s of DSP processors and types of DSP processor.

UNIT I

UNIT II

UNIT III

UNIT IV

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

Suggested Readings:
BM 391 UE

BASIC CLINICAL SCIENCES PRACTICE-I

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

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
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. Metzler 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/

Credits: Satisfactory/Unsatisfactory

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
With effect from the academic year 2013-2014

BM 396 UE

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
BM 397 UE

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
4. Design of an Analog ECG Signal Generator
5. Acquisition of Bio potentials using 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