With effect from the academic year 2012-2013

**B.E. II/IV (SEMESTER-II)**

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**PRACTICALS**

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<td>MEDICAL INSTRUMENTATION LAB</td>
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With effect from the academic year 2012-2013

BM 251 UE

BIOMEDICAL INSTRUMENTATION

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

COURSE OBJECTIVES: The study of Biopotentials and electrodes are used to construct instrumentation systems to acquire and process different physiological signals. The use of display devices and recorders are also considered, and can be used to display or record type acquired signals. The students learn about analytical instruments and their working features along with their medical applications.

UNIT-I

UNIT-II

UNIT III

UNIT -IV
UNIT V

Medical Analytical Instrumentation: Methods of chemical analysis. Absorption Photometry, emission photometry, Fluorometry, Colorimeter, spectrophotometer, Flame photometer, Mass spectrophotometer, Electrophoresis, chromatography, blood gas analyzer, Semi and fully automated analyzers.

Suggested Readings:
COURSE OBJECTIVES: This course facilitates the students to understand the basic characteristics of transducer, classification of transducers such as temperature, pressure, displacement and piezoelectric transducers. Signal conditioning and processing, controllers, display, recording; direct digital control, programmable logic controllers, and PC based instrumentation.

UNIT-I
Transducers and their classification
Principles of transduction and measurement, Sensor, Transducer, Basic requirements of transducers. Passive and Active transducers. Classification based on application and operating principle medically significant measurands- strain, force, pressure, acceleration, flow, volume, temperature and Biopotentials, Functional specifications of medical sensors; static and dynamic characteristics of first and second order transducers, Primary sensors.

UNIT II
Resistive and self generating Transducers
Principle of operation, associated circuits and applications of Resistive sensors: Potentiometers, Strain gages, RTDs, Thermistors, LDR, governing equations, materials and constructional details of various resistive transducers. Principle of operation, associated circuits and applications of Self-generating sensors. Thermoelectric sensors, thermocouples, piezoelectric sensors, photovoltaic sensors, governing equations, materials and constructional details of various self generating sensors.

UNIT III
Capacitive and inductive transducers: Principle of operation, associated circuits and applications of Capacitive sensors, governing equations, materials and constructional details of capacitive transducers, Principle of operation, associated circuits and applications of Inductive transducers, governing equations, materials and constructional details of Inductive transducers, LVDT and Hall effect transducers.

UNIT IV
Chemical transducers
UNIT V
Bio-MEMS
Introduction to MEMS, Micro and nano scale devices, Fabrication techniques of MEMS and their characteristics, Solid state transducers, optical transducers, electrochemical transducers, biomedical microelectronics. Clinical applications.

Suggested Reading:
With effect from the academic year 2012-2013

CE 151 UE

ENVIRONMENTAL STUDIES

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

COURSE OBJECTIVES: This course facilitates the students to understand the basic concepts of environmental studies. The study of eco systems, environmental pollution and the social issues are discussed. The students in future take a keen look on the environment, when new things are implemented.

UNIT –I
Environmental Studies: Definition, scope and importance, need for public awareness. Natural resources: Water resources; use and over utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Effects of modern Agriculture, fertilizer-pesticide problems, water logging and salinity.

UNIT II
Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem(ponds, streams, lakes, rivers, oceans, estuaries).
Energy resources: Growing energy needs renewable and non-renewable energy sources. Land Resources, land as a resource, land degradation, soil erosion and desertification.

UNIT III
Biodiversity: Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT IV
Environmental Pollution: Causes, effects and control measures of air pollution, water Pollution, soil pollution, noise pollution, noise pollution, thermal pollution and solid waste management.
Environment protection act: Air, water, forest and wild life Acts, enforcement of Environmental legislation.

UNIT V
Disaster management: Types of disasters, impact of disasters on environment, infrastructure and development. Basic principles of disaster mitigation, disaster management, and methodology, disaster management cycle, and disaster management in India.

Suggested readings:
With effect from the academic year 2012-2013

DIGITAL ELECTRONICS

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

COURSE OBJECTIVES: This course facilitates the students to understand the number systems and conversions between them. To study the properties for Boolean algebra and simplification of Boolean equations using K-maps. The digital circuits classification is studied and the main elements of this classification are studied. Application of these circuits to build a basic computer is discussed. The student also learn about different types of memories and how they are programmed. The course also discuss about the basic applications of digital electronics like digital clock, frequency counter etc.

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
Basic computer Organization: Instruction codes, Computer registers, Timing and control, Instruction cycle, Input-output Configuration, Interrupt cycle. Introduction to microprocessors and microcontrollers.

UNIT-V
Memories: Types of memories, Memory Addressing, ROM, PROM, EPROM, SRAM, DRAM, DDRAM, NVRAM, flash memory. Programmable Logic Devices: PLAs, PALs, PLLs. Applications: Digital Clock, Frequency counter, Time measurement, Displays.

Suggested Reading:
With effect from the academic year 2012-2013

EC 271 UE

ELECTRONIC ENGINEERING-II
(Common to BME and EEE)

Instruction
Duration of University Examination
University Examination
Sessionals
Credits

4 Periods per week
3 Hours
75 Marks
25 Marks
4

COURSE OBJECTIVES: The study of feedback in amplifiers is considered and its advantages in amplifiers is discussed. The theory of oscillators and different oscillator circuits are covered. The filters and their usage is discussed. The students are also exposed to carrier amplifiers and wave shaping circuits.

UNIT-I
Feedback Amplifiers: Concept of Feedback, feedback amplifier configurations, circuits, Advantages of negative feedback, analysis of simple feedback amplifiers using BJT and FET.

UNIT -II
Oscillators: Barkhausen Criterion, RC Oscillators: Wein-bridge, Phase shift, LC oscillator, Hartly and Colpitts oscillator, Crystal controlled oscillators (analysis of oscillators using BJTs only) stability of oscillator, Non-sinusoidal oscillators (using OP amps).

UNIT -III

UNIT -IV
Carrier Amplifier: Chopper amplifier, Principles and Applications, Phase sensitive detector, Classification of power amplifiers, analysis of class A and Class B power amplifier: distortion in amplifier, push-pull amplifier, complementary symmetry, IC power amplifiers.

UNIT -V
Wave Shaping Circuits: RC Low Pass and High Pass circuits, response to step, pulse Ramp and Square wave input, Differentiator and Integrator, Clipping circuits for single level and two level, Clamping circuit and applications, Multivibrator circuit: Astable, Monostable and Bistable circuit using Op-Amp and 555 timer, Schmitt Trigger circuit.

Suggested Reading:
With effect from the academic year 2012-2013

MT 201 UE

MATHEMATICS-III
(Common to all Branches)

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

UNIT-I

UNIT-II
Fourier series: Expansion of a function in Fourier series for a given range- half range sine and cosine expansions, Fourier series of odd and even functions, change of interval.

UNIT-III
Applications of Fourier series: Classification of linear second order partial differential equations, separation of variables method, solution of Heat equation, Wave equation, and Laplace equation.

UNIT-IV
Laplace Transforms and Fourier Transforms: Laplace transform, inverse Laplace transform, properties of Laplace transforms, Laplace transforms of Unit step function, Dirac-Delta function with constant coefficients using Laplace transform Fourier transforms-inverse Fourier Transforms-sine and cosine transforms-inverse and cosine transforms.

UNIT-V

Suggested Reading:

References:
With effect from the academic year 2012-2013

BM 281 UE

MEDICAL INSTRUMENTATION LAB

Instruction 3 Periods per week
Duration of University Examination 3 Hours
University Examination 50 Marks
Sessional 25 Marks
Credits 2

I. Study the characteristics of following Transducers:

1. Thermistors, Thermocouple, RTD
2. Potentiometric transducer
3. Strain Gauge and Load Cell
4. LVDT
5. Capacitive transducer (Linear and Angular)
6. Piezoelectric transducer
7. Photoelectric transducer (LDR)
8. Hall Effect transducer

II. Clinical Experiments:

1. Colorimeter
2. Spectrophotometer
3. Electrophoresis Apparatus (Paper and Gel)
4. Body mass index experiment
5. Tuning fork experiment to test the hearing ability of the subject
6. Blood Pressure measurement by using Sphygmomanometer

III. Design Experiments

1. Design of Instrumentation amplifiers for ECG, EEG, and EMG.
2. Design of filters for ECG, EMG, and EEG
3. Common Mode Rejection Ratio (CMRR) of Medical instrumentation amplifier
4. Design of RC phase shift oscillator for LVDT.
EC 291 UE

ELECTRONICS ENGINEERING LAB-II

Instruction: 3 Periods per week
Duration of University Examination: 3 Hours
University Examination: 50 Marks
Sessionals: 25 Marks
Credits: 2

1. RC Amplifiers:
   1. RC Coupled Amplifier
   2. Frequency response of BJT version
   3. Frequency response of FET version

2. Feedback Amplifiers:
   a) Voltage series configuration
   b) Current Shunt configuration

3. Oscillators:
   a) Wein Bridge Oscillator
   b) RC Phase Shift Oscillator
   c) LC Oscillator
   d) Hartley Oscillator
   e) Colpitts Oscillator

4. Filters
   a) Active Low Pass Filters
   b) Active High Pass Filters
   c) Band Pass Filters
   d) Notch Filters

5. Power Amplifier:
   a) Class A Amplifier
   b) Class B Amplifier
   c) Class C Amplifier

6. Wave Shaping Circuits using operational amplifiers:
   a) Differentiator Circuits
   b) Integrator Circuits
   c) Clipping Circuits
d) Clamping Circuits

7. Instrumentation amplifier

8. Differential amplifier

9. 555 Timer Applications:
   a) Astable Multivibrator using 555 timer
   b) Monostable Multivibrator using 555 timer
   c) Bistable Multivibrator using 555 timer