# ANNA UNIVERSITY, CHENNAI
## AFFILIATED INSTITUTIONS
### R-2008
## B.E. BIOMEDICAL ENGINEERING
### II- VIII SEMESTERS CURRICULA AND SYLLABI

### SEMESTER II

<table>
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<tr>
<th>SL. No.</th>
<th>COURSE CODE</th>
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### A. CIRCUIT BRANCHES

**I Faculty of Electrical Engineering**
1. B.E. Electrical and Electronics Engineering  
2. B.E. Electronics and Instrumentation Engineering  
3. B.E. Instrumentation and Control Engineering

**II Faculty of Information and Communication Engineering**
1. B.E. Computer Science and Engineering  
2. B.E. Electronics and Communication Engineering  
3. B.E. Bio Medical Engineering  
4. B.Tech. Information Technology

### B. NON–CIRCUIT BRANCHES

**I Faculty of Civil Engineering**
1. B.E. Civil Engineering

**II Faculty of Mechanical Engineering**
1. B.E. Aeronautical Engineering  
2. B.E. Automobile Engineering  
3. B.E. Marine Engineering  
4. B.E. Mechanical Engineering  
5. B.E. Production Engineering

**III Faculty of Technology**
1. B.Tech. Chemical Engineering  
2. B.Tech. Biotechnology  
3. B.Tech. Polymer Technology  
4. B.Tech. Textile Technology  
5. B.Tech. Textile Technology (Fashion Technology)  
7. B.Tech. Plastics Technology

| 9. a | ME2155 | Computer Aided Drafting and Modeling Laboratory  
(For non-circuits branches) | 0 | 1 | 2 | 2 |
|------|--------|----------------------------------------------------------------------------------|----|----|----|----|
| 9. b | EE2155 | Electrical Circuits Laboratory  
(For branches under Electrical Faculty) | 0 | 0 | 3 | 2 |
| 9. c | EC2155 | Circuits and Devices Laboratory  
(For branches under I & C Faculty) | 0 | 0 | 3 | 2 |

**TOTAL : 28 CREDITS**

| 10. | - | English Language Laboratory * | 0 | 0 | 2 | - |

* Common to all B.E. / B.Tech. Programmes

+ Offering English Language Laboratory as an additional subject (with no marks) during 2nd semester may be decided by the respective Colleges affiliated to Anna University Chennai.
## SEMESTER III

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

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SEMESTER VI
(Applicable to the students admitted from the Academic year 2008–2009 onwards)

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# LIST OF ELECTIVES

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### SEMESTER VIII - Elective VI

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AIM:
To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES:
1. To help students develop listening skills for academic and professional purposes.
2. To help students acquire the ability to speak effectively in English in real-life situations.
3. To inculcate reading habit and to develop effective reading skills.
4. To help students improve their active and passive vocabulary.
5. To familiarize students with different rhetorical functions of scientific English.
6. To enable students write letters and reports effectively in formal and business situations.

UNIT I
Technical Vocabulary - meanings in context, sequencing words, Articles- Prepositions, intensive reading & predicting content, Reading and interpretation, extended definitions, Process description

Suggested activities:
1. Exercises on word formation using the prefix ‘self’ - Gap filling with preposition.
2. Exercises - Using sequence words.
3. Reading comprehension exercise with questions based on inference – Reading headings
4. and predicting the content – Reading advertisements and interpretation.
5. Writing extended definitions – Writing descriptions of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future.

UNIT II

Suggested activities:
1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) - Reading comprehension exercises with texts including graphic communication - Exercises in interpreting non-verbal communication.
2. Listening comprehension exercises to categorise data in tables.
3. Writing formal letters, quotations, clarification, complaint – Letter seeking permission for Industrial visits– Writing analytical paragraphs on different debatable issues.

UNIT III
Cause and effect expressions – Different grammatical forms of the same word - Speaking – stress and intonation, Group Discussions - Reading – Critical reading - Listening, - Writing – using connectives, report writing – types, structure, data collection, content, form, recommendations.
Suggested activities:
1. Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word. (Eg: object – verb / object – noun)
2. Speaking exercises involving the use of stress and intonation – Group discussions – analysis of problems and offering solutions.
3. Reading comprehension exercises with critical questions, Multiple choice question.

UNIT IV
Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application - content, format (CV / Bio-data) - Instructions, imperative forms - Checklists, Yes/No question form – E-mail communication.

Suggested Activities:
1. Rewriting exercises using numerical adjectives.
2. Reading comprehension exercises with analytical questions on content – Evaluation of content.
3. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.
4. Speaking - Role play – group discussions – Activities giving oral instructions.

UNIT V
Speaking - Discussion of Problems and solutions - Creative and critical thinking – Writing an essay, Writing a proposal.

Suggested Activities:
1. Case Studies on problems and solutions
2. Brain storming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements.

TOTAL : 60 PERIODS

TEXT BOOK:

REFERENCES:
Extensive Reading:

Note:
The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA2161 MATHEMATICS – II

UNIT I ORDINARY DIFFERENTIAL EQUATIONS
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS

UNIT III ANALYTIC FUNCTIONS
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z, and bilinear transformation.

UNIT IV COMPLEX INTEGRATION

UNIT V LAPLACE TRANSFORM
Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TOTAL : 60 PERIODS

TEXT BOOKS:

REFERENCES:

PH2161          ENGINEERING PHYSICS – II             L  T  P  C
                                                      3  0  0  3

UNIT I          CONDUCTING MATERIALS              9
Conductors – classical free electron theory of metals – Electrical and thermal conductivity –
Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum
theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of
energy states – carrier concentration in metals.

UNIT II         SEMICONDUCTING MATERIALS          9
Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi
level with temperature – electrical conductivity – band gap determination – extrinsic
semiconductors – carrier concentration derivation in n-type and p-type semiconductor –
varying of Fermi level with temperature and impurity concentration – compound
semiconductors – Hall effect – Determination of Hall coefficient – Applications.

UNIT III        MAGNETIC AND SUPERCONDUCTING MATERIALS    9
Origin of magnetic moment – Bohr magneton – Dia and para magnetism – Ferro
magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti –
ferrimagnetic materials – Ferrites – applications – magnetic recording and readout –
storage of magnetic data – tapes, floppy and magnetic disc drives.
Superconductivity : properties - Types of super conductors – BCS theory of
superconductivity(Qualitative) - High Tc superconductors – Applications of
superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV         DIELECTRIC MATERIALS             9
Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space
charge polarization – frequency and temperature dependence of polarisation – internal
field – Clausius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown –
uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V          MODERN ENGINEERING MATERIALS      9
Metallic glasses: preparation, properties and applications.
Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application,
advantages and disadvantages of SMA
Nanomaterials: synthesis – plasma arcing – chemical vapour deposition – sol-gels –
electrodeposition – ball milling - properties of nanoparticles and applications.
Carbon nanotubes: fabrication – arc method – pulsed laser deposition – chemical vapour
deposition - structure – properties and applications.

TOTAL: 45 PERIODS
TEXT BOOKS:
2. Charles P. Poole and Frank J.Owen, ’Introduction to Nanotechnology’, Wiley India(2007) (for Unit V)

REFERENCES:

CY2161 ENGINEERING CHEMISTRY – II

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AIM
To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

OBJECTIVES
- The student should be conversant with the principles electrochemistry, electrochemical cells, emf and applications of emf measurements.
- Principles of corrosion control
- Chemistry of Fuels and combustion
- Industrial importance of Phase rule and alloys
- Analytical techniques and their importance.

UNIT I ELECTROCHEMISTRY
Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes – Standard Hydrogen electrode - Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometer titrations (redox - Fe²⁺ vs dichromate and precipitation – Ag⁺ vs Cl⁻ titrations) and conduct metric titrations (acid-base – HCl vs, NaOH) titrations,

UNIT II CORROSION AND CORROSION CONTROL
UNIT III FALLS AND COMBUSTION

UNIT IV PHASE RULE AND ALLOYS

UNIT V ANALYTICAL TECHNIQUES

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

ME2151 ENGINEERING MECHANICS

OBJECTIVES:
At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.
UNIT I  BASICS & STATICS OF PARTICLES  

UNIT II  EQUILIBRIUM OF RIGID BODIES  

UNIT III  PROPERTIES OF SURFACES AND SOLIDS  

UNIT IV  DYNAMICS OF PARTICLES  

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  

TOTAL: 60 PERIODS

TEXT BOOK:

REFERENCES:
UNIT I BASIC CIRCUITS ANALYSIS 12

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS: 12
Network reduction: voltage and current division, source transformation – star delta conversion.
Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS 12
Series and paralled resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS 12
Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input.

UNIT V ANALYSING THREE PHASE CIRCUITS 12
Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL : 60 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I CIRCUIT ANALYSIS TECHNIQUES 12

UNIT II TRANSIENT RESONANCE IN RLC CIRCUITS 12

UNIT III SEMICONDUCTOR DIODES 12

UNIT IV TRANSISTORS 12
Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V SPECIAL SEMICONDUCTOR DEVICES 12
(Qualitative Treatment only)

TOTAL : 60 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I  ELECTRICAL CIRCUITS & MEASUREMENTS  12
Ohm’s Law – Kirchoff’s Laws – Steady State Solution of DC Circuits – Introduction to AC
Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and
Three Phase Balanced Circuits.
Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and
Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II  ELECTRICAL MECHANICS  12
Construction, Principle of Operation, Basic Equations and Applications of DC Generators,
DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III  SEMICONDUCTOR DEVICES AND APPLICATIONS  12
Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics –
Half wave and Full wave Rectifiers – Voltage Regulation.
Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary
Treatment of Small Signal Amplifier.

UNIT IV  DIGITAL ELECTRONICS  12
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-
Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V  FUNDAMENTALS OF COMMUNICATION ENGINEERING  12
Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of
Amplitude and Frequency Modulations.
Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block
Diagram Approach only).

TOTAL : 60 PERIODS

TEXT BOOKS:

REFERENCES:
   (2005).
UNIT I  SURVEYING AND CIVIL ENGINEERING MATERIALS  15


UNIT II  BUILDING COMPONENTS AND STRUCTURES  15
Foundations: Types, Bearing capacity – Requirement of good foundations.


TOTAL : 30 PERIODS

B – MECHANICAL ENGINEERING

UNIT III  POWER PLANT ENGINEERING  10

UNIT IV  I C ENGINES  10
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V  REFRIGERATION AND AIR CONDITIONING SYSTEM  10

TOTAL: 30 PERIODS

REFERENCES:
LIST OF EXPERIMENTS

1. UNIX COMMANDS  
   Study of Unix OS - Basic Shell Commands - Unix Editor  

2. SHELL PROGRAMMING  
   Simple Shell program - Conditional Statements - Testing and Loops  

3. C PROGRAMMING ON UNIX  
   Dynamic Storage Allocation-Pointers-Functions-File Handling  

TOTAL : 45 PERIODS

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware
- 1 UNIX Clone Server
- 33 Nodes (thin client or PCs)
- Printer – 3 Nos.

Software
- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

LIST OF EXPERIMENTS

GS2165 PHYSICS LABORATORY – II  

1. Determination of Young’s modulus of the material – non uniform bending.  
2. Determination of Band Gap of a semiconductor material.  
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.  
5. Spectrometer dispersive power of a prism.  
6. Determination of Young’s modulus of the material – uniform bending.  

- A minimum of FIVE experiments shall be offered.  
- Laboratory classes on alternate weeks for Physics and Chemistry.  
- The lab examinations will be held only in the second semester.
LIST OF EXPERIMENTS

1. Conduct metric titration (Simple acid base)
2. Conduct metric titration (Mixture of weak and strong acids)
3. Conduct metric titration using $\text{BaCl}_2$ vs $\text{Na}_2\text{SO}_4$
4. Potentiometric Titration ($\text{Fe}^{2+}$ / $\text{KMnO}_4$ or $\text{K}_2\text{Cr}_2\text{O}_7$)
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper sulphate)
7. Estimation of Ferric iron by spectrophotometry.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.

List of Exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building ( Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.
List of Equipments for a batch of 30 students:
1. Pentium IV computer or better hardware, with suitable graphics facility -30 No.
2. Licensed software for Drafting and Modeling. – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 No.

EE2155  ELECTRICAL CIRCUIT LABORATORY  L T P C
(Common to EEE, EIE and ICE)  0 0 3 2
LIST OF EXPERIMENTS
1. Verification of ohm’s laws and kirchoff’s laws.
2. Verification of Threvenin’s and Norton’s Theorem
3. Verification of superposition Theorem
4. Verification of maximum power transfer theorem.
5. Verification of reciprocity theorem
6. Measurement of self inductance of a coil
7. Verification of mesh and nodal analysis.
8. Transient response of RL and RC circuits for DC input.
10. Frequency response of single tuned coupled circuits.
   TOTAL: 45 PERIODS

EC2155  CIRCUITS AND DEVICES LABORATORY  L T P C
0 0 3 2
1. Verification of KVL and KCL
2. Verification of Thevenin and Norton Theorems.
3. Verification of superposition Theorem.
4. Verification of Maximum power transfer and reciprocity theorems.
5. Frequency response of series and parallel resonance circuits.
6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of UJT and SCR
10. Characteristics of JFET and MOSFET
   TOTAL : 45 PERIODS
ENGLISH LANGUAGE LABORATORY (Optional)  

1. Listening: 5  
Listening & answering questions – gap filling – Listening and Note taking - Listening to telephone conversations

2. Speaking: 5  
Pronouncing words & sentences correctly – word stress – Conversation practice.

Classroom Session 20  
1. Speaking: Introducing oneself, Introducing others, Role play, Debate-  
Presentations: Body language, gestures, postures.  
Group Discussions etc  
2. Goal setting – interviews – stress time management – situational reasons

Evaluation  
(1) Lab Session – 40 marks  
Listening – 10 marks  
Speaking – 10 marks  
Reading – 10 marks  
Writing – 10 marks  

(2) Classroom Session – 60 marks  
Role play activities giving real life context – 30 marks  
Presentation – 30 marks

Note on Evaluation  
1. Examples for role play situations:  
a. Marketing engineer convincing a customer to buy his product.  
b. Telephone conversation – Fixing an official appointment / Enquiry on availability of flight or train tickets / placing an order. etc.

2. Presentations could be just a Minute (JAM activity) or an Extempore on simple topics or visuals could be provided and students could be asked to talk about it.

REFERENCES:  

LAB REQUIREMENTS  
1. Teacher – Console and systems for students  
2. English Language Lab Software  
3. Tape Recorders.
OBJECTIVES
The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electrooptics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I FOURIER SERIES

UNIT II FOURIER TRANSFORMS

UNIT III PARTIAL DIFFERENTIAL EQUATIONS
Formation of partial differential equations – Lagrange’s linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS
Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V Z-TRANSFORMS AND DIFFERENCE EQUATIONS

LECTURES: 45 TUTORIALS: 15, TOTAL: 60 PERIODS

TEXT BOOK:

REFERENCES:
AIM
To get the complete understanding of radioactivity and medical applications of various radio isotopes

OBJECTIVES
To Study the effects of sound and light in Human body
To study the effects of radiation in matter and how isotopes are clinically used.

UNIT I
Electromagnetic spectrum and its medical application
Light - Physics of light, Intensity of light, limits of Vision and color vision
Sound - Physics of sound, Normal sound levels - Ultrasound fundamentals- Generation of ultrasound (Ultrasound Transducer) – Interaction of Ultrasound with Materials-Reflection and Refraction – Absorption and Scattering
Non-ionizing Electromagnetic Radiation

UNIT II
Radioactive Decay – Spontaneous Emission – Isometric Transition - Gamma ray emission, alpha, beta, positron decay, electron capture
Principles of Nuclear Physics – Natural radioactivity, Decay series, Half life period, type of radiation and their applications.
Production of radionuclides – Cyclotron produced Radionuclide - Reactor produced Radionuclide – fission and electron Capture reaction, Radionuclide Generator – Milking Process - Linear accelerator , Radionuclide used in Medicine and technology.

UNIT III
INTERACTION OF RADIATION WITH MATTER
Interaction of charged particles with matter – Specific ionization , linear energy Transfer
Range, Bremsstrahlung , Annihilation Interaction of Gamma radiations with matter – Photoelectric effect, Compton Scattering , pair Production, Attenuation of Gamma Radiation, Interaction of neuron with matter

UNIT IV
PHYSICS OF CARDIOPULMONARY SYSTEM

UNIT V
RADIATION EFFECTS
Acute Radiation Effects - The concept of LD 50 – Radiation syndromes- Central nervous system syndrome - Gastro-intestinal syndrome –Bone Marrow syndrome
Delayed Effects of Radiation - Stochastic and Deterministic effects – Late Deterministic effect in different organs and tissues.

TEXT BOOKS:
REFERENCES:

BM 2202 SIGNALS AND SYSTEMS

AIM
To study and analyse characteristics of continuous, discrete signals and systems

OBJECTIVE
- To study the properties and representation of discrete and continuous signals
- To study the properties and representation of discrete and continuous systems
- To study the signals in time domain and frequency domain using Fourier
- To study the sampling process and analysis of signals and systems using Laplace and Z-transforms.
- To study the analysis and synthesis of systems.

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS

UNIT II FOURIER SERIES AND FOURIER TRANSFORM
Discrete-time Fourier series (DTFS) and Discrete-time Fourier transform (DTFT) – properties – linearity, time-shifting, time-reversal, time-scaling, multiplication, Parseval’s relation – difference – accumulation. Application to systems - solution to difference equation using DTFT.
UNIT III LAPLACE TRANSFORM

UNIT IV DISCRETE FOURIER TRANSFORM (DFT) AND FAST FOURIER TRANSFORM (FFT)

UNIT V Z-TRANSFORM AND STATE MATRIX
Z-transform (ZT) – region of convergence (ROC) - properties of ZT – linearity, time-shifting, time-reversal, time-scaling, multiplication, convolution, Parseval’s relation – differentiation in time and frequency domain – integration – initial value and final value theorem – inversion of ZT – power series method, partial-fraction method, residual method - solution to difference equation using ZT.
State variable description for LTI system – determination of transfer function from state model – discrete-time model.

TEXT BOOK

REFERENCES:
UNIT III PHOTOELECTRIC AND PIEZOELECTRIC SENSORS
Phototube, Photo Multiplier Tube (PMT), photovoltaic, photoconductive cells, photodiodes, phototransistor, comparison of photoelectric transducers, spectro-photometric applications of photoelectric transducers. Piezoelectric active transducer and biomedical applications as pressure & Ultrasound transducer.

UNIT IV SIGNAL CONDITIONING & SIGNAL ANALYSER

UNIT V DISPLAY AND RECORDING DEVICES
Digital voltmeter – Multi meter – CRO – block diagram, CRT – vertical & horizontal deflection system, DSO, LCD monitor, PMMC writing systems, servo recorders, photographic recorder, magnetic tape recorder, X–Y recorder, thermal recorder.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

BM 2204 ELECTRONIC CIRCUITS L T P C
3 1 0 4

AIM
The aim of this course is to familiarize the student with analysis and design of basic transistor amplifier circuits, signal generator circuits and power supplies

OBJECTIVES:
On completion of this course, the student will understand
- The methods of biasing transistors,
- Design the simple amplifier circuits, and design of signal generation circuits,
- Advantages and analysis of feed back,
- Design of Power supplies.
UNIT I  DIODE APPLICATIONS AND TRANSISTOR BIASING  9

UNIT II  SMALL SIGNAL AMPLIFIERS  9
Two port network, h-parameter model – small signal analysis of BJT (CE and CC configurations only) — high frequency model of BJT – (CE configuration only) - small signal analysis of JFET (CS configuration only) - Frequency response of BJT and FET.

UNIT III  FEEDBACK AMPLIFIER AND OSCILLATORS  9
Basic of feedback system (block diagram approach) – Types of feedback amplifier – Basic principles of oscillator. Audio oscillators – RC phase shift and wein bridge oscillator. RF oscillators – Heartly and Collpit oscillator – Crystal oscillator,Multivibrators.

UNIT IV  POWER AMPLIFIERS  9
Definition – Types of power amplifiers – Class A (series fed – transformer coupled )- Class B amplifier – Class-B push-pull amplifier – Complimentary symmetry type - Class-C amplifier – Heat sinking.

UNIT V  VOLTAGE REGULATIONS  9
Shunt voltage regulator – Series voltage regulator – current limiting – feedback technique – SMPS (Block diagram approach) – DC to DC converter - Three terminal IC regulators (78XX and 79XX).

TEXT BOOK:

REFERENCES:

BM 2205  BIOCHEMISTRY  L T P C
3 0 0 3

AIM
➢ To study the biochemical reactions and the various methods to analyze them.

OBJECTIVE:
➢ To give a clear understanding of important biomolecules and their functions.
➢ To analyze the metabolic pathways in normal and diseased state.
➢ To help in devising analytical & diagnostic tools.
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCE S:
1. Understanding Enzymes By Trevor palmer. Published by Ellis Horwood LTD.
AIM
To provide the students the exposure to the fundamentals in human anatomy and physiology.

UNIT I STUDY OF CELLULAR SYSTEM 8

UNIT II HEMATOLOGICAL SYSTEM 9
Blood composition - functions of blood – functions of RBC. WBC types and their functions. Blood groups –importance of blood groups –identification of blood groups. blood flow factors regulating blood flow such as viscosity, radius, density etc (Fahreus lindqvist effect, Poiseuille’s Law)

UNIT III RENAL AND RESPIRATORY SYSTEM 9

UNIT IV CARDIAC SYSTEM 9
Structure of heart – Properties of Cardiac muscle – Cardiac muscle and pacemaker potential - Cardiac cycle – ECG - Heart sound - volume and pressure changes and regulation of heart rate.

UNIT V SENSORY SYSTEM 10

TEXT BOOK:

REFERENCES:
1. Review of Medical Physiology, 22nd edition, William F. Ganong Mc Graw Hill New Delhi,

BM 2208 BIOCHEMISTRY AND HUMAN PHYSIOLOGY LAB
1. General tests for carbohydrates, proteins and lipids.
2. Preparation of serum and plasma from blood.
3. Estimation of blood glucose.
5. Assay of SGOT/SGPT.
8. Separation of amino acids using thin layer chromatography.
9. ESR, PCV, MCH, MCV, MCHC, total count of RBCs and Hemoglobin estimation
10. Differential count of different WBCs and Blood group identification
11. Ishihara chart for color blindness and Snellen’s chart for myopia and hyperopia – by letters reading and ophthalmoscope to view retina.
12. Weber’s and Rinnee’s test for auditory conduction.

**TOTAL: 60 PERIODS**

**LAB EQUIPMENTS**

1) Test tube, microscope (Binocular), colorimeter
2) Centrifuge, Test tubes, anticoagulant
3) Blood Glucose kit
4) Cholesterol kit
5) SGOT/SGPT kit
6) Creatinine kit
7) Electrophoresis apparatus
8) Glass tanks, thin layer chromatography
9) ESR glan tube wintrobe PCV tube(Haematocrit tube), sahli’s Haemo globinometer, Microscope, Haemocytometer(Mirror coated)
10) Differential count Leishman stain(readymade), Blood group antigen, microscope slides.
11) Ishihara chart, Snellen’s chart, Opthalmoscope
12) Weber’s and Rinnee’s test.

**BM 2209 ELECTRONIC CIRCUITS LAB**

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1. Rectifiers – HWR and FWR (with & without capacitor filter)
2. Zener diode as regulator
3. Study of biasing circuits
   a. i). Fixed bias, ii). Self bias, iii). collector to base bias
4. FET amplifier
5. Differential amp – CMRR and determination of Gain
6. Design of RC coupled amplifier
7. Design of Voltage series feedback amplifier
8. Design of Class A and Class B amplifier
9. Design of RC phase shift oscillator
10. Design of Hartely Oscillator
11. Design of Colpit oscillator
12. Study of pulse shaping circuits
   i). Astable Multivibrator
   ii). Monostable Multivibrator

**TOTAL: 45 PERIODS**
LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS
(3 per Batch)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the Equipments / Components</th>
<th>Quantity Required</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Variable DC Power Supply</td>
<td>10</td>
<td>(0-30V)</td>
</tr>
<tr>
<td>2</td>
<td>Fixed Power Supply</td>
<td>5</td>
<td>+ / - 12V</td>
</tr>
<tr>
<td>3</td>
<td>CRO</td>
<td>10</td>
<td>30MHz</td>
</tr>
<tr>
<td>4</td>
<td>Multimeter</td>
<td>10</td>
<td>Digital</td>
</tr>
<tr>
<td>5</td>
<td>Function Generator</td>
<td>10</td>
<td>1 MHz</td>
</tr>
<tr>
<td>6</td>
<td>Digital LCR Meter</td>
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<td></td>
</tr>
<tr>
<td>7</td>
<td>BC107, BF195, 2N2222, BC147, BFW10, SL100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>IC 555, LEDs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Resistors 1/4 Watt Assorted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Capacitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Inductors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Bread Boards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Transformer Diodes, Zener Diodes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Consumables (Minimum of 25 Nos. each)

AIM

This course aims at providing the necessary basic concepts in random processes. Knowledge of fundamentals and applications of random phenomena will greatly help in the understanding of topics such as signals & systems, pattern recognition, voice and image processing and filtering theory.

OBJECTIVES:

At the end of the course, the students would
- Have a fundamental knowledge of the basic probability concepts.
- Have a well-founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
- Be able to analyze the response of random inputs to linear time invariant systems.
UNIT I  RANDOM VARIABLES

UNIT II  TWO DIMENSIONAL RANDOM VARIABLES
Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem (for iid random variables)

UNIT III  CLASSIFICATION OF RANDOM PROCESSES

UNIT IV  CORRELATION AND SPECTRAL DENSITIES
Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function

UNIT V  LINEAR SYSTEMS WITH RANDOM INPUTS
Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – white noise.

LECTURES: 45  TUTORIAL: 15  TOTAL: 60

TEXT BOOKS
1. Oliver C. Ibe, “Fundamentals of Applied probability and Random processes”, Elsevier, First Indian Reprint (2007) (For units 1 and 2)

REFERENCES

BM 2251  BIOMEDICAL INSTRUMENTATION  L T P C
3 0 0 3

UNIT I  BIO POTENTIAL ELECTRODES
UNIT II ELECTRODE CONFIGURATIONS
Biosignals characteristics – frequency and amplitude ranges. ECG – Einthoven’s triangle, standard 12 lead system. EEG – 10-20 electrode system, unipolar, bipolar and average mode. EMG, ERG and EOG – unipolar and bipolar mode.

UNIT III BIO AMPLIFIER

UNIT IV MEASUREMENT OF NON-ELECTRICAL PARAMETER

UNIT V BIO-CHEMICAL MEASUREMENT
Biochemical sensors - pH, pO2 and pCO2, Ion selective Field effect Transistor (ISFET), Immunologically sensitive FET (IMFET), Blood glucose sensors - Blood gas analyzers, colorimeter, flame photometer, spectrophotometer, blood cell counter, auto analyzer (simplified schematic description).

TEXT BOOKS:

REFERENCE

BM2253 BASICS OF ELECTRICAL ENGINEERING
L T P C
3 0 0 3

AIM
To make the students understand the basics of electricity generation and utilization.

OBJECTIVES
- To study the magnetic circuits
- To study the principle and application of transformers
- To study the principle of operation of DC motors
- To study the principle and operation of AC machines
- To study the principle of fractional-kW motors and their applications.
UNIT I  MAGNETIC CIRCUIT  9
Magnetic effects of electric current, Magnetic circuits, Magnetic materials and B-H relationship, Electromagnetic induction and force, Hysteresis and eddy current losses.

UNIT II  DCMOTORS  9
Parts of DC motors, types of motors, principle of operation of DC motors, Back EMF, circuit model, power balance, calculation of torque and speed, armature and field control, DC motor starting, calculation of efficiency.

UNIT III  TRANSFORMERS  9
Methods of generation of AC voltages, role of transformers in the distribution of electricity, Construction and principle of operation of single phase transformers, Ideal transformer, voltage and current relationships, impedance transformation, definition of voltage regulation, Losses in the transformer, calculation of efficiency of transformer, construction and voltage ratio aspects of single phase autotransformer, construction and voltage ratio aspects three phase transformer.

UNIT IV  AC MACHINES  9
Synchronous machines, construction, principle of operation, phasor diagram, voltage equation, Open circuit and short circuit characteristics, voltage regulation, induction motor, construction, circuit model, torque slip characteristics, starting, speed control-slip control, frequency control

UNIT V  FRACTIONAL -KW MOTORS  9

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCE:

BM2254  ANALOG AND DIGITAL ICs  L T P C
3 1 0 4

AIM:
To understand the functions of various analog and digital IC and their applications

OBJECTIVES
- To acquire the knowledge about the characteristics and operation of various analog ICs
- To study the application of analog ICs in the designing circuit.
- To study the applications of these Digital ICs.
- To understand the basic of the Digital systems.
- To study the design of the various functional circuits using these ICs.
UNIT I  OPERATIONAL AMPLIFIERS  

UNIT II  ACTIVE FILTERS AND SIGNAL GENERATOR  
Active filters (first and second order) – Low pass, high pass, band pass filters, band reject filters (notch filters). Oscillators - RC Phase shift and Wein-bridge. Waveform generators - Square, triangular and saw tooth.

UNIT III  TIMER, PLL, A/D AND D/A CONVERTERS  
555 Timer (internal diagram) and its applications – monostable multivibrator, astable multivibrator. Phase locked Loop (565 - block diagram approach) and its applications - Frequency multiplication, Frequency translation, voltage to frequency and frequency to voltage converters. DAC – Binary weighted DAC and R-2R DAC. ADC – single slope and dual slope ADCs, successive approximation ADC

UNIT IV  NUMBER SYSTEMS AND LOGIC GATES  

UNIT V  REGISTERS AND COUNTERS  

TEXT BOOKS:  

REFERENCES:  
2. Sergio Franco, DESIGN with Operational Amplifiers and analog Integrated circuits, McGraw-Hills  
UNIT I:
Cell Degeneration, repair and neoplasia-Cell injury and Necrosis, Apoptosis, Intracellular accumulations, Pathological calcification, cellular adaptations of growth and differentiation, Inflammation and Repair including fracture healing, Neoplasia, Classification, Benign and Malignant tumours, carcinogenesis, spread of tumours.

UNIT II:

UNIT III:

UNIT IV:
Genetic disorders, Infection and Immunity-Mutations, Autosomal and X linked disorders, Mendelian disorders, types of immune response, hypersensitivity disorders, Immune deficiency syndrome, Viral disease, Chlamydial, Bacterial, Mycoplasma, Rickettsial, Fungal, protozoal and helminthic disease.

UNIT V:
Identification of disease producing organisms, simple stain, Gram stain, AFB stain, Fluorescent techniques, antigen-antibody techniques.

TEXT BOOKS:

REFERENCE:

MICROBIOLOGY
TEXT BOOK

REFERENCES:
UNIT I  ANALOG MODULATION  9
Amplitude Modulation – AM, DSBSC, SSBSC, VSB – PSD, modulators and demodulators
– Angle modulation – PM and FM – PSD, modulators and demodulators –
Superheterodyne receivers

UNIT II  PULSE MODULATION  9
Low pass sampling theorem – Quantisation - PAM – Line coding - PCM, DPCM, DM,
ADPCM and ADM, Channel Vocoder,– Time Division Multiplexing, frequency Division
Multiplexing

UNIT III  DIGITAL MODULATION AND TRANSMISSION  9
Phase shift keying – BPSK, DPSK, QPSK - Principles of M-ary signaling M-ary PSK &
QAM – Comparison, ISI – Pulse shaping – Duo binary encoding - Cosine filters – Eye
pattern, equalizers

UNIT IV  INFORMATION THEORY AND CODING  9
Measure of information – Entropy – Source coding theorem - Shannon-Fano coding,
Huffman Coding, LZ Coding– Channel capacity – Shannon-Hartley law – Shannon’s limit-
Error control Codes – Cyclic codes, Syndrome calculation – Convolutional Coding,
Sequential and Viterbi decoding

UNIT V  SPREAD SPECTRUM AND MULTIPLE ACCESS  9
PN sequences – properties – m-sequence –DSSS –Processing gain, Jamming – FHSS –
Synchronisation and tracking - Multiple Access – FDMA, TDMA, CDMA

Tutorial = 15
TOTAL 45+15 = 60 PERIODS

TEXT BOOKS:
1. H Taub, D L Schilling, G Saha, “Principles of Communication Systems” 3/e, TMH,
   2007

REFERENCES:
   University Press,2007
2. H P Hsu, Schaum Outline Series - “Analog and Digital Communications” TMH 2006
3. B.Sklar, “Digital Communications Fundamentals and Applications” 2/e Pearson
   Education 2007
AIM

- The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional Endeavour that they participate.

OBJECTIVE

- At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I       ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II       ENVIRONMENTAL POLLUTION

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III           NATURAL RESOURCES

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of
alternate energy sources. Case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIA L ISSUES AND THE ENVIRONMENT

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES BOOKS:
1. Inverting, non-inverting amplifier and comparator
2. Integrator and Differentiator
3. Active filter – first order LPF and HPF
4. Schmitt trigger using IC741
5. Instrumentation amplifier using IC741
6. Wein bridge oscillator
7. Multivibrator using IC555 Timer
8. Study of logic gates, Half adder and Full adder
9. Encoder and BCD to 7 segment decoder
10. Multiplexer and demultiplexer using digital ICs
11. Universal shift register using flipflops
12. Design of mod-N counter

TOTAL : 45 PERIODS

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS (3 per Batch)

<table>
<thead>
<tr>
<th>S.N o</th>
<th>Name of the equipments / Components</th>
<th>Quantity Required</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Dual , (0-30V) variable Power Supply</td>
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<tr>
<td>2</td>
<td>CRO</td>
<td>9</td>
<td>30MHz</td>
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<tr>
<td>3</td>
<td>Digital Multimeter</td>
<td>10</td>
<td>Digital</td>
</tr>
<tr>
<td>4</td>
<td>Function Generator</td>
<td>8</td>
<td>1 MHz</td>
</tr>
<tr>
<td>5</td>
<td>IC Tester (Analog/Digital)</td>
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<tr>
<td>6</td>
<td>Bread board</td>
<td>10</td>
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</tr>
</tbody>
</table>

Consumables (Minimum of 25 Nos. each)

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<table>
<thead>
<tr>
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<tr>
<td>1</td>
<td>IC 741</td>
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<tr>
<td>2</td>
<td>IC NE555</td>
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<tr>
<td>3</td>
<td>LED</td>
<td>25</td>
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<tr>
<td>4</td>
<td>Potentiometer</td>
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<tr>
<td>5</td>
<td>Seven Segment Display</td>
<td>25</td>
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<tr>
<td>6</td>
<td>Capacitor</td>
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<tr>
<td>7</td>
<td>Resistors 1/4 Watt Assorted</td>
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<tr>
<td>8</td>
<td>Single Strand Wire</td>
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<td>9</td>
<td>Encoder and Decoder ICs (IC7445, IC 74147)</td>
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<tr>
<td>10</td>
<td>Multiplexer and Demultiplexer ICs. (IC74150, IC74154)</td>
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<tr>
<td>11</td>
<td>Shift register ICs, Counter ICs</td>
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<td>12</td>
<td>IC7400</td>
<td>25</td>
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<tr>
<td>13</td>
<td>IC7404</td>
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<td>IC7402</td>
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<tr>
<td>15</td>
<td>IC7408</td>
<td>25</td>
</tr>
<tr>
<td>16</td>
<td>IC7411</td>
<td>25</td>
</tr>
<tr>
<td>17</td>
<td>IC7432</td>
<td>25</td>
</tr>
</tbody>
</table>
1. Urine physical and chemical examination (protein, reducing substances, ketones, bilirubin and blood)
2. Hematoxylin and eosin staining.
3. Study of parts of compound microscope
4. Histopathological slides of benign and malignant tumours.
5. Manual tissue processing and section cutting (demonstration)
7. Gram stain.
8. AFB stain.
9. Slides of malarial parasites, micro filaria and leishmania donovani.
10. Haematology slides of anemia and leukemia
11. Bleeding time and clotting time.
12. Study of bone marrow charts

TOTAL: 60 PERIODS

(Lab Requirement for a both of Semester)

1) Test tubes, Test tube racks, Bunsen burner(gas),(Benedict’s solution, Acetic acid, Sulphosalicylic acid), centrifuge, microscope.
2) Slides, cover slips,H & E stains
3) Microscope
4) Beakers,graded alcohols, acetone,Lmoulds(or maling bodies), paradigm wax, water bath, microtone for section cutting,slides,cover slips,hotair oven,refrigerator to store chemical and ice.
5) whanman filter paper for bleeding time Test tubes.
6) Simple Stain test
   SIMPLE STAIN, Glass Slide Reagents – Methylene blue, Crystal Violet, Cabal Iuschin
7) Gram Stain test SIMPLE GRAM STAIN
   Reagents – Crystal Violet, Gram’s Iodine, 95% ethyl alcohol Safranin
   Urine bacterial count/ml exceeding 100,000(10s) denotes urinary tract infection.
   Normal : 0-100 ml Glass Slide
8) AFB Strain test ACID FAST STAIN (ZIEHL – NEELSON METHOD) Reagent – Carbal Iushin, Acid Alcohol, Methylene blue, Glass slide
9) Bone marrow charts

BM2305 DIGITAL SIGNAL PROCESSING L T P C 3 1 0 4

AIM
To study the signal processing methods and processors

OBJECTIVES:
- To study the design techniques of IIR and FIR filters
- To study the structure realization method for IIR and FIR filters
- To study the finite word length effects in signal processing
- To study power spectrum estimation
- To study multirate signal processing
UNIT I  FINITE IMPULSE RESPONSE (FIR) FILTER

UNIT II  INFINITE IMPULSE RESPONSE (IIR) FILTER

UNIT III  FINITE WORD LENGTH EFFECT IN FIR AND IIR FILTER

UNIT IV  BASICS OF RANDOM SIGNAL PROCESSING
(ONLY QUALITATIVE ANALYSIS)

UNIT V  INTRODUCTION TO DIGITAL SIGNAL PROCESSORS

L: 45, T: 15, TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:
2. Andreas Antoniou, Digital filter Analysis and Design”, Prentice Hall India
AIM
By studying various control systems modeling technique, time response analysis and frequency response analysis, biological control systems can be analysed and understood.

OBJECTIVES:
• To study concept and different mathematical techniques applied in analyzing any given system
• To learn to do the analysis of given system in time domain and frequency domain
• To study the techniques of plotting the responses in both domain analysis
• To study techniques of modeling the physiological systems

UNIT I  CONTROL SYSTEM MODELLING  9
Terminology and basic structure of control system, example of a closed loop system, transfer functions, modeling of electrical systems, translational and rotational mechanical systems, electromechanical systems, block diagram and signal flow graph representation of systems, conversion of block diagram to signal flow graph, reduction of block diagram and signal flow graph.

UNIT II  RESPONSE ANALYSIS  9
Step and Impulse responses of first order and second order systems, determination of time domain specifications of first and second order systems from its output responses. definition of steady state error constants and its computation, definition of stability, Routh-Hurwitz criteria of stability, root locus technique, construction of root locus and study of stability, definition of dominant poles and relative stability.

UNIT III  FREQUENCY RESPONSE ANALYSIS  9
Frequency response, Nyquist stability criterion, Nyquist plot and determination of closed loop stability, definition of gain margin and phase margin, Bode plot, determination of gain margin and phase margin using Bode plot, use of Nichol's chart to compute resonance frequency and band width.

UNIT IV  PHYSIOLOGICAL CONTROL SYSTEMS  9
Block diagram representation of the muscle stretch reflex, difference between engineering and physiological control systems, generalized system properties, models with combination of system elements, introduction to simulation.

UNIT V  PHYSIOLOGICAL SYSTEM MODELING  9
Linear model of respiratory mechanics, model of chemical regulation of ventilation, linear model of muscle mechanics, model of regulation of cardiac output, model of Neuromuscular reflex motion.

L: 45, T: 15, TOTAL= 60 PERIODS

TEXT BOOKS:
REFERENCES

BM2302 DIAGNOSTIC AND THERAPEUTIC EQUIPMENTS-I L T P C 3 0 0 3

UNIT I CARDIAC EQUIPMENTS 9
Electrocardiograph, Normal and Abnormal Waves, Heart rate monitor, Arrhythmia Simulator, Holter Monitor, Phonocardiography, Plethysmography, Cardiac Pacemaker—Internal and External Pacemaker—Batteries, AC and DC Defibrillator—Internal and External.

UNIT II NEUROLOGICAL EQUIPMENTS 9
Clinical significance of EEG, Multi channel EEG recording system, Epilepsy, Evoked Potential—Visual, Auditory and Somatosensory, MEG (Magneto Encephalon Graph). EEG Bio Feedback Instrumentation.

UNIT III SKELETAL MUSCULAR SYSTEM 9
Sliding theory of contraction, recording and analysis of EMG waveforms, fatigue characteristics, Muscle stimulators, nerve stimulators, Nerve conduction velocity measurement, EMG Bio Feedback Instrumentation.

UNIT IV RESPIRATORY MEASUREMENT SYSTEM 9

UNIT V SENSORY MEASUREMENT 9
Psycho Physiological Measurements—for testing and sensory Responses, Electro oculograph, Electro retinograph, Audiometer—Pure tone, Speech. EGG (Electrogastrograph), galvanic skin resistance(GSR).

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I  STRUCTURE OF BIO-MATERIALS AND BIO-COMpatibility  9
Definition and classification of bio-materials, mechanical properties, visco elasticity, wound-healing process, body response to implants, blood compatibility.

UNIT II  IMPLANT MATERIALS  9
Metallic implant materials, stainless steels, co-based alloys, Ti-based alloys, ceramic implant materials, aluminum oxides, hydroxyapatite glass ceramics carbons, medical applications.

UNIT III  POLYMERIC IMPLANT MATERIALS  9

UNIT IV  TISSUE REPLACEMENT IMPLANTS  9
Soft-tissue replacements, sutures, surgical tapes, adhesive, Percutaneous and skin implants, maxillofacial augmentation, blood interfacing implants, hard tissue replacement implants, internal fracture fixation devices, joint replacements.

UNIT V  ARTIFICIAL ORGANS  9
Artificial Heart, Prosthetic Cardiac Valves, Artificial lung ( oxygenateor), Artificial Kidney ( Dialyser membrane), Dental Implants.

Total= 45 Periods

TEXT BOOKS:

REFERENCES :
UNIT III  PERIPHERAL INTERFACING & APPLICATION  9
Programmable Peripheral Interface (8255), keyboard display controller (8279), ADC, DAC Interface, Programmable Timer Controller (8254), Programmable interrupt controller (8259), Serial Communication Interface (8251).

UNIT IV MICROCONTROLLER  9

UNIT V 8086 AND 8051 BASED SYSTEM DESIGN  9
Design and interfacing - LED, LCD & Keyboard Interfacing, ADC, DAC, Sensor Interfacing, External Memory Interface, Traffic light controller, Washing machine, RTC Interfacing using I2C Standard, Motor Control, Relay, PWM, DC, Stepper Motor Multichannel biomedical data acquisition system.

TOTAL:45 PERIODS

TEXTBOOKS:

REFERENCES:
5. Krishna Kant, “ Microprocessor and Microcontroller Architecture, programming a. and system design using 8085, 8086, 8051 and 8096, PHI, 2007

BM2304 HOSPITAL MANAGEMENT  L T P C
3 0 0 3

UNIT I OVERVIEW OF HOSPITAL ADMINISTRATION  9
Distinction between Hospital and Industry, Challenges in Hospital Administration – Hospital Planning – Equipment Planning – Functional Planning.

UNIT II HUMAN RESOURCE MANAGEMENT ON HOSPITAL  9
UNIT III RECRUITMENT AND TRAINING

Different Departments of Hospital, Recruitment, Selection, Training Guidelines – Methods of Training – Evaluation of Training – Leadership grooming and Training, Promotion – Transfer.

UNIT IV PLANNING SUPPORTIVE SERVICES

Medical Records Department – Central Sterilization and Supply Department – Pharmacy – Food Services - Laundry Services.

UNIT V COMMUNICATION AND SAFETY ASPECTS IN HOSPITAL


TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCE:

BM2306 MICROPROCESSOR AND MICROCONTROLLER LAB

8085 based experiments

- Assembly Language Programming of 8085
- Programs for 16 bit Arithmetic, Sorting, Searching and String operations,
- Programs for Digital clock, Interfacing ADC and DAC
- Interfacing and Programming 8279, 8259, and 8253.
- Serial Communication between two Microprocessor Kits using 8251.
- Interfacing and Programming of Stepper Motor and DC Motor Speed control and Parallel Communication between two Microprocessor Kits using Mode 1 and Mode 2 of 8255.
- Macroassembler Programming for 8086

8086 based experiments

1. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051 microcontroller.
2. Programming and verifying Timer, Interrupts and UART operations in 8051 microcontroller.
3. Interfacing – DAC and ADC and 8051 based temperature measurement
4. Interfacing – LED and LCD
5. Interfacing – stepper motor traffic light control
6. Communication between 8051 Microcontroller kit and PC.

TOTAL: 45 PERIODS
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description of Equipment</th>
<th>Quantity Required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
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<tbody>
<tr>
<td>1.</td>
<td>8085 Trainer Kit</td>
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<tr>
<td>2.</td>
<td>8051 Trainer Kit</td>
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<td>3.</td>
<td>8086 Trainer Kit</td>
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<tr>
<td>4.</td>
<td>8255 Addon card (PPI) compatable with 8085/8051/8086</td>
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<td>3 Nos.</td>
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<tr>
<td>5.</td>
<td>8251 Addon card (Serial) compatable with 8085/8051/8086</td>
<td></td>
<td>3 Nos.</td>
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<td>6.</td>
<td>8279 Addon card compatible with 8085/8051/8086</td>
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<td>3 Nos.</td>
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<td>7.</td>
<td>Stepper Motor &amp; Interfacing card Compatible</td>
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<td>3 Nos.</td>
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</tr>
<tr>
<td>8.</td>
<td>ADC x DAC Interfacing card compatible with 8085/8051/8086</td>
<td></td>
<td>3 Nos.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>LED &amp; LCD Interfacing card</td>
<td></td>
<td>3 Nos.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>8086 Macro assembler with PC P(IV)</td>
<td></td>
<td>3 Nos</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Personal Computer</td>
<td></td>
<td>1 No.</td>
<td></td>
</tr>
</tbody>
</table>

**BM2307 BIO MEDICAL INSTRUMENTATION LAB**

- Design of low noise pre-amplifier for ECG
- Study of characteristics of temperature sensors – thermistor, thermocouple and RTD
- Measurement of pulse rate using photo transducer
- Measurement of respiration rate
- Measurement of blood flow velocity using ultrasound transducer
- Study of ESU – cutting and coagulation modes
- pH Measurement and conductivity test
- Measurement of heart rate using F-V converter
- Galvanic skin resistance (GSR) measurement
- Recording of Audiogram

**TOTAL:45 PERIODS**
## Requirement for a batch of 30 students

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description of Equipment</th>
<th>Quantity Required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.</td>
<td>Low Persistance CRO</td>
<td>3 Nos.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Low Frequency Oscillator (1 Hz to 5 KHz and above)</td>
<td>5 Nos.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Thermistor, Thermocouple, RTD module with accessories</td>
<td>1 No. each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Pulse rate measurement setup with accessories</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Respiration rate measurement setup with accessories</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Ultrasound Doppler flow meter</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Electrosurgical unit</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>GSR Measurement setup with accessories</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Audiometer (air conduction, bone conduction test)</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>pH meter</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Conductivity meter</td>
<td>1 No.</td>
<td></td>
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</tr>
<tr>
<td>24.</td>
<td>CRO (0-5 MHz)</td>
<td>5 Nos.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GE2321 COMMUNICATION SKILLS LABORATORY L T P C 0 0 4 2

(Fifth / Sixth Semester)

Globalisation has brought in numerous opportunities for the teeming millions, with more focus on the students’ overall capability apart from academic competence. Many students, particularly those from non-English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre-employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the industry environment, thus rendering them as prospective assets to industries. The course will equip the students with the necessary communication skills that would go a long way in helping them in their profession.
OBJECTIVES:

- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their job.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

<table>
<thead>
<tr>
<th>I. PC based session</th>
<th>(Weightage 40%)</th>
<th>24 periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. ENGLISH LANGUAGE LAB</td>
<td>(18 Periods)</td>
<td></td>
</tr>
<tr>
<td>1. LISTENING COMPREHENSION:</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Listening and typing – Listening and sequencing of sentences – Filling in the blanks - Listening and answering questions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. READING COMPREHENSION:</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. SPEAKING</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. DISCUSSION OF AUDIO-VISUAL MATERIALS</td>
<td>(6 PERIODS)</td>
<td></td>
</tr>
<tr>
<td>(Samples are available to learn and practice)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. RESUME / REPORT PREPARATION / LETTER WRITING</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Structuring the resume / report - Letter writing / Email Communication - Samples.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. PRESENTATION SKILLS:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. SOFT SKILLS:</td>
<td>2</td>
<td></td>
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<tr>
<td>Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management &amp; Poise - Video Samples</td>
<td></td>
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<tr>
<td>4. GROUP DISCUSSION:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Why is GD part of selection process ? - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work - Body Language - Mock GD -Video samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. INTERVIEW SKILLS:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews-Video samples.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Practice Session</th>
<th>(Weightage – 60%)</th>
<th>24 periods</th>
</tr>
</thead>
</table>

50
1. **Resume / Report Preparation / Letter writing**: Students prepare their own resume and report.

2. **Presentation Skills**: Students make presentations on given topics.

3. **Group Discussion**: Students participate in group discussions.

4. **Interview Skills**: Students participate in Mock Interviews

**REFERENCES:**

**LAB REQUIREMENTS:**
1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Server</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>o PIV system</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>o 1 GB RAM / 40 GB HDD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o OS: Win 2000 server</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Audio card with headphones (with mike)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o JRE 1.3</td>
<td></td>
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<tr>
<td>2.</td>
<td><strong>Client Systems</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>o PIII or above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o 256 or 512 MB RAM / 40 GB HDD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o OS: Win 2000</td>
<td></td>
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<tr>
<td></td>
<td>o Audio card with headphones (with mike)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o JRE 1.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. **Softwares**
   a) Interactive Teacher Control Software   Available / Not Available
   b) English Language Lab Software   Available / Not Available
   c) Career Lab software   Available / Not Available

4. **Handycam Video Camera (with video lights and mic input)**   1 No.

5. **Television - 29”**   1 No.
6. **Collar mike**   1 No.
7. **Cordless mikes**   1 No.
8. **Audio Mixer**   1 No.
9. **DVD Recorder / Player**   1 No.

**L: 45, T: 15, TOTAL= 60 PERIODS**

**BM2351**

**RADIOLOGICAL EQUIPMENT**

**L T P C**

3 0 0 3

**AIM**
To get the clear understanding of X-ray generation and radio isotopes and various techniques used for visualizing organs in detail.

**OBJECTIVES:**
To study the functioning of X-ray tubes and scattered radiation and method by which fogginess can be reduced.
To study the different types radio diagnostic unit.
To know the techniques to visualize opaque, transparent organs.
To study the special techniques adopted to visualize different sections of any organ.

**UNIT I**

**MEDICAL X-RAY EQUIPMENT**

**UNIT II**

**COMPUTER TOMOGRAPHY**
UNIT III  MRI

UNIT IV  NUCLEAR MEDICINE SYSTEMS

UNIT V  RADIATION THERAPY AND RADIATION SAFETY

TOTAL :45 PERIODS

TEXT BOOKS:

REFERENCES:

BM 2352  BIOMECHANICS

UNIT I  INTRODUCTION

UNIT II  MECHANICS OF PHYSIOLOGICAL SYSTEMS
Heart valves, power developed by the heart, prosthetic valves. Constitutive equations for soft tissues, dynamics of fluid flow in cardiovascular system and effect of vibration - shear stresses in extra-corporal circuits.
UNIT III  ORTHOPAEDIC MECHANICS  9
Mechanical properties of cartilage, diffusion properties of articular cartilage, mechanical properties of bone, kinetics and kinematics of joints, Lubrication of joints.

UNIT IV  MATHEMATICAL MODELS  9
Introduction to Finite Element Analysis, Mathematical models - pulse wave velocities in arteries, determination of in-vivo elasticity of blood vessel, dynamics of fluid filled catheters.

UNIT V  ORTHOPAEDIC APPLICATIONS  9

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

BM2353  DIAGNOSTIC AND THERAPEUTIC EQUIPMENTS-II  L T P C
UNIT I  ULTRASONIC TECHNIQUE  9
Diagnosis: Basic principles of Echo technique, display techniques A, B and M mode, Application of ultrasound as diagnostic tool – Echocardiogram, abdomen, obstetrics and gynaecology, ophthalmology.

UNIT II  PATIENT MONITORING AND BIOTELEMETRY  9
ICU/CCU Equipments, Infusion pumps, bed side monitors, Central consoling controls. Radio Telemetry (single, multi), Portable and Landline Telemetry unit, Applications in ECG and EEG Transmission.

UNIT III  DIATHERMY  9
IR and UV lamp and its application. Thermography – Recording and clinical application. Short wave diathermy, ultrasonic diathermy, Microwave diathermy, Electro surgery machine - Current waveforms, Tissue Responses, Electro surgical current level.

UNIT IV  EXTRA CORPOREAL DEVICES AND SPECIAL DIAGNOSTIC TECHNIQUES  9
UNIT V  PATIENT SAFETY  9
Physiological effects of electricity – important susceptibility parameters – Macro shock –
Micro shock hazards – Patient’s electrical environment – Isolated Power system –
Conductive surfaces – Electrical safety codes and standards – Basic Approaches to
protection against shock, Protection equipment design, Electrical safety analyzer – Testing
the Electric system

TEXT BOOKS:
1. Leslie Cromwell, “Biomedical Instrumentation and Measurement”, Prentice Hall of
   India, New Delhi, 2007
2. John G. Webster, “Medical Instrumentation Application and Design”, John Willey and
   sons, 2002
3. Joseph J. Carr and John M. Brown, “Introduction to Biomedical equipment
technology”, John Willey and sons, New York, 1997

REFERENCES:
1. Principles of Biomedical Instrumentation and Measurement” – Richard Aston, Merril
   Publishing Company, 1990
3. John G. Webster, Bioinstrumentation”, John Willey and sons, New York, 2004
   Delhi, 2003.
5. Standard Handbook of Biomedical Engineering & Design – Myer Kutz
   McGraw-Hill Publisher, 2003

CS2361  INTERNET AND JAVA  L T P C  3 0 0 3
UNIT I  WORLD WIDE WEB  9
HTTP protocol, Web browsers Netscape, Internet explorer, Web site and web page
design, XHTML, Dynamic HTML, CSS.

UNIT II  JAVASCRIPT PROGRAMMING  9
Introduction, Control statements, Functions, Arrays and Objects.

UNIT III  9
Micromedia Dream Weaver, XML, Web Servers, Databases – SQL, MYSQL, DBI and
ADO.NET

UNIT IV  JAVA PROGRAMMING:  9
Language features, Classes, Object and methods. Sub-classing and dynamic binding,
Multithreading, Overview of class library, Object method serialization, Remote method
invocation, Java Servelets and Javaserver pages.

UNIT V  WEB DESIGN AND MEDICAL STANDARDS  9
Web Design case studies – Design and development of Dynamic Hospital Information
System Web sites using Macromedia Dreamweaver, Java, XML, Javascript, Programming
Techniques. HL7 Standards, DICOM standards.

TOTAL:45 PERIODS
TEXT BOOKS:

REFERENCES:

BM2356 DIGITAL SIGNAL PROCESSING LAB L T P C
0 0 3 2

MATLAB / Equivalent Software Package(30% of the course)
1. Generation of sequences (functional & random), correlation and convolution
2. Spectrum Analysis using FFT
3. Filter Design & Analysis
4. Filter Implementation in time-domain & frequency domain
5. Study of Quantization errors in DSP algorithms
6. Multirate Filters
7. Adaptive filter
8. Equalization
9. Echo Cancellation

DSP Processor Implementation (70% of the course)
1. Waveform Generation
2. FIR Implementation
3. IIR Implementation
4. FFT
5. Finite word Length effect
6. Multirate filters
CS2362  INTERNET AND JAVA PROGRAMMING LABORATORY  L T P C
0 0 3 2

Programs using basic elements and design of Web pages, hyperlinks and web navigation using HTML, XHTML and CSS.
Java script programs using control statements, functions, arrays and objects and applications in web environment
Macromedia Dreamweaver platform to design and develop web pages, insert images and links into web pages, create XHTML elements to be able insert script into Dreamweaver pages and site management
Programs relating to relational database model, database queries using SQL, MYSQL database server and interfaces
Java programming using GUI components, java applet applications, servelets and java server pages.
Design and development of a web based dynamic Hospital Information System

TOTAL : 60 PERIODS

BM2355  DIAGNOSTIC AND THERAPEUTIC EQUIPMENT LAB  L T P C
0 0 3 2

Recording and analysis of ECG signals
Recording and analysis of EEG signals.
Recording - Fatigue test of EMG signals.
Simulation of ECG – detection of QRS complex and heart rate
Study of Pacemaker simulator
Study of Defibrillator simulator
Study of shortwave and ultrasonic diathermy.
Study of biotelemetry
Electrical safety measurements.
Mini project

TOTAL : 60 PERIODS

BM2401  PATTERN RECOGNITION AND NEURAL NETWORKS  L T P C
3 0 0 3

UNIT I  INTRODUCTION AND SIMPLE NEURAL NET  9
Elementary neurophysiology and biological neural network-Artificial neural network – Architecture, biases and thresholds, Hebb net, Perceptron, Adaline and Madaline.

UNIT II  BACK PROPOGATION AND ASSOCIATIVE MEMORY  9
Back propogation network, generalized delta rule, Bidirectional Associative memory, Hopefield network

UNIT III  NEURAL NETWORKS BASED ON COMPETITION  9
Kohonen Self organising map, Learning Vector Quantisation, counter propogation network.

UNIT IV  UNSUPERVISED LEARNING AND CLUSTERING ANALYSIS  9
Patterns and features, training and learning in pattern recognition, discriminant functions, different types of pattern recognition. Unsupervised learning- hierarchical clustering, partitional clustering. Neural pattern recognition approach – perceptron model
UNIT V  SUPERVISED LEARNING USING PARAMETRIC AND NON PARAMETRIC APPROACH

Bayesian classifier, non parametric density estimation, histograms, kernels, window estimators, k-nearest neighbour classifier, estimation of error rates.

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT V RECENT TRENDS IN MEDICAL INFORMATICS

Virtual reality applications in medicine, Computer assisted surgery, Surgical simulation, Telemedicine - Tele surgery computer aids for the handicapped, computer assisted instrumentation in Medical Informatics - Computer assisted patient education and health care information.

TEXT BOOKS:


BM2403 MEDICAL OPTICS L T P C

UNIT I OPTICAL PROPERTIES OF THE TISSUES

9

Refraction, Scattering, absorption, light transport inside the tissue, tissue properties, Light interaction with tissues, optothermal interaction, fluorescence, speckles.

UNIT II INSTRUMENTATION IN PHOTONICS

9

Instrumentation for absorption, scattering and emission measurements, excitation light sources – high pressure arc lamp, solid state LEDs, Lasers, optical filters, polarizer, solid state detectors, time resolved and phase resolved detectors.

UNIT III APPLICATIONS OF LASERS

9

Laser in tissue welding, lasers in dermatology, lasers in ophthalmology, otolaryngology, urology.

UNIT IV OPTICAL TOMOGRAPHY

9

Optical coherence tomography, Elastrography, Doppler optical coherence tomography, Application towards clinical imaging.

UNIT V SPECIAL OPTICAL TECHNIQUES

9

Near field imaging of biological structures, in vitro clinical diagnostic, fluorescent spectroscopy, photodynamic therapy.

TOTAL : 45 PERIODS

TEXT BOOKS


REFERENCES:

AIM
To study the image processing techniques

OBJECTIVE
- To study the image fundamentals and image transforms
- To study the image enhancement techniques
- To study the image restoration procedures
- To study the image compression procedures

UNIT I  DIGITAL IMAGE FUNDAMENTAL  9
Elements of digital image processing systems - Elements of visual perception – image sampling and quantization – basic relationships between pixels - matrix and singular value representation of discrete images.

UNIT II  IMAGE TRANSFORMS  9

UNIT III  IMAGE ENHANCEMENT  9
Gray level transformation – Histogram processing – enhancement using arithmetic/logic operation – spatial filtering – smoothening and sharpening spatial filter – smoothening in frequency domain filter – homomorphic filtering

UNIT IV  IMAGE RESTORATION AND RECOGNITION  9

UNIT V  IMAGE COMPRESSION  9

TEXT BOOKS:

REFERENCES:
BM2406  DIGITAL IMAGE PROCESSING LAB  L T P C  0 0 3 2

1. Display of Grayscale Images.
2. Histogram Equalization.
4. Edge detection using Operators.
5. 2-D DFT and DCT.
6. Filtering in frequency domain.
7. Display of color images.
8. conversion between color spaces.
9. DWT of images.
10. Segmentation using watershed transform.

REFERENCE:

TOTAL : 60 PERIODS

BM2021  BIOFLUIDS AND DYNAMICS  L T P C  3 0 0 3

UNIT I  10

UNIT II  10

UNIT III  9

UNIT IV  8
UNIT V
ORTHOPEDIC MECHANICS: Mechanical properties of cartilage, diffusion properties of Articular cartilage, mechanical properties of bone, kinetics and kinematics of joints, lubrication of joints.

TEXT BOOKS:

REFERENCE:

BM 2022 BIOMETRIC SYSTEM L T P C
3 0 0 3

UNIT I BIOMETRIC FUNDAMENTALS
Key Biometric terms and Processes – Definitions-verification and identification – matching, Accuracy in Biometric Systems – False match rate - False nonmatch rate - Failure to enroll rate – Derived metrics - An Introduction to Biometric Authentication Systems- a taxonomy of application environment, a system model, biometrics and privacy.

UNIT II FINGERPRINT IDENTIFICATION TECHNOLOGY

UNIT III IRIS RECOGNITION
Introduction, Anatomical and Physiological underpinnings, Components, Sensing, Iris Scan Representation and Matching, Iris Scan Strengths and Weaknesses, System Performance, Future Directions.

UNIT IV FACE RECOGNITION
Introduction, components, Facial Scan Technologies, Face Detection, Face Recognition - Representation and Classification, Kernel- based Methods and 3D Models, Learning the Face Spare, Facial Scan Strengths and Weaknesses, Methods for assessing progress in Face Recognition.

UNIT V VOICE SCAN
TEXT BOOKS:

REFERENCE:

CS2068 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING
L T P C
3 0 0 3

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING
Introduction- Tokens-Expressions-contour Structures –Functions in C++, classes and objects, constructors and destructors, operators overloading and type conversions.

UNIT II ADVANCED OBJECT ORIENTED PROGRAMMING
Inheritance, Extending classes, Pointers, Virtual functions and polymorphism, File Handling Templates, Exception handling, Manipulating strings.

UNIT III DATA STRUCTURES & ALGORITHMS
Algorithm, Analysis, Lists, Stacks and queues, Priority queues-Binary Heap-Application, Heaps, skew heaps, Binomial—hashing-hash tables without linked lists

UNIT IV NONLINEAR DATA STRUCTURES

UNIT V SORTING AND SEARCHING
Sorting – Insertion sort, Shell sort, Heap sort, Merge sort, Quick sort, Indirect sorting, Bucket sort, External sorting, Disjoint set class, Algorithm Design Techniques—Greedy algorithm, Divide and Conquer, Dynamic Programming, Randomized Algorithm, Backtracking algorithm.

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I  INTRODUCTION  9

UNIT II  DATA PATH DESIGN  9
Fixed Point Arithmetic, Addition, Subtraction, Multiplication and Division, Combinational and Sequential ALUs, Carry look ahead adder, Robertson algorithm, booth’s algorithm, non-restoring division algorithm, Floating Point Arithmetic, Coprocessor, Pipeline Processing, Pipeline Design, Modified booth’s Algorithm

UNIT III  CONTROL DESIGN  9
Hardwired Control, Microprogrammed Control, Multiplier Control Unit, CPU Control Unit, Pipeline Control, Instruction Pipelines, Pipeline Performance, Superscalar Processing, Nano Programming.

UNIT IV  MEMORY ORGANIZATION  9
Random Access Memories, Serial - Access Memories, RAM Interfaces, Magnetic Surface Recording, Optical Memories, multilevel memories, Cache & Virtual Memory, Memory Allocation, Associative Memory.

UNIT V  SYSTEM ORGANIZATION  9
Communication methods, Buses, Bus Control, Bus Interfacing, Bus arbitration, IO and system control, IO interface circuits, Handshaking, DMA and interrupts, vectored interrupts, PCI interrupts, pipeline interrupts, IOP organization, operation systems, multiprocessors, fault tolerance, RISC and CISC processors, Superscalar and vector processor.

TOTAL : 45 PERIODS

TEXTBOOKS:

REFERENCES:
UNIT I

UNIT II
IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures..

UNIT III

UNIT IV

UNIT V
Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TEXT BOOKS:

REFERENCES:
UNIT II
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III

UNIT IV
Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V
Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

BM2023 PHYSIOLOGICAL MODELLING L T P C 3 0 0 3

UNIT I
PROPERTIES OF SYSTEMS AND ELECTRICAL ANALOG
UNIT II  TRANSFER FUNCTIONS  9
Transfer functions and its use, Study of transfer function of first order and second order systems, engineering concept in coupled system, example of Transformed signals.

UNIT III  IMPEDANCE CONCEPT  9
Transfer functions with impedance concept, prediction of performance, identification of the system from impedance function, periodic signals, relationship between transfer function and sinusoidal response, evaluation of transfer function from frequency response.

UNIT IV  FEEDBACK SYSTEMS  9
Characteristics of physiological feedback systems, stability analysis of systems.

UNIT V  SIMULATION OF BIOLOGICAL SYSTEMS  9
Simulation of thermal regulation, pressure and flow control in circulation, occulo motor system, endocrinal system, functioning of receptors.

TOTAL : 45 PERIODS

REFERENCES

BM2024  BIOINFORMATICS  L T P C
3 0 0 3

UNIT I  BIOINFORMATICS  9
Introduction, Overview of structural Bioinformatics; Characteristics, Categories, Navigation and information retrieval of Bioinformatics databases,

UNIT II  DATABASES  9
Description and Organisation of Sequence, Structure and Other databases; Database Warehousing and data mining in Bioinformatics.

UNIT III  TOOLS  9
Need for tools, Knowledge discovery, Industry trends and data mining tools; Data submission tools, Data analysis tools, Prediction tools and modeling tools.

UNIT IV  MACHINE LEARNING IN BIOINFORMATICS  9
Neural network, Genetic and fuzzy logic applications in Bioinformatics; Modeling for Bioinformatics – Hidden Markov, Comparative, probabilistic and molecular modeling.
UNIT V  ALGORITHMS
Classification algorithms, implementing algorithms, biological algorithms, bioinformatics tasks and corresponding algorithms and algorithms and bioinformatics software; Data analysis algorithms – Sequence comparison, Substitution matrices and sequence alignment optimal algorithm; Prediction algorithms – Gene prediction, Phylogenetic prediction and protein structure prediction algorithms.

TEXT BOOKS:

REFERENCES:
3. Lukas K. Beehler and Hooman H. Rashidi, Bioinformatics basics Applications in biological science and medicine, Taylor and Francis Group, 2005.

EC2352  COMPUTER NETWORKS  L T P C
3 0 0 3

AIM
To introduce the concept, terminologies, and technologies used in modern data communication and computer networking.

OBJECTIVES:
1. To introduce the students the functions of different layers.
2. To introduce IEEE standard employed in computer networking.
3. To make students to get familiarized with different protocols and network components.

UNIT I  PHYSICAL LAYER

UNIT II  DATA LINK LAYER
Wireless LANS : IEEE 802.11– Bluetooth.
Connecting LANS: Connecting devices - Backbone networks - Virtual LANS
Virtual circuit networks: Architecture and Layers of Frame Relay and ATM.
UNIT III  NETWORK LAYER  9
Logical addressing: IPv4, IPv6 addresses

UNIT IV  TRANSPORT LAYER  7

UNIT V  APPLICATION LAYER  10
Domain Name System (DNS) – E-mail – FTP – WWW – HTTP – Multimedia

TOTAL : 45PERIODS

TEXT BOOKS

REFERENCES:
1. Wayne Tomasi, “Introduction to Data Communication and Networking”, 1/e, Pearson Education.

CS2069  COMPUTER HARDWARE, INTERFACING AND INSTRUMENTATION  L T P C
AND INSTRUMENTATION  3 0 0 3

UNIT I  INTEL ADVANCED PROCESSORS  7
80186, 80286- Architecture, Programming enhancements, 80c188EB interfacing

UNIT II  INTEL 80386, 80486 PROCESSOR  10
80386- Introduction, Special 80386 registers, Memory management, Protected mode, virtual 8086 mode, memory paging mechanism, 80486 Microprocessor – Introduction and architecture.
UNIT III PENTIUM PROCESSORS 10
Pentium Architecture- Memory Management- New Pentium instructions - Pentium Pro microprocessors - Pentium II, Pentium III, Pentium 4- Special Features and Software changes.

UNIT IV PC HARDWARE OVERVIEW 10
Functional Units & Interconnection, New Generation Mother Boards 286 to Pentium 4 Bus Interface- ISA- EISA- VESA- PCI- PCIX., Memory and I/O Port Addresses, Peripheral Interfaces and Controller.

UNIT V PC BASED DATA ACQUISITION 8

TOTAL : 45 PERIODS

TEXTBOOKS:

REFERENCES:

BM2027 REFRIGERATION AND AIR CONDITIONING L T P C
3 0 0 3

UNIT I REFRIGERATION CYCLES & REFRIGERANTS 9

UNIT II SYSTEM COMPONENTS 9

UNIT III CYCLING CONTROLS AND SYSTEM BALANCING 9
Pressure and Temperature controls. Range and Differential settings. Selection and balancing of system components - Graphical method.
UNIT IV  PSYCHROMETRY  9
Moist air behaviour, Psychrometric chart, Different Psychrometric process analysis.

UNIT V  AIR CONDITIONING  9

TOTAL : 45 PERIODS

TEXT BOOK:

REFERENCES:

GE2022  TOTAL QUALITY MANAGEMENT  L T P C
3 0 0 3

UNIT I  INTRODUCTION  9

UNIT II  TQM PRINCIPLES  9
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III  TQM TOOLS & TECHNIQUES I  9

UNIT IV  TQM TOOLS & TECHNIQUES II  9

UNIT IV  QUALITY SYSTEMS  9

TOTAL : 45 PERIODS
TEXT BOOK:

REFERENCES:

EC2038 NANO ELECTRONICS L T P C
3 0 0 3

UNIT I INTRODUCTION TO NANOTECHNOLOGY

UNIT II FUNDAMENTALS OF NANOELECTRONICS

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES
Quantum transport devices based on resonant tunneling:- Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices – applications of single electron devices to logic circuits.
UNIT IV CARBON NANOTUBES

UNIT V MOLECULAR ELECTRONICS

TEXTBOOKS:

TOTAL: 45 Hrs.
UNIT V  BIOMEMS
CAD for MEMs, Drug delivery, micro total analysis systems (MicroTAS) detection and measurement methods, microsystem approaches to polymerase chain reaction (PCR), DNA hybridization

TEXT BOOKS:

BM2025  ASSIST DEVICES  L T P C
AIM
To understand functioning and usage of electromechanical units which will restore normal functional ability of particular organ which is defective temporarily or permanently.

OBJECTIVES:
- To study various mechanical techniques that will help failing heart.
- To study the functioning of the unit which does the clearance of urea from the blood.
- To understand the tests to assess the hearing loss and development of electronic devices to compensate for the loss.
- To study the various orthotic devices and prosthetic devices to overcome orthopaedic problems.
- To understand electrical stimulation techniques used in clinical applications.

UNIT I  CARDIAC ASSIST DEVICES
Principle of External counter pulsation techniques, intra aortic balloon pump, Auxillary ventricle and schematic for temporary bypass of left ventricle, prosthetic heart valves.

UNIT II  HEMODIALYSERS
Artificial kidney, Dialysis action, hemodialyser unit, membrane dialysis, portable dialyser monitoring and functional parameters.

UNIT III  HEARING AIDS
Common tests – audiograms, airconduction, boneconduction, masking techniques, SISI, Hearing aids – principles, drawbacks in the conventional unit, DSP based hearing aids.

UNIT IV  PROSTHETIC AND ORTHODIC DEVICES
Hand and arm replacement – different types of models, externally powered limb prosthesis, feedback in orthotic system, functional electrical stimulation, sensory assist devices.
UNIT V RECENT TRENDS
Transcutaneous electrical nerve stimulator, bio-feedback.

TEXT BOOKS:

EC2354 VLSI DESIGN

AIM
To introduce the technology, design concepts and testing of Very Large Scale Integrated Circuits.

OBJECTIVES
- To learn the basic CMOS circuits.
- To learn the CMOS process technology.
- To learn techniques of chip design using programmable devices.
- To learn the concepts of designing VLSI subsystems.
- To learn the concepts of modeling a digital system using Hardware Description Language.

UNIT I CMOS TECHNOLOGY
A brief History-MOS transistor, Ideal I-V characteristics, C-V characteristics, Non ideal I-V effects, DC transfer characteristics - CMOS technologies, Layout design Rules, CMOS process enhancements, Technology related CAD issues, Manufacturing issues

UNIT II CIRCUIT CHARACTERIZATION AND SIMULATION
Delay estimation, Logical effort and Transistor sizing, Power dissipation, Interconnect, Design margin, Reliability, Scaling - SPICE tutorial, Device models, Device characterization, Circuit characterization, Interconnect simulation

UNIT III COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN
Circuit families –Low power logic design – comparison of circuit families – Sequencing static circuits, circuit design of latches and flip flops, Static sequencing element methodology- sequencing dynamic circuits – synchronizers

UNIT IV CMOS TESTING
Need for testing- Testers, Text fixtures and test programs- Logic verification- Silicon debug principles- Manufacturing test – Design for testability – Boundary scan
UNIT V  SPECIFICATION USING VERILOG HDL
Basic concepts- identifiers- gate primitives, gate delays, operators, timing controls, procedural assignments conditional statements, Data flow and RTL, structural gate level switch level modeling, Design hierarchies, Behavioral and RTL modeling, Test benches, Structural gate level description of decoder, equality detector, comparator, priority encoder, half adder, full adder, Ripple carry adder, D latch and D flip flop.

TOTAL : 45 PERIODS

TEXTBOOKS:
2. Uyemura J.P: Introduction to VLSI circuits and systems, Wiley 2002

REFERENCES:
2 Wayne Wolf, Modern VLSI design, Pearson Education, 2003
3 M.J.S.Smith: Application specific integrated circuits, Pearson Education, 1997
4 J.Bhasker: Verilog HDL primer, BS publication,2001
5 Ciletti Advanced Digital Design with the Verilog HDL, Prentice Hall of India, 2003
TEXT BOOKS :

REFERENCES :

BM2026 MEDICAL IMAGING TECHNIQUES

AIM
• To study the image reconstruction techniques

OBJECTIVE
• To study the quality assurance test for radiography, method of recording sectional images
• To study the functioning of radioisotopic imaging equipments
• To study the MRI, image acquisition and reconstruction
• To study the 3-D image display techniques

UNIT I ULTRASOUND IN MEDICINE
Production of ultrasound – properties and principles of image formation, capture and display – principles of A-mode, B-mode and M-mode display – Doppler ultrasound and colour flow mapping – applications of diagnostic ultrasound.

UNIT II X-RAY COMPUTED TOMOGRAPHY

UNIT III MAGNETIC RESONANCE IMAGING
Principles of MRI pulse sequence – image acquisition and reconstruction techniques – MRI instrumentation magnetic gradient system RF coils – receiver system functional MRI – Application of MRI

UNIT IV RADIO ISOTOPIC IMAGING
Rectilinear scanners – linear scanners – SPECT – PET Gamma camera radio nuclides for imaging – emission computed CT
UNIT V INFRA RED IMAGING
Physics of thermography – imaging systems – pyroelectric vidicon camera clinical thermography – liquid crystal thermography

TEXT BOOK:

REFERENCES:
1. A. C. Kak, “principles of computed tomography”, IEEE press, Newyork
2. G. A. Hay, “Medical Image formation perception and measurement”,

CS2053 SOFT COMPUTING

UNIT I FUZZY SET THEORY 10

UNIT II OPTIMIZATION 8

UNIT III ARTIFICIAL INTELLIGENCE 10

UNIT IV NEURO FUZZY MODELING 9

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE 8

TOTAL : 45 PERIODS
TEXT BOOKS:

REFERENCES:

BM2028 RAPID PROTOTYPING

UNIT I INTRODUCTION
Basic operation-impact of rapid prototyping and tooling on product development-benefits-applications

UNIT II RAPID PROTOTYPING PROCESSES
Introduction-classification-laminated object manufacturing-fused deposition modeling-stereolithography-solid ground curing-selective laser sintering-3 D printing.

UNIT III CAD PROCESSES

UNIT IV MATERIALS FOR RAPID PROTOTYPING

UNIT V RAPID TOOLING PROCESSES
Introduction-classification-indirect rapid tooling-silicone rubber moulding-epoxy moulding-electro forming-vacuum casting-vacuum forming- rapid tools for injection moulding-direct rapid tooling processes-SLS rapid tool-shape deposition manufacturing – laser deposition lamination- rapid tooling roots.

TOTAL : 45 PERIODS

TEXT BOOK
REFERENCES:

1. PAUL F. JACOBS, Rapid Prototyping and Manufacture. Fundamentals of Stereolithography, 1995
2. Rapid proto typing reports, CAD/CAM publishing, 1991
4. Rapid Tools for Injection Moulding
   (www.vmreg.com/raptia/reports/CRIF.pdf)
   Applications of RP techniques for Sheet Metal Forming
   (www.raptia.org)
   Medical RP applications
   (http://home.att.net/~rppat/museum/mus-5.htm)