17BECC101   **ENGLISH FOR ENGINEERS**   **L T P C**
                                                         3 0 0 3

OBJECTIVES:

- To enable students to attain fluency and accuracy to inculcate proficiency in professional communication to meet the growing demand in the field of Global communication.
- To help students acquire their ability to speak effectively in real life situations.
- To inculcate the habit of reading and to develop their effective reading skills.
- To ensure that students use dictionary to improve their active and passive vocabulary.
- To enable students to improve their lexical, grammatical and communicative competence.
- To develop their intellectual, personal and professional abilities.

INTENDED OUTCOMES:

Students undergoing this course will be able to

- Use English language for communication: verbal & non –verbal.
- Enrich comprehension and acquisition of speaking & writing ability.
- Gain confidence in using English language in real life situations.
- Improve word power: lexical, grammatical and communication competence.
- Understand the descriptions of the specific **knowledge**, skills, or expertise that the learner will get from a learning activity.
- Able to compose freely and independently in speech and writing.

UNIT I   LSRW SKILLS & GRAMMAR
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   (9)
Listening –Types of listening- Listening to class reading - Video tapes/ Audio tapes. **Speaking** – Introduction on self. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative. **Writing** – Formal and Informal letters- Letters to the Editor.
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
Tenses -Articles. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

UNIT II   LSRW SKILLS & GRAMMAR
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   (8)
Listening – Understanding the passage in English –Pronunciation practice. **Speaking** – Asking and answering questions. **Reading** – Critical reading – Finding key information in a given text (Skimming - Scanning). **Writing**– Coherence and cohesion in writing – Short paragraph writing – Writing short messages.
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
WH questions –Yes/No Question - Subject Verb agreement. **Vocabulary** – Compound Nouns/Adjectives – Irregular verbs.

UNIT III   LSRW SKILLS & GRAMMAR
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   (8)

Listening – Listening for specific task – fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** –comprehension passages based on general topics or matters of current affairs. **Writing** - Autobiographical writing & Biographical writing.
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
Preposition – Infinitive & Gerund. **Vocabulary** – Foreign words used in English – British and American usage.

UNIT IV   LSRW SKILLS & GRAMMAR, CAREER ORIENTED
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   **(10)**
Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate- Presentations in seminars. **Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing** - Interpreting visual materials (tables, graphs, charts, etc) & Instruction writing.
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
Parts of Speech , Sentence pattern – Voice (active and passive voice). **Vocabulary** – One word substitution.

UNIT V   LSRW SKILLS & GRAMMAR, FIELD WORK
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   **(10)**
Listening –Distinction between native and Indian English (Speeches by TED and Kalam). **Speaking**- Extempore talk –Just-a-minute talk. **Reading**-Reading strategies–Intensive reading – Text analysis. **Writing** - Creative writing – Writing circulars and notices – Writing proposal.
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
Direct and Indirect speech – Conditional sentences - Auxiliary verbs. **Vocabulary** – Abbreviations & Acronyms.
Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

                                                                    Total Hours: 45
TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles and Practice 2nd Edition	OUP, New Delhi.	2015

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2009
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES:

1. www.learnerstv.com – Listening/ Speaking/ Presentation
2. www.usingenglish.com – Writing/ Grammar
3. www.englishclub.com – Vocabulary Enrichment/ Speaking
4. www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
5. www.teachertube.com – Writing Technically
6. www.Dictionary.com – Semantic / Grammar

17BECC102   ENGINEERING MATHEMATICS -I   L T P C
                                                     3 2 0 4

OBJECTIVES:

- To develop analytical skills for solving different engineering problems.
- To understand the concepts of Matrices, sequences and series.
- To solve problems by applying Differential Calculus and Differentialequations.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.

INTENDED OUTCOMES:

The student will be able to

- Apply advanced matrix knowledge to Engineering problems.
- Improve their ability in solving geometrical applications of differential calculus problems.
- Improve their ability in vector differentiation.
- Improved facility in algebraic manipulation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Understanding the ideas of differential equations and facility in solving simple standard examples.

UNIT I   MATRICES   (12)
Review of Matrix Algebra - Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic forms – Reduction to canonical form through orthogonal reduction.

UNIT II   DIFFERENTIAL CALCULUS   (12)
Limits, Continuity (Concepts only)- Differentiation- Differentiation Techniques: standard formulae, product rule, quotient rule, chain rule, method of substitution, implicit functions and successive differentiation.

UNIT III   GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS   (12)
Curvature – centre, radius and circle of curvature in Cartesian co- ordinates – Evolutes – Envelope – Evolute as envelope of normals.

UNIT IV   DIFFERENTIAL EQUATIONS   (12)
Introduction to Ordinary differential equations: Linear ordinary differential equations of second and higher order with constant coefficients.
Introduction to Partial differential equations: Linear Partial differential equations of second and higher order with constant coefficients.

UNIT V   VECTOR DIFFERENTIATION   (12)
Vectors-Differentiation of vectors – scalar and vector point functions –vector operator – vector operator applied to scalar point functions: Gradient; vector operator applied to vector point

functions: Divergence and curl; Physical interpretation of divergence and curl, Directional derivative, solenoidal and irrotational vectors.

Total Hours: 60

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Hemamalini. P. T	Engineering Mathematics	McGraw Hill Education (India) Private Limited, New Delhi.	2014
2	Sundaram, V. Lakhminarayan, K.A. & Balasubramanian, R.	Engineering Mathematics for first year.	Vikas Publishing Home, New Delhi.	2006
3	Bali, N.P. & Manish Goyal	A Text Book of Engineering Mathematics	Laxmi Publications Pvt. Ltd., New Delhi.	2014

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Grewel. B. S.	Higher Engineering Mathematics	Khanna Publications, New Delhi.	2014
2	Bhaskar Rao. P. B, Sri Ramachary SKVS, Bhujanga Rao. M	Engineering Mathematics I	BS Publications, India.	2010
3	Ramana. B. V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Company, New Delhi.	2007
4	Shahnaz Bathul	Text book of Engineering Mathematics (Special Functions and Complex Variables)	PHI Publications, New Delhi.	2009
5	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES:

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.intmath.com/matrices-determinants
4. www. Intmath.com/calculus/calculus-intro.php

OBJECTIVE:
1. To understand the properties of matter and thermodynamics with its applications.
2. To introduce the concepts of light, laser and fiber optics for diverse applications.
3. To study the fundamentals of quantum physics and their applications.
4. To comprehend the properties of crystal and its various crystal structures.
5. To study the basics of sound and ultrasonics with appropriate applications.

INTENDED OUTCOME:
1. Identify the elastic nature of materials and its thermodynamic properties.
2. Infer the characteristics of laser and optical fibers for engineering applications.
3. Develop the idea of quantum mechanics through applications.
4. Identify the different atomic arrangements of crystals and its defects.
5. Make use of the concepts of sound waves for medical applications.
6. Illustrate the basic ideas of nuclear reactors for energy resources.

OBJECTIVES:
COURSE OUTCOMES:

UNIT I   PROPERTIES OF MATTER AND THERMODYNAMICS   (9)
Three types of modulus of elasticity – basic definitions, relation connecting the modulii (Derivation), Poisson's ratio- Torsional pendulum- bending of beams - bending   moment – uniform and non uniform bending.
Thermodynamics – laws of thermodynamics- concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II   LASER AND FIBER OPTICS   (9)
Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER - CO_2, Semiconductor LASER- Applications of LASER in industry and medicine.
Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (block diagram)

UNIT III   QUANTUM PHYSICS   (9)
Introduction to quantum theory – Black body radiation - dual nature of matter and radiation – de Broglie wavelength, uncertainty principle –Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box- physical significance of wave function, scanning electron microscope

UNIT IV   CRYSTAL PHYSICS   (9)
Lattice – unit cell – Bravais lattice – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures, crystal defects – point, line and surface defects

UNIT V   ULTRASONICS AND NUCLEAR PHYSICS   (9)
Production of ultrasonics by piezoelectric method –Non Destructive Testing – pulse echo system through transmission and reflection modes - A, B and C – scan displays, Medical applications – Sonogram. Introduction – basics about nuclear fission and fusion, Radiation detectors – semi conductor detector. Reactors – essentials of nuclear reactor- power reactor.

Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641001	2015

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Serway and Jewett	Physics for Scientists and Engineers with	Thomson Brooks/Cole, Indian reprint, New Delhi	2010
2	Gaur, R.K. and Gupta, S.C	Engineering Physics	Dhanpat Rai Publications, New Delhi.	2011
3	M.N. Avadhanulu and PG Kshirsagar	A Text book of Engineering Physics	S. Chand and company, Ltd., New Delhi	2011
4	D.C. Ghosh, N.C. Ghosh, P.K. Haldar	Engineering Physics	University Science, New Delhi	2011
5	P. Khare, A. Swarup	Engineering Physics: Fundamentals and	Jones & Bartlett Learning	2009

WEBSITES:

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www. oyc.yale.edu
4. www.physics.org

17BECH103   ENGINEERING CHEMISTRY   L T P C
17BECH203   3 0 0 3

OBJECTIVES:

> 1. To make the students conversant with basics of water technology.
> 2. To make the student acquire sound knowledge of electrochemistry and storage devices.
> 3. To acquaint the student with concepts of fuels and combustion.
> 4. To develop an understanding of the basic concepts of corrosion science.
> 5. To acquaint the students with the basics of surface chemistry.

INTENDED OUTCOME:

> 1. Outline the basic principles of chemistry for water treatment (K).
> 2. Examine the electrochemical properties to design non – conventional energy storage devices (S).
> 3. Apply the concepts combustion of different fuels (S).
> 4. Identify the concepts of corrosion and its protection in the engineering field (S).
> 5. Apply the concepts of surface chemistry in the field of engineering (S).
> 6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (S).

UNIT I   WATER TECHNOLOGY   9

Sources-Characteristics – Specification for drinking water, BIS &WHO-Alkalinity – Types of alkalinity and determination (No problems) – Hardness – Types and estimation by EDTA method (No problems) - Domestic water treatment – Disinfection methods   (Chlorination, Ozonation. UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination - Reverse osmosis.

UNIT II   ELECTROCHEMISTRY AND STORAGE DEVICES   9

Electrolytic conductance-application (conductometric titration)- Electrochemical cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes – Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+}vs dichromate) –-Batteries- Primary batteries-Leclanche cell- Secondary batteries- Lead acid battery. An introduction to Fuel Cell- H_2-O_2 Fuel Cell.

UNIT III   FUELS AND COMBUSTION   9

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas, Combustion of fuel-Introduction-GCV-NCV- Problems on Calculation of GCV & NCV - Flue gas analysis.

UNIT IV   CORROSION SCIENCE   9

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion - Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective coatings – Organic coatings-Paints - Constituents and functions –Inorganic coatings- Metallic coatings - Electroplating of Cu over Fe and Electro less plating (Ni) - Surface conversion coating - Hot dipping.- Anodizing of Al

UNIT V   SURFACE CHEMISTRY AND PHASE RULE   9

Introduction-Adsorption-Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms-Freundlich adsorption isotherm-Langmuir adsorption isotherm-Role of adsorbents in industries (catalysis and water softening).

Phase Rule: Definition -Phase diagrams – one component water system, two component Ag-Pb system.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Dr. Vairam.S	Engineering Chemistry	Gems Publishers, Coimbatore.	2014
2	Dr. Ravikrishnan.A	Engineering Chemistry I & II	Sri Krishna Hi Tech Publishing Company (P) Ltd., Chennai.	2012

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Raman Sivakumar	Engineering Chemistry I &II	McGraw-Hill Publishing Co.Ltd., 3rd Reprint NewDelhi.	2013
2	Kuriakose. J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010
3	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009
4	Dara.S. S	Text book of Engineering Chemistry.	S. Chand & Co.Ltd., New Delhi	2008
5	Sharma.B. K	Engineering Chemistry	Krishna Prakasam Media (P) Ltd., Meerut	2001

WEBSITES:
1. http://www.studynotes.ie/leaving-cert/chemistry/
2. http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html
3. http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm
4. http://ocw.mit.edu/courses/#chemistry
5. http://www.chem.qmul.ac.uk/surfaces/sec

17BEEC104   **BASIC ELECTRICAL ENGINEERING**   **L T P C**
                                                            3 0 0 3

OBJECTIVES:

- To impart the basic knowledge about the Electric circuits.
- To understand the working of Electrical Machines and Transformers.
- To understand the working of Power Converters and components of low-voltage electrical installations.
- To divulge the basics of analysis of simple circuits with dc excitation
- To make the students familiar with construction and working of various electrical machines.
- To learn the voltage and current relations in star and delta connections.

INTENDED OUTCOME:

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters.
- To introduce the components of low-voltage electrical installations
- Gain good knowledge in batteries and their important characteristics.
- Clear idea about the components of LT Switchgear.
- Understand the concept Single-phase and three-phase voltage source inverters.

UNIT I   FUNDAMENTALS OF DC CIRCUITS   9

Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law,Voltage-Current relations for resistor, inductor, capacitor, Kirchhoff's laws, Mesh analysis, Nodal analysis –equivalent resistor, current division, voltage division

UNIT II   MAGNETIC CIRCUITS   9

Introduction to magnetic circuits-Simple magnetic circuits-Faraday's laws, Lenz law-Flemings rules - induced emfs and inductances-self and mutual inductance.

UNIT III   AC CIRCUITS (Elementary treatment only)   9

Generation of AC, Average and RMS values, Form and peak factors, concept of phasor representation, J operator – representation of AC in rectangular and polar form – power and power factor - Introduction to three phase systems - types of connections, relationship between line and phase values.

UNIT VI   ELECTRICAL MACHINES (Elementary treatment only)   9

Working principle, construction, types and applications of DC machines and AC machines – single phase transformers - single phase induction motors: capacitor start and capacitor start & run motors

**UNIT V   ELECTRICAL SAFETY, WIRING AND INTRODUCTION TO
              POWER SYSTEM   9**

Safety measures in electrical system- types of wiring- wiring accessories staircase, fluorescent lamps & corridor wiring- Basic principles of earthing-Types of earthing-protection devices MCB- Fuses and its types –calculation of fuses.

                                                            Total Hours: 45

TEXTBOOK

S. NO.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dash.S.S,Subramani. C,Vijayakumar.K	Basic Electrical Engineering First edition	Vijay Nicole Imprints Pvt.Ltd	2013

REFERENCES

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Smarajt Ghosh	Fundamentals of Electrical & Electronics Engineering 2nd Edition	PHI Learning	2007
2	Metha.V. K, RohitMetha	Basic Electrical Engineering5^{th} Editon.	Chand.S& Co	2012
3	Kothari.D. P and Nagrath.I. J	Basic Electrical Engineering2^{nd} Edition	Tata McGraw – Hill	2012
4	Bhattacharya.S. K	Basic Electrical and Electronics Engineering1^{st} Edition	Pearson Education	2011

WEBSITES:

1. www.nptel.com
2. www.electrical4u.com

17BEEC105   **BASIC ELECTRONICS ENGINEERING**   **L T P C**
                                                      3 0 0 3

OBJECTIVES:

- To impart the basic knowledge about the Electric circuits.
- To impart the basic knowledge about the basic electronic components.
- To understand the operation and characteristics of various semiconductor devices.
- To understand the concept of Electro Mechanical Energy Conversion and Transformers.
- To understand the working of Semiconductor devices and Measuring Instruments.
- To impart the basic knowledge of Digital Circuits.

INTENDED OUTCOME:

- Attributing the electric circuits with DC and AC excitation by applying various circuit laws.
- Attributing the magnetic circuits and transformer.
- Reproduce the two port networks.
- Evaluate the various digital circuits in real time applications.
- Analysis various semiconductor devices in real time applications.
- Reproduce the Measuring Instruments.

UNIT I- ELECTRONIC COMPONENTS   9
Passive components – resistors, capacitors and inductors -properties, common types, I-V relationship and uses.

UNIT II- SEMICONDUCTOR DEVICES   9
Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT, JFET.

UNIT III – OPTOELECTRONIC DEVICES   9
Construction and Operation: LED, LCD, 7-Segment Display, LDR, Photodiode, Phototransistor, Solar cell, Opto couplers

UNIT IV- TRANSDUCERS   9
Transducers - Instrumentation – general aspects, classification of transducers, basic requirements of transducers, passive transducers - strain gauge, thermistor, Hall-Effect transducer, LVDT, and active transducers – piezoelectric and thermocouple.

UNIT V- DIGITAL ELECTRONICS   9
Number systems – binary codes - logic gates - Boolean algebra, laws & theorems-simplification of Boolean expression - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

Total Hours: 45

TEXTBOOKS

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication

1	Thyagarajan.T SendurChelvi.K. P Rangaswamy.T. R	Engineering Basics: lectrical, Electronics and Computer Engineering -3rd Edition	New Age International	2007
2	SomanathanNair.B Deepa.S. R	Basic Electronics	I.K. International Pvt.Ltd	2009

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Thomas L. Floyd	Electronic Devices 9th Edition	Pearson Education	2011
2	Rajput.R. K	Basic Electrical and Electronics Engineering 1st Edition	LaxmiPublications	2007

WEBSITES:

1.ww.nptel.com
2. www.electrical4u.com

17BEPH111   ENGINEERING PHYSICS LABORATORY   L T P C
17BEPH211   0 0 4 2

OBJECTIVE:

- To develop basic laboratory skills and demonstrating the application of physical principles.
- To prepare for the lab experiment and perform individually a wide spectrum of experiments.
- To present experimental data in various appropriate forms like tabulation, and plots.
- To analyze, Interpret and Summarize experimental results.
- To communicate clearly understanding of various experimental principles, instruments/setup, and procedure.

INTENDED OUTCOME:

- The students will have the knowledge on Physics practical experiments and that knowledge will be used by them in different engineering and technology applications.
- Prepare for the lab experiment and perform individually a wide spectrum of experiments.
- Present experimental data in various appropriate forms like tabulation, and plots.
- Analyze, Interpret and Summarize experimental results.
- Communicate clearly understanding of various experimental principles, instruments/setup, and procedure.
- Prepare to develop the skills for understanding basic electric circuits.

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.

2. Determination of wavelength of mercury spectrum – spectrometer grating.

3. Determination of Young's modulus of the material – Non uniform bending (or) Uniform bending.

4. Determination of Viscosity of liquid – Poiseuille's method.

5. Spectrometer Dispersive power of a prism.

6. Torsional pendulum – Determination of Rigidity modulus.

7. Particle size determination using Diode Laser

8. Determination of Laser parameters – Wavelength, and angle of divergence.

9. Determination of acceptance angle in an optical fiber.

10. Determination of thickness of a thin wire – Air wedge method

11. Determination of Band Gap of a semiconductor material.

12. Determination of Specific resistance of a given coil of wire – Wheatstone Bridge

17BECH111   ENGINEERING CHEMISTRY LABORATORY   L T P C
17BECH211   0 0 4 2

OBJECTIVE:

- To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.
- To estimate the amount of alkalinity ions, hardness, chloride in water sample
- To make the student acquire practical skills in the determination of conductance of solutions, EMF etc
- To acquaint the students with the determination of molecular weight of a polymer by viscometry
- To carried out different types of titrations for estimation of concerned in materials

INTENDED OUTCOME:

- The students will be outfitted with hands-on knowledge in quantitative chemical analysis of water quality parameters and corrosion measurement.
- Estimate the amount of alkalinity ions, hardness, chloride in water sample
- Measure molecular/system properties of conductance of solutions, EMF etc
- Acquaint the students with the determination of molecular weight of a polymer by visocometry
- Determine the corrosion rate of steel by weight loss method.
- Carrying out different types of titrations for estimation of concerned in materials using comparatively more qualities and quantities of materials involved for accurate results

LIST OF EXPERIMENTS – CHEMISTRY

1. Estimation of alkalinity of Water sample.
2. Estimation of hardness of Water by EDTA
3. Estimation of chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Conductometric Titration (Simple acid base).
6. Conductometric Titration (Mixture of weak and strong acids).
7. Conduct metric Titration using $BaCl_2$ vs $Na_2 SO_4$.
8. pH Titration (acid & base).
9. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$).
10. Estimation of Ferric ion by Spectrophotometry.
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Determination of molecular weight and degree of polymerization using Viscometry.
13. Determination of chemical oxygen demand.

17BEEC112   ENGINEERING WORKSHOP PRACTICE LABORATORY   L T P C
                                                                0 0 4 2

OBJECTIVE:

> o To prepare the students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
> o To prepare the students to communicate effectively and to use the techniques, skills, and modern engineering tools necessary for engineering practice

INTENDED OUTCOMES:

> o Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.
> o Students will be able to fabricate components with their own hands.
> o They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
> o By assembling different components, they will be able to produce small devices of their interest

PART – A (MECHANICAL)

1. WELDING
    i. Preparation of arc welding of butt joints, lap joints and tee joints.

2. BASIC MACHINING
    i. Simple Turning and Taper turning
    ii. Drilling and Tapping
    iii. Sheet Metal Work
    iv. Model making – Trays, funnels, etc.

3. DEMONSTRATION ON
    i. Smithy operations
    ii. Foundry operations
    iii. Plumbing Works
    iv. Carpentary Works

PART –B (ELECTRICAL & ELECTRONICS)

4. ELECTRICAL ENGINEERING
    i. Study of electrical symbols and electrical equipments.
    ii. Construct the wiring diagram for Stair case wiring.
    iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energy meter.
    iv. Measurement of electrical quantities – voltage, current, power & power factor in R load.
    v. Measurement of energy using single phase energy meter.

5. ELECTRONICS ENGINEERING
    i. Study of Electronic components– Resistor (color coding), capacitors and inductors.
    ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
    iii. Study of logic gates AND, OR, NOT, NOR and NAND.

Total Hours: 45

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jeyachandran, K. & Balasubramanian, S	A Premier on Engineering Practices Laboratory	Anuradha Publications, Kumbakonam	2007
2	Jeyapoovan, T., Saravanapandian, M	Engineering Practices Lab Manual	Vikas Puplishing House Pvt. Ltd, Chennai	2006
3	Bawa, H.S	Workshop Practice	Tata McGraw – Hill Publishing Company Limited, New Delhi	2007

17BEEC113 **ELECTRICAL ENGINEERING LABORATORY** **L T P C**
                                                          0 0 3 2

OBJECTIVES:

- To impart the basic knowledge about the Electric circuits.
- To understand the concept of Electro Mechanical Energy Conversion and Transformers.
- To understand the working of Semiconductor devices and Measuring Instruments.
- To impart the basic knowledge of Digital Circuits.

INTENDED OUTCOME:

- Attributing the electric circuits with DC and AC excitation by applying various circuit laws.
- Attributing the magnetic circuits and transformer.
- Reproduce the two port networks.
- Evaluate the various digital circuits in real time applications.
- Analysis various semiconductor devices in real time applications.
- Reproduce the Measuring Instruments.

LIST OF EXPERIMENTS

1. Study of Electrical Measurements and the Oscilloscope.
2. Study of Potentiometers and Rheostats.
3. Study and verification of Series Circuits, Parallel Circuits in DC Circuits.
4. Study and verification of Series-Parallel Circuits in DC Circuits.
5. Study and verification of Ohm's Law and Kirchoff's law.
6. Study and verify of Mesh Analysis.
7. Study and verify of Nodal Analysis.
8. Study of V-I Characteristics of Incandescent lamp.
9. Measurement of three phase power by using two wattmeter methods.
10. Study and verification of DC starters and DC Motors.

Total Hours: 45

17BECC151   **YOGA**   **L T P C**
                                                                        1 0 0 -

OBJECTIVE:

- Yoga education helps to develop the self discipline, self control, awareness, concentration   and higher level of consciousness.
- Respect for life, protection of nature and the environment
- A peaceful state of mind
- Full vegetarian diet
- Pure thoughts and positive lifestyle
- Physical, mental and spiritual practices

Course Outcome

- To enable the student to have physical health and mental health.
- Demonstrate the ability to create and present various yoga activities.

AIM :   To Enable The Student To Have Physical Health And Mental Health.

UNIT- I
Introduction To Yoga- Meaning Of Yoga – Concept Of Yoga- Aim And Objectives Of Yoga – History Of Yoga - Systems Of Yoga.- Stages (Or) Limbs Of Yoga

UNIT- II
Asanas-Surya Namashkar- Thdasana- Veerabadhra Asana- Trikonasana- Utkatasana- Ardha Chakrasana- Ardha Kati Chakrasana- Thandasana- Gomugasana- Padmasana- Vajrasana- Paschimottasana- Matsyendrasana-Bavana Mukthasana- Supta Padhangusthasana- Sethubhandhasana- Navasana- Ardha Bavanamukthasana- Mathasyasana- Naukasana- Bujangasana- Salabasana- Makkarasana-Dhanurasana.

UNIT- III
Advance Asanas- Sirasasana- Garudasana- Natrajasana- Rajakoptasana- Chakrasana- Kukutasana- Virikshasana- Sarvagasana- Halasana-. Mayurasana .

UNIT- IV
Pranayama- Meaning- Types Of Pranayama- Bhastrika- Bhramari- Udgeeth- Kabalbhati- Bahya- Anulom Vilom- Pranay Pranayama- Benefits Of Pranayama. Neti - Jala Neti , Sutra Neti, Nouli- Three Types, Douthy-Three Types

UNIT- V
Mudras- Uses Of Mudras- Gyan- Shoonya- Apaan- Prana- Vayu- Prithvi- Linga- Apana- Adi Mudra- - Agni Mudra- Surya Mudra- Varuna- Hakini Mudra.

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1.	Dr.K.Chandrasekaran	Sound Health Through Yoga	Prem Kalyan	2009
2.	B.K.S.Iyangar	Light On Pranayama	Crossroad Centuary	2013
3.	Thirumular	Thirumandhiram	Sriramakrishna Math	2016

17BECC201A   **BUSINESS COMMUNICATION**   **L T P C**
                                                                     3 0 0 3

OBJECTIVES:

- To help students comprehend the role of listening skills in effective communication.
- To familiarize students with verbal and non-verbal communication.
- To expose students to neutral accent.
- To develop emotional intelligence skills in them for enhancing their self-esteem.
- To assist them in setting goals and developing positive attitude.
- To enable students to acquire decision making skills, problem solving skills and assertive skills.

INTENDED OUTCOMES:

Students undergoing this course will be able to

- Design and deliver a persuasive presentation that convinces the audience of the topic's relevance and overcomes resistance, using appropriate visual support and adhering to a specified time limit.
- Use a strategic communication model and critical thinking to identify objectives, analyze audiences, and choose the most effective structure and style for delivering strategically sound written and spoken messages.
- Practice principles of effective business writing and document design in all written documents.
- Build an understanding of different organizational cultures, business practices, and social norms to communicate more effectively in domestic and cross-cultural business contexts.
- Develop their soft skills and inter personal skills, which will make the transition from college to workplace smoother and help them excel in their job.

UNIT I   **9**
What is Business Communication? - Types of Communication – Formal and informal communication – Process of Communication- modes of Communication – Barriers to communication.

UNIT II   **9**
Written Business Communication – Style- word-usage- organisation of Ideas – mechanics of writing and fill up of forms - Cover Letter- Letter for Job Application- Letter of Complaint - Memos - Resumes - Email-   Reports Revising and proofreading- Advertising slogans- jargons- interpretation of graphs using expressions of comparison and contrast .

UNIT III   **9**
Reading and Understanding the news articles - Oral Business Communication - First Impressions - Attire – Effective Presentation strategies- Nuances of delivery – Controlling nervousness and stage fright- Visual aids Presentations-   Capturing Audience -   Tone - Behavior - Telephone Etiquette- Non - verbal communication - Eye contact - Facial expressions - Posture - Gestures - Body langage – Etiquette- Organization of presentation – brain storming- Negotiations.

UNIT IV   **9**
Difference between goals and dreams - SMART goal setting - 3 Ds of goal setting- Determination, Discipline and Direction - Developing the right attitude - Motivation - Intrinsic and Extrinsic motivation - Dealing with change - Dedication - Taking responsibilities - Decision making.

UNIT V **9**

Intrapersonal skills - Self-analysis - Thought process – Interpersonal skills - Confidence building - Resolving conflicts- Analytical skills - Team Building - Leadership skills - Planning/organizing - Ability to work independently - Professional ethics - Communicating via e-mail. Ethical perspectives and their implications for responsible communication - Proposal Presentation

Total Hours: 45

TEXTBOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Meenakshi Raman ; Prakash Singh	Business Communication	Oxford University Press	2012

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Murthy, G .R. K.	Soft Skills for Success**.**	The ICFAI University Press, Hyderabad.	2008
2	Jagadeesan, G & Santanakrishnan,R.	Soft Skills Development:Training and Evaluation.	The ICFAI University Press, Hyderabad.	2008
3	Sherfield, Robert M., Rhonda J. Montgomery, & Patricia G. Moody	Developing Soft Skills.	Pearson Education, New Delhi.	2005

WEBSITES:

1. http://tribehr.com/social-hr-software/talent-management/skills-tracking
2. www.ispeakyouspeak.blogspot.com
3. https://alison.com/subjects/6/Personal-Development-Soft-Skills
4. www.learning-development.hr.toolbox.com
5. http://www.niit.com/solution/soft-skill-training
6. http://mybcommlab.com to test your understanding of the concepts presented in each chapter and explore additional materials that will bring the ideas to life in videos, activities, and an online multimedia e-book.

17BECC201B   **TECHNICAL ENGLISH**   **L T P C**
                                                          3 0 0 3

OBJECTIVES:

- To motivate learners to acquire listening & speaking skills in both formal and informal context.
- To focus on question forms & to make them understand the importance of using question tags and also the functional use of transformation of sentences.
- To improve their reading habit and to train them in critical and analytical reading.
- To equip them to write for academic as well as work place context.
- To enable students to face interviews.

INTENDED OUTCOMES:

Students undergoing this course will able to

- Acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.
- Enhance them reading texts critically and analytically.
- Develop writing effectively, persuasively and producing different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Enrich the ability to face interviews with confidence.

UNIT I   LSRW SKILLS & GRAMMAR
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   9
Listening - Difference between Hearing & Listening –Listening to informal conversation.
Speaking - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a covering letter.
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
Regular & Irregular verbs - Kinds of sentences - Question tags. Homonyms and Homophones.

UNIT II   LSRW SKILLS & GRAMMAR
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   9
Listening – Note Taking- Improving grasping ability. **Speaking** – Welcome address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story.
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
Modal verbs – Conjunction - Expression of cause and effect. Phrasal verbs - Idioms.

UNIT III   LSRW SKILLS & GRAMMAR
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   9
Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid reading – Skimming, Scanning and Surveying. (SQ3R)**Writing** - Essay writing -Minutes of meeting - Agenda
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
 Active and Passive voice - Purpose expression. Same words used as noun and verb - Often misspelt and confused words.

UNIT IV   LSRW SKILLS & GRAMMAR, CAREER ORIENTED
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   9
Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non - verbal communication. **Reading** – Reading comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Checklist preparation.
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
Grammar - Numerical expressions – Collocations. Singular and Plural (Nouns)

UNIT V   LSRW SKILLS & GRAMMAR, FIELD WORK
Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing)   9
Listening – Types of listening- Improving listening comprehension**. Speaking** - Oral presentation - Vocal communication techniques - Voice, quality, volume, pitch etc., **Reading** - Note making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation writing – Short essays writing-
Grammar & Vocabulary (Function Grammar & Technical Vocabulary)
Transformation of sentences (Simple, Compound & Complex).Collection of Technical Vocabularies with their meanings.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

Total Hours: 45

TEXTBOOK:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2nd Edition	OUP, New Delhi.	2015

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES:

1. www.learnerstv.com – Listening/ Speaking/ Presentation
2. www.usingenglish.com – Writing/ Grammar
3. www.englishclub.com – Vocabulary Enrichment/ Speaking
4. www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
5. www.teachertube.com – Writing Technically
6. www.Dictionary.com – Semantic / Grammar

17BECC202   **ENGINEERING MATHEMATICS II**   **L T P C**
                                                                      3 2 0 4

OBJECTIVES:

- To have knowledge in integral calculus.
- Determine mathematical tools needed in evaluating multiple integrals and their usage.
- Utilize Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.
- Apply the knowledge of Mathematics in various Engineering fields by making them to identify the functions in engineering problems as analytic function and their analyze as a function of a complex variables.
- Develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, to specify some difficult integration that appear in applications can be solved by complex integration in application areas such as fluid dynamics and flow of the electric current.

INTENDED OUTCOMES:

The student will be able to

- The student will be able to solve problems in Fluid Dynamics, Theory of Elasticity, Heat and Mass Transfer etc.
- The students will be able to understand mathematical tools needed to evaluate the areas and volumes using multiple integrals.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage. Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.
- To find the Analytic functions using the Cauchy Riemann equations and they will learn mapping properties of elementary functions and mapping properties of some special transcendental functions.
- Students will understand relations between conformal mappings and quadratic differentials and how geometric structures are changing under conformal mappings.
- To evaluate complex integrals using the Cauchy integral formula and the residue Theorem and to appreciate how complex methods can be used to prove some important theoretical results.

UNIT I   INTEGRAL CALCULUS   **12**
Definite and indefinite integrals – Techniques of integration – Substitution rule, Trigonometric integrals, Integration by parts , Integration of rational functions by partial fraction, Integration of irrational functions – Improper Integrals.

UNIT II   MULTIPLE INTEGRALS   **12**
Double integral – Cartesian coordinates – Polar coordinates – Area as double integrals- Change the order of integration – Triple integration in Cartesian co-ordinates.

UNIT III   VECTOR INTEGRATION   **12**
Integration of vectors – line integral- surface integral- volume integral- Green's theorem - Gauss divergence theorem and Stoke's theorems (Statement Only), hemisphere and rectangular parallelopipeds problems.

UNIT IV   ANALYTIC FUNCTIONS   **12**
Analytic functions - Cauchy-Riemann equations in Cartesian and polar forms – Sufficient condition for an analytic function (Statement Only) - Properties of analytic functions – Constructions of an analytic function - Conformal mapping: w = z+a, az, 1/z and bilinear transformation.

UNIT V   COMPLEX INTEGRATION   **12**

Complex Integration - Cauchy's integral theorem and integral formula (Statement Only) – Taylor series and Laurent series - Residues – Cauchy's residue theorem (Statement Only) - Applications of Residue theorem to evaluate real integrals around unit circle and semi-circle (excluding poles on the real axis).

Total Hours: 60

TEXTBOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi	2014
2	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2014

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011
2	Venkataraman, M. K.	Engineering Mathematics.	The National Publishing Company, Chennai	2005
3	Narayanan. S, Manicavachagam pillay.T.K and Ramaniah.G	Advanced Mathematics for Engineering Students.	Viswanathan S.(Printers and Publishers) Pvt. Ltd. Chennai.	2002
4	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES:

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.sosmath.com/diffeq/laplace/basic/basic.html
4. www.mathworld.wolframe.com

17BECC204   **ENVIRONMENTAL SCIENCES**   **L T P C**
                                                                                      3 0 0 3

OBJECTIVES:

- To give a comprehensive insight into natural resources.
- To impart knowledge on ecosystem and biodiversity.
- To educate the ways and means of the environment.
- To protect the environment from various types of pollution.
- To impart some fundamental knowledge on human welfare measures.

INTENDED OUTCOME:

- Recognize the importance of natural resources (S).
- Associate themselves with the various ecosystems (S).
- Describe the importance of biodiversity (S).
- Identify and minimize the difference pollutions (S).
- Prioritize and analyses the social issues (S).
- Integrate the environmental principles in the projects undertaken in field of engineering and technology (A).

UNIT I   INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL
RESOURCES   9
Definition, Scope and Importance – Need for public awareness -Forest resources: Use and over-exploitation, deforestation- Water resources-Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources-Land as a resource, land degradation, man induced landslides, soil erosion and desertification –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources-World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources-Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources- role of an individual in conservation of natural resources.

UNIT II   ECOSYSTEM   9
Chemistry and Environment- Environmental segments, Composition and Structure of atmosphere- Concept of an ecosystem- Structure, components   and function of an   ecosystem Energy flow in the ecosystem – Food chain, Food web and Ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem)

UNIT III   BIODIVERSITY   9
Introduction to biodiversity, Definition- Genetic   diversity, Species   diversity and   Ecosystem diversity, Biogeographical classification of India, Importance   of   biodiversity-Value   of biodiversity - Hot Spots of biodiversity-Threats to biodiversity - Endangered and Endemic Species of India – Conservation of biodiversity- In-Situ and Ex-Situ conservation of biodiversity.

UNIT IV   ENVIRONMENTAL POLLUTION   9
Definition – causes, effects and control measures of Air   pollution,   Water   pollution,   Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid   waste management-causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention of pollution–Disaster management-earthquake, tsunami, cyclone and landslides.

UNIT V   SOCIAL ISSUES AND ENVIRONMENT   9

From   Unsustainable to Sustainable development, Urban problems related to energy   sources, Water conservation,   Rain water harvesting and Watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and Global warming, Acid rain, Ozone layer depletion, Wasteland   reclamation-   Environment   Protection   Act-   Human Rights- Value education, Role of Information Technology in Environment and Human health-Population growth, Variation of population among nations-Population explosion.

Total Hours: 45

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Dr. Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2	Anubha kaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (P) Ltd., New Delhi.	2010

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	William P.Cunningham	Principles of Environmental Science	Tata Mc Graw –Hill Publishing Company, New Delhi.	2008
2	Linda D. Williams	Environmental Science Demystified	Tata Mc Graw –Hill Publishing Company Ltd., New Delhi.	2005
3	Bharucha Erach	Environmental Science Demystified	Mapin Publishing (P) Ltd., Ahmedabad.	2005
4	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004
5	Trivedi, R.K. and Goel, P.K	Introduction to Air Pollution	Techno-Science Publications, Jaipur.	2003

WEBSITES:

1. http://people.eku.edu/ritchisong/envscinotes1.html
2. http://nptel.ac.in/courses.php?disciplineId=120
3. www.unesco.org/ext/field/beijing/scienceb.htm
4. www.infinitepower.org/education.htm
5. www.newagepublishers.com/samplechapter/001281.
6. http://www.sciencedaily.com/news/top/environment/

17BEEC205   **CIRCUIT THEORY**   **L T P C**
                                                                                                        3 1 0 4

OBJECTIVES:

- To understand the concept of circuit elements lumped circuits, circuit laws and network reduction.
- To impart concept of various theorems for circuit analysis.
- To under stand the sinusoidal steady state analysis of AC Circuits.
- To understand various resonance and transient response.
- To introduce concepts of coupled circuits and its basic analysis.

INTENDED OUTCOMES:

- Ability to analyse different electrical circuits
- Ability to apply circuit theorems
- Ability to analyse and differentiate AC and DC circuits.
- Design power supply for various application
- Ability to analyse different topology

UNIT I   DC CIRCUIT ANALYSIS   12

Basic components and electric circuits – Charge – Current – Voltage and Power– Voltage and Current Sources – Ohms Law – Voltage and Current laws – Kirchoff's Current Law – Kirchoff's voltage law – The single Node – Pair Circuit – Series and Parallel Connected Independent Sources – Resistors in Series and Parallel – Voltage and Current division – Basic Nodal and Mesh anal ysis – Nodal analysis – Mesh anal ysis.

UNIT II   NETWORK THEOREM AND DUALITY   12

Useful   Circuit Analysis techniques –   Linearity and superposition – Thevenin and Norton Equivalent Circuits – Maximum Power Transfer – Delta – Wye Conversion – Duality – Dual circuits.

UNIT III   SINUSOIDAL STEADY STATE ANALYSIS   12

Sinusoidal   Steady – State analysis –   Characteristics of Sinusoids– The Complex Forcing Function– The Phasor– Phasor relationship for R– L – C – impedance and Admittance – Nodal and Mesh Anal ysis– Phasor Diagrams – AC Circuit Power Anal ysis – Instantaneous Power – Average Power – apparent Power and Power Factor – Complex Power.

UNIT IV   TRANSIENTS AND RESONANCE IN RLC CIRCUITS   12

Basic   R L   and   RC Circuits – The Source – Free R L Circuit – The Source–Free RC Circuit – The Unit- Step Function – Driven R L Circuits – Driven RC Circuits – R LC Circuits – Frequency Response – Parallel Resonance – Series Resonance – Quality Factor.

UNIT V   COUPLED CIRCUITS AND TOPOLOGY   12

Magnetically coupled circuits –   Mutual inductance –   the Linear Transformer –   the Ideal Transformer –   An introduction to Network Topology – Trees and General Nodal analysis – Links and Loop analysis.

                                                                                   Total Hours: 60

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	William Hart Hayt, Jack Ellsworth Kemmerly, Steven M. Durbin	Engineering Circuit Analysis. 8th Edition	Tata McGraw-Hill, New Delhi.	2012
2	David.A. Bell.	Electric Circuits. 6th Edition	Oxford University Press.	1998
3	Sudhakar and Shyammohan.S. Palli.	Electric Circuits.	Tata Mc Graw – Hill.	2007

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Nilson, Reidal.	Electric Circuits.	Pearson Education.	2008
2	Charles.K. Alexander & Mathew, N.O. Sadiku.	Fundamentals of Electric Circuits.	McGraw- Hill.	2003
3	Cunningham.D.R., Stuller.J.A.	Basic Circuit Analysis.	Jaico Publishing House.	2002
4	David E. Johnson, Johnny R. Johnson, John L. Hilburn, Peter D. Scott	Electric Circuit Analysis. 3rd Edition.	John Wiley & Sons, Inc.	2012

17BEEC212   **ELECTRIC CIRCUITS LABORATORY**   **L T P C**

Course Objectives

The goal of this course for students is :
- To impart the basic knowledge about the Electric circuits.
- To understand the concept of Electro Mechanical Energy Conversion and Transformers.
- To understand the working of Semiconductor devices and Measuring Instruments.
- To impart the basic knowledge of Digital Circuits.

Course Outcomes

At the end of this course, students will be able to
- Attributing the electric circuits with DC and AC excitation by applying various circuit laws.
- Attributing the magnetic circuits and transformer.
- Reproduce the two port networks.
- Evaluate the various digital circuits in real time applications.
- Analysis various semiconductor devices in real time applications.
- Reproduce the Measuring Instruments.

                                                                 0 0 3 2

LIST OF EXPERIMENTS

1. Verification of Kirchoff's voltage and Current Laws
2. Verification of Superposition Theorem
3. Verification of Thevenin's Theorem & Norton's Theorem
4. Verification of Maximum Power Transfer Theorem
5. Verification of Tellegen's and Reciprocity Theorem
6. Time domain response of R L Transient Circuit.
7. Time domain response of RC Transient Circuit.
8. Series R LC Resonance Circuits (Frequency response& resonant frequency)
9. Parallel R LC Resonance Circuits (Frequency response & resonant frequency)
10. Simulation experiments using PSPICE or MultiSim.

                                                 Total Hours: 45

17BEEC213　　　　　　**ENGINEERING GRAPHICS**　　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　1 0 4 3

OBJECTIVES:

- To prepare the students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare the students to communicate effectively and to use the techniques, skills, and modern engineering tools necessary for engineering practice
- Learn to sketch and take field dimensions.
- Learn to take data and transform it into graphic drawings.
- Learn basic engineering drawing formats
- Prepare the student for future Engineering positions

INTENDED OUTCOMES:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design and engineering graphics standards
- Exposure to solid modeling ,computer-aided geometric design , creating working drawings and engineering communication.
- Understand the conventions and the method of engineering drawing.
- Interpret engineering drawings using fundamental technical mathematics.
- To improve their visualization skills so that they can apply these skill in developing new products.

UNIT I　　INTRODUCTION　　　　　　　　　　　　　　　　　　　　　9

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning– linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II　　SCALES AND PLANE CURVES　　　　　　　　　　　　　8

SCALES: Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale. Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III　　FREE HAND SKETCHING　　　　　　　　　　　　　　　9

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV　　PROJECTION OF POINTS, LINES AND PLANE SURFACES　　　8

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces–Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V　　PROJECTION OF SOLIDS　　　　　　　　　　　　　　　8

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

Introduction to Drafting Software/Package (Not for Exam)   **3**
Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

Total Hours: 45

TEXTBOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Venugopal K and Prabhu Raja V	Engineering Graphics	New Age International Publishers	2007
2	VTU	A Primer on Computer Aided Engineering Drawing	Belgaum	2006

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Kumar M S	Engineering Graphics	D D Publications, Chennai	2007
2	Bureau of Indian Standards	Engineering Drawing Practices for Schools and Colleges SP 46-2003	BIS, New Delhi	2003
3	Luzadder W J	Fundamentals of Engineering Drawing	Prentice Hall Book Co., New York	1998

WEB REFERENCES:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

17BEEC251   **BUSINESS PLAN**   **L T P C**
                                                     1 0 0 -

SCOPE:

- Any business has to be developed from scratch. As entrepreneur one should learn various avenues of promoting the given business along with ethics which is other side of the coin. This course is meant to inculcate to develop a business plan connected with ethics.
- To enable the students to create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty and to appreciate the rights of others.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.
- To familiarize the student with professional rights and employee rights
- To imparts a good knowledge in weapons development

OBJECTIVE:

- Gain knowledge on human values
- Apply ethics in society,
- Discuss the ethical issues related to engineering
- Realize the responsibilities and rights in the society
- Understand about Computer Ethics
- Gain knowledge on Corporate Social Responsibility

UNIT I

Entrepreneurship – Types- Entrepreneurial Competencies -Business Plan – Meaning - Basic parameters - Project parameters - Factors of successful business - Term Loans and Working Capital Management.

UNIT II

Business Plan Process - Sources of Information – Online Resources - Offline Resources - Sources of Market Research - Benefits of market study - Coverage of market study.

UNIT III

Business Plan components - Company description - Industry Analysis - Target Market - Competition - Strategic position - Risk assessment - Technology plan - Management and Organization – Government policy

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Rhonda Abrams	The Successful business Plan Secret & Strategies - 4th Edition	Planning Shop	2003
2.	Rhonda Abrams	The business plan in a day	Planning Shop	2009
3.	V. G. Patel	Business plan preparation	Entrepreneurship Development Institute of India	1987

17BEEC301A   OPTIMIZATION AND CALCULUS OF VARIABLES   L T P C
3 2 0 4

OBJECTIVES:

- To develop analytical skills for solving engineering problems.

- To teach the students the basic concepts of LPP.

- To teach the students the basic concepts of Transportation and Assignment problems.

- To make the students to study about the Integer Programming.

- To make the students to study about the Network Analysis.

INTENDED OUTCOMES:

- Be able to solve problems in different environments and develop critical thinking.

- Be able to shape and solve Transportation Models and Assignment Models.

- Be able to build and solve integer programming.

- Be able to build and solve Nonlinear programming.

- Use the theory, methods and techniques of the course to solve problems;

- Give an account of the foundations of calculus of variations and of its applications in mathematics and physics.

UNIT I   LINEAR PROGRAMMING PROBLEM   (12)
Formulation of LPP - Graphical Method - Simplex Method - Artificial variable technique and two phase simplex method. Duality - Dual and simplex method - Dual Simplex Method.

UNIT II   TRANSPORTATION AND ASSIGNMENT PROBLEM   (12)
Transportation Model- finding initial basic feasible solutions- moving towards optimality- Degeneracy. Solution of an Assignment problem - Hungarian Algorithm.

UNIT III   INTEGER PROGRAMMING   (11)
Integer Programming Problem – Gromory's fractional cut Method – Branch Bound Method

UNIT IV   NETWORK ANALYSIS   (11)
 PERT & CPM- network diagram-probability of achieving completion date- crash time- cost analysis.

UNIT V   CALCULUS OF VARIATIONS   (14)
Calculus of Variations - Basic definition, Simplest problem, Isoperimetric problem, Problems with Higher order derivatives, Euler Lagrange Equation, Weierstrass - Erdmann conditions; Pontryagin Maximum Principle; Transversality condition; Applications

Total Hours: 60

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi.	2013
2	Dr. Grewal B.S.	Higher Engineering Mathematics	Khanna Publishers, New Delhi.	2013

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education, New Delhi.	2005
2	Srinivasan G	Operations Research: Principles and Applications	PHI Private Limited, New Delhi.	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning India Pvt. Ltd, New Delhi.	2004
4	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons, New Delhi.	2010

WEBSITES:

1. www.mathworld. Wolfram.com
2. www.mit.edu
3. www.nptel.com

17BEEC301B   LINEAR ALGEBRA AND SPECIAL FUNCTIONS   **L T P C**
                                                                 3 2 0 4

OBJECTIVES:

- To develop analytical skills for solving engineering problems.
- To make the students to study about   linear algebra and some useful special functions.
- To understand the concepts of vector space, linear transformations and diagonalization.
- To apply the concept of inner product spaces in orthogonalization.
- To understand the procedure to solve partial differential equations.
- To give an integrated approach to number theory and abstract algebra, and provide a firm

INTENDED OUTCOMES:

- Be able to acquire basic knowledge on vector spaces and linear transformations.
- Be able to build and solve the special functions.
- Illustrate accurate and efficient use of advanced algebraic techniques.
- Demonstrate their expertise by solving non - trivial problems related to the concepts and by proving simple theorems about the statements proven by the text.
- Gain the capability to solve Bessel Function equations.
- Ability to clarify engineering problems using Fourier series.

UNIT I   VECTOR SPACES   (12)
General vector spaces, real vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space.

UNIT II   LINEAR TRANSFORMATIONS   (12)
Linear Transformations - The Null Space and Range - Isomorphisms - Matrix Representation of Linear Transformations –Eigen values and Eigen vectors - Similarity, Diagonalization.

UNIT III   INNER PRODUCT SPACES   (12)
The Dot Product on R^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

UNIT IV   HYPERBOLIC FUNCTIONS, BETA AND GAMMA FUNCTIONS   (12)
Hyperbolic Functions: Hyperbolic functions and Inverse Hyperbolic functions – Identities – Real and imaginary parts – solving problems using hyperbolic functions.
Beta and Gamma Functions: Definitions – Properties – Relation between beta and gamma integrals – Evaluation of definite integrals in terms of beta and gamma functions.

UNIT V   BESSEL FUNCTIONS   (12)
Bessel Functions – Preliminaries – Definitions – Bessel Differential Equation – Differential recurrence relations – the pure recurrence relation – A generating function – Bessel's integral – Index half and odd integer.

Total Hours: 60

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Shahnaz Bathul	Text book of Engineering Mathematics(Special Functions and Complex Variables)	PHI Publications, New Delhi.	2009

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Dr. Grewal B.S.	Higher Engineering Mathematics	Khanna Publishers, New Delhi.	2013
2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India Edition, New Delhi.	2012
3	Jim Defranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill, New Delhi.	2008

WEBSITES:

1. www.sosmath.com
2. www.nptel.ac.in
3. www.mathworld.wolfram.com

17BEEC302   ELECTRONIC DEVICES AND CIRCUITS   L T P C
                                                                    3 0 0 3

OBJECTIVES:

- To understand the working of PN junction diodes and special purpose diodes.
- To understand the basic working physics of BJT and its applications.
- To understand the basic working of FET.
- To understand the working of Rectifiers, Filters and Voltage regulators.
- To understand the fabrication process of Monolithic ICs.
- To expose the students about the construction working and applications of basic electronic devices essential for subsequent courses on Analog electronics, Analog & digital communication and CMOS design.

INTENDED OUTCOMES:

- Ablity to choose the diodes based on applications.
- Ability to design simple circuits using diodes and transistors.
- Ability to construct DC power supply for given specification.
- Gain knowledge on construction and applications of Diodes
- Understand MOS transistors for circuits and systems
- Gain knowledge on Construction and working of Field effect Transistors

UNIT I   SEMICONDUCTOR DIODES AND SPECIAL PURPOSE DIODES   9
Semiconductor diodes: Formation of PN junction – working principle – VI characteristics – PN diode currents – diode current equation – diode resistance – transition and diffusion capacitance – diode models – voltage breakdown in diodes.
Special purpose diodes: Zener diode – point-contact diode – backward diode – varactor diode – step-recovery diode – schottky diode, PNPN diode – RF diode.

UNIT II   BIPOLAR TRANSISTORS   9
Bipolar Transistors: Construction – working – transistor currents –transistor configurations and input- output characteristics – Early effect (base width modulation) – Ebers Moll model – transistor as an amplifier –Transistor as a switch.

UNIT III   FIELD EFFECT TRANSISTORS   9
Field-Effect Transistors: construction, working and VI characteristics of JFET – comparison of BJT and JFET – MOSFET – enhancement MOSFET, depletion MOSFET, their working principle and VI characteristics, comparison of MOSFET with JFET, comparison of D MOSFET with E-MOSFET, CMOS, MESFET, CCD.

UNIT IV   DC POWER SUPPLIES   9
Rectifiers and Filters: Block schematic of a typical DC power supply, single phase HWR, FWR, full-wave bridge rectifier, power supply filters (ripple factor and efficiency anal ysis), bleeder resistor, voltage dividers.
Voltage regulators: voltage regulation, Zener diode shunt regulator, transistor series   regulator, transistor shunt regulator, switching regulators, design of complete DC power supply circuit.

UNIT V   INTEGRATED CIRCUIT FABRICATION   9
Integrated circuit – advantages and drawback of ICs – scale of integration –classification of ICs –

definition of linear IC and digital IC with examples –manufacturing process of monolithic ICs – fabrication of components (diode, capacitor, bipolar transistor and resistor) on monolithic IC – comparison of MOS ICs and bipolar ICs.

Total Hours: 45

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Millman and Halkias	Electronic devices and Circuits	Tata McGraw Hill International	2010
2	David A. Bell	Fundamental of electronic devices and circuits	Oxford press	2009

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Street Man	Solid State Electronic Devices 6th Edition	Prentice Hall Of India	2005
2	Mathur Kulshrestha and Chadha	Electron devices and Applications and Integrated circuits'	Umesh Publications	2005
3	Thomas L. Floyd	Electron Devices	Charles and Messil Publications	2012
4	G.K. Mithal	Electronic Devices and Circuits	Khanna Publishers	2013
5	Robert L. Boylestad and Louis Nashelsk y	Electronic Devices and Circuit Theory- 9th Edition	Pearson Education	2009.
6	B. Somanathan Nair	Electronic Devices and Applications	PHI,	2006

17BEEC303   **DIGITAL ELECTRONICS**   **L T P C**

                                                                3 0 0 3

OBJECTIVES:

- To introduce basic postulates of Boolean algebra and shows the correlation between boolean expressions
- To introduce logic gates and combinational circuits.
- To outline the formal procedures for the analysis and design of sequential circuits.
- To illustrate the concept of s ynchronous and as ynchronous sequential circuits
- To introduce the concept of memories and programmable logic devices.
- To imparts the knowledge of memory devices like FPGA

INTENDED OUTCOMES:

- Ability to reduce any given Boolean expression
- Ablity to design combinational and sequential circuits.
- Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
- Design & analyze synchronous sequential logic circuits
- Differentiate different logical families
- Gain knowledge about various memory devices and implement using PLAs

UNIT-I   **NUMBER SYSTEMS AND BOOLEAN ALGEBRA**   **9**

Binary, Octal, Decimal, Hexadecimal - Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binar y codes: Weighted –BCD-2421-Gray Code-Excess-3 code - ASCII – Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality- Boolean expression – Boolean function- Minimization of Boolean expressions – Sum of Products (SOP) –Product of Sums (POS)-Minterm- Maxterm- Canonical forms – Conversion between canonical forms –Karnaugh map Minimization – Don't care conditions.

UNIT-II   **LOGIC GATES AND COMBINATIONAL CIRCUITS**   **9**

LOGIC GATES: AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR- Implementations of Logic Functions using gates, NAND –NOR implementations–Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates.
COMBINATIONAL CIRCUITS: Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parit y checker – code converters. Implementation of combinational
logic using MUX.

UNIT-III   **SEQUENTIAL CIRCUIT**   **9**

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering –Realization of one flip flop using other flip flops – Asynchronous / Ripple counters – Synchronous counters –Modulo – n counter –Classification of sequential circuits – Moore and Mealy-Design of S ynchronous counters: state diagram- State table –State minimization –State assignment- ASM-Excitation table and maps-Circuit implementation - Register – shift registers- Universal shift register – Shift counters – Ring

counters.

UNIT-IV   ASYNCHRONOUS SEQUENTIAL CIRCUITS   9
Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- cycles – Races – Hazards: Static –Dynamic –Essential –Hazards elimination.

UNIT-V   MEMORY DEVICES   9
Classification of memories –RAM organization – Write operation –Read operation – Memory c ycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM – EEPROM – EAPROM –Programmable Logic Devices –Programmable Logic Array (PLA)- Programmable Array Logic (PAL)-Field Programmable Gate Arrays (FPGA). Implementation of combinational logic using ROM, PAL and PLA

Total Hours: 45

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Morris Mano.M	Digital Design	Prentice Hall of India Pvt. Ltd., New Delhi	2003
2	John M. Yarbrough	Digital Logic Applications and Design	Thomson- Vikas publishing house, New Delhi	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Salivahanan.S and Arivazhagan.S	Digital Circuits and Design	Vikas Publishing House Pvt. Ltd, New Delhi	2004
2	Charles H. Roth	Fundamentals of Logic Design	Thomson Publication Company, New Delhi.	2003
3	Donald P. Leach and Albert Paul Malvino	Digital Principles and Applications	Tata McGraw Hill Publishing Compan y Limited, New Delhi	2003
4	Jain.R. P	Modern Digital Electronics	Tata McGraw–Hill publishing compan y limited, New Delhi	2003
5	Thomas L. Flo yd	Digital Fundamentals	Pearson Education, New Delhi	2003

WEBSITES:

1. http://www.ee.surrey.ac.uk/Projects/Labview/minimisation/tabular.html
2. http://www.brown.edu/Departments/Engineering/Labs/ddzo/async.html
3. http://nptel.ac.in/

17BEEC304   **C PROGRAMMING**   **L T P C**
                                                            3 0 0 3

OBJECTIVES:

- Identify and understand the working of key components of a computer program.
- Identify and understand the various kinds of keywords and different data types of C programming.
- Understand, analyze and implement software development tools like algorithm, pseudo codes and programming structure.
- Study, analyze and understand logical structure of a computer program, and different construct to develop
- Ability to work with arrays and structures.
- To discuss the implementation of different non linear data structures such as trees and graphs.

INTENDED OUTCOMES:

- Write small programs related to simple/ moderate mathematical and logical problems in C
- Study, analyze and understand simple data structures and how to use it in C language.
- Identify and understand the working of different operating systems like windows and Linux etc.
- Perceptive of the basic data structures.
- Understand the basic search and sort algorithms.
- Cultivate the knowledge to use a particular data structure and algorithm to solve a problem

UNIT I   INTRODUCTION TO C LANGUAGE   (8)
Character Set, Variables And Identifiers, Keywords- Built-In Data Types- Arithmetic Operators And Expressions, Constants And Literals, Simple Assignment Statement- Basic Input/Output Statement-Simple 'C' Programs, usage of const keyword

UNIT II   CONDITIONAL STATEMENTS AND LOOPS   (8)
Logical and Relational Operators- If Statement, If-Else Statement- Loops: While Loop, Do While, For Loop- Nested Loops, Infinite Loops- Switch Statement

UNIT III   ARRAYS   (9)
One Dimensional Arrays- Array Manipulation; Searching, Insertion, Deletion Of An Element From An Array- Finding The Largest/Smallest Element In An Array- Two Dimensional Arrays, -Addition / Multiplication Of Two Matrices- Strings As Array Of Characters.

UNIT IV   POINTERS AND FUNCTIONS   (10)
Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays Example Problems- Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion.

UNIT V   USER DEFINED DATATYPES AND FILES   (10)

Structures – initialization - nested structures – structures and arrays – structures and pointers - union – typedef and enumeration types - bit fields - File Management in C – Files and Streams – File handling functions – Sequential access file- Random access file – Command line arguments.

Total Hours: 45

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	E. Balagurusamy	Computing Fundamentals and C Programming 5th Edition	TMH Education	2014
2	Yashavant Kanetkar	Let us C", 13th Edition	BPB Publications	2013
3	H. M. Deitel and D. J. Deitel	C: How to Program 7th Edition	Prentice Hall	2012
4	E. Balagurusamy	Programming in ANSI C- 6th edition	TMH Education	2012

17BEEC305   **ELECTROMAGNETIC FIELDS**   **L T P C**
                                                                              3 1 0 4

OBJECTIVES:

- To impart knowledge on the basics of static electric and magnetic field and the associated laws.
- To give insight into the propagation of EM waves and also to introduce the methods in computational electromagnetic
- To make students have depth understanding of antennas, electronic devices, Waveguides is possible
- To study the various law in static magnetic fields
- To understand magnetic field concepts
- To learn the concept of Maxwell's equations

INTENDED OUTCOMES:

Upon completion of the course, the students would be able to
- Analyze field potentials due to static changes and static magnetic fields.
- Explain how materials affect electric and magnetic fields.
- Analyze the relation between the field sunder time varying situations.
- Discuss the principles of propagation uniform plane waves.
- Apply Magnetic boundary conditions in evolving magnetic fields.
- Understand Faraday's law for Electromagnetic induction

UNIT I   STATIC ELECTRICFIELD   9
Vector Algebra, Coordinate Systems, Vector differential operator, Gradient, Divergence, Curl, Divergence theorem, Stokes theorem, Coulombs law, Electric field intensity, Point, Line, Surface and Volume charged distributions, Electric flux density, Gauss law and its applications, Gauss divergence theorem, Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electro static Energy and Energy density.

UNIT II   CONDUCTORS AND DIELECTRICS   9
Conductors and dielectrics in Static Electric Field, Current and current density, Continuity equation, Polarization, Boundary conditions, Methodofimages, Resistance of a conductor, Capacitance, Parallel plate, Coaxial and Spherical capacitors, Boundary conditionsfor perfect dielectric materials, Poisson'sequation, Laplace'sequation, Solution of Laplace equation, Application of Poisson's and Laplace's equations.

UNIT III   STATIC MAGNETIC FIELDS   9
Biot-Savart Law, Magneticfield Intensity, Estimation of Magneticfield Intensity for straight and circular conductors, Ampere's Circuital Law, Point form of Ampere's Circuital Law, Stokes theorem, Magnetic flux and magnetic flux density, The Scalar and Vector Magnetic potentials, Derivation of Steady magneticfield Laws.

UNIT IV   MAGNETICFORCES AND MATERIALS   9
Forceona moving charge, Force on a differential current element, Force between current elements, Force and torque on a closed circuit, The nature magnetic materials, Magnetization and permeability, Magnetic boundary conditions in evolving magnetic fields,Themagnetic circuit, Potential energy and forceson magnetic materials,Inductance,Basic expressions fo rself and mutual inductances, Inductance evaluation for solenoid, toroid,coaxial cables and transmissionlines,Energy stored in Magneticfields.

Fundamental relations for Electro static and Magneto static fields, Faraday's law for Electromagnetic induction, Transformers, Motional Electromotive forces, Differential form of Maxwell's equations, Integral form of Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and their solutions, Poynting'stheorem, Time harmonic fields, Electro magnetic Spectrum.

Total Hours: 45

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	WilliamH Haytand Jr. John A Buck	Engineering Electromagnetics	TataMcGraw-Hill PublishingCompanyLtd NewDelhi	2008
2	SadikuMH	PrinciplesofElectromagnetics	OxfordUniversity PressInc, NewDelhi	2009

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	DavidKCheng	FieldandWaveElectromagnetics	PearsonEducationInc, Delhi	2004
2	JohnDKrausand Daniel A Fleisch, "	Electromagneticswith Applications	McGrawHillBookCo	2005
3	KarlELongmanandSava VSavov	FundamentalsofElectromagnetics	PrenticeHallofIndiaNew Delhi	2006
4	AshutoshPramanic	Electromagnetism	PrenticeHall of India, NewDelhi	2006

17BEEC311   **C PROGRAMMING LABORATORY**   **L T P C**
                                                                                 0 0 3 2

OBJECTIVES:

- To provide an awareness to Computing and C Programming.
- To know the correct and efficient ways of solving problems.
- To learn to develop algorithm for simple problem solving.
- Analyze the given algorithms.
- Enable to write algorithms for solving problems with the help of fundamental data structures
- Write programs that implement of different non linear data structures such as trees and graphs.

INTENDED OUTCOMES:

- Able to understand the basic terminology used in computer programming.
- Able to write, compile and debug programs in C language.
- Able to use different data types in a computer program.
- Able to design programs involving decision structures, loops and functions.
- Able to understand the dynamics of memory by the use of pointers.
- Capability to analyze and differentiate different algorithms based on their time complexity.

List of Experiments

1. Write a C program to find Factorial of a given number using do while loop.
2. Write a C Program to print Fibonacci series using while loop.
3. Write a C Program to check a given number is Prime or Not.
4. Write a C Program to compute the sum of even numbers for a given n value.
5. Write a C Program to check the given string is Palindrome or Not.
6. Write a C Program to check the given number is Armstrong or Not using functions.
7. Write a C Program to count the number of vowels from the given string using switch case.
8. Write a C Program to read a line of text from keyboard and print the number of characters, words and spaces.
9. Write a C Program to print the student's record using structure.
10. Write a C Program to find factorial of a number using recursion function.

Total Hours: 45

17BEEC312   ELECTRONIC DEVICES AND CIRCUITS LABORATORY   **L T P C**
                                                                      0 0 3 2

OBJECTIVES:

- To learn the characteristics of various basic electronic devices
- To study experimentally the characteristics of diodes, BJT's and FET's.
- To verify practically, the response of various special purpose electron devices.
- To understand the characteristic of LED.
- To learn how to use software's for simulating characteristics of various circuits.
- To divulge the basics of rectifier circuits.

INTENDED OUTCOMES:

At the end of the course, the student should be able to:
- Learn the characteristics of basic electronic devices.
- Design Halfwave and Fullwave rectifiers with and without filters.
- Verify the Characteristics of various devices using simulation software.
- Clear idea about the design of rectifiers.
- Divulge the basics of LED with three different wavelengths.
- Enable the students familiar with construction series voltage regulator.

LIST OF EXPERIMENTS
1. Characteristics of PN junction and Zenerdiode.
2. Input, Output and Transfer characteristics of CE Configuration.
3. Input, Output and Transfer characteristics of CC Configuration.
4. Characteristics of LDR, Photo-diode and Phototransistor.
5. Transfer characteristics of JFET.
6. Transfer characteristics of MOSFET. (with depletion and enhancement mode)
7. Characteristics of LED with three different wavelengths.
8. Halfwave rectifier, Fullwave rectifier and Fullwave Bridge rectifier with and without Capacitive filter.
9. Series voltage Regulator.
10. Simulation experiments1, 2,3,5,6 using PSPICE or Multisim.

Total Hours: 45

17BEEC313   **DIGITAL ELECTRONICS LABORATORY**   **L T P C**
                                                              0 0 3 2

OBJECTIVES:

- To verify operation of logic gates .
- To design and construct digital circuits.
- To implement combinational function using multiplier
- To do simulation of simple combinational and sequential circuits
- To design synchronous sequential circuits.
- To simulate simple combinational and sequential circuits
- To learn about Encoders and Decoders design.

INTENDED OUTCOMES:

At the end of the course, the student should be able to:
- Differentiate between combinational and sequential circuits.
- Design simple digital circuits for various applications.
- Learn to simulate using HDL.
- Construct counter circuits for different application
- Simulate a design using VHD/Verilog HDL
- Design a two bit magnitude comparator.
- Design and simulate encoder and decoder circuits.

LIST OF EXPERIMENTS

1. Study of Gates & Flip-flops.
2. Design and implementation of HalfAdder and FullAdder.
3. Design and implementation of Magnitude Comparator (2-Bit).
4. Design and implementation Encoders and Decoders.
5. Design and implementation Multiplexer and Demultiplexer.
6. Design and implementation Code Converters.
7. Implementation of combinational logic functions using standard ICs
8. Design and implementation Synchronous Counters.
9. Design and implementation Ripple Counter.
10. Design and implementation Mod–N Counter.
11. Implementation of Shift Registers.
12. Simulation Experiments using VHDL/Verilog for experiments 2, 4,5,7,8.

Total Hours: 45

17BEEC351   PCB DESIGNING   L T P C
1 0 0 –

   OBJECTIVES:

- To learn software used for PCB design
- To learn about the tools used in PCB.
- To create a net list for a design.
- To divulge the basics of OR-CAD PCB software.
- To make the students familiar with design verification.
- To learn the automatic routing and manual routing.

INTENDED OUTCOME:
- At the end of this course students will demonstrate the ability to simulate any circuit design using simulation software.
- Able to carry out any PCB design necessary for their graduation projects
- The course is intended to give the students the necessary knowledge and of PCB design steps, starting from a simple schematics, through creating new components, and all the way to down a final PCB layout ready for population.
- Gain good knowledge about PCB design .
- Clear idea about automatic routing and manual routing.
- Understand the basics tools used in PCB.

1. Introduction to OR-CAD PCB
2. Installation and Setup
3. PCB Basics(Tools)
4. PCB Design Session
5. Automatic Routing
6. Manual Routing
7. Design Verification
8. Creation of Net list

17BEEC401   LINEAR INTEGRATED CIRCUITS   L T P C
                                                                     3 0 0 3
OBJECTIVES:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear application s of operational amplifiers.
- To introduce the concepts of waveform generation and to introduce theory and applications of analog multipliers and PLL.
- To educate the design of Filters and Voltage regulators.
- To teach the theory of ADC
- To learn the theory of DAC.

INTENDED OUTCOME:

Studens gain Knowledge in
- Desiging circuits using Opamp for linear and non-linear applications.
- Concepts of waveform generation
- Theory and applications of analog multipliers and PLL.
- Design of Filters and Voltage regulators.
- The concept of ADC
- Design of DAC.

UNIT I   OPERATIONAL AM PLIFIER CHARACTERISTICS   9

Op-amp symbol, terminals, packages and specifications - Block Diagram Representation of op-amp-Ideal op-amp & practical op-amp – Open loop & closed loop configurations – DC & AC performance characteristics of op-amp – Frequency compensation – Noise – Differential amplifiers – Electrical Characteristics and internal schematic of 741 op-amps.

UNIT II   OP–AMP APPLICATIONS   9
Basic op-amp circuits: Inverting & Non-inverting voltage amplifiers -Voltage follower -Summing, scaling & averaging amplifiers - AC amplifiers. Linear Applications: Instrumentation Amplifiers-V-to-I and I-to-V Converters – Differentiators and Integrators.
Non-linear Applications: Precision Rectifiers – Wave Shaping Circuits (Clipper and Clampers) – Log and Antilog Amplifiers – Analog voltage multiplier circuit and its applications - Comparators and its applications.

UNIT III   WAVEFORM GENERATORS AND PLL   9
Waveform Generators: Sine-wave Generators – Square / Triangle / Sawtooth Wave generators. IC 555 Timer: Monostable operation and its applications, Astable operation and its applications
PLL: Operation of the Basic PLL–Closed loop analysis of PLL – Voltage Controlled Oscillator – PLL Applications

UNIT IV   ACTIVE FILTERS & VOLTAGE REGULATOR   9
Filters: Comparison betweenPassive and Active Networks-Active Network Design –   Filter Approximations-Design of LPF, HPF, BPF and Band Reject Filters – State Variable Filters
Voltage Regulators: Basics of Voltage Regulator – Linear Voltage Regulators using Op-amp – IC Regulators (78x x, 79xx, LM 317, 723)-Switching Regulators.

UNIT V   DATA CONVERSION DEVICES   9
Digital to Analog Conversion: DAC Specifications – DAC circuits – Weighted Resistor DAC-R-2R Ladder DAC- Inverted R-2R Ladder DAC Monolithic DAC
Analog to Digital conversion: ADC specifications-ADC circuits-Ramp Type ADC-Successive Approximation ADC-Dual Slope ADC-Flash Type ADC.

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Roy Choudhury and Shail Jain	Linear Integrated Circuits	New Age International Publishers	2003
2	Ramakant A. Gayakwad	Op-Amps and Linear Integrated Circuits	Prentice Hall of India, New Delhi	2000

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Robert F. Coughlin, Frederick F. Driscoll	Operational-Amplifiers and Linear Integrated Circuits	Prentice Hall of India, New Delhi	2001
2	Sergio Franco	Design with operational amplifier and analog integrated circuits	McGraw Hill	2015

17BEEC402   **SIGNALS AND SYSTEMS**   **L T P C**
                                                                      3 2 0 4
OBJECTIVES:

- To study the properties and representation of discrete and continuous signals.
- To study the sampling process and analysis of discrete systems using z-transforms.
- To study the analysis and synthesis of discrete time systems.
- To inculcate the characteristics of various signals.
- To familiarize with Z Transform and its application on signals
- To get familiarize of sampling of signals

INTENDED OUTCOMES:

Students will gain
- Knowledge about the properties and representation of discrete and continuous signals.
- Knowledge about the sampling process and analysis of discrete systems using z-transforms
- Knowledge about the analysis and synthesis of discrete time systems.
- Depict discrete systems in different domain using Fourier Transform
- Investigate stability of the system
- Carry on state-space analysis of signals and its multi-input, multi-output representation

UNIT I   CLASSIFICATION OF SIGNALS AND SYSTEMS   12
Continuous time signals (CT signals) - Discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Sinusoidal, Exponential, Classification of CT and DT signals - Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - CT systems and DT systemsClassification of systems – Static & Dynamic, Linear & Nonlinear, Time-variant & Time-invariant, Causal & Noncausal, Stable & Unstable.

UNIT II   ANALYSIS OF CONTINUOUS TIME SIGNALS   12
Fourier series analysis-spectrum of Continuous Time (CT) signals- Fourier and Laplace Transforms in CT Signal Analysis - Properties.

UNIT III   LINEAR TIME INVARIANT- CONTINUOUS TIME SYSTEMS   12
Differential Equation-Block diagram representation-impulse response, convolution integrals-Fourier and Laplace transforms in Analysis of CT systems

UNIT IV   SAMPLING THEOREM AND Z-TRANSFORMS   12
Sampling theorem – Reconstruction of a Signal from its samples, aliasing – sampling of band pass signals. Basic principles of z -transform - z-transform definition – Region of Convergence – Properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform - Residue Theorem, Power Series expansion and Partial fraction expansion.

UNIT V   FILTER REALIZATION STRUCTURES   12
Realization structures – Direct Form – I, Direct Form – II, Cascade, Parallel and Transpose forms.

Total Hours: 60

TEX BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	AlanV.Oppenheim, Alan S. Willsky and Hamid Nawab.S	Signals and Systems	Pearson Education, New Delhi	2003
2	Roberts.M. J	Signals and Systems Analysis using Transform method and MATLAB	TMH, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	John G. Proakis and Dimitris G. Manolakis	Digital Signal Processing, Principles, Algorithms and Applications	PHI, New Delhi	2000
2	Simon Ha ykin and Barr y Van Veen	Signals and Systems	John Wile y, New York	2002
3	Lindner.K	Signals and Systems	McGraw Hill International, New York	2001
4	Moman.H. Ha ys	Digital Signal Processing	Tata McGraw-Hill Co Ltd., New Delhi	2004
5	Ashok Amhardar	Analog and Digital Signal Processing	PHI, New Delhi	2002

WEBSITES:

1. www.relisoft.com
2. www.dspguide.com

17BEEC403   TRANSMISSION LINES AND NETWORKS   L T P C
                                                          3 0 0 3

OBJECTIVES:

- To become familiar with propagation of signals through lines.
- To know about various line parameters by conventional and graphical methods.
- To understand the need for impedance matching
- To understand the different impedance matching techniques.
- To understand the design of different types of filters
- To know about the usuage of equalizer and attenuators.

INTENDED OUTCOMES:

- Students have complete exposure to basics and Fundamentals of transmission lines and networks.
- Students will have ability to design filters, equalizers and attenuator.
- Students will understand the need for impedance matching
- Students could understand the different impedance matching techniques.
- Students could understand the design of different types of filters
- Students will know about the usuage of equalizer and attenuators.

UNIT I   TRANSMISSION LINE THEORY   9

General theory of Transmission lines – the transmission line– general solution–The infinite line– Wavelength, velocity of propagation– Waveform distortion– the distortion lessline- Loading and different methods of loading– Line not terminated in Z0 –Reflection coefficient–Calculation of current, voltage, power delivered and efficiency of transmission–Input and transfer impedance-Open and short-circuited lines–reflection factor and reflection loss.

UNIT II   HIGH FREQUENCY TRANSMISSION LINES   9

Transmission line equations at radio frequencies–Line of Zero dissipation–Voltage   and current on the dissipation less line, StandingWaves, Nodes Standing Wave Ratio–Input impedance of the dissipation less line - Open and short-circuited lines – Powerand impedance measurement on lines – Reflection losses– Measurement of VSWR and wavelength.

UNIT III   IMPEDANCE MATCHING IN HIGH FREQUENCY LINES   9

Impedance matching: Quarter wave transformer – Impedance matching bystubs–Single stuband double stubmatching– Smith chart – Solutions of problems using Smith chart – Single and double stubmatching using Smithc hart.

UNIT IV   PASSIVE FILTERS   9

Characteristic impedance of symmetrical networks–filter fundamentals. Design of filters: Constant K, LowPass, High Pass, Band Pass, Band Elimination, m-derived sections and composite.

UNIT V   ATTENUATORS AND EQUALIZERS   9

Attenuators: Lattice Attenuators, Bridged– T attenuator, L-Type Attenuator. Equalizers: Inverse network, series, fullseries, shunt, fullshunt, constant resistanceT, constant resistance, constant resistance lattice and bridged T network.

                                                          Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Year of publication
1	Ryder.J. D	Networks, Linesand Fields	PHI, NewDelhi.	2009
2	E.G. Jordan&balmain	ElectromagneticWaves AndRadiatingSystems, 2ndEdition,	Prentice-Hallof India,	2000

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Year of publication
1	UmeshSinha	TransmissionLinesand Network	SatyaPrakashan PublishingCompany, NewDelhi	2012
2	Sudhakar.A, ShyammohanS Palli	Circuits and Networks AnalysisandSynthesis 4th Edition	TataMcGrawHill,	2010

17BEEC404   **COMMUNICATION THEORY**   **L T P C**
                                                         3 0 0 3

OBJECTIVES:

- To provide various Amplitude modulation and demodulation systems.
- To provide various Angle modulation and demodulation systems.
- To provide some depth analysis in noise performance of various receiver.
- To study some basic information theory with some channel coding theorem.
- To learn the transmission of a Random Process through a LTI filter.
- To study the concept of differential entropy.

INTENDED OUTCOMES:

Student will gain knowledge on
- Various Amplitude modulation and demodulation systems.
- Various Angle modulation and demodulation systems.
- Some depth analysis in noise performance of various receivers.
- Some basic information theory with some channel coding theorem.
- Transmission of a Random Process through a LTI filter.
- Concept of differential entropy.

UNIT I   AMPLITUDE MODULATION   9
Generation and demodulation of AM, DSB-SC, SSB-SC, VSB Signals, Filtering of sidebands, Comparison of Amplitude modulation systems, Frequency translation, Frequency Division multiplexing, AM transmitters – Super heterodyne receiver, AM receiver.

UNIT II   ANGLE MODULATION   9
Angle modulation, frequency modulation, Narrowband and wideband FM, transmission bandwidth of FM signals, Generation of FM signal – Direct FM – indirect FM, Demodulation of FM signals, FM stereo multiplexing, P LL – Nonlinear model and linear model of P LL, Non-linear effects in FM systems, FM Broadcast receivers, FM stereo receives.

UNIT III   RANDOM PROCESS   9
Random variables, Central limit Theorem, Random Process, Stationary Processes, Mean, Correlation & Covariance functions, Power Spectral Density, Ergodic Processes, Gaussian Process, Transmission of a Random Process Through a LTI filter.

UNIT IV   NOISE CHARACTERIZATION   9
Noise sources and types – Noise figure and noise temperature – Noise in cascaded systems. Narrow band noise – PSD of in-phase and quadrature noise –Noise performance in AM systems – Noise performance in FM systems – Pre-emphasis and de-emphasis – Capture effect, threshold effect.

UNIT V   INFORMATION THEORY   9
Uncertainty, Information and entropy, Source coding theorem, Data compaction, Discrete memory less channels, mutual information, channel capacity, channel coding theorem, differential entropy, and mutual information for continuous ensembles, information capacity theorem, implication of the information capacity theorem, rate distortion theory, Compression of information.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Simon Haykin	Communication Systems	John Wiley & sons, New Jersy.	2005
2	Wayne Tomasi	Electronic Communication theory systems	PearsonEdition, New Jersy	2003
3	J.G. Proakis, M. Salehi,	Fundamentals of Communication Systems	Pearson Education	2006.

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Roddy and Coolen	Electronic communication	PHI, New Delhi.	2003
2	Taub and Schilling	Principles of communication systems	TMH, New Delhi	2008
3	B.P.Lathi	Modern Digital and Analog Communication Systems 3rd Edition	Oxford University Press	2007

WEBSITES:

1. http://williamson-labs.com/480_mod.htm
2. www.mit.edu
3. http://www.sfu.ca/~truax/fmtut.html

17BEEC405   **ELECTRONIC CIRCUITS**   **L T P C**
                                                3 0 0 3

OBJECTIVES:

> The purpose of this course is to introduce to the students.
> * The basics of biasing transistor circuits.
> * Concepts of feedback amplifiers, large signal amplifiers, tuned amplifiers.
> * Operation of oscillators, wave shaping circuits.
> * Design and analyze various electronic switching circuits and systems.
> * Impart knowledge on feedback and oscillator circuits.
> * Understand the concept of multivibrators.

INTENDED OUTCOMES:

> At the end of this course the students will learn and apply
> * Operating point calculations and working of basic amplifiers.
> * Working of different types of feedback amplifiers & oscillators.
> * Frequency response and design of tuned amplifiers.
> * Basic working & design of wave shaping circuits.
> * Design power supply for various application
> * Design regulators for different application

UNIT I   BIASING CIRCUITS AND SMALL SIGNAL MODELS   9
Biasing circuits: DC load line and Q point – BJT biasing circuits – FET biasing circuits-Bias Stabilization. Small-signal models: AC load line, BJT models and parameters – hybrid equivalent model, Hybrid π model, FET small-signal model and parameters.

**UNIT II   SMALL SIGNAL AMPLIFIERS ANALYSIS AND FREQUENCY
             RESPONSE   9**
BJT amplifiers: CE, CB and CC amplifiers – multistage amplifiers -differential amplifier. Frequency response: low frequency response of BJT and FET amplifiers –Miller effect capacitance –high frequency response of BJT and FET amplifiers.

UNIT III   FEEDBACK AND OSCILLATOR CIRCUITS   9
Feedback circuits: concept of feedback – effects of negative feedback –Types of negative feedback topologies Oscillator circuits: oscillator principles – LC oscillators – RC oscillators – crystal oscillators.

UNIT IV   POWER AMPLIFIERS AND TUNED AMPLIFIERS   9
Power amplifiers: Class A amplifier – Class B and Class AB push-pull amplifiers – Class C Amplifiers-Amplifier distortions – heat sink. Tuned amplifiers: need for tuned circuits – single tuned – double tuned – video amplifier (CA3040).

UNITV   SOLID STATE SWITCHING CIRCUITS   9
Transistor switching times – multivibrators – astable multivibrator – monostable multivibrator – bistable multivibrator – Schmitt trigger. Oscillator-Sweep generators.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	David A Bell,	Fundamentals of Electronic Devices and	Oxford University Press	2009
2	Jacob Millman, Christos C Halkias, Satyabrata Jit	Electron Devices and Circuits	Tata McGraw Hill	2010

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Thomas L. Flo yd	Electronic Devices 9th Edition	Pearson Education,	2011.
2	Albert P. Malvino David J. Bates	Electronic Principles 7th Edition	Tata McGraw Hill	2007
3	Robert L. Bo ylestad and Louis Nashelsk y	Electronic Devices and Circuit Theory 9th Edition	Pearson Education,	2009
4	David A. Bell	Solid State Pulse Circuits	Oxford Universit y Press	2007

17BEEC406A   **CONTROL SYSTEMS**   **L T P C**
                                                                                     3 0 0 3

OBJECTIVES:

- To introduce students to control system modeling
- To introduce methods for analyzing the time response, the frequency response.
- To introduce the concept of compensators.
- To introduce control system componets and its applications.
- To gain basic knowledge on open loop and closed–loop frequency response of systems.
- To outline state variable representation of physical systems

INTENDED OUTCOMES:

- Upon completion of the course, students will be able to:
- Perform time domain and frequency domain analysis of control systems required for stability analysis.
- Design the compensation technique that can be used to stabilize control systems.
- Analyze frequency and time response for any given system
- Design various controllers
- Describe the necessity of controllability and observability

UNIT I   CONTROL SYSTEM MODELLING   9

System concept, differential equations and transfer functions. Modeling of electric systems, translational and rotational mechanical systems, Simple electromechanical systems.
Block diagram representation of systems – Block diagram reduction methods – Closed loop transfer function, determination of signal flow graph. Mason's gain formula – Examples.

UNIT II   TIME DOMAIN ANALYSIS   9

Test signals – time response of first order and second order systems – time domain specifications – types and order of systems – generalized error co-efficient – steady state errors – concepts of stability – Routh-Hurwitz stability – root locus. Analysis using MATLAB

UNIT III   FREQUENCY DOMAIN ANALYSIS   9

Introduction – correlation between time and frequency response – stability analysis using Bode plots, Polar plots, Nichols chart and Nyquist stability criterion – Gain margin – phase margin, Analysis using MATLAB.

UNIT IV   COMPENSATORS   9

Realization of basic compensators – cascade compensation in time domain and frequency domain and feedback compensation – design of lag, lead, lag-lead compensator using Bode plot and Root locus. Introduction to P, PI and PID controllers. Analysis using MATLAB.

UNIT V   CONTROL SYSTEM COMPONENTS AND ITS APPLICATION   9

Stepper motors – AC servo motor – DC servo motor – Synchros – sensors and encoders – DC tacho generator – AC tacho generator – Hydraulic controller – Pneumatic controller – Typical application of control system in industry.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Ogata.K	Modern Control Engineering	Prentice Hall of India, New Delhi	2003
2	Nagrath & Gopal	Control System Engineering 5th Edition	New Age International, New Delhi.	2007

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Benjamin.C. Kuo	Automatic Control Systems 9th Edition	Prentice Hall of India, New Delhi	2009
2	Gopal.M	Control Systems – Principles and Design 2nd Edition	Tata McGraw-Hill, New Delhi	2002

17BEEC406B   **COMPUTER NETWORKS**   **L T P C**
                                                                3 0 0 3

OBJECTIVES:

- To introduce the students about the functions of different layers.
- To introduce IEEE standard employed in computer networking.
- To make students to get familiarized with different protocols and network components.
- To familiarize the students with layering concepts.
- To imparts a good knowledge in transport layer protocol
- To learn about congestion avoidance mechanisms and quality of service

INTENDED OUTCOMES:

At the end of the course, the student should be able to:
- Identify the components required to build different types of networks.
- Choose the required functionality at each layer for given application.
- Identify solution for each functionality at each layer.
- Trace the flow of information from one node to another node in the network.
- Gain knowledge to allocate appropriate resources
- Analyze the performance of the network.

UNIT I   DATA COMMUNICATIONS   9
Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OS I model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing Sequences-Real time applications.

UNIT II   DATA LINK LAYER   9
Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control: stop and wait – go back N ARQ – selective repeat ARQ- sliding window techniques – HDLC.LAN: Ethernet IEEE 802.3, IEEE 802.4, and IEEE 802.5 – IEEE 802.11–FDD I, SONET – Bridges. Real time applications.

UNIT III   NETWORK LAYER   9
Internetworks - Packet Switching and Datagram approach – IP addressing methods – IP4 and IP6 - Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers- Real time applications.

UNIT IV   TRANSPORT LAYER   9
Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services- Real time applications.

UNIT V   APPLICATION LAYER   9
Domain Name Space (DNS) – SMTP, FTP, HTTP, WWW, Email, Search engines - POP server- Security – Cryptograph y- Real time applications.

                                                          Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Behrouz A. Foruzan	Data communication and Networking	Tata McGraw-Hill, New Delhi	2004
2	William Stallings	Data and Computer Communication	Pearson Education, New Delhi	2000

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	James .F. Kurouse &.Rouse.W	Computer Networking: A Top down Approach Featuring	Pearson Education, New Jersy	2001
2	Larr y L.Peterson & Peter S.Davie	Computer Networks	Harcourt Asia Pvt. Ltd, New Delhi	2000
3	Andrew S. Tannenbaum	Computer Networks	PHI, New Delhi	2003

17BEEC411   ELECTRONIC CIRCUITS AND SIMULATION LABORATORY   L T P C
0 0 3 2

OBJECTIVE:

- To study experimentally the working of amplifiers, regulators and analyze their behavior by plotting graphs.
- To study the Harlet and Colpitts Oscilaltor
- To know the design of Wein Bridge Oscillator
- To learn about Integrators, Differentiators, Clippers and Clampers
- To know the design of Astable, Monostable and Bistable multivibrators
- To design Class C Amplifier

INTENDED OUTCOME:

- Ability to simulate and design any given electronic circuit and analyze their performance frequency response and characteristics.
- Design the Harlet and Colpitts Oscilaltor
- Design of Wein Bridge Oscillator
- Know Integrators, Differentiators, Clippers and Clampers
- Design Astable, Monostable and Bistable multivibrators
- Design Class C Amplifier

LIST OF EXPERIMENTS

1. Series and Shunt feed back amplifiers: Frequency response, Input and output impedance calculation
2. Design of RC Phaseshift oscillator: Design Wein Bridge Oscillator
3. Design of Hartley and Colpitts Oscillator
4. Tuned Class C Amplifer
5. Integrators, Differentiators, Clippers and Clampers
6. Design of Astable, Monostable and Bistable multivibrators

SIMULATION USING PSPICE/MultiSim:

7. Differential amplifier
8. Activefilter: Butter worth I or IInd order LPF, HPF
9. Astable, Monostable and Bistable multivibrator
10. D/A and A/D converter (Successive approximation)
11. Analog multiplier
12. CMOS Inverter, NAND and NOR gates

Total Hours: 45

17BEEC412   LINEAR INTEGRATED CIRCUITS LABORATORY   **L T P C**
                                                                 0 0 3 2

OBJECTIVES:

- To expose the students to linear and integrated circuits
- To understand the basics of linear integrated circuits and available ICs
- To apply operational amplifiers in linear and nonlinear applications.
- To acquire the basic knowledge of special function IC.
- To study the characteristics of PLL
- To use PSPICE/ MultiSim software for circuit design.

INTENDED OUTCOMES:

At the end of the course, the student should be able to:
- Design oscillators and amplifiers using operational amplifiers.
- Design filters using Opamp and perform experiment on frequency response.
- Analyse the working of PLL and use PLL as frequency multiplier.
- Design DC power supply using ICs.
- Design ofADC andDAC using discrete components.
- Analyse the performance of oscillators and multivibrators using PSPICE/MultiSim.

LIST OF EXPERIMENTS

1. Inverting, Noninverting and differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier.
4. Active lowpass, highpass and Bandpass filter.
5. Astable, Monostable multivibrators and SchmittTrigger using op-amp.
6. Phase shift and Wienbridge oscillator using op-amp.
7. Astable and Monostable using NE555 Timer.
8. PLL characteristics and Frequency Multiplier using PLL.
9. Design of ADC and DAC using discrete components.
10.Study of DC power supply using LM317and LM723 and SMPS control ICSG 3524/SG3525.
11.Simulation of Experiments1,2,3,4,5 using PSpice / MultiSim

Experiments 1,2,3,4,5 &6 to be constructed using Analog kit ASLK PRO kits from Texas Instruments

                                                               Total Hours: 45

17BEEC451   **LIFE SKILLS**   **L T P C**
                                                                1 0 0 –

Course Objectives
- To elevate the students into productivity powerhouses who can employ life skills to better their performances.
- To help the students understand interpersonal skills.
- To support them in building interpersonal skills.
- To better the ability to work with others.
- To imparts good knowledge in stress management.
- To understand the leadership teamwork, creativity, efficiency & productivity

Course Outcomes
- Ability to communicate smartly and effectively with co-workers, relationship enhancement
- Improvement of time management and organizational skill.
- Development of leadership teamwork, creativity, efficiency & productivity
- Development of presentation skills
- Recognize stress symptom & develop stress deflecting strategies
- Brain storming & problem solving strategies to increase creativity and collaborative outcomes

UNIT I   **4**
Overview to communication, self Introduction, Presentation on their own topic, Extempore, Group Activity

UNIT II   **3**
Group Discussion, Do's and Don'ts of Group Discussion, Body language, Grooming and Resume, Resume correction

UNIT III   **4**
Introduction to HRM – Questions - Do's and Don't's - Interview - Mock GD - Stress Management

UNIT IV   **4**
Personality Development - Presentation skills, Interpersonal skills, Critical thinking, Confidence building and Stress management.

                                                                    Total Hours: 15

REFERENCES:

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Barun K Mitra	Personality Development and Soft Skills	Oxford University Press- New Delhi	2012
2	Rajiv K. Mishra	Personality Development	Rupa & Co.	2012

17BEEC452   **TECHNICAL SEMINAR**   **L T P C**
                                                                                 1 0 0 -

Course Objectives

The goal of this course for students is :
- To make students aware of recent technical advancements in electronics
- To enable students to overcome stage fear

Course Outcomes

 At the end of this course students will be able to :
- Gain knowledge on recent trends in electronics
- Acquire fluency and confidence for conference presentation

17BEEC501   **DIGITAL SIGNAL PROCESSING**   **L T P C**
                                                                         3 1 0 4

OBJECTIVES:

- To learn discrete Fourier transform and its properties.
- To know the characteristics of IIR and FIR filters learn the design of infinite and finite impulse response filters for filtering undesired signals.
- To understand Finite word length effects.
- To study the concept of Multirate.
- To study the concept of Adaptive Filters
- To understand Direct I and Direct II structures

INTENDED OUTCOMES:
Upon completion of the course, students will be able to

- Apply DFT for the analysis of digital signals & systems
- Design IIR and FIR filters
- Characterize finite Word length effect on filters
- Design the Multirate Filters.
- Apply Adaptive Filters to equalization.
- Apply direct form I and direct form II structures.

UNIT I   DISCRETE FOURIER TRANSFORM   12
Discrete Signals and Systems- A Review – Introduction to DFT – Properties of DFT – Circular Convolution - Filtering methods based on DFT – FFT Algorithms –Decimation in time Algorithms, Decimation in frequency Algorithms – Use of FFT in Linear Filtering.

UNIT II   IIR FILTER DESIGN   12
Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation.

UNIT III   FIR FILTER DESIGN   12
Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques – Finite word length effects in digital Filters: Errors, Limit Cycle, Noise Power Spectrum.

UNIT IV   FINITE WORDLENGTH EFFECTS   12
Fixed point and floating point number representations – ADC –Quantization- Truncation and Rounding errors - Quantization noise – coefficient quantization error – Product quantization error - Overflow error – Roundoff noise power - limit cycle oscillations due to product round off and overflow errors – Principle of scaling

UNIT-V   DIGITAL SIGNAL PROCESSORS   12
Introduction to DSP architecture - Dedicated MAC unit - Multiple ALUs, Advanced addressing modes, Pipelining, Overview of instruction set of TMS320C5X and C54X.

                                                                Total Hours: 60

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	John G. Proakis, Dimtris G. Manolakis	Digital Signal Processing Principles, Algorithms and Application Fourth edition	Pearson Education,	2007
2	Venkataramani B & M. Bhaskar	Digital Signal Processor Architecture, Programming and Application	TMH, New Delhi	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Emmanuel C.Ifeachor, & Barrie.W.Jervis	Digital Signal Processing Second Edition	Pearson Education / Prentice Hall	2002
2	Sanjit K. Mitra,	Digital Signal Processing- A Computer Based Approach	Tata Mc Graw Hill	2007
3	A.V.Oppenheim, R.W. Schafer and J.R. Buck	Discrete-Time Signal Processing 8th Indian Reprint	Pearson	2004
4	Andreas Antoniou	Digital Signal Processing	Tata Mc Graw Hill	2006

WEBSITES:

1. www.cnx.org
2. www.dspguide.com
3. http://mathworld.wolfram.com/Z-Transform.html

17BEEC502   **DIGITAL COMMUNICATION**   **L T P C**
                                                        3 0 0 3

OBJECTIVES:

- To learn and understand Pulse modulation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals.
- To educate baseband pulse transmission which deal swith the transmission of pulse amplitude modulated signals in their baseband form Pass band data transmission methods
- To learn spread spectrum techniques.
- To understand Pulse Code Modulation (PCM) techniques
- To provide knowledge on inter symbol interference and nyquist criterion.
- To learn about pass band digital modulation

INTENDEDOUTCOMES:

Upon completion of the course, students will be able to
- Design PCM systems.
- Design and implement base band transmission schemes.
- Design and implement band pass signaling schemes.
- Analyze the spectral characteristics of band pass signaling schemes and their noise performance.
- Analyze the behavior of a communication system in the presence of noise.
- Investigate pulsed modulation system and analyze the system performance.

UNIT I   SAMPLING AND QUANTIZATION   9
Sampling Process – Aliasing – Instantaneous sampling – Natural Sampling – Flat Sampling – Quantization of signals – sampling and quantiz ing effects – channel effects – SNR for quantiz ation pulses – Time division multiplexing.

UNIT II   DIGITAL MODUL ATION SYSTEMS   9
Pulse amplitude modulation-Bandwidth noise trade off-Pulse code modulation – Noise Considerations in PCM system – Virtues, Limitations & Modification of PCM system– Delta Modulation – Noise Considerations in Delta Modulation – SNR Calculations –Differential PCM – Comparison of PCM, DPCM & DM.

UNIT III   BASE BAND PULSE TRANSMISSION   9
Maximum likelihood receiver structure – Matched filter receiver – Error rate due to noise Probability error of the Matched filter –   Inter symbol interference –   Nyquist criterion for distortionless baseband transmission – Correlative coding – Eye pattern.

UNIT IV   PASS BAND DATA TRANSMISSION   9
Pass Band Transmission Model – Generation, Detection, Signal Space Diagram, Probability of Error for BFSK, BPSK, QPSK, DPSK, and Schemes– Comparison.

UNIT V   SPREAD   SPECTRUM MODULATION   9
Generation & Characteristics of PN Sequence – Discrete   Sequence Spread Spectrum technique – Use of Spread Spectrum with CDMA-Ranging Using Discrete Sequence Spread Spectrum – Frequency Hopping Spread Spectrum.

Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Simon Haykins	Digital Communication	JohnWiley PHI, NewDelhi	2009
2	Taub & Schilling	Principles of Communication	TataMcGraw-Hill, NewDelhi	2008

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	SamK.Shanmugam	Analog & Digital Communication	JohnWiley Publication, New Delhi	2007
2	JohnG.Proakis	Digital Communication 5th Edition	McGraw Hill, Inc,	2008
3	Singh, R.P. & Sapre, S. D	Communication Systems: Analog & Digital 2nd Edition 7th reprint	TataMcGraw-Hill	2008

17BEEC503   **ANTENNAS AND WAVE PROPAGATION**   **L T P C**
                                                                  3 0 0 3

OBJECTIVES:

- To give an insight to antenna fundamentals and radiations.
- To create awareness about the different types antennas arrays and synthesis.
- To give a thorough understanding of the radiation characteristics of different types of antennas.
- To understand the propagation of radio waves in the atmosphere.
- To have an exposure on special purpose antennas
- To understand the concept of beam forming in smart antennas

INTENDED OUTCOMES:

Upon completion of the course, students will be able to:
- Explain the various types of antennas and wave propagation.
- Write about the radiation from a current element.
- Demonstrate the working of smart antennas
- Explain radio wave propagation in ionosphere
- Choose appropriate antennas based on applications
- Analyze the antenna arrays and special antennas with introduction nto CAD modeling.

UNIT I   ANTENNA FUNDAMENTALS AND RADIATION   9
Definition and function of antennas – Antenna Theorems-Antenna parameters – Radiation Mechanism – Antenna field zones – Radiation from a small current element – Power radiated by a small current element and its radiation resistance – Hertzian dipole – Half wave dipole – Monopole – Current distributions.

UNIT II   ANTENNA ARRAYS AND SYNTHESIS   9
Linear arrays – Analysis of linear arrays – Phased arrays – Binomial arrays – Pattern multiplication – Method of excitation of antennas – Impedance matching techniques. Synthesis methods: Schelkunoff polynomial – Fourier transform – Wooden Lawson method.

UNIT III   SPECIAL PURPOSE ANTENNAS   9
Travelling wave – Loop – small loop – Dipole and Folded dipole antennas – Horn antenna – Reflector antenna – Yagi – Uda antenna – Log periodic antenna – Helical and Microstrip antennas. Introduction to CAD tools used for antenna modeling.

UNIT IV   ANTENNA MEASUREMENTS   9
Drawbacks in measurements of antenna parameters – Methods to overcome drawbacks in measurements –Measurement ranges – Impedance – Gain – Radiation pattern – Beam width – Radiation resistance – Antenna efficiency- Directivity-Polarization and Phase Measurements.

UNIT V   RADIO WAVE PROPAGATION   9
Basics of propagation-Ground wave propagation – Space wave propa gation- Considerations in space wave propagation – Super refraction – Ionospher ic wave propagation – Structure of ionosphere – Mechanism of ionospheric propagation – Effect of earth's Magnetic field on Radio wave propagation– Virtual height – MUF – Skip distance – OWF – Ionosphere abnormalities.

Total Hours: 45

TEXT BOOKS:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Year of publication
1.	John D Kraus, Ronald J Marhefka, Ahmad S Khan	Antenna and Wave Propagation 4th Edition	Tata McGrawHill,	2010
2.	R.E. Collins	Antenna and Wave Propagation	McGraw-Hill,	1998

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Year of publication
1	ConstantineA. Balanis	AntennaTheory: Analysisand Design Third Edition	John WileyandSons	2012
2	G.S.N. Raju	Antennas and wave propagation	St Pearson Education	2012
3	RobertS.Elliott	Antenna Theory and Design Revised Edition	JohnWileyand Sons	2007
4	R.L. Yadava	Antennas and Wave Propagation	PHI	2011

17BEEC504   MICROPROCESSORS AND MICROCONTROLLERS   L T P C
3 0 0 3

OBJECTIVES:

- To introduce the h/w architecture, instruction set and programming of 8086 microprocessor.
- To introduce the peripheral interfacing of microprocessors.
- To introduce the h/w architecture, instruction set, programming and interfacing of 8051 microcontroller.
- To introduce the h/w architecture of ARM processor.
- To study advanced processor architecture
- To expose them to programming concepts

INTENDED OUTCOMES:

At the end of the course, the student should be able to:

- Design and implement programs on 8086 microprocessors.
- Design and implement programs on 8051 microcontrolleer.
- Design Memory Interfacing circuits using 8051.
- Gain knowledge on ARMv7 processor.
- Interface memory and I/O device with controllers
- Gain knowledge about architectures of RISC and ARM processors

UNIT I   MICROPROCESSOR- 8086   9
Review of 8085- Introduction to 8086 -Register Organization -Architecture-Signals-Memory Organization-Bus Operation-I/O Addressing-Minimum Mode-Maximum Mode-Timing Diagram- Interrupts - Service Routines – I/O and Memory Interfacing concepts.

UNIT II   PROGRAMMING OF 8086   9
Addressing Modes- Instruction Format-Instruction set-Assembly language programs in 8086. R ISC architecture – introduction to ARM Programming-register configuration and instruction set – sample program.

UNIT III   MICROCONTROLLER-8051   9
Register Set-Architecture of 8051 microcontroller- I/O and memory addressing- Interrupts-Instruction set- Addressing modes.

UNIT IV   PROGRAMMING AND INTERFACING OF 8051   9
Timer-Serial Communication-Interrupts Programming- Interfacing t oExternal Memory-Interfacing to ADC, LCD, DAC, Keyboard and stepper motor.

UNIT V   OVERVIEW OF ARM PROCESSOR   9
Review of ARMv7 core and its architecture, Introductionto Advanced ARM CORTEX M4 architecture, Peripherals over view, Advantages of using Cortex M4, Instructionset implementation, CPU timer's introduction.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	K. Ray and K.M. Bhurchandi,	Advanced Microprocessors and Peripherals– Architectures, Programming and Interfacing Indian Edition	Tata McGraw Hill, New Delhi	2001 Reprint
2	Muhammad Ali Mazidi, Janice Gillispie Mazidi, RolinD.MCKinlay	The 8051 Microcontroller and Embedded Systems	Pearson Education, NewJersy.	2008
3	DouglasV.Hall	Microprocessor & Interfacing, Programming and Hardware. Indian Edition	Tata McGraw Hill, New Delhi	2007

REFERENCES:

S.NO.	Author(s) Name	Titleof thebook	Publisher	Year of publication
1	Krishna Kant	Microprocessor and Microcontroller Architecture, programming and system design using 8085, 8086, 8051 and 8096.	PHI, NewDelhi.	2007
2	KennethJ.Ayala	The 8051 Microcontroller	Thompson Delmar Learning, NewDelhi	2007
3	Ray.A. K, Bhurchandi.K.M	Advanced Microprocessor and Peripherals	TataMcGraw-Hill, NewDelhi	2007
4	BarryB.Brey	The Intel Microprocessors Architecture, Programming and Interfacing	Pearson Education, NewDelhi	2007
5	RameshS.Goankar	Microprocessor Architecture, Programming, and Applications with the 8085.	PHI, NewDelhi.	2002
6	JonathanW Valvano	Introductionto Arm(r) Cortex-M Microcontrollers	Createspace Independent Publisher	2012

17BEEC5E**   **PROFESSIONAL ELECTIVE**   **L T P C**
                                                                     3 0 0 3

17BEEC511   **DIGITAL SIGNAL PROCESSING LABORATORY**   **L T P C**
                                                                 0 0 3 2

OBJECTIVES:

- To implement the processing techniques using TMS320C5X
- To implement the IIR and FIR filter using MATLAB.
- To familiarize with DSP system simulations.
- To study the knowledge about various addressing modes of DSP.
- To imparts a good knowledge sampling and effect of aliasing.
- To familiarize with fast fourier transform and its simulation using MATLAB.

INTENDED OUTCOMES:

Students will be able to:
- Carry out simulation of DSP systems.
- Demonstrate the applications of FFT to DSP.
- Implement adaptive filters for various applications of DSP.
- Acquire good knowledge about IIR and FIR filters.
- Understand the Sampling and effect of aliasing
- Clear idea about various addressing modes of DSP.

LIST OF EXPERIMENTS USING TMS320C5X
    1. Study of various addressing modes of DSP using simple programming examples
    2. Sampling of input signal and display.
    3. Implementation of FIR filter.
    4. Calculation of FFT.

SIMULATION USING MATLAB/ EQUIVALENT SOFTWARE PACKAGE
    5. Generation of Signals
    6. Linear and circular convolution of two sequences
    7. Sampling and effect of aliasing
    8. Design of FIR filters
    9. Design of IIR filters
    10. Calculation of FFT of asignal

                                                      Total Hours: 45

17BEEC512   COMMUNICATION SYSTEMS LABORATORY   **L T P C**
                                                               0 0 3 2

OBJECTIVES:

- To Understand the radiation patterns and applications of all types of antennas
- Understand the design of Yagi antenna.
- Design Half-wave dipole Antenna using Matlab.
- To Implement AM & FM modulation and demodulation.
- To implement PCM & DM.
- To implement FSK, PSK and DPSK schemes.

INTENDED OUTCOMES:

At the end of the course, the student should be able to:

- Distinguuish between radiation patterns of various antennas.
- Design antenna for any application
- Select proper type of antenna based on applications
- Distinguish between various antennas based on their radiation patterns.
- Demonstrate their knowledge in AM, FM transmission and reception.
- Demonstrate their knowledge in base band signaling schemes through implementation of FSK, PSK and DPSK.

LIST OF EXPERIMENTS

1. Radiation pattern of Halfwave dipole Antenna.
2. Radiation pattern of Yagi Antenna.
3. Radiation pattern of loop Antenna.
4. Characteristics of AM receiver (Selectivity&Sensitivity).
5. Characteristics of FM receiver (Selectivity &Sensitivity).
6. Signal Sampling & Time division multiplexing.
7. Pulse modulation and demodulation-PAM/PWM/PPM.
8. Pulse code modulation & demodulation.
9. Line Coding & Decoding.
10. Delta modulation & demodulation.
11. Digital modulation & demodulation–ASK, PSK, FSK.
12. Simulation of hardware mentioned above using Lsim software.

                                                               Total Hours: 45

17BEEC513 MICROPROCESSOR AND MICROCONTROLLER LABORATORY

L T P C
0 0 3 2

OBJECTIVES:

> The student should be made to:
> - Introduce ALP concepts and features.
> - Write ALP for arithmetic and logical operations in 8086.
> - Interface peripherals with microprocessor and microcontroller.
> - Excute programs in 8051
> - Know the concept of CPU timers.
> - Gain knowledge on ARMv7 processor

INTENDED OUTCOMES:

> At the end of the course, the student should be able to:
> - Write ALP Programmes for fixed and Floating Point and Arithmetic.
> - Interface different I/Os with processor.
> - Execute Programs in 8051.
> - Design Memory Interfacing circuits using 8051.
> - Gain knowledge on ARMv7 processor.
> - Introduce the CPU timer's.

LIST OF EXPERIMENTS:

Minimum 12 Experiments to be conducted
1. Programs for 8/16 bit Arithmetic operations (Using 8085 and 8086).
2. Programs for Sorting and Searching (Using 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Programs on Subroutines (Using 8086).
6. Interfacing ADC and DAC (Using MSP 430 Controller).
7. Interfacing with 8255.
8. Transfer data serially between two kits (8253/8251).
9. Interfacing with 8279.
10. Traffic Control Using MSP 430 controller.
11. Interfacing with 8259 Programmable Interrupt Controller.
12. Interfacing and Programming of DC Motor Speed control (Using MSP 430 controller).
13. Interfacing and Programming of Stepper Motor and (8051).
14. Programming using Arithmetic, Logical & Bit Manipulation instructions of 8051 microcontroller.

Total Hours: 45

17BEEC551   **INPLANT TRAINING**   **L T P C**
                                                        - - - -

Course Objective

The goal of this course for students is :
- To bridge the gap between academia and industry in providing a industry exposure for satisfying local industrial needs .

Course Outcomes

At the end of this course, the students will be able to :
- Gain knowledge on various tools used in industry
- Know recent technological advancement happening in industry

17BEEC601   **WIRELESS COMMUNICATION**   **L T P C**
                                                            3 0 0 3

OBJECTIVES:

- To learn the fundamental cellular radio concepts
- To learn radio propagation models
- To provide ideas about digital modulation techniques used in mobile communication
- To provide ideas about analog modulation techniques used in mobile communication
- To learn various coders and multiple access techniques.
- To study the architectures of AMPS, GSM, WLL, Bluetooth, DECT, GPRS.

INTENDED OUTCOMES:

At the end of the course, the student should be able to:

- Gain adequate knowledge in the fundamentals of cellular radio concepts.
- Gain adequate knowledge in radio propagation models and modulation techniques.
- Provide ideas about digital modulation techniques used in mobile communication.
- Provide ideas about analog modulation techniques used in mobile communication
- Familiarize with the fundamentals of Multiple Access Techniques.
- Analyze the architectures of AMPS, GSM, WLL, Bluetooth, DECT, GPRS

UNIT I   **CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS**   **9**

Introduction to wireless communication: Evolution of mobile communications, mobile radio systems- Examples, trends in cellular radio and personal communications.
Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems.

UNIT II   **MOBILE RADIO PROPAGATION**   **9**

Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.

UNIT III   **MODULATION TECHNIQUES AND EQUILISATION**   **9**

Modulation Techniques: Minimum Shift Keying, Gauss ion MSK, M-ary QAM, M-ary FSK, Orthogonal Frequency Division Multiplexing, Performance of Digital Modulation in Slow-Flat Fading Channels and Frequency Selective Mobile Channels. Equalization: Survey of Equalization Techniques, Linear Equalization, Non-linear Equalization, Algorithms for Adaptive Equalization. Diversity Techniques, RAKE receiver.

UNIT IV   **CODING AND MULTIPLE ACCESS**   **9**

Coding: Vocoders, Linear Predictive Coders, Selection of Speech Coders for Mobile Communication, GSM Codec, RS codes for CDPD. Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

AMPS, GSM, WLL, Bluetooth, IS-95 and DECT - RFID antennas – Mobile Antennas – GPRS.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Rappaport.T. S	Wireless Communications: Principles and Practice	Pearson Education/ Prentice Hall of India, New Delhi	2003
2	JochenSchiller	Mobile Communication	PHI, New Delhi.	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Roy Blake	Wireless Communication Technology	Thomson Delmar, New Delhi.	2003
2	Lee.W.C. Y	Mobile Communications Engineering: Theory and applications	McGraw-Hill International, New York	1998
3	Stephen G.Wilson	Digital Modulation and Coding	Pearson Education, New Delhi	2003

17BEEC602A   **VLSI DESIGN**   **L T P C**
                                                                                 3 0 0 3

OBJECTIVES:

- To learn the MOS process technology.
- To learn the basic MOS Circuits.
- To learn concept of various logic design styles.
- To learn the concepts of modeling a digital system using Hardware Description Language.
- To provide overview on Field Programmable Gate Array (FPGA)
- To learn the concepts of VLSI implementation strategies.

INTENDED OUTCOMES:

Upon completion of the course, students should
- Explain the basic CMOS circuits and the CMOS process technology.
- Explain working of various complex gates and logic styles.
- Draw physical layout for simple circuit
- Model the digital system using Hardware Description Language.
- Explore high speed adders and multipliers
- Gain exposure on clocking Strategies

UNIT I   MOS TECHNOLOGY   9
Chip Design Hierarchy – IC Layers – Photolithography and Pattern Transfers – Basic MOS Transistors – CMOS Fabrication: n-well – p-well – twin tub – Latch up and prevention- Layout design rules, physical design- basic concepts, CAD tool sets, physical design of logic gates- Inverter, NAND, NOR.

UNIT II   MOS TRANSISTOR PRINCIPLE   9
Introduction to MOSFET: Symbols, Enhancement Mode-Depletion mode transistor   operation   – Threshold voltage derivation – body effect – Drain current Vs voltage derivation – channel length modulation. NMOS and CMOS inverter – Determination of pull up to pull down ratio – Stick diagrams – VLSI Circuit Design Flow.

UNIT III   CMOS LOGIC GATES & OTHER COMPLEX GATES   9
Gate delays – Logical Effort - CMOS Static Logic – Transmission Gate Logic – Tri-State Logic – Pass Transistor Logic – Dynamic CMOS Logic – Domino CMOS Logic, NORA CMOS Logic, True Single-Phase Clock (TSPC) Dynamic Logic

UNIT IV   VERILOG HDL   9
Hierarchical modeling concepts – Basic concepts: Lexical conventions – Data types   –   Modules and ports. Gate   level   modeling –   Dataflow modeling – Behavioral modeling – Design examples of Combinational and Sequential circuits – Switch level modeling – Functions – UDP concepts.

UNIT V   VLSI IMPLEMENTATION STRATEGIES   9
Introduction – Design of Adders: carry look ahead-carry select-carry save. Design of multipliers: Array – Braun array – Baugh-Wooley Array. Introduction to FPGA – Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures.

                                                                                 Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Douglas A. Pucknell	Basic VLSI Systems and Circuits 3rd Edition reprint	Prentice Hall of India	2008
2.	John P. Uyemura,	Introduction to VLSI Circuits and Systems	John Wiley&Sons, Reprint	2009

REFERENCES:

S.NO.	Author(s)Name	Title ofthebook	Publisher	Year of publication
1.	Smith.M.J. S	Application Specific integrated	Pearson Education, New York	2008
2.	Weste & Eshraghi an,	Principles of CMOS VLSI Design 2nd Edition	AddisonWesley,	2008
3.	John P Uyemura	Chip Design for Submicron VLSI: CMOS layout and simulation	Thomson India Edition	2010
4	Samir Palnitkar,	VerilogHDL– Guide to Digital Design and Synthesis-3rd Edition	Pearson Education	2003

17BEEC602B   **OPTICAL COMMUNICATION**   **L T P C**
                                                                        3 0 0 3

OBJECTIVES:

- To Facilitate the knowledge about optical fiber sources and transmission techniques
- To Enrich the idea of optical fiber networks algorithm such as SONET/SDH.
- To Explore the trends of optical fiber measurement systems.
- To inculate the basics of point–to–point links.
- To acquaint the student with basics of optical amplifiers and networks.
- To make the student acquire knowledge of fiber alignment and joint loss.

INTENDED OUTCOMES:

Upon completion of the course, students will be able to:
- Discuss the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- Explain the various optical sources and optical detectors and their use in the optical communication system.
- Analyze the digital transmission and its associated parameters on system performance.
- Understand operation of lasers, LEDs, and detectors
- Understand the application of analog and digital links in optical communication systems
- Gain knowledge on optical amplifiers and networks.

UNIT I   INTRODUCTION TO OPTICAL FIBERS   9
Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ra y Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Mode Fibers-Graded Index fiber structure.

UNIT II   SIGNAL DEGRADATION OPTICAL FIBERS   9
Attenuation – Absorption losses, scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave Guides-Information Capacity determination –Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT III   FIBER OPTICAL SOURCES AND COUPLING   9
Direct and indirect Band gap materials-LED structures –Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lancing schemes, Fibre –to- Fibre joints, Fibre splicing – Energy efficiency of LAS ER.

UNIT IV   FIBER OPTICAL RECEIVERS   9
PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error – Quantum Limit.

Point-to-Point links System considerations –Link Power budget –Rise - time budget –Noise Effects on System Performance-Operational Principles of WDM, Solutions-Erbium-doped Amplifiers. Basic on concepts of SONET/SDH Network.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Gerd Keiser	Optical Fiber Communication 4th Edition	McGraw Hill International	2010
2.	Senior.J	Optical Communication Principles and Practice 2nd Edition	Prentice Hall of India,New Delhi	2007

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Gower.J	Optical Communication System	Prentice Hall of India, NewDelhi	2001
2	Ramaswami, Sivarajan and Sasaki	Optical Networks	Morgan Kaufmann Publishers	2009

MICROWAVE ENGINEERING   **L T P C**
                                                                          3 0 0 3

OBJECTIVES:

- To inculcate under standing of the basics required for circuit representation of RFnetworks.
- To deal with the issues in the design of microwave amplifier.
- To instill knowledge on the properties of various microwave components.
- To deal with the microwave generation and microwave measurement techniques.
- To familiarize the students with the analysis of RF and microwave transmission lines.
- To acquaint the student with concepts   microwave semiconductor devices and microwave tubes.

INTENDED OUTCOMES:

Upon completion of the course, students will be able to:
- Explain the active & passive microwave devices & components used in Microwave communication systems.
- Analyze the multi- port RF networks and RF transistor amplifiers.
- Generate Microwave signals and design microwave amplifiers.
- Measure and analyze Microwave signal and parameters.
- Understand the principle behind microwave measurements
- Design microwave systems for different practical application.

UNIT I   TWO PORT NETWORK THEORY   9
Review of Low frequency parameters: Impedance, Admittance, Hybridand ABCD parameters, Different types of inter connection of Two port networks, High Frequency parameters, Formulation of Sparameters, Properties of Sparameters, Reciprocal and lossless Network, Transmission matrix, RF behavior of Resistors, Capacitors and Inductors.

UNIT II   RF AMPLIFIERS AND MATCHING NETWORKS   9
Characteristics of Amplifiers, Amplifier power relations, Stability considerations, Stabilization Methods, Noise Figure, Constant VSWR, Broadband, Highpower and Multistage Amplifiers, Impedance matching using discrete components, Two component matching Networks, Frequency responseand quality factor, T and Pi Matching Networks, Microstrip Line Matching Networks.

UNIT III   PASSIVE AND ACTIVE MICROWAVE DEVICES   9
Terminations, Attenuators, Phase shifters, Directional couplers, Hybrid Junctions, Power dividers, Circulator, Isolator, Impedance matching devices: Tuning screw, Stub and quarter wave transformers. Crystal and Schottkey diode detector and mixers, PIN diode switch, Gunn diode oscillator, IMPATT diode oscillator and amplifier, Varactor diode, Introduction to MIC.

UNIT IV   MICROWAVE GENERATION   9
Review of conventional vacuum Triodes, Tetrodes and Pentodes, High frequency effects in vacuum Tubes, Theory and application of Two Cavity Klystron Amplifier, Reflex Klystron oscillator, traveling wave tube amplifier, Magnetron oscillator using Cylindrical, Linear, Coaxial Voltage tunable Magnetrons, Backwardwave Crossed field amplifier and oscillator.

UNIT V   MICROWAVE MEASUREMENTS   9
Measuring Instruments: Principle of operation and application of VSWR meter, Power meter, Spectrumanalyzer, Networkanalyzer, Measurement of Impedance, Frequency, Power, VSWR, Q-factor, Dielectric constant, Scattering coefficients, Attenuation, S-parameters.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Reinhold Ludwig and GeneBogdano	RF Circuit Design: Theory & Applications	Pearson Education Inc	2011
2.	Robert E Colin	Foundations for Microwave Engineering	JohnWiley & Sons Inc	2005

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	David M. Pozar	Microwave Engineering	Wiley India(P) Ltd, New Delhi	2008
2.	Thomas H Lee	Planar Microwave Engineering: A Practical Guide to Theory, Measurements and Circuits	Cambridge University Press	2004
3.	Mathew.M. Radmanesh	RF and Microwave Electronics	Prentice Hall	2000
4.	Annapurna Das and Sisir K Das	Microwave Engineering	Tata Mc Graw Hill Publishing Company Ltd, NewDelhi	2005

17BEEC603B   **EMBEDDED SYSTEMS**   **L T P C**
                                                                    3 0 0 3

OBJECTIVES:

- To introduce students to the embedded systems, its hardware and software.
- To introduce devices and buses used for embedded networking.
- To develop knowledge on ARMv7core and ARM CORTEXM4 architecture.
- To developknowledge on Floating Point Unit.
- To develop knowledge on Motion Control.
- To imparts a good knowledge in Ports- Timer and Counting Devices

INTENDEDOUTCOMES:

- Gain adequate knowledge about devices and buses used for embedded networking.
- Gain adequate knowledge about ARMv7 core and ARMCORTEXM4 architecture.
- Gain adequate knowledge about Floating Point Unit.
- Gain adequate knowledge about Motion Control.
- Design interfacing of the systems with other data handling / processing systems.
- Suggest design approach using advanced controllers to real-life situations.
- Gain knowledge on buses and devices for network

UNIT I   INTRODUCTION TO EMBEDDED SYSTEMS   9
Definition and Classification–Overview of Processors and hardware units in an embedded system–
Software embedded into the system–Exemplary Embedded Systems –Embedded Systems on a Chip
(SoC) and the use of VLSI designed circuits

UNIT II   DEVICES AND BUSES FOR DEVICES NETWORK   9
I/O Devices- Device I/O Types and Examples–Synchronous-Iso –synchronous and Asynchronous
Communications from Serial Devices- Examples of Internal Serial-Communication Devices-UART
and HDLC- Parallel Port Devices-Sophisticated interfacing features in Devices/ Ports-Timerand
Counting Devices- 'I2C', 'USB', 'CAN'and advanced I/O Serial high speed buses.

UNIT III   OVERVIEW OF ARCHITECTURE   9
Review of ARM v7 core and its architecture, Introductionto AdvancedARM CORTEX M4
architecture, Peripherals overview, Advantages of using Cortex M4, Instruction se timplementation,
CPU timers introduction.

UNIT IV   FLOATING POINT UNIT   9
Introduction to Floating Point Architecture, Advantages of FPU, Need for FPU, IEEEStandards for
implementing FPU, Various FPU Modules in Cortex M4 Processors, Software flow for FPU
implementation.

UNIT V   MOTION CONTROL   9
Introduction to motion control, advantages for using motion control modules, Implantation of motion
control overview, introductionto PWM Modules, PWM Concepts for Motion Control, Configuration
of PWM Modules, Introduction to encoders, types of encoders, QEP Module.

                                                                    Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Rajkamal	Embedded Systems Architecture, Programming and Design	TATA McGraw-Hill, First reprint, NewYork	2013
2.	JonathanW Valvano	Introduction to Arm(r) Cortex–M3 Microcontrollers	Createspace Independent Publisher	2012

REFERENCE:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof Publication
1.	Andrew Sloss, Dominic Symes, ChrisWright	ARM System Developer's Guide	Elsevier/Morgan Kaufman	2004

17BEEC6E**   **PROFESSIONAL ELECTIVE**   **L T P C**
3 0 0 3

17BEEC6E**   **PROFESSIONAL ELECTIVE**   **L T P C**
3 0 0 3

17BEEC6E**   **PROFESSIONAL ELECTIVE**   **L T P C**
3 0 0 3

17BEEC611A   **VLSI DESIGN LABORATORY**   **L T P C**
                                                                      0 0 3 2

OBJECTIVES:

- To learn Hardware Descriptive Language(Verilog/VHDL).
- To learn the fundamental principles of VLSI circuit design in digital and analog domain.
- To familiarise fusing of logical modules on FPGAs.
- To learn simulation, synthesis and implementation using Cadence tools.
- To familiarize the students with the design of adders using VHDL.
- To know about the various CAD tools.

INTENDED OUTCOMES:

At the end of the course, the student should be able to

- Write HDL code for basic as well as advanced digital integrated circuits.
- Import the logic modules into FPGA Boards.
- Acquire the knowledge of procedural assignments in VHDL.
- Acquire the knowledge of conditional statements
- Understand the concept of mixed language programming
- Ability to write verilog programmes for digital circuits.

LIST OF EXPERIMENTS

All the experiments must be implemented using Cadence tool

1. Study of Simulator tools.
2. Study of Synthesis tools.
3. Place and Root and Back annotation for FPGAs.
4. Study of development tool for FPGAs for schematic entry and Verilog.
5. Design of traffic light controller using verilog and above tools.
6. Design and simulation of pipelined serial and parallel adder to add/ subtract 8 number of size,13 bits each in 2's complement method.
7. Design and simulation of back annotated verilog files for multiplying two signed, 8 bit numbers in 2's complement. Design must be pipelined and completely RTL compliant.
8. Study of FPGA board and testing on board LEDs and switches using verilog codes.
9. Testing the traffic controller design developed in S I. NO.5 on the FPGA board.
10. Design a Real-time Clock (2 digits, 7 segments LED displays each for HRS., MTS, and SECS.) and demonstrate its working on the FPGA board. An expansion card is required for the displays.

                                                                      Total Hours: 45

17BEEC611B   OPTICAL COMMUNICATION LABORATORY   L T P C
                                                        0 0 3 2

OBJECTIVES:

- To understand the working principle of optical sources, detector, fibers.
- To develop understanding of simple optical communication link.
- To undersstand the different characteristics of Fibres
- To learn about the characteristics and measurements in optical fiber.
- To learn about LED charateristics of fiber optic analog link for 3mm and 6mm cable
- To know the fiber optic tools

INTENDEDOUTCOMES:

At the end of the course, the student should be able to:
- Analyze the performance of simple optical link.
- Analyse the mode characteristics of fiber.
- Understand Coupling Fibers to Semi-Conductor Source –Connectors & Splices.
- Understand LED charateristics of fiber optic analog link for 3mm and 6mm cable.
- Analyze the fiber optic tools.
- Analyze Photo Diode Characteristics of fiber optic receiver

LIST OF EXPERIMENTS:

1. Numerical aperture determination for fibers & Attenuation Measurement in 3 mm cable Fibers.
2. Numerical aperture determination for fibers & Attenuation Measurement in 6 mm cable Fibers.
3. Mode Characteristics of Fibres–SMFibres.
4. Study of Coupling Fibers to Semi-Conductor Source –Connectors & Splices.
5. Fiber optic analog link for 3mm and 6mm cable.
6. Fiber optic digital link for 3mm and 6mm cable.
7. LED Characteristics of fiber optic transmitter using 3 mm cable.
8. LED Characteristics of fiber optic transmitter using 6 mm cable.
9. Photo Diode Characteristics of fiber optic receiver.
10. Study of fiber optic tools.

Total Hours: 45

17BEEC612A   MICROWAVE ENGINEERING LABORATORY   L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:
- Know about the behavior of microwave components.
- Practice microwave measurement procedures
- To expose to magic tee coupler and its usage.
- To study the microwave power measurement.
- To understand the different attenuators.
- To learn the various components of microwave systems

INTENDEDOUTCOMES:

At the end of the course, the student should be able to:
- Analyse the radiation of pattern of antenna.
- Test various microwave components.
- Analyze the working of Gunn diode oscillators
- Gain knowledge on the usage of magic tee coupler
- Understand the concepts of couplers .
- Gain knowledge on implementation of couplers in specific areas

LIST OF EXPERIMENTS:
1. VSWR Measurements–Determination of terminated impedance.
2. Determination of guide wavelength, frequency measurement.
3. Radiation Pattern of Horns, Paraboloids.
4. Microwave Power Measurement.
5. Characteristics of Gunn diode Oscillator.
6. Study of MagicTee.
7. Study of attenuators (fixed and variable).
8. Conduct an experiment using microwave test bench.
9. Study of resonant cavity.
10. Simulation using CAD tools.

Total Hours: 45

17BEEC612B   **EMBEDDED SYSTEM DESIGN LABORATORY**   **L T P C**
                                                          0 0 3 2

OBJECTIVES:

- To learn the working of ARM processor and PIC microcontroller.
- To understand the Building Blocks of Embedded Systems.
- To earn the concept of memory map and memory interface.
- To gain knowledge on PIC microcontroller interfacing
- To expose them to the concept of memory
- To gain inputs on stepper motor interface.

INTENDEDOUTCOMES:

At the end of the course, the student should be able to:

- Write programs in ARM and PIC microcntroller for a specific Application.
- Interface memory and Write programs related to memory operations
- Interface A/D and D/A convertors with ARM system.
- Write programmes for interfacing keyboard, display, motor and sensor.
- Enhance programming skill using EPROM and interrupt.
- Write programs for various interfacing boards.

LIST OF EXPERIMENTS

1. Study of ARM evaluation system.
2. Interfacing ADC and DAC with ARM controller.
3. Interfacing LED and keyboard with ARM controller.
4. Interfacing real time clock and serial port.
5. Interfacing EPROM and interrupt.
6. Flashing of LEDS using ARM.
7. Interfacing stepper motor and temperature sensor using ARM controller.
8. Implementing zigbee protocol with ARM.
9. Program for LCD Interfacing using PIC microcontroller.
10. Program for RS232C Serial port interfacing using PIC microcontroller.
11. Program for I2C based RTC/Memory interface using PIC microcontroller.

                                                        Total Hours: 45

17BEEC652   ADVANCED SIMULATION LABORATORY   L T P C

1 0 0 -

1. Simulation using ORCAD PSPICE
2. Basic Bio signal pre-processing using MATLAB
3. Basic Bio signal pre-processing using LabVIEW
4. Image processing using MATLAB

17BECC701   PROFESSIONAL ETHICS PRINCIPLES OF MANAGEMENT AND
ENTREPRENEURSHIP DEVELOPMENT   L T P C
3 0 0 3

OBJECTIVE:

- To enable the students to create an awareness on Engineering Ethics and Human Values.

- To instill Moral and Social Values and Loyalty and to appreciate the rights of others.

- To understand social responsibility of an engineer.

- To appreciate ethical dilemma while discharging duties in professional life.

- To familiarize the student with professional rights and employee rights

- To imparts a good knowledge in weapons development.

INTENDEDOUTCOMES:

At the end of the course, the student should be able to:
- Gain knowledge on human values

- Apply ethics in society,

- Discuss the ethical issues related to engineering

- Realize the responsibilities and rights in the society

- Understand about Computer Ethics

- Gain knowledge on Corporate Social Responsibility

UNIT I   ENGINEERING ETHICS   9
Senses of 'Engineering Ethics' – variety of moral issued – types of inquiry – moral dilemmas – moral autonomy – Kohlberg's theory – Gilligan's theory – consensus and controversy – Models of Professional Roles – theories about right action – Self–interest – customs and religion – uses of ethical theories.

UNIT II   FACTORS OF CHANGES   9
Forces that shape culture, social control – Meaning, Agencies, Institution, Customs, Values, Folkways, Norms and Laws. Social changes – Meaning and nature – Theories.

UNIT III   HISTORICAL DEVELOPMENT, PLANNING, ORGANISING   9
Definition of Management – Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Steps involved in Planning – Objectives – Setting Objectives – Process of Managing by Objectives – Strategies, Policies and Planning Premises– Forecasting – Decision–making – Formal and informal organization – Organization Chart –.

UNIT IV   DIRECTING AND CONTROLLING   9
Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment –Process of Communication – System and process of Controlling – Requirements for effective control – Control of Overall Performance – Direct and Preventive Control – Reporting

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth– Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

Total Hours: 45

TEXT BOOKS:

S. NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Harold Kooritz and Heinz Weihrich	Essentials of Management	Tata McGraw Hill, New Delhi	2010
2	Khanka S. S	Entrepreneurial Development	S. Chand and Co. Ltd., NewDelhi	2006
3	Mike Martin and Roland Schinzinger	Ethics in Engineering	McGraw–Hill, NewYork	2005

REFERENCES:

S. NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Tripathy P.C and Reddy P. N	Principles of Management	Tata McGraw Hill, New Delhi	2008
2	Rabindra N Kanungo	Entrepreneurship and innovation	Sage Publications, New Delhi	1998
3	Charles E Harris, and Michael J Rabins	Engineering Ethics – Concepts and Cases	Wadsworth Thompson Learning, New Delhi	2013

WEB REFERENCES

1. http://www.managementstudyguide.com/taylor_fayol.htm
2. http://tutor2u.net/business/gcse/people_motivation_theories.htm
3. http://lfkkb.tripod.com/eng24/gilliganstheory.html
4. http://www.developingeyes.com/five–types–of–entrepreneurs/

17BEEC702A   **VLSI DESIGN**   **L T P C**
                                                                     3 0 0 3

OBJECTIVES:

- To learn the MOS process technology.
- To learn the basic MOS Circuits.
- To learn concept of various logic styles.
- To learn the concepts of modeling a digital system using Hardware Description Language.
- To understand the verilog HDL programming
- To learn the concepts of VLSI implementation strategies.

INTENDED OUTCOMES:

Upon completion of the course, students should
- Explain the basic CMOS circuits and the CMOS process technology.
- Explain working of various complex gates and logic styles.
- Model the digital system using Hardware Description Language.
- Learn the concepts of modeling a digital system using Hardware Description Language.
- Understand the verilog HDL programming
- Learn the concepts of VLSI implementation strategies.

UNIT I   MOS TECHNOLOGY   9
Chip Design Hierarchy – IC Layers – Photolithography and Pattern Transfers – Basic MOS Transistors – CMOS Fabrication: n-well – p-well – twin tub – Latch up and prevention- Layout design rules, physical design- basic concepts, CAD tool sets, physical design of logic gates- Inverter, NAND, NOR.

UNIT II   MOS TRANSISTOR PRINCIPLE   9
Introduction to MOSFET: Symbols, Enhancement Mode-Depletion mode transistor   operation   – Threshold voltage derivation – body effect – Drain current Vs voltage derivation – channel length modulation. NMOS and CMOS inverter – Determination of pull up to pull down ratio –Stick diagrams – VLSI Circuit Design Flow.

UNIT III   CMOS LOGIC GATES & OTHER COMPLEX GATES   9
Gate delays – Logical Effort - CMOS Static Logic – Transmission Gate Logic – Tri-State Logic – Pass Transistor Logic – Dynamic CMOS Logic – Domino CMOS Logic, NORA CMOS Logic, True Single-Phase Clock (TSPC) Dynamic Logic

UNIT IV   VERILOG HDL   9
Hierarchical modeling concepts – Basic concepts: Lexical conventions – Data types   –   Modules and ports. Gate level modeling –   Dataflow modeling – Behavioral modeling – Design examples of Combinational and Sequential circuits – Switch level modeling – Functions – UDP concepts.

UNIT V   VLSI IMPLEMENTATION STRATEGIES   9
Introduction – Design of Adders: carry look ahead-carry select-carry save. Design of multiplier s: Array – Braun array – Baugh-Wooley Array. Introduction to FPGA – Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures.

                                                                    Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Douglas A. Pucknell	Basic VLSI Systems and Circuits 3rd Edition, reprint	Prentice Hall of India,	2008
2.	John P. Uyemura,	Introduction to VLSI Circuits and Systems	John Wiley&Sons, Reprint	2009

REFERENCES:

S.NO.	Author(s)Name	Title ofthebook	Publisher	Year of publication
1.	Smith.M.J. S	Application Specific integrated circuits	Pearson Education, New York	2008
2.	Weste & Eshraghian,	Principles of CMOS VLSI Design 2nd Edition	AddisonWesley	2008
3.	John P Uyemura	Chip Design for Submicron VLSI: CMOS layout and simulation	Thomson India Edition	2010
4	Samir Palnitkar,	VerilogHDL– Guide to Digital Design and Synthesis 3rd Edition	Pearson Education	2003

17BEEC702B   **OPTICAL COMMUNICATION**   **L T P C**
                                                                    3 0 0 3

OBJECTIVES:

- To facilitate the knowledge about optical fiber sources and transmission techniques
- To enrich the idea of optical fiber networks algorithm such as SONET/SDH.
- To explore the trends of optical fiber measurement systems.
- To inculate the basics of point–to–point links.
- To acquaint the student with basics of optical amplifiers and networks.
- To make the student acquire knowledge of fiber alignment and joint loss.

INTENDED OUTCOMES:

Upon completion of the course, students will be able to:
- Discuss the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- Explain the various optical sources and optical detectors and their use in the optical communication system.
- Analyze the digital transmission and its associated parameters on system performance.
- Understand operation of lasers, LEDs, and detectors
- Understand the application of analog and digital links in optical communication systems
- Gain knowledge on optical amplifiers and networks

UNIT I   INTRODUCTION TO OPTICAL FIBERS   9
Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ra y Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Mode Fibers-Graded Index fiber structure.

UNIT II   SIGNAL DEGRADATION OPTICAL FIBERS   9
Attenuation – Absorption losses, scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave Guides-Information Capacity determination –Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT III   FIBER OPTICAL SOURCES AND COUPLING   9
Direct and indirect Band gap materials-LED structures –Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lancing schemes, Fibre –to- Fibre joints, Fibre splicing – Energy efficiency of LAS ER.

UNIT IV   FIBER OPTICAL RECEIVERS   9
PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error – Quantum Limit.

UNIT V   DIGITAL TRANSMISSION SYSTEM   9
Point-to-Point links System considerations –Link Power budget –Rise - time budget –Noise Effects on System Performance-Operational Principles of WDM, Solutions-Erbium-doped Amplifiers. Basic on concepts of SONET/SDH Network.

Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Gerd Keiser	Optical Fiber Communication 4th Edition	McGraw Hill International,	2010
2.	Senior.J	Optical Communication Principles and Practice 2nd Edition	Prentice Hall of India, New Delhi	2007

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Gower.J	Optical Communication System	Prentice Hall of India, NewDelhi	2001
2	Ramaswami, Sivarajan and Sasaki	Optical Networks	Morgan Kaufmann Publishers	2009

17BEEC7E**   **PROFESSIONAL ELECTIVE**   **L T P C**
                                                              3 0 0 3

17BESHOE**/17BECSOE**/17BEEEOE**/   **OPEN ELECTIVE**   **L T P C**
17BTBTOE**/17BEMEOE**/17BTASOE**/   **3 0 0 3**
17BEAEOE**/ 17BECEOE**

17BESHOE**/17BECSOE**/17BEEEOE**/   **OPEN ELECTIVE**   **L T P C**
17BTBTOE**/17BEMEOE**/17BTASOE**/   **3 0 0 3**
17BEAEOE**/ 17BECEOE**

17BEEC711A **VLSI DESIGN LABORATORY** **L T P C**
0 0 3 2

OBJECTIVES:

- To learn Hardware Descriptive Language(Verilog/VHDL).
- To learn the fundamental principles of VLSI circuit design in digital and analog domain.
- To familiarise fusing of logical modules on FPGAs.
- To learn simulation, synthesis and implementation using Cadence tools.
- To familiarize the students with the design of adders using VHDL.
- To know about the various CAD tools.

INTENDEDOUTCOMES:

At the end of the course, the student should be able to

- Write HDL code for basic as well as advanced digital integrated circuits.
- Import the logic modules into FPGA Boards.
- Acquire the knowledge of procedural assignments in VHDL.
- Acquire the knowledge of conditional statements
- Understand the concept of mixed language programming
- Ability to write verilog programmes for digital circuits.

LIST OF EXPERIMENTS:

All the experiments must be implemented using Cadence tool
1. Study of Simulator tools.
2. Study of Synthesis tools.
3. Place and Root and Back annotation for FPGAs.
4. Study of development tool for FPGAs for schematic entry and Verilog.
5. Design of traffic light controller using verilog and above tools.
6. Design and simulation of pipelined serial and parallel adder to add/ subtract 8 number of size,13 bits each in 2's complement method.
7. Design and simulation of back annotated verilog files for multiplying two signed, 8 bit numbers in 2's complement. Design must be pipelined and completely RTL compliant.
8. Study of FPGA board and testing on board LEDs and switches using verilog codes.
9. Testing the traffic controller design developed in S I. NO.5 on the FPGA board.
10.Design a Real-time Clock (2 digits, 7 segments LED displays each for HRS., MTS, and SECS.) and demonstrate its working on the FPGA board. An expansion card is required for the displays.

Total Hours: 45

17BEEC711B   **OPTICAL COMMUNICATION LABORATORY**   **L T P C**
                                                                      0 0 3 2

OBJECTIVES:

- To understand the working principle of optical sources, detector, fibers.
- To develop understanding of simple optical communication link.
- To undersstand the different characteristics of Fibres
- To learn about the characteristics and measurements in optical fiber.
- To learn about LED charateristics of fiber optic analog link for 3mm and 6mm cable
- To know the fiber optic tools

INTENDEDOUTCOMES:

At the end of the course, the student should be able to:
- Analyze the performance of simple optical link.
- Analyse the mode characteristics of fiber.
- Understand Coupling Fibers to Semi-Conductor Source –Connectors & Splices.
- Understand LED charateristics of fiber optic analog link for 3mm and 6mm cable.
- Analyze the fiber optic tools.
- Analyze Photo Diode Characteristics of fiber optic receiver

LIST OF EXPERIMENTS:

1. Numerical aperture determination for fibers & Attenuation Measurement in 3 mm cable Fibers.
2. Numerical aperture determination for fibers & Attenuation Measurement in 6 mm cable Fibers.
3. Mode Characteristics of Fibres–SMFibres.
4. Study of Coupling Fibers to Semi-Conductor Source –Connectors & Splices.
5. Fiber optic analog link for 3mm and 6mm cable.
6. Fiber optic digital link for 3mm and 6mm cable.
7. LED Characteristics of fiber optic transmitter using 3 mm cable.
8. LED Characteristics of fiber optic transmitter using 6 mm cable.
9. Photo Diode Characteristics of fiber optic receiver.
10. Study of fiber optic tools.

                                                                      Total Hours: 45

17BEEC791   **PROJECT WORK- PHASE I**   **L T P C**
                                                                  0 0 8 4

17BEEC751A **REAL TIME CONTROLLER** **L T P C**
1 0 0 –

INTRODUCTION

Real Time Systems, Types of Real Time systems – Hard and Soft, Real Time Event Characteristics, Challenges in Real Time System Design, Distributed and Multi-Processor Architecture, Embedded systems and its Characteristics

ARCHITECTURE OF TI C2000

Introduction to Software Development and the Process, Assembler Directives, C2000 Architecture Overview, Central Processing Unit, Program Control, Programming and System Issues, Phase Locked Loop Application
Demo Classes
- Temperature Sensor Demo
- Low Power Modes of C2000

17BEEC751B **VLSI DESIGN USING CADENCE TOOL** **L T P C**
1 0 0 –

Course Objectives
- To understand the basics of VLSI, CMOS techniques.
- To know about the various CAD tools.
- To understand design styles & programming using verilogHDL language
- To learn simulation, synthesis and implementation using Cadence tools.
- To familiarize the students with the design of adders using VHDL.
- To indulge the fundamentals of Cadence IES.

Course Outcomes
- Familiar with VLSI basics.
- Ability to write verilog programmes for digital circuits.
- Gain mastery to work on cadence tools
- Acquire the knowledge of procedural assignments in VHDL.
- Acquire the knowledge of conditional statements
- Understand the concept of mixed language programming

Design using Cadence Tool

1. An Inverter
2. A Buffer
3. Transmission gates
4. Basic/Universal Gates.
5. T Flip-Flops
6. NCO (10 Bit number controlled oscillator)
7. Counter designs
8. Automatic generation layout followed by post layout extraction and simulation of NCO.

17BEEC801A   **MEDICAL ELECTRONICS**   **L T P C**
                                                                 3 0 0 3

OBJECTIVES:

- To gain knowledge about the various physiological parameters both electrical and non-electrical and the methods of recording and also the method of transmitting these parameters.
- To study about the various assist devices used in the hospitals.
- To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.
- To study how to measure biochemical and various physiological information
- To understand the working of units which will help to restore normal functioning
- To imparts good knowledge in diagnostic x-ray equipments.

INTENDEDOUTCOMES:

Upon completion of the course, students will be able to:
- Discuss the application of electronics in diagnostic and therapeutic area.
- Measure biochemical and various physiological information.
- Describe the working of units which will help to restore normal functioning.
- Demonstrate the practical limitations on the electronic components while handling bio-substances.
- Understand and analyze the biological processes like other electronic processes.
- Gain knowledge on recent medical instruments

UNIT I   ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING   9
The origin of Bio-potentials; Biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG, leadsystems and recording methods, typical waveforms and signal characteristics.

UNIT II   BIO-CHEMICAL AND NON-ELECTRICAL PARAMETER MEASUREMENT 9
PH, PO2, PCO2, PHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III   ASSIST DEVICES AND BIO-TELEMETRY   9
Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Bio-telemetry radio- pill and tele-stimulation.

UNIT IV   RADIOLOGICAL EQUIPMENTS   9
Ionizing radiation, Diagnostic x-ray equipments, use of Radio Isotope in diagnosis, Radiation Therapy.

UNIT V   RECENT TRENDS IN MEDICAL INSTRUMENTATION   9
Thermograph, endoscopy unit, Laserin medicine, Diathermy units, Electrical safetyin medical equipment.

                                                                 Total Hours: 45

TEXTBOOKS:

S.No.	Author(s) Name	Titleof thebook	Publisher	Year of Publication
1.	LeislieCromwell	Biomedical instrumentation and measurement	PrenticeHallof India, NewDelhi.	2007
2.	Khandpur, R.S.	Hand book of Biomedical Instrumentation	TataMcGraw-Hill, NewDelhi.	1997
3.	John G. Webster	Medical Instrumentation Application and Design 3rd Edition	Wiley India Edition	2007

REFERENCE:

S.No.	Author(s) Name	Titleof the book	Publisher	Year of Publication
1.	Joseph J. Carr and John M. Brown	Introduction to Biomedical equipment Technology	JohnWiley and Sons, NewYork	2004

17BEEC801B   **DIGITAL IMAGE PROCESSING**   **L T P C**
                                                              3 0 0 3

OBJECTIVES:

- To understand the Fundamentals of image processing.
- To learn Various transforms used in image processing.
- To study smoothing and sharpening of images
- To learn the Image processing techniques like image enhancement, reconstruction, compression and segmentation.
- To familiarize the students with the the images for enhancement of certain properties or for optimized use of the resources.
- To inculate colour transformations.

INTENDED OUTCOMES:

- Understand the Fundamentals of image processing.
- Knowledge about various transforms used in image processing.
- Knowledge about the Image processing techniques like image enhancement, reconstruct ion, compression and segmentation.
- Gain knowledge on Multi resolution analysis.
- Understand about video coding and compression techniques.
- Develop algorithms for image compression and coding

UNIT I   DIGITAL IMA GE FUNDAMENTALS   9
Introduction -Elements of Digital Image Processing system- elements of visual perception – image sensing and acquisition – Image sampling and quantization - image representation -Some basic relationship between pixels.

UNIT II   IMAGE TRANSFORMS   9
Introduction -2D Discrete Fourier Transform – Properties- Importance of Phase   -Walsh   – Hadamard – Discrete Cosine Transform, Haar –K L transforms –Singular Value Decomposition.

UNIT III   IMAGE ENHANCEMENT   9
Enhancement through point operation- Histogram manipulation – Gray level transformation- Neighborhood operation – Median filter - Image Sharpening- Bit plane slicing - Homomorphism Filtering – Zooming operation.

UNIT IV   IMAGE RESTORATION   9
Model of Image Degradation/restoration process –Inverse filtering -Least mean square (Wiener)filtering – Constrained least mean square restoration – Singular value decomposition- Recursive filtering.

UNIT V   IMAGE COMPRESSION AND SEGMENTATION   9
Image compression schemes – Information theory – Run length, Huffman and arithmetic coding – Vector quantization - JPEG. Image Segmentation – Classification – Threshold – edge based segmentation – Hough transform – Active contour.

                                                          Total Hours: 45
TEXTBOOKS:

S. No	Author(s) Name	Title of the book	Publisher	Year of publication

S. No	Author(s) Name	Title of the book	Publisher	Year
1.	Rafael C Gonzalez and Richard E Woods	Digital Image Processing3rd Edition	Pearson Education.	2010
2.	S. Jayarman, S. Esakkirajanand T. Veerakumar.	Digital Image Processing.	Tata McGraw Hill.	2010
3.	A.K. Jain.	Fundamentals of Digital Image Processing.	Pearson Education.	2011

REFERENCES:

S. No	Author(s) Name	Title of the book	Publisher	Year of publication
1.	William K Pratt	DigitalImage Processing	John Willey	2011
2	Millman Sonka, Vaclav Hlavac, Roger Boyle, and BroosColic	ImageProcessing Analysisand MachineVision	Thompson learning	1999

17BEEC8E**   **PROFESSIONAL ELECTIVE**   **L T P C**
3 0 0 3

17BEEC891   **PROJECT WORK - PHASE II & VIVA VOCE**   **L T P C**
0 0 32 16

17BEEC5E01   ADVANCED ELECTRONIC SYSTEM DESIGN   L T P C
3 0 0 3

OBJECTIVES:

- To study RF component such as resonator, filter, transmission lines, etc.
- To learn design of RF amplifiers using transistors.
- To study modern Power Supplies using SCR.
- To study modern Power Supplies using SMPS technology.
- To learn about signal shielding & grounding techniques and study of A/D and D/A Converters.
- To learn knowledge about fabrication of PCBs using CAD.

INTENDED OUTCOMES:

- Gain knowledge in RF component such as resonator, filter, and transmission lines, etc…
- Gain knowledge in design of RF amplifiers using transistors.
- Gain knowledge in Power Supplies using SCR
- Gain knowledge on modern Power Supplies using SMPS technology.
- Gain knowledge about signal shielding & grounding techniques and stud y of A/D and D/A Converters.
- Gain knowledge about fabrication of PCBs using CAD.

UNIT I   INTRODUCTION TO RF DESIGN   9
RF behaviour of passive components, chip components and circuit board considerations, Review of transmission lines, Impedance and admittance transformation, Parallel and series connection of networks, ABCD and scattering parameters, Analysis of amplifier using scattering parameter. RF filter– Basic resonator and filter configurations – Butterworth and Chebyshev filters. Implementation of micro strip filters design. Band pass filter and cascading of band pass filter elements.

UNIT II   RF TRANSISTOR AMPLIFIER DESIGN   9
Impedance matching using discrete components. Micro strip line matching networks. Amplifier classes of operation and biasing networks – Amplifier power gain, Unilateral design (S12 =0) – Simple input and output matching networks – Bilateral design - Stability circle and conditional stability, Simultaneous conjugate matching for unconditionally stable transistors. Broadband amplifiers, High power amplifiers and multistage amplifiers.

UNIT III   DESIGN OF POWER SUPPLIE   9
DC power supply design using transistors and SCRs, Design of crowbar and fold back protection circuits, switched mode power supplies, Forward, fly back, buck and boost converters, Design of transformers and control circuits for SMPS.

UNIT IV   DESIGN OF DATA ACQUISITION SYSTEMS   9
Amplification of Low level signals, Grounding, Shielding and Guarding techniques, Dual slope, quad slope and high-speed A/ D converters, Microprocessors Compatible A/D converters, Multiplying A/D converters and Logarithmic A/D converters, Sample and Hold, Design of two and four wire transmitters.

UNIT V   DESIGN OF PRINTED CIRCUIT BOARDS   9
Introduction to technology of printed circuit boards (PCB), General layout and rules and parameters, PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits, Computer Aided design of PCBs.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Reinhold Luduig and Pavel Bretchko	RF Circuit Design – Theory and Applications	Pearson Education, New York	2000
2.	Sydney Soclof	Applications of Analog Integrated Circuits	Prentice Hall of India, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Keith H. Billings	Handbook of Switched Mode Supplies.	McGraw-Hill Publishing Co, New York.	1989
2.	Michael Jaacob	Applications and Design with Analog Integrated Circuits.	Prentice Hall of India, New Delhi.	2004
3.	Otmar Kigenstein	Switched Mode Power supplies in Practice.	John Wiley and Sons, Chennai.	1989
4.	Muhammad H. Rashid	Power Electronics – Circuits, Devices and Applications.	Prentice Hall of India New Delhi.	2004
5.	Walter C.Bosshart	Printed circuit Boards – Design and Technology.	TATA McGraw-Hill, New Delhi.	2002

17BEEC5E02   TELECOMMUNICATION SWITCHING AND NETWORKS   L T P C
3 0 0 3

OBJECTIVES:

- To introduce the concept soft Frequency and Time division multiplexing.
- To introduce digital multiplexing.
- To introduce the concepts of space switching, times switching and combination switching, example of a switch namely No.4ESS Toll switch.
- To characterize blocking probability holding service time distributions for in speec hand data networks.
- To gain knowledge about ISDN, DSL/ADSL, and fiber optic system sin subscriber loop.
- Togain knowledge about statistical modeling of telephone traffic.

INTENDED OUTCOMES:

After completion nof this course student will gain
- Knowledge about the concepts of Frequency and Time division multiplexing.
- Knowledge about digital multiplexing.
- Knowledge about the enhanced local loop systems in digital environment.
- Knowledge about ISDN, DSL/ADSL, and fiber optic system sin subscriber loop.
- Knowledge about statistical modeling of telephone traffic.
- Understand blocking probability holding service time distributions for in speec hand data networks.

UNIT I   MULTIPLEXING   9
Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplexing, Time Division Multiplex Loops and Rings.

UNIT II   DIGITAL SWITCHING   9
Switching Functions, Space Division Switching, and Time Division Switching, two-dimensional is switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross-Connect Systems, Digital Switching in an Analog Environment. Elements of SSN07 signaling.

UNIT III   NETWORK SYNCHRONIZATIONCONTROL AND MANAGEMENT   9
Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter.   Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control, Network Management.

UNIT IV   DIGITAL SUBSCRIBER ACCESS   9
ISDN: ISDN Basic Rate Access Architecture, ISDNU Interface, ISDND Channel Protocol. High- Data- Date Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next- Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

UNIT V   TRAFFIC ANALYSIS   9
Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

Total Hours: 45

TEXTBOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Bellamy John	Digital Telephony	John Wily & Sons, Inc Chennai	2000
2.	Viswanathan.T	Telecommunication Switching System and Networks	Prentice Hall of India Ltd, New Delhi	1994

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	P. Gnanasivam	Telecommunication Switching System and Networks	New Age International	2007

17BEEC5E03   MEASUREMENTS AND INSTRUMENTATION   L T P C
                                                              3 0 0 3
OBJECTIVES:

- To gain knowledge about basic measurement concepts.
- To introduce Concepts of electronic measurements.
- To give exposure to different types of waveform generators and analyzers and their applications.
- To learn about digital instruments in measurements.
- To educate on virtual instrumentation, its applications, programming and DAQ cards and modules.
- To introduce data acquisition elements and transducers

INTENDED OUTCOMES:

- Ability to understand and analyze working of various Instruments.
- Ability to choose Instruments based on application and industrial needs.
- Demonstrate the working of electrical and electronic measuring instruments
- Choose correct bridge arrangement for measurement of resistance
- Demonstrate the working of various storage devices
- Pick different transducers for different applications

UNIT-I   BASIC MEASUREMENT CONCEPTS   9
Measurement systems – Static and dynamic characteristics – units and standards of measurements – error analysis – moving coil, moving iron meters – multimeters – True RMS meters – Bridge measurements – Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT-II   BASIC ELECTRONIC MEASUREMENTS   9
Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes – Q meters – Vector meters – RF voltage and power measurements - Carbon microphone - Loud speaker.

UNIT-III   SIGNAL GENERATORS AND ANALYZERS   9
Function generators – RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer.

UNIT-IV   DIGITAL INSTRUMENTS   9
Comparison of analog and digital techniques – digital voltmeter – - Microprocessor based DMM with auto ranging and self-diagnostic features – frequency counters – measurement of frequency and time interval – extension of frequency range – measurement errors.

UNIT-V   VIRTUAL INSTRUMENTATION   9
Virtual instrumentation (VI) – Definition, flexibility – Block diagram and architecture of virtual instruments – Virtual instruments versus traditional instruments – Software in virtual instrumentation - VI programming techniques – DAQ cards for VI applications – DAQ modules with serial communication

                                                              Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Albert D. Helfrick and William D. Cooper,	Modern Electronic Instrumentation and Measurement Techniques	Prentice Hall of India, New Delhi	2003
2	Joseph J. Carr	Elements of Electronics Instrumentation and Measurement	Pearson education, New Delhi	2003
3	Jerome J	Virtual Instrumentation using Lab VIEW	Prentice Hall India Private Ltd New Delhi	2010

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Alan S Morris	Principles of Measurements and Instrumentation	Prentice Hall of India, New Delhi	2003
2	Ernest O. Doebelin	Measurement Systems-Application and Design	Tata McGraw-Hill, New Delhi	2004
3	Sanjay Gupta	Virtual Instrumentation using Lab view	Tata McGraw-Hill Education	2010

WEBSITES:

1. http://mechatronics.mech.northwestern.edu/design_ref/tools/multimeter.html
2. http://www.radio-electronics.com/info/t_and_m/generators/radio-frequency-rf-signal-generator.php
3. www.physics.sc.edu/~hoskins/Demos/CathodeRay.html

17BEEC5E04   COMPUTER ARCHITECTURE   L T P C
                                                         3 0 0 3

OBJECTIVES:

- To make students understand the basic structure and operation of digital computer.
- To understand the hardware-software interface.
- To familiarize the students with arithmetic and logic unit
- To learn implementation of fixed point and floating-point arithmetic operations.
- To familiarize the students with hierarchical memory system including cache memories and virtual memory.
- To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

INTENDED OUTCOMES:

After completion of this course student will gain
- Through knowledge about the basic structure and operation of a digital computer.
- Understand of operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- Detailed exposure about the different types of control and the concept of pipelining.
- Detailed exposure about the hierarchical memory system including cache memories and virtual memory.
- To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I   ARCHITECTURE OF COMPUTING SYSTEMS   9
Functional units – Basic Operational Concepts, Bus Structures, Software Performance– Memory Locations & addresses– Memory operations– Instruction and instruction sequencing– addressing modes–assembly language–Basic I/O operations–stacks and queues.

UNIT II   ARITHMETIC UNIT   9
Addition and subtraction of signed numbers– Design of fast adders – multiplication of positive Numbers-signed operand multiplication and fast multiplication– Integer division– floating point numbers and operations.

UNIT III   BASIC PROCESSING UNIT   9
Fundamental concepts –Execution of a complete Instruction–Multiple bus organization–Hard wired control–micro programmed control. Pipelining–Basic concepts–data hazards–instruction hazards–influence on Instruction sets–Data path and control consideration–Super scalar operation.

UNIT IV   MEMORY SYSTEM   9
Basic concepts–semiconductor RAMs, ROMs–Speed, size and cost–cache Memories-Performance consideration –Virtual Memory-Memory Management requirements–Secondary storage.

UNIT V   I/O ORGANIZATION   9
Accessing I/O devices–Interrupts–Direct Memory Access–Buses–Interface Circuits–Standard I/O Interfaces (PCI, SCSI, USB).

                                                         Total Hours: 45

TEXTBOOKS:

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Carl Hamacher, Zvonko Vranesic and Safwat Zaky	Computer Organization	McGraw Hill	2002
2	William Stallings	Computer Organization & Architecture – Designing for Performance	Pearson Education, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	David A. Patterson and John L. Hennessy	Computer Organization & Design the hardware/ software interface	Morgan Kaufmann, New York.	2002
2	John P. Hayes	Computer Architecture& Organization	McGraw-Hill, New York	1998

WEBSITES:

1. www.webopedia.com/quick_ref/OSI_Layers.asp
2. www.yale.edu/pclt/COMM/TCPIP.HTM

17BEEC6E01   ADVANCED MICROPROCESSORS   L T P C
                                                         3 0 0 3

OBJECTIVES:

- To introduce the concepts in internal programming model of Intel family of microprocessors.
- To introduce the programming techniques using MASM, DOS and BIOS function calls.
- To introduce the basic architecture of Pentium family of processors.
- To introduce the architecture programming and interfacing of 16 bit microcontrollers.
- To introduce the concepts and architecture of RISC processor
- To introduce the concepts and architecture of ARM.

INTENDED OUTCOMES:

- Gain knowledge about the concept sin internal programming model of Intel family of microprocessors.
- Gain knowledge about the programming techniques using MASM, DOS and BIOS Function calls.
- Gain knowledge about the basic architecture of Pentium family of processors.
- Gain knowledge about the architecture programming and interfacing of 16 bit microcontrollers.
- Gain knowledge about the concepts and architecture of RISC processor
- Gain the concepts and architecture of ARM and ARM.

UNIT I   ADVANCED MICROPROCESSOR ARCHITECTURE   9
Internal Microprocessor Architecture-Real mode memory addressing– Protected Mode Memory addressing–Memory Paging-Data addressing modes–Program memory addressing modes–Stack memory addressing modes–Data movement instructions–Program control Instructions-Arithmetic and Logic Instructions.

UNIT II   MODULAR PROGRAMMING AND ITS CONCEPTS   9
Modular programming–UsingkeyboardandVideodisplay–DataConversions-Diskfiles-Interrupt hooks-using assembly languages with C/C++

UNIT III   PENTIUM PROCESSORS   9
Introduction to Pentium Microprocessor–Special Pentium Registers-Pentium memory management– New Pentium Instructions–Pentium Processor–Special Pentium pro features–Pentium4 processor.

UNIT IV   16-BIT MICRO CONTROLLER   9
8096/8097 Architecture-CPU registers–RALU-Internal Program and Data Memory Timers-High-speed Input and Output–Serial Interface-I/O ports–Interrupts–A/D Converter-Watch dog timer–Power down feature–Instruction Set-External Memory Interfacing–External I/O interfacing.

UNIT V   RISC PROCESSORS ANDARM   9
The RISC revolution–Characteristics of RISC Architecture–The Berkeley RISC–Register

Windows –Windows and parameter passing–Window overflow–RISC architecture and pipelining–Pipeline bubbles–Accessing external memory in RISC systems–Reducing the branch penalties–Branch Prediction–The ARM processors–ARM registers–ARM instructions–The ARM built-in shift Mechanism–ARM branch instructions–sequence control–Data movement and memory reference instructions.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Barry B. Brey	The Intel Microprocessors 8086/8088, 80186,80286,80386,80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium4, Architecture, Programming and interfacing	Prentice Hall of India Private Limited, New Delhi.	2003
2.	John Peatman	Design with Microcontroller	McGraw Hill Publishing Co Ltd, New Delhi.	1997

REFERENCE:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Raj Kamal	The concepts and feature of microntrollers 68HC11,8051 and 8096	S Chand Publishers, New Delhi.	2000
2.	Alan Clements	The principles of computer Hardware	Oxford University Press, Oxford.	2003

17BEEC6E02   **WIRELESS NETWORKS**   **L T P C**
                                                                3 0 0 3

OBJECTIVES:

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications.
- To study the fundamentals of wireless communications
- To introduce the concept of diversity for reception
- To learn the main factors affecting performance of networks.

INTENDED OUTCOMES:

  Upon completion of the course, the students will be able to
- Conversant with the latest 3G/4G and WiMAX networks and its architecture.
- Design and implement wireless network environment for any application using latest wireless protocols and standards.
- Apply the concept of fading to improve the quality of reception
- Identify the importance of multiplexing technique
- Understand the concept of diversity for reception
- Implement different type of applications for smart phones and mobile devices with latest network strategies.

UNIT I   WIRELESS LAN   9
Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX.

UNIT II   MOBILE NETWORK LAYER   9
Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol - mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing.

UNIT III   MOBILE TRANSPORT LAYER   9
TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit /fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks.

UNIT IV   WIRELESS WIDE AREA NETWORK   9
Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3GSGSN,3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

UNIT V   4G NETWORKS   9
Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

                                                                Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jochen Schiller	Mobile Communications 2nd Edition	Pearson Education	2012
2	Vijay Garg	Wireless Communications and networking	Elsevier	2007

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming.	3G Evolution HSPA and LTE for Mobile Broadband. 2nd Edition.	Academic Press.	2008
2	Anurag Kumar, D. Manjunath, Joy kuri.	Wireless Networking 1st Edition.	Elsevier	2011
3	Simon Haykin, Michael Moher, David Koilpillai.	Modern Wireless Communications 1st Edition	Pearson Education .	2013

17BEEC6E03   SATELLITE COMMUNICATION   L T P C
                                                                 3 0 0 3

OBJECTIVES:

- To understand the basics of satellite orbits.
- To understand the satellite segment and earth segment.
- To analyze the various methods of satellite access.
- To understand the applications of satellites.
- To imparts a good knowledge in concepts of solar day and sidereal day.
- To familiarize the students with the drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions.

INTENDED OUTCOMES:

Upon Completion of the course, the students will be able to:
- Analyze the satellite orbits.
- Analyze the earth segment and space segment.
- Design various satellite applications.
- Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.
- Gain knowledge in the overview of satellite systems in relation too the terrestrial systems.
- Gain adequate knowledge in satellite orbit sand launching
- Gain knowledge on Multiple access schemes on Modulation

UNIT I   SATELLITE ORBITS   9
Kepler's Laws, Newton''s law, orbital parameters, orbital perturbations, station keeping, geo stationary and non-Geo-stationary orbits – Look Angle Determination- Limits of visibility – eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.

UNIT II   SPACE SEGMENT AND SATELLITE LINK DESIGN   9
Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation-performance impairments-system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.

UNIT III   EARTH SEGMENT   9
Introduction–Receive-Only Home TV Systems–Outdoor Unit–Indoor Unit for Analog (FM) TV–Master Antenna TV System–Community Antenna TV System–Transmit-Receive Earth Stations–Problems–Equivalent Isotropic Radiated Power–Transmission Losses–Free-Space Transmission–Feeder Losses–Antenna Misalignment Losses–Fixed Atmospheric and Ionospheric Losses– Link Power Budget Equation–System Noise–Antenna Noise–Amplifier Noise Temperature–Amplifiers in Cascade– Noise Factor– Noise Temperature of Absorptive Networks– Overall System Noise Temperature–Carrier-to-NoiseRatio–Uplink–SaturationFluxDensity–Input Back Off– The Earth Station HPA –Downlink–Output Back off –Satellite TWTA Output–Effects of Rain–Uplink rain-fade margin– Downlink rain-fade margin– Combined Uplink and Downlink C/N Ratio – Inter modulation Noise.

UNIT IV   SATELLITE ACCESS   9
Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Brocast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption.

UNIT V SATELLITE APPLICATIONS 9

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- Worldspace services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dennis Roddy	Satellite Communications	McGraw-Hill, 4th Publication, New York.	2006
2	Timothy Pratt– Charles Bostian & Jeremy	Satellite Communications	John Willy &Sons (Asia)Pvt. Ltd	2004

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Wilbur L. Pritchars Henri G. Suyder Hond Robert A. Nelson	Satellite Communication Systems Engineering	Pearson Education Ltd.	2007
2	N. Agarwal	Design of Geosynchronous Space Craft	Prentice Hall	1986
3	Emanuel Fthenakis	Manual of Satellite Communications	Mc Graw Hill Book Co	1984
4	Robert G. Winch	Telecommunication Trans Mission Systems	Mc Graw-Hill Book Co	1983
5	M.Richharia	Satellite Communication Systems-Design	Macmillan	2003

17BEEC6E04   ROBOTICS AND AUTOMATION   L T P C
                                                                     3 0 0 3
OBJECTIVES:

> - To study the various parts of robots and fields of robotics.
> - To study the various kinematics and inversekinematics of robots.
> - To study the Euler formulation of Robot dynamics.
> - To study the Lagrangian formulation of Robot dynamics.
> - To study the trajectory planning for robot.
> - To study the control of robots for some specific applications.

INTENDED OUTCOMES:

> Upon completion of the course, the student should be able to:
> - Explain the basic concepts of working of robot.
> - Analyze the function of sensors in the robot.
> - Write a program tousea robot for a typical application.
> - Use Robots indifferent applications.
> - Analyze the trajectory planning for robot.
> - Understand the control of robots for some specific applications.

UNIT I   BASIC CONCEPTS   9
Definition and origin of robotics–different types of robotics–various generations of robots–
degrees of freedom–Asimov'slaws of robotics–dynamic stabilization of robots.

UNIT II   POWER SOURCES AND SENSORS   9
Hydraulic, pneumatic and electric drives–determination of HPof motor and gear ingratio–
variable speed arrangements–path determination – micro machines in robotics– machine vision
– ranging– laser–acoustic –magnetic, fiber opticandtactilesensors.

UNIT III   MANIPULATORS, ACTUATORS AND GRIPPERS   9
Construction of manipulators– manipulator dynamics and forcec ontrol –electronic and
pneumatic manipulator control circuits–endeffectors–U various typesof grippers –design
considerations.

UNIT IV   KINEMATICS AND PATH PLANNING   9
Solution of inverse kinematics problem–multiple solution jacobian workenvelop–hill Climbing
Techniques– robot programminglanguages

UNIT V   CASE STUDIES   9
Multiplerobots–machine interface–robots in manufacturing and non-manufacturing applications–
robotcell design–selection of robot.
                                                          Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Mikell P. Weiss G.M., Nagel R.N., Odraj N.G,	Industrial Robotics	McGraw-Hill Singapore	1996
2	Ghosh	Control in Robotics and Automation: Sensor Based Integration	Allied Publishers, Chennai	1998

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Deb.S. R	Robotics Technology and flexible Automation	JohnWiley, USA	1992
2	KlafterR.D., Chimielewski T.A., NeginM	Robotic Engineering–An integrated approach	Prentice Hall of India, New Delhi	1994
3	McKerrow P. J	Introduction to Robotics	Addison Wesley, USA,	1991
4	BarryLeatham- Jones	Elements of industrial Robotics	PITMAN Publishing	1987
5	Mikell P. Groover, Mitchell Weiss, Roger N. Nagel Nicholas G. Odrey	Industrial Robotics Technology, Programming and Applications	McGraw Hill	1986
6	Fu K.S. Gonzaleaz R.C.and Lee C.S. G	Robotics Control Sensing, Visionand Intelligence International Editions.	McGraw Hill	1987

17BEEC6E05   RADAR AND NAVIGATIONAL AIDS   **L T P C**
                                                        3 0 0 3

OBJECTIVES:

- To study RADAR theory.
- To study and learn different types of RADAR and their working principle.
- To study RADAR signal detection methods.
- To study an overview of RADAR Navigation.
- To study Decca Navigation System
- To learn about RADAR systems and components.

INTENDED OUTCOMES:

- Gain adequate knowledge about RADAR theory.
- Gain adequate knowledge about different types of RADAR and their working principle.
- Gain adequate knowledge about RADAR signal detection methods.
- Gain Decca Navigation System
- Gain adequate knowledge about RADAR Navigation.
- Gain adequate knowledge about RADAR systems and components.

UNIT I   RADAR EQUATIONS   9

RADAR Block Diagram & operation– RADAR Frequencies– RADAR Equation–Detection of signal sin Noise – RADAR cross section of targets–RADAR cross section   fluctuations   – transmitter power–pulse repetition frequency–system losses and propagation effects.

UNIT II   MTI AND PULSE DOPPLER RADAR   9

Introduction to Doppler & MTIRADAR– Delay Line canceller–Moving Target Detector– Pulse Doppler RADAR– Non-Coherent MTI– CW RADAR– FMCWRADAR – Tracking RADAR– Mono pulse Tracking–Conical Scan and Sequential Lobbing.

UNIT III   RADAR SIGNAL DETECTION AND PROPAGATION ON WAVES   9

Detection criteria–automatic detection–constant false alarm rate receiver–Ambiguity diagram– pulse compression –   introduction to clutter –   surface clutter RADAR equation – anomalous propagation and diffraction.

UNIT IV   RADIO NAVIGATION   9

Ad cock directional finder–automatic directional finder– Decca Navigation System–Tactical Air Navigation –Instrument Landing System–Ground Controlled Approach.

UNIT V   RADAR TRANSMITTER AND RECEIVER   9

Linear beam power tubes– Solid state RF power sources–solid state devices used in RADAR– Magnetron-crossed field amplifiers – other aspects of radar transmitter–RADAR Receiver– Receiver noise figure–super hetero dyne receiver–dynamic range–RADAR Displays.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Merrill I. Skolnik	Introduction to Radar systems	Tata McGraw-Hill, New	2003
2.	N.S. Nagaraja	Elements of Electronic Navigation 2nd Edition	Tata Mc-Graw Hill	1993

REFERENCES:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1.	Nadav Levanon	RADAR Principles	John Wiley and Sons	1989
2.	Brook ner.	RADAR Technology.	Artech House.	1986
3.	Mark, A. Richards.	Fundamentals of radar signal processing 1stEdition.	Mc-Graw Hill, Electronic Engineering	2005
4.	V.S. Bagad.	Radar Systems,1st edition.	Technical Publications.	2008

17BEEC6E06   **INTERNET AND JAVA**   **L T P C**
                                                                          3 0 0 3

OBJECTIVES:

- To learn Internet working with TCP/IP.
- To learn routing for high speed multimedia traffic
- To learn the fundamental sin WWW, HTML and XML.
- To learn Java for Networking application
- To understand the basic concepts in E-com, Network operating system
- To understand the basic concepts in Web design.

INTENDED OUTCOMES:

- Thorough knowledge in Internet working with TCP/IP.
- Thorough knowledge about routing for high speed multimedia traffic
- Thorough knowledge in WWW, HTML and XML.
- Thorough knowledge in Java for Networking application
- Understand the basic concept sin E-com, Network operating system
- Understand the concepts in Web design.

UNIT I   INTERNET WORKING WITH TCP/IP   9
Review of network technologies, Internet addressing, Address resolution protocols (ARP/ RARP),
Routing IP data gram's, Reliable stream transport service(TCP)TCP/IP over ATM networks,
Internet Applications-E-mail, Telnet, FTP, NFS, Internet traffic management.

UNIT II   INTERNET ROUTING   9
Concepts of graph theory, Routing protocols, Distance vector protocols(RIP), Link state protocol
(OSPP), Path vector protocols (BGP and IDRP), Routing for high speed multimedia traffic,
Multicasting, Resource reservation(RSVP), IP switching.

UNIT III   WORLD WIDE WEB   9
HTTP protocol, Web browsers net scape, Internet explorer, Website and Web page design, HTML,
XML, Dynamic HTML, CGI.

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, JavaScript.

UNIT V   MISCELLANEOUS TOPICS   9
E-Commerce, Network operating systems, Web Design case studies.

                                                                    Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Dauglas E. Comer.	Internet working with TCP/IP", Vol.I	Prentice Hall of India, New Delhi.	1999
2.	William Stallings.	High Speed Networks.	Prentice Hall Inc, New Delhi.	1998

REFERENCE:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Eric Laddand Jim O'Donnell.	UsingHTML4, XML And Java1.2, Que Platinum edition.	Prentice Hall of India, New Delhi.	1999

17BEEC6E07   TOTAL QUALITY MANAGEMENT   L T P C
3 0 0 3

OBJECTIVES:

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
- To understand the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.
- To familiarize the students with statistical fundamentals.
- To imparts a good knowledge in stages of FMEA.
- To learn about the New seven Management tools.

INTENDED OUTCOMES:

- Apply the tools and techniques of quality managements to manufacturing and servicing process
- Understand the Principles behind TQM
- List tools of quality
- Gain knowledge on Benchmarking process
- Understand the ISO Quality standards
- Gain knowledge on ISO auditing

UNIT I   INTRODUCTION   9
Definition of Quality, Dimensions of Quality, Quality Planning, Quality Costs-Analysis Techniques For Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership–Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT II   TQM PRINCIPLES   9
Customer satisfaction– Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement– Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement–Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership– Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures– Basic Concepts, Strategy, Performance Measure.

UNIT III   STATISTICAL PROCESS CONTROL (SPC)   9
The seven tools of quality, Statistical Fundamentals–Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT IV   TQM TOOLS   9
Bench marking–Reasons to Benchmark, Bench marking Process, Quality Function Deployment(QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM)–Concept, Improvement Needs, FMEA–Stages of FMEA.

UNIT V   QUALITY SYSTEMS

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System–Elements, Implementation of Quality System, Documentation, Quality Auditing, QS9000, ISO 14000–Concept, Requirements and Benefits.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dale H. Besterfiled	Total Quality Management	Pearson Education	2003
2	James R. Evans& William M. Lidsay	The Management and Control of Quality	South-Western (Thomson Learning)	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Feigenbaum. A.V.	Total Quality Management	Mc Graw Hill	1991
2.	Oakland. J. S	Total Quality Management	Butterworth–Hcinemann Ltd., Oxford	1989
3.	NarayanaV. and Sreenivasan, N. S	Quality Management –Concepts and Tasks	New Age International	1996

17BEEC6E08   **INTERNET OF THINGS**   **L T P C**
                                                         3 0 0 3

OBJECTIVES:

- To understand the basics of Internet of Things.
- To get an idea of some of the application areas where Internet of Things can be applied
- To understand the middleware for Internet of Things.
- To understand the concepts of Web of Things.
- To understand the concepts of Cloud of Things with emphasis on Mobile cloud computing.
- To understand the IOT protocols.

INTENDED OUTCOMES:

- To Identify and design the new models for market strategic interaction Design business intelligence and information security for WoB.
- Analyze various protocols for IoT Design a middleware for IoT.
- Analyze and design different models for network dynamics.
- Identify and design the new models for market strategic interaction Design business intelligence and information security for Web.
- Gain knowledge on Integrated billing solutions in IoT
- Design for IoT applications

UNIT I   INTRODUCTION   (**10**)

Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security

UNIT II   IOT PROTOCOLS   (**8**)

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols –
Issues with IoT Standardization – Unified Data Standards –   Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security

UNIT III   WEB OF THINGS   (**10**)

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards
– Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture

UNIT IV   INTEGRATED   (**9**)

Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things - Network Dynamics: Population Models – Information Cascades - Network Effects - Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World Phenomenon

UNIT V APPLICATIONS (8)

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging

Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Honbo Zhou	The Internet of Things in the Cloud: A Middleware Perspective	CRC Press	2012

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dieter Uckelmann; Mark Harrison; Florian Michahelles	Architecting the Internet of Things	Springer	2011
2.	David Easley and Jon Kleinberg	Networks, Crowds, and Markets: Reasoning About a Highly Connected World	Cambridge University Press	2010
3	Olivier Hersent, Omar Elloumi and David Boswarthick	The Internet of Things: Applications to the Smart Grid and Building Automation	Wiley	2012

17BEEC6E09   DATA STRUCTURES AND ALGORITHMS   L T P C
                                                              3 0 0 3

OBJECTIVES:

- To learn the systematic way of solving problems.
- To understand the different methods of organizing large amounts of data.
- To learn lists, stacks and queues
- To learn top Program in C.
- To efficiently implement the different data structures.
- To efficiently implement solutions for specific problems.

INTENDED OUTCOMES:

- Gain adequate knowledge about the systematic way of solving problems.
- Gain adequate knowledge about the different methods of organizing large amounts of data.
- Gain learn lists, stacks and queues.
- Gain adequate knowledge to program in C.
- Gain adequate knowledge to implement the different data structures.
- Gain adequate knowledge about to implement solutions for specific problems.

UNIT I   PROBLEM SOLVING   9

Problem   solving–Top-down   Design–Implementation–Verification–Efficiency–analysis–
Sample algorithms.

UNIT II   LISTS, STACKS AND QUEUES   9

Abstract Data Type(ADT)–The List ADT–The Stack ADT–The Queue ADT.

UNIT III   TREES   9

Preliminaries– Binary Trees– The Search Tree ADT– Binary Search Trees– AVL Trees–
Tree
Traversals–Hashing–General Idea–Hash Function –Separate Chaining–Open Addressing–
Linear
Probing–Priority Queues (Heaps)–Model–Simple implementations–Binary Heap.

UNIT IV   SORTING   9

Preliminaries–InsertionSort–Shellsort–Heapsort–Mergesort–Quicksort–ExternalSorting

UNIT V   GRAPHS   9

Definitions– Topological Sort– Shortest-Path Algorithms– Unweighted Shortest Paths–
Dijkstra's Algorithm– Minimum Spanning Tree – Prim's Algorithm– Applications of Depth-
First Search– Undirected Graphs–Bi connectivity –Introduction to NP-Completeness.

                                                        Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publicatio
1	Dromey.R. G	How to Solve it by Computer	Prentice-Hall of India,	2002
2	Weiss.M. A	Data Structures and Algorithm	Pearson Education Asia, New Delhi	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Langsam. Y Augenstein. M. J and Tenen baum. M	Data Structures using C	Pearson Education, Asia, New Delhi	2004
2	Richard.F. Gilberg, Behrouz A and Forouzan. A	Data Structures–A Pseudocode Approach with C	Thomson Brooks/ COLE, New York	1998
3	Aho.J.E. Hopcroft and Ullman.J. D	Data Structures and Algorithms	Pearson education, Asia, New Delhi	2007

WEBSITES:

1. http://www.cs.auckland.ac.nz/software/AlgAnim/trees.html
2. http://www.itl.nist.gov/div897/sqg/dads/HTML/graph.html

17BEEC6E10   PROBABILITY AND RANDOM PROCESS   **L T P C**
                                                                     3 0 0 3

OBJECTIVES:

- To acquire knowledge about probability and random variables.
- To gain knowledge on 2-Drandomvariables.
- To gain knowledge about correlation functions.
- To learn about the applications of Fourier transforms like spectral density and others.
- To expose the concepts of random process.
- To learn about Ergodicity

INTENDED OUTCOMES:

- Gain knowledge about probability and random variables.
- Gain knowledge on 2-D random variables.
- Gain knowledge about correlation functions.
- Gain knowledge about the applications of Fourier transforms like spectral density and others.
- Gain knowledge about the concepts of random process.
- Gain knowledge about Ergodicity

UNIT I   PROBABILITY DISTRIBUTIONS   9
Random Variables- Moments- Moment generating function- Binomial, Poisson, Geometric, Exponential and Normal Distributions-Functions of Random Variables.

UNIT II   TWO DIMENSIONAL RANDOM VARIABLES   9
Two dimensional Random Variables-Marginal and conditional distributions–Transformation of Random Variables-central limit theorem-simple problems.

UNIT III   RANDOM PROCESSES   9
Classification of Random Processes-Stationarity-WSS and SSS Processes-Poisson Random Process-Renewal Process-Markov Chain and transition probabilities.

UNIT IV   CORRELATION FUNCTIONS   9
Auto correlation function and its Properties-Cross Correlation function and its Properties-Linear System with Random Inputs-Ergodicity.

UNIT V   SPECTRAL DENSITY   9
Power spectral Density Function-Properties-System in the form of convolution - Unit Impulse Response of the System - Einstein   - Weiner-Khinchine Relationship-Cross Power Density Spectrum-Properties.

                                                             Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Veerarajan, T.	Probability, Statistics and Random processes 3rd Edition.	Tata McGraw Hill Publications, NewDelhi.	2008

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Siva Ramakrishna das P. and Vijayakumari.C.	A text book of Engineering Mathematics-III	Viji's Academy	2010.
2	Trivedi KS	Probability and Statistics with reliability, Queueing and Computer Science Applications 2nd revised edition.	Prentice Hall of India, New Delhi	2002

WEBSITES:

1. www.cut-theknot.org/probability.shtml
2. www.ece.uah.edu/courses/ee420-500
3. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/probabilityrp/index. htm
4. www.mhhe.com/engcs/electrical/popoulis
5. http://hmdc.harvard.edu/projects/SPSS_Tutorial/spsstut.shtml

17BEEC6E11   **REMOTE SENSING**   **L T P C**
                                                             3 0 0 3

OBJECTIVES:

- To understand the basic concepts of Remote Sensing.
- To understand the concepts of optical and microwave remote sensing.
- To understand the concepts of geometric information systems.
- To understand the EMR interaction with Earth Surface Materials.
- To study about description of Sensors in Landsat.
- To study about Sonar remote sensing systems.

INTENDED OUTCOMES:

- Understand the basic concepts of Remote Sensing.
- Understand the concepts of optical and microwave remote sensing
- Understand the concepts of geometric information systems
- Understand the EMR interaction with Earth Surface Materials.
- Gain knowledge about description of Sensors in Landsat.
- Gain knowledge about Sonar remote sensing systems.

UNIT I   REMOTE SENSING   9

Definition–Components of Remote Sensing–Energy, Sensor, Interacting Body-Active and Passive Remote Sensing– Platforms– Aerial and Space Platforms– Balloons, Helicopters, Aircraft and Satellites– Synoptivity and Receptivity– Electro Magnetic Radiation(EMR)– EMR spectrum– Visible, Infra-Red(IR), Near IR, Middle IR, Thermal IR and Microwave–Black Body Radiation - Planck's law–Stefan-Boltzman law.

UNIT II   EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS   9

Atmospheric characteristics–Scattering of EMR–Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows– Significance of Atmospheric windows – EMR interaction with Earth Surface Materials – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy–Reflectance–Specular and Diffuse Reflection Surfaces-Spectral Signature–Spectral Signature curves–EMR interaction with water, soil and Earth Surface: Imaging spectrometry and spectral characteristics.

UNIT III   OPTICALANDMICROWAVEREMOTESENSING   9

Satellites- Classification–Based on Orbits and Purpose–Satellite Sensors-Resolution–Description of Multi Spectral Scanning–Along and Across Track Scanners –Description of Sensors in Landsat, SPOT, IR S series–Current Satellites-Radar–Speckle-Back Scattering–Side Looking Airborne Radar–Synthetic Aperture Radar–Radiometer–Geometrical characteristics; Sonar remote sensing systems.

UNIT IV   GEOGRAPHIC INFORMATION SYSTEM   9

GIS–Components of GIS–Hardware, Software and Organizational Context–Data–Spatial and Non-Spatial–Maps–Types of Maps–Projection–Types of Projection-Data Input–Digitizer, Scanner– Editing– Raster and Vector data structures– Comparison of Raster and Vector data structure– Analysis using Raster and Vector data– Retrieval, Reclassification, Overlaying, Buffering– Data Output–Printers and Plotters

UNIT V   MISCELLANEOUS TOPICS   9

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image–Image enhancement–Filtering–Classification-Integration of GIS and Remote Sensing– Application of Remote Sensing and GIS – Urban Applications-Integration of GIS and Remote Sensing–Application of Remote Sensing and GIS–Water resources–

Urban Analysis – Watershed Management – Resources Information Systems. Global positioning system– an introduction.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Srinivas.M.G.	Remote Sensing Applications	Narosa Publishing House, New Delhi	2001
2.	Anji Reddy	Remote Sensing and Geographical Information Systems	B S Publications, New Delhi	2001

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Jensen, J. R	Remote sensing of the environment	Prentice Hall	2000
2.	Kang-Tsung Chang	Introduction to Geographic Information Systems	TMH.	2002
3.	Lilles and T.M. and Kiefer R.W	Remote Sensing and Image Interpretation	John Wiley and Sons, Inc, New York	1987
4.	Burrough P A, "Principle of GIS for land resource assessment", Oxford Mischael Hord	Remote Sensing Methods and Applications	John Wiley & Sons, New York	1986.
5.	Singal	Remote Sensing	Tata McGraw-Hill, New Delhi	1990

17BEEC6E12   **OPTO ELECTRONIC DEVICES**   **L T P C**
                                                                                   3 0 0 3

OBJECTIVES:

- To understand the basics of solid state physics.
- To understand the basics of display devices.
- To understand the basics of magneto optic devices
- To understand the optical detection devices.
- To understand the design of optoelectronic integrated circuits.
- To study the design of opto electronic modulator.

INTENDED OUTCOMES:

Upon Completion of the course, the students will be able to
- Understand the basics of solid state physics
- Design display devices.
- Design magneto optic devices
- Design optoelectronic detection devices and modulators.
- Design optoelectronic integrated circuits.
- Understand the design of optoelectronic integrated circuits.

UNIT I   ELEMENTS OF LIGHTAND SOLID STATE PHYSICS   9

Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State Physics, Review of Semiconductor Physics and Semiconductor Junction Device.

UNIT II   DISPLAY DEVICES AND LASERS   9

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, Classes of Lasers, Mode Locking, laser applications.

UNIT III   OPTICAL DETECTION DEVICES   9

Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT IV   OPTO ELECTRONIC MODULATOR   9

Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acoustic optic devices, Optical, Switching and Logic Devices.

UNIT V   OPTO ELECTRONIC INTEGRATED CIRCUITS   9

Introduction, hybrid and Mono Lithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

                                                                    Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Wilson.J, and Haukes.J	Opto Electronics–An Introduction	Prentice Hall of India Pvt. Ltd., New Delhi	1998

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Pallab Bhattacharya	Semiconductor Opto Electronic Devices	Prentice Hall of India Pvt., Ltd, New Delhi	2006
2.	Jasprit Singh	Opto Electronics–As Introduction to materials and devices International Edition	McGraw-Hill, New York	1998

17BEEC7E01   **SENSORS AND TRANSDUCERS**   **L T P C**
                                                                                3 0 0 3

Course Objectives

- To study basic concepts of various sensors and transducers.
- To develop knowledge in selection of suitable sensor based on requirement
- To familiarize the concepts of inductive and capacitive sensors and its comparison
- To imparts the knowledge in analysis of error.
- To learn the fundamentals of various thermal and radiation sensors.
- To study about applications of sensors in various field.

Course Outcomes

- Characterize and classify errors
- Understand basic concepts of mechanical sensors.
- Gain knowledge about thermal sensors
- Explain the principle behind magnetic sensors
- Gain knowledge about electro analytical sensors
- Gain thorough knowledge in selection of suitable sensor based on requirement and application.

UNIT I   INTRODUCTION   9
Definition, classification, static and dynamic parameters, Characterization–Electrical, mechanical, thermal, optical, biological and chemical, Classification of errors–Error analysis, Static and dynamic characteristics of transducers, Performance measures of sensors.

UNIT II   MECHANICAL AND ELECTRO MECHANICAL SENSORS   9
Resistive Potentiometer, strain gauge, Inductive sensors and transducer, capacitive sensors, ultrasonic sensors.

UNIT III   THERMAL AND RADIATION SENSOR   9
Thermal Sensors: Gas thermometric sensors, acoustic temperature sensors, magnetic thermometer, resistance change-type thermometric sensors, thermos emf sensors, junction semiconductor types, Thermal radiation sensors, spectroscopic thermometry
Radiation Sensors: Photo detectors, photovoltaic and photo junction cells, photo sensitive cell, photo FET sand other devices.

UNIT IV   MAGNETIC AND ELECTRO ANALYTICAL SENSOR   9
Magnetic Sensors: Force and displacement measurement, magneto resistive sensors, Hall Effect sensor, Inductance and eddy current sensors, Angular/rotary movement transducer, Electromagnetic flowmeter, squid sensor.
Electroanalytical Sensors: Electro chemical cell, cell potential, sensor electrodes, electro ceramics in gas media, chem FET.

UNIT V   SENSORS AND THEIR APPLICATIONS   9
Auto mobile sensor, Home appliance sensor, Aero space sensors, sensors for manufacturing, medical diagnostic sensors, environmental monitoring.

                                                                        Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Patranabis D	Sensor and Actuators	Prentice Hall of India (Pvt)Ltd	2006
2	Ian Sinclair	Sensor and Transducers 3rd Edition	Elsevier India Pvt Ltd,	2011

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	A.K. Sawhney, Puneethsawhney	A Course in Electrical and Electronic Measurements and Instrumentation	Dhanpat Rai Publications	2012
2	Ernest O. Doeblin	Measurement System, Application and Design 5th Edition.	Tata McGraw Hill Publishing Company Ltd.	2008

17BEEC7E02   COMPUTER HARDWARE AND INTERFACING   L T P C
                                                                3 0 0 3

OBJECTIVES:

- To introduce issues related to CPU and memory.
- To understand the components on them other board.
- To understand BIOS and Boot sequences
- To understand different storage media.
- To introduce the features of different I/O peripheral devices and the interfaces.
- To understand bus architecture

INTENDED OUTCOMES:

- Knowledge about issues related to CPU and memory.
- Understand the components on them other board
- Understand BIOS and Boot sequences
- Understand different storage media
- Knowledge about the features of different I/O peripheral devices and their interfaces.
- Knowledge about bus architecture

UNIT I   CPU ANDMEMORY   9
CPU essentials–processor modes–modern CPU concepts–Architectural performance features–the Intel's CPU–CPU overclocking–over clocking requirements–overclocking the system–over clocking the Intel processors–Essential memory concepts–memory organizations–memory packages –modules–logical memory organizations–memory considerations–memory types–memory techniques–selecting and installing memory.

UNIT II   MOTHER BOARDS   9
Active motherboards–sockets and slots–Intel D850GB–Pentium 4 motherboard–expansion slots–form factor–upgrading motherboard–chipsets–north bridge–south bridge–CMOS–CMOS optimization tactics–configuring the standard CMOS setup–motherboard BIOS–POST–BIOS features–BIOS and Boot sequences–BIOS short comings and compatibility issues–power supplies and power management– concepts of switching regulation – potential power problems–power management.

UNIT III   STORAGE DEVICES   9
The floppy drive–magnetic storage–magnetic recording principles–data and disk organization–floppy drive–hard drive–data organization and hard drive–sector layout–IDE drive standard and features–Hard drive electronics–CD-ROM drive–construction–CDROM electronics–DVD-ROM –DVD media–DVD drive and decoder.

UNIT IV   I/O PERIPHERALS   9
Parallel port–signals and timing diagram–IEEE 1384 modes–asynchronous communication-serial port signals–video adapters–graphic accelerators–3D graphics accelerator issues–DirectX–mice– modems–keyboards–soundboards– audio bench.

UNIT V   BUS ARCHITECTURE   9
Buses–Industry standard architecture(ISA), peripheral component Interconnect(PCI)–Accelerated Graphics port(AGP)–plug-and-play devices–SCSI concepts–USB architecture.

                                                                Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Stephen J. Bigelow	Trouble Shooting, maintaining and Repairing PCs.	Tata McGraw-Hill, New Delhi.	2001
2.	B. Govindarajulu	PC and Clones hardware troubleshooting and maintenance	Tata McGraw-Hill, New Delhi.	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publicatio
1.	Craig Zacker & John Rourke.	The complete reference: PC hardware.	Tata McGraw-Hill, New Delhi.	2001
2.	Mike Meyers.	Introduction to PC Hardware and Troubleshooting	Tata McGraw-Hill, New Delhi.	2003

17BEEC7E03   **HIGH SPEED NETWORKS**   **L T P C**
                                                         3 0 0 3

OBJECTIVES:

- To Provide knowledge about high speed networks, congestion control and traffic management mechanism and also about protocols for QoS support.
- To imparts a good knowledge in wireless LANs and high speed LANs
- To familiarize the students with the ATM protocol architecture.
- To inculcate the congestion control in packet switching networks.
- To divulge the basics of RSVP.
- To make the student acquire Integrated Services Architecture.

INTENDED OUTCOMES:

- Understand significance and the areas of application of high-speed networks.
- Gain knowledge on ATM Protocols.
- Understand the congestion control mechanisms
- Design of traffic free network
- Kknowledge about ISDN architecture and its services
- Gain exposure on various protocols for QoS support.

UNIT I   HIGH SPEED NETWORKS   9
Frame Relay Networks–Asynchronous transfer mode–ATM Protocol Architecture, ATM logical Connection, ATM Cell–ATM Service Categories–AAL.
High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel–Wireless LANs: applications, requirements–Architecture of 802.11

UNIT II   CONGESTION AND TRAFFIC MANAGEMENT   9
Queuing Analysis-Queuing Models–Single Server Queues–Effects of Congestion–Congestion Control–Traffic Management–Congestion Control in Packet Switching Networks–Frame Relay Congestion Control.

UNIT III   TCP AND ATM CONGESTION CONTROL   9
TCP Flow control –TCP Congestion Control–Re transmission–Timer Management–Exponential RTO back off–KARN's Algorithm–Window management–Performance of TCP over ATM. Traffic and Congestion control in ATM– Requirements– Attributes– Traffic Management Frame work, Traffic Control– ABR traffic Management– ABR rate control, RM cell formats, ABR Capacity allocations–GFR traffic management.

UNIT IV   INTEGRATED AND DIFFERENTIATED SERVICES   9
Integrated Services Architecture–Approach, Components, Services-Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ–Random Early Detection, Differentiated Services

UNIT V   PROTOCOLS FOR QOS SUPPORT   9
RSVP–Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms–Multiprotocol Label Switching–Operations, Label Stacking, Protocol details–RTP–Protocol Architecture, Data Transfer Protocol, RTCP.

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publicatio
1.	William Stallings	High Speed Networks And Internet	Pearson Education, New Delhi.	2002
2.	Irvan Pepelnjk, Jim Guichard and Jeff Apcar	MPLS and VPN architecture	Cisco Press, New York.	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Warland & Pravin Varaiya	High Performance Communication Networks	Jean Har court Asia Pvt. Ltd	2001

17BEEC7E04   **NANO ELECTRONICS**   **L T P C**
                                                              3 0 0 3

OBJECTIVES:

- To Understand the basics of Quantum mechanics concepts and process involved in preparation of nano particle.
- To imparts a good knowledge in nanosensors and nanobiosensors
- To familiarize the students with the benefits of the nano-materials and appropriate use in solving practical problems.
- To inculate the nanoscale MOSFET.
- To divulge the applications of nanosenors in various fields.
- To make the student acquire the knowledge of carbon nanotubes and its application in various fields

INTENDED OUTCOMES:

- Understand the basics of Quantum Mechanics
- Gain knowledge on shrink down approaches
- Characterize SET and tunnel diodes
- Understand various aspects of carbon nano structures
- Advantages of the carbon nano sensors
- Knowledge on benefits of the nano-materials and appropriate use in solving practical problems.

UNIT I   BASICS OF NANO ELECTRONICS   9
Capabilities of nano electronics– physical fundamentals of nano electronics– basics of information theory – the tools for micro and nano fabrication – basics of lithographic techniques for nano electronics.

UNIT II   QUANTUM ELECTRON DEVICES   9
From classical to quantum physics: upcoming electronic devices –electrons in mesoscopic structure– Short channel MOS transistor–split gate transistor–Electron wave transistor–Electron spin transistor –quantum cellular automate –quantum dot array –Principles of Single Electron Transistor(SET)– SET circuit design–comparison between FET and SET circuit design.

UNIT III   NANO ELECTRONICS WITH TUNNELING DEVICES AND
                     SUPERCONDUCTING DEVICES   9
Tunneling element technology- RTD: circuit design–Defect tolerant circuits - Molecular electronics –elementary circuits–flux quantum devices–application of Super conducting devices–Nanotubes Based sensors, fluid flow, gas, temperature, Strain–oxide nano wire, gas sensing (ZnO, TiO, SnO, WO), LPG sensor (SnO powder)- Nano 2232 designs and Nano contacts-metallic nano structures.

UNIT IV   A SURVEY ABOUT THE LIMITS   9
Replacement Technologies– Energy and Heat dissipation– Parameter spread as Limiting Effect–Limitsduetothermalparticlemotion–Reliabilityaslimitingfactor–Physicallimits–Final objectives of integrated chip and systems.

UNITV   MEMORY DEVICES AND SENSORS   9

Nano ferroelectrics –Ferro electric random-access memory–Fe-RAM circuit design –ferroelectric thin film properties and integration–calorimetric sensors–electro chemical cells–surface and bulk acoustic devices–gas sensitive FETs–resistive semiconductor gas sensors–electronic noses–identification of hazardous solvents and gases–semiconductor sensor array.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	K. Goser, P. Glosekotter & J. Dienstuhl,	From Transistors to Molecular Quantum Devices	Springer	2004
2.	Rainer Waser	Nano electronics and Information Technology: Advanced Electronic Materials Novel and Devices	Wiley VCH	2005

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Mick Wilson, Kamali Kannangara, Geoffsmith	Nano technology: Basic Science and Emerging Technologies: Materials, Devices, Measurement Techniques	Springer	2010
2.	Branda Paz,	A Handbook on Nano electronics	Vedams book	2008

17BEEC8E01   ARTIFICIAL NEURAL NETWORKS   L T P C
                                                            3 0 0 3

OBJECTIVES:

- To learn the various architectures of building an ANN and its applications.
- Advanced methods of representing information in ANN like elf organizing.
- Networks, associative and competitive learning.
- To learn architecture of Neocognitron.
- To imparts a good knowledge in self-organizing map-learning algorithm.
- To familiarize the students with the Data processing and performance of architecture of spacio -temporal networks for speech recognition.

INTENDED OUTCOMES:

- Gain adequate knowledge about the various architectures of building an ANN and its applications.
- Sufficient knowledge regarding BPN and BAM.
- Understand the process of Annealing
- Gain knowledge about self organizing networks, associative and competitive learning.
- Understand the architecture of ART
- Aply neural networks for classification of various applications.

UNIT I   INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS   9
Neuro-Physiology-General Processing Element-ADALINE-LMS learning rule-MADALINE-MR2 training algorithm.

UNIT II   BPN AND BAM   9
Back Propagation Network-updating of output and hidden layer weights-application of BPN–associative memory- Bi-directional Associative Memory-Hopfield memory-traveling sales man problem.

UNIT III   SIMULATED ANNEALING AND CPN   9
Annealing, Boltzmannmachine-learning-application-CounterPropagationnetwork-architecture-Training-Applications.

UNIT IV   SOM AND ART   9
Self-organizing map-learning algorithm-feature map classifier-applications -architecture of Adaptive Resonance Theory-pattern matching in ART network.

UNIT V   NEOCOGNITRON   9
Architecture of Neocognitron -Data processing and performance of architecture of spacio -temporal networks for speech recognition.

Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	J. A. Freeman and	Neural Networks, Algorithms Applications and Programming	Wiley & Sons Chichester,	2003

	B.M. Skapura	Techniques		
2.	Laurene Fausett	Fundamentals of Neural Networks: Architecture, Algorithms and Applications	Prentice Hall	1994

REFERENCE:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	S.N. Sivanandham Paul raj.M. P	Introduction to artificial neural networks	Vikas Publishers	2003

17BEEC8E02   **VIRTUAL INSTRUMENTATION**   **L T P C**
                                                             3 0 0 3

OBJECTIVES:

- To understand the basic needs of VI.
- To learn LabVIEW software basics.
- To understand data acquisition techniques.
- To learn different interfacing techniques.
- To design some real-time application using LabVIEW software.
- To learn programming techniques

INTENDED OUTCOMES:

After completion of this course students will be
- Able to program using Virtual Instrumentation
- Familiar to use data acquistio nin analog and digital design.
- Able to design filters and signal processing using LAB VIEW.
- Understand data acquisition techniques.
- Learn different interfacing techniques.
- Learn programming techniques

UNIT I   VIRTUAL INSTRUMENTATION   9
Historical perspective, Need of VI, Advantages of VI, Define VI, block diagram & architecture of VI, data flow techniques, graphical programming in data flow, comparison with conventional programming.

UNIT II   VI PROGRAMMING TECHNIQUES   9
VIS and sub-VIS, loops & charts, arrays, clusters, graphs, case & sequence structures, formula modes,Local and global variable, string & file input.

UNIT III   DATA ACQUISITION BASICS   9
Introduction to data acquisition on PC, Sampling fundamentals, Input / Output techniques and buses. ADC, DAC, DIO, Counters &timers, PC Hardware structure, timing, interrupts, DMA, Software and Hardware Installation, Simple applications using NIMy DAQ and NIELVIS.

UNIT IV   LABVIEW IN SIGNAL PROCESSING   9
Waveform Generation, Sampling, Quantization, Aliasing, Signal Reconstruction. Fourier transforms, Power spectrum, Correlation methods, windowing &filtering. Digital Filter Design, IIR/FIR Filtering system Design, Adaptive Filter design.

UNIT V   FREQUENCY DOMAIN PROCESSING   9
Discrete Fourier Transform and Fast Fourier Transform, STFT, Wavelet Transform, Signal Processing applications.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Sumathi &P. Surekha	LabVIEW based Advanced Instrumentation	Springer	2007
2	Jovitha Jerome	Virtual Instrumentation Using LabVIEW	PHI Learning Pvt. Ltd	2010

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Sanjay Gupta, Joseph John	Virtual Instrumentation using LabVIEW 2nd Edition	Tata McGraw Hill Education Private Limited	2010
2	Gary W. Johnson, Richard Jennings	Lab VIEW Graphical Programming 4th Edition.	Mc Graw- Hill publications.	2006

17BEEC8E03   **FPGA DESIGN**   **L T P C**
                                                                     3 0 0 3

OBJECTIVES:

- To Provide an understanding of FPGA lifecycle
- To understand the concept of selecting a FPGA based on project specifications
- To enable the student to understand the floor planning, place and route optimization techniques.
- To introduce the lower power reduction techniques to analyze and design FPGA.
- To imparts a good knowledge in logical replications-I/O registers.
- To familiarize the students with the power consumption reduction techniques

INTENDED OUTCOMES:

- Ability to understand FPGA lifecycle
- Understand the concept of selecting a FPGA based on project specifications
- Understand the placement techniques
- Knowledge on lower power reduction techniques to analyze and design FPGA.
- Understand the floor planning techniques
- Understand the route optimization techniques

UNIT I   INTRODUCTION TO GATE ARRAY AND CMOS LOGIC   9
Types of gate array–Design flow-CMOS Logic-Combinational–Sequential–Data path–Transistor as resistor–Capacitance-Hardware description language.

UNIT II   FIELD PROGRAMMABLE GATE ARRAY   9
FPGA Architecture- Altera FPGA technologies- Xilinx FPGA technologies – Lattice FPGA technologies-Actel FPGA technologies.

UNIT III   FPGA IMPLEMENTATION ISSUES   9
Lookuptables–Memoryavailability-Fixedcoefficientdesigntechnique–Distributedarithmetic.

UNIT IV   FLOOR PLANNING, PLACE AND ROUTE OPTIMIZATION   9
Design Partitioning-Optimal floor planning–Relationship between placement and routing–Logical Replications-I/O registers–Register Ordering-Placement seed.

UNIT V   LOW POWER FPGA IMPLEMENTATION   9
Sources of power Consumption-Power consumption reduction Techniques-Voltage scaling FPGA's–Data reordering- Pipeline.

                                                                     Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Steve Kilts	Advanced FPGA Design	Wiley Inter-Science,	2003

| 2 | Roger Woods, John McAllister, Ying Yi, Gaye Lightbody | FPGA-based Implementation of Signal Processing Systems | Wiley | 2008 |

REFERENCE:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	M.J. S. Smith	Application Specific Integrated Circuits	Pearson	2003

17BEEC8E04   **ASIC DESIGN**   **L T P C**
                                                                     3 0 0 3
OBJECTIVES:

- To give basic knowledge of ASIC internals.
- To impart knowledge on ASIC types.
- To give basic understanding of tools used.
- To make the students acquire the design of ASIC library.
- To make the student acquire the knowledge of automatic test pattern generation algorithm.
- To acquaint the student with the introduction of SOC

INTENDED OUTCOMES:

- Understand basic knowledge of ASIC internals.
- Gain knowledge on types of ASIC.
- Gain knowledge about the tools used in ASIC design.
- Simulate and synhezise any circuit
- Perform testing of ASIC
- Gain knowledge about the optimization of area

UNIT I   INTRODUCTION TO ASICS   9
Introduction to ASICs: Full-custom and Semi-custom ASIC–CMOS logic –ASIC library design.

UNIT II   PROGRAMMABLE ASICS   9
Programmable ASICs–Anti fuse–static RAM–EPROM and technology–Actel ACT–Xilinx LCA
–Altera flex–Altera MAX Logic cells– I/O cells–Interconnects– Low level design entry: Schematic entry.

UNIT III   SIMULATION AND SYNTHESIS   9
Logic synthesis: A comparator MUX, inside a logic synthesizer, VHDL and logic synthesis, FSM synthesis, memory synthesis–Simulation: Types of simulation–logic systems–how logic simulation works.

UNIT IV   ASIC TESTING   9
Boundary scantest– Faults–Fault simulation–Automatic test pattern generation algorithm: D-algorithm, PODEM –Built in self-test.

UNIT V   ASIC CONSTURCTION   9
System partitioning–power dissipation–partitioning methods–floor planning and placement: – Routing: Global routing, detailed routing, special routing–Introduction to SOC.

                                                           Total Hours: 45
TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication

1.	M.J. S. Smith	Application Specific Integrated Circuits	Pearson Education Reprint	2006
2.	Wolf Wayne	FPGA based system design	Pearson Education	2005

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	M. Sarafzadehand C.K. Wong	An Introduction to VLSI Physical Design	McGraw Hill	1996
2.	JanM.Rabaey. Anantha Chandra kasan, Borivoje Nikolic	Digital Integrated Circuits	Prentice-Hall Publication	2002

17BESHOE01   PROBABILITY AND RANDOM PROCESS   L T P C
3 0 0 3

OBJECTIVES:

- To gain knowledge in measures of central tendency.
- To provide necessary basic concepts in probability and random processes.

INTENDED OUTCOMES:

- Learners acquire skills in handling situations involving more than one random variable and functions of random variables.
- The students will have an exposure of various distribution functions, correlation and spectral densities.

UNIT I   MEASURES OF CENTRAL TENDENCY AND PROBABILITY   (9)
Measures of central tendency – Mean, Median, Mode - Standard Deviation Probability –
Random variable - Axioms of probability - Conditional probability – Total probability – Baye's theorem.

UNIT II   STANDARD DISTRIBUTIONS   (9)
Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma (one Parameter only) and Normal distributions - Moment generating functions, Characteristic function and their properties – Chebyshev's inequality.

UNIT III   TWO DIMENSIONAL RANDOM VARIABLES   (9)
Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression

UNIT IV   CLASSIFICATION OF RANDOM PROCESS   (9)
Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V   CORRELATION AND SPECTRAL DENSITIES   (9)
Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Peebles Jr, P. Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Pubishers, New Delhi.	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2012
2	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Chand and Sons, New Delhi.	2014
3	Veerarajan,T.	Probabilitiy, Statistics and Random process	Tata McGraw-Hill Education pvt. Ltd., New Delhi	2008
4	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing Third edition.	Pearson Education, Delhi	2002

WEBSITES:

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld.Wolfram.com

17BESHOE02   **FUZZY MATHEMATICS**   **L T P C**

                                                                 3 0 0 3

OBJECTIVES:

- To know the fundamentals of fuzzy Algebra.
- To know the basic definitions of fuzzy theory
- To know the applications of fuzzy Technology

INTENDED OUTCOME:

- The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNIT I   FUZZY SETS   (9)
Fuzzy Sets : Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – Fuzzy functions - Zadeh's Extension Principle

UNIT II   OPERATIONS ON FUZZY SETS   (9)
Operations on Fuzzy Sets Operations on [0, 1] – Fuzzy negation, triangular norms, tconorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III   FUZZY RELATIONS   (9)
Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNIT IV   FUZZY MEASURES   (9)
Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNIT V   FUZZY INFERENCE   (9)
Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic: Theory and Applications	Prentice Hall of India, New Delhi.	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Zimmermann H.J.	Fuzzy Set Theory and its Applications	Kluwer Academic publishers, USA.	2001
2	Michal Baczynski and Bala subramaniam Jayaram	Fuzzy Implications	Springer-Verlag publishers, Heidelberg	2008
3	Kevin M Passino and Stephen Yurkovich	Fuzzy Control	Addison Wesley Longman publishers, USA	1998

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld. Wolfram.com
3. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm

17BESHOE03   **LINEAR ALGEBRA**   **L T P C**
                                                             3 0 0 3

OBJECTIVES:

- To know the fundamentals of linear Algebra.
- To study about the linear transformations
- To introduce the concepts of inner product spaces

INTENDED OUTCOMES:

The student will be able to

- Recognize the underlying theory of vector spaces over a field and inner product spaces over real or complex numbers
- Visualize linear transformations as matrix form
- Articulate the importance of Linear Algebra and its applications in branches of   Mathematics

UNIT I   VECTOR SPACES   **(9)**
General vector spaces, real vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space,

UNIT II   EIGEN VALUES AND EIGEN VECTORS   **(9)**
Eigen values and Eigen vectors - Diagonalization - Power method - QR decomposition

UNIT III   SYSTEM OF LINEAR EQUATIONS   **(9)**
Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss-Jacobi method, Gauss–Seidel method, convergence criteria.

UNIT IV   LINEAR TRANSFORMATIONS   **(9)**
Linear Transformations   - The Null Space and Range -   Isomorphisms - Matrix Representation of Linear Transformations – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors -   Diagonalization

UNIT V   INNER PRODUCT SPACES   **(9)**
The Dot Product on R^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

                                                             Total Hours: 45
TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Shahnaz Bathul	Text book of Engineering Mathematics (Special Functions and Complex Variables)	PHI Publications, New Delhi.	2009

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India, New Delhi.	2012
3	Jim Defranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill, New Delhi.	2008

WEBSITES:

1. www.sosmath.com
2. www.nptel.ac.in
3. www.mathworld.wolfram.com

17BESHOE04   **ENGINEERING ACOUSTICS**   **L T P C**
                                                           3 0 0 3

OBJECTIVES:
- To provide mathematical basis for acoustics waves and the characteristic behaviour of sound in pipes, resonators and filters.
- To introduce the properties of hearing and speech.

INTENDED OUTCOME:
- The students will have the knowledge on acoustics waves , the characteristic behaviour of sound in pipes, resonators and filters and that knowledge will be used by them in different engineering and technology applications.

UNIT I   INTRODUCTION   9
Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves - Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales. Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II   RADIATION AND RECEPTION OF ACOUSTIC WAVES   9
Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III   PIPES RESONATORS AND FILTERS   9
Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmoltz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combing band levels and tones – detecting signals in noise – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV   ARCHITECTURAL ACOUSTICS   9
Sound in endosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound
sources   in   live   rooms   –   acoustics   factor   in   architectural   design. Environmental Acoustics: Highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V   TRANSDUCTION   9
Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker– horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers

                                                      Total Hours: 45

TEXTBOOK:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	Lawerence E.Kinsler, Austin R.Frey,	Fundamentals of Acoustics	John Wiley & Sons	2000

REFERENCE:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	F. AltonEverest & Ken Pohlmann	Master Handbook of Acoustics	McGraw Hill Professional	2014

WEBSITES:

1. www.acousticalsociety.org
2. www.acoustics-engineering.com
3. www.nptel.ac.in
4. www. ocw.mit.edu

17BESHOE05   **SOLID WASTE MANAGEMENT**   **L T P C**

                                                                                3 0 0 3

OBJECTIVES:

- To understand about the solid waste.
- To study about the waste treatment.
- To gain knowledge on the disposal of waste and waste management.
- To get the information on energy conservation.

INTENDED OUTCOME:

- The students will know solid waste and energy conservation. They will understand the methodologies to disposal of solid waste and its management.

UNIT I   SOLID WASTE   9

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Property – Collection – Transfer Stations – Waste Minimization and Recycling of Municipal Waste

UNIT II   WASTE TREATMENT   9

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration

UNIT III   WASTE DISPOSAL   9

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classficaition, Types, Methods &Siting Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation, Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases, Waste landfill Remediation

UNIT IV   HAZARDOUS WASTE MANAGEMENT   9

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling -Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediaiton, risk assessment.

UNIT V   ENERGY GENERATION FROM WASTE   9

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, Energy recovery systems. Biological & Chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

                                                                                Total Hours: 45

TEXTBOOK:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	Dara.S.S,Mishra.D.D	A Text book of Environmental Chemistry and Pollution Control	S.Chand and Company Ltd., New Delhi.	2011

REFERENCES:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	Naomi B. Klinghoffer and Marco J. Castaldi	Waste to Energy Conversion Technology (Woodhead Publishing Series in Energy)	Woodhead Publishing Ltd., Cambridge, UK	2013
2	Frank Kreith, George Tchobanoglous	Hand Book of Solid Waste Management- 2nd edition	McGraw Hill Publishing Ltd., Newyork	2002
3	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall (P) Ltd., New Delhi.	1999

WEBSITES:

1. www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
2. http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/
3. www.alternative-energy-news.info/technology/garbage-energy/
4. nzic.org.nz/Chem Processes/environment/

17BESHOE06   **GREEN CHEMISTRY**   **L T P C**
                                                                              3 0 0 3

OBJECTIVES:

- To understand about the green chemistry.
- To study the atom efficient process and synthesis elaborately.
- To gain knowledge on the green technology and renewable energy resources.
- To get the information on catalysis.

INTENDED OUTCOME:

- Students will know the chemistry and application of green technology for energy sources. They will understand the role of green catalyst in industries.

UNIT I   INTRODUCTION TO GREEN CHEMICAL PRINCIPLES   9
Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorous solvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II   ATOM EFFICIENT PROCESSES   9
Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker synthesis.

UNIT III   BIOTECHNOLOGY AND GREEN CHEMISTRY   9
Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology-Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and bio catalysts.

UNIT IV   RENEWABLE RESOURCES   9
Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion.

UNIT V   CATALYSIS IN GREEN CHEMISTRY   9
Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

                                                                    Total Hours: 45

TEXTBOOKS:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	Sanjay K. Sharma, Ackmez Mudhoo	Green Chemistry for Environmental Sustainability	CRC Press,London	2010
2	Ahluwalia V. K. and M.Kidwai	New Trends in Green Chemistry 2nd edition	Anamaya publishers, New Delhi.	2007

REFERENCES:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	Dr. Sunita Ratan	A Textbook of Engineering Chemistry	S.K. Kataria and Sons., New Delhi.	2012
2	Mukesh Doble. Ken Rollins, Anil Kumar	Green Chemistry and Engineering, 1st edition	Academic Press, Elesevier., New Delhi.	2007
3	Desai K. R.	Green Chemistry	Himalaya Publishing House, Mumbai.	2005
4	Matlack A. S.	Introduction to Green Chemistry	Marcel Dekker: New York	2001

WEBSITES:

1. http://www.organic-chemistry.org/topics/green-chemistry.shtm
2. http://www.essentialchemicalindustry.org/processes/green-chemistry.html
3. http://www.chm.bris.ac.uk/webprojects2004/vickery/green_solvents.htm
4. http://www.epa.gov/research/greenchemistry/
5. http://www.amazon.in/Green-Chemistry-Catalysis

17BESHOE07   **APPLIED ELECTROCHEMISTRY**   **L T P C**
                                                              3 0 0 3

OBJECTIVES:

- To get the information on electrochemical material.
- To study about the conducting polymers.
- To understand about the fuel.
- To gain knowledge on the batteries and power sources.

INTENDED OUTCOME:

- Students will understand about the fuel. They will get knowledge on the batteries and power sources.

UNIT I   METAL FINISHING   9

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electro less plating of nickel- anodizing – Electroforming – Electro winning.

UNIT II   CONDUCTING POLYMERS AND ELECTROCHEMICALS   9

Electropolymerization- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation of conducting polymers- poly acetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III   BATTERIES AND POWER SOURCES-I   9

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV   BATTERIES AND POWER SOURCES-II   9

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries, Lithium ion batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V   ELECTROCHEMICAL MATERIAL SCIENCE   9

Solar cells- Preparation of CdS/Cu_2S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

                                                              Total Hours: 45

TEXTBOOKS:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	Cynthia G. Zoski	Hand Book of Electrochemistry	Academic Press, Elesevier., UK	2007
2	D.Pletcher and F.C.Walsh	Industrial Electrochemistry	Chapman and Hall, London	1990

REFERENCES:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	M. Barak	Electrochemical Power Sources	I.EEE series, Peter Peregrinius Ltd, Steverage, U.K.	1997
2	Bruno Scrosati	Applications of Electroactive Polymers	Chapman & Hall, London	1993
3	K.L. Chopra and I. Kaur	Thin Film Devices and their Application	Plenum Press, New York.	1983
4	M.M.Baizer	Organic Electrochemistry	Dekker Inc. New York	1983

WEBSITES:

1. http://www.anoplate.com/finishes/
2. http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html
3. http://inventors.about.com/od/sstartinventions/a/solar_cell.htm

17BESHOE08   **INDUSTRIAL CHEMISTRY**   **L T P C**
                                                          3 0 0 3

OBJECTIVES:

- To understand about the fuel.
- To study about the abrasives and lubricants.
- To gain knowledge on inorganic chemicals and explosive materials.
- To get the information on agriculture chemicals.

INTENDED OUTCOME:

- The student will acquire basic knowledge on cement.The student will understand the interaction of engineering materials and their utilization in industries.

UNIT I   CEMENT AND LIME   9

Manufacture of Portland cement – settling of hardening of portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydraulic lime.

UNIT II   ABRASIVES AND REFRACTORIES   9

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses. Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT III   INORGANIC CHEMICALS   9

Common salt and soda ash – manufacture – different grades – products – alkalis – Na_2CO_3, caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage. Hydrochloric acid – manufacture – absorption – uses, sulphur and sulphuric acid – extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.

UNIT IV   EXPLOSIVES   9

Explosives – uses – properties and tests – explosives for war – nitrocellulose – picric acid and T.N.T. – industrial explosives – nitroglycerin and dynamites – black powder – smoke screens – incendiaries – gas mask.

UNIT V   AGRICULTURE CHEMICALS   9

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

                                                              Total Hours: 45

TEXTBOOKS:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	Hari krishan	Industrial Chemistry	Goel Publishing House, Meerut.	2014
2	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut.	2000

REFERENCES:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	B.N.Chakrabarty	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
2	James A. Kent	Hand Book of Industrial Chemistry, 9th edition	Van Nostrand Reinhold, New York.	1992
3	R.N. Sherve	Chemical Process Industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
4	S.D. Shukla and G.N. Pandy	A Text book of Chemical Technology	Vikas Publishing House (P) Ltd, New Delhi.	1979

WEBSITES:

1. http://en.wikipedia.org/wiki/Cement
2. http://www.hon.ch/HONselect/Selection/D01.html
3. http://fas.org/man/dod-101/navy/docs/fun/part12.htm
4. http://toxics.usgs.gov/topics/agchemicals.html

ENGLISH FOR TECHNOCRATS   **L T P C**
                                                                 1 4 0 3

PURPOSE:

It provides techniques of writing and also trains the students to write without their influence of mother tongue. In addition to honing their skills as professional writers, students will develop technical vocabularies that will aid writing research articles and discussing articles produces by their peers.

OBJECTIVE:

- Develop abilities to write technically and expressively.
- Recognize writing as a constructive, meaningful process.
- Practise using reading strategies for effective writing.

INTENDED OUTCOMES:

Students undergoing this course are able to
- Construct simple sentences, correct common grammatical errors in written English.
- Build confidence in English language by imbibing lexical and syntax rules.
- Enrich their reading ability for effective writing.

UNIT I   BASICS OF WRITING   9

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer's block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT II   PARAGRAPHS AND ESSAYS   9

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kinds of paragraphs – Writing drafts – Paragraph length and pattern – Types of Essays – Characteristics of Essays – Salient point of sentence constructions.

UNIT III   LETTERS, MEMOS AND EMAIL   9

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT IV   THE ART OF CONDENSATION AND TECHNICAL PROPOSALS   9

Steps to Effective précis writing – Guidelines – Technical Proposals – Types of Proposals – Characteristics – Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /Film Review – Travelogue – Dialogue Writing.

UNIT V   REPORTS AND RESEARCH ARTICLES   9

Discussion of newspaper articles -Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

                                                          Total Hours: 45

TEXTBOOK:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	V.N. Arora & Lakshmi Chandra	Improve Your Writing: Revised First Edition	OUP	2014

REFERENCES:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1	Crème, P. and M. Lea.	Writing at University: A guide for students.	OUP	2003
2	Graham King	Collins Improve Your Writing First edition	Collins	2009
3	David Morley	The Cambridge Intro. To Creative Writing	Cambridge	2008

WEBSITES:

1. http://www.stevepavlina.com/blog/2006/08/10-ways-to-improve-your-technical-skills/
2. http://www.nyu.edu/classes/keefer/brain/net2.html
3. https://www.udemy.com/technical-writing-and-editing/
4. http://techwhirl.com/what-is-technical-writing/

17BECSOE01   **INTERNET PROGRAMMING**   **L T P C**
                                                          3 0 0 3

OBJECTIVE:

- To introduce the Java programming language and explore its current strengths and Weaknesses
- To study the way that object-oriented concepts are implemented in the Java programming language
- To write working Java code to demonstrate the use of applets for client side programming
- To study the way that exceptions are detected and handled in the Java programming language
- To write working Java code that demonstrates multiple threads of execution

UNIT I   INTRODUCTION   9
Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Sub netting and addressing- Classful and Classless Addressing, Sub netting

UNIT II   HTML   9
Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Color name, Color value. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction-Environment Variable, GET and POST Methods.

UNIT III   PERL   9
Introduction, Variable, Condition, Loop, Array, implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets-Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV   CLIENT-SERVER PROGRAMMING   9
Client-Server programming in Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks-Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V   INTERNET TELEPHONY   9
Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and
RTSP-Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler-
Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

Total Hours: 45

TEXTBOOKS:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1.	Paul Deitel, Harvey Deitel and Abby Deitel	Internet and World Wide Web-How to Program 5th Edition	Dorling Kindersley pvt Ltd	2011
2.	N.P. Gopalan and J. Akilandeswari	Web Technology: A Developer's Perspective	PHI Learning	2013

REFERENCES:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1.	Rahul Banerjee	Internetworking Technologies, An Engineering Perspective	PHI Learning, Delhi	2011
2.	Robert W. Sebesta	Programming the World Wide Web	Pearson Education	2016

			L	**T**	**P**	**C**

17BECSOE02   **MULTIMEDIA AND ANIMATION**

3   0   0   3

OBJECTIVE:

- ☐ ☐☐☐study the graphics techniques and algorithms
- ☐ To study the multimedia concepts and various I/O technologies. ☐☐☐
- ☐ To enable the students to develop their creativity ☐☐☐
- • To impart the fundamental concepts of Computer Animation and Multimedia.

UNIT I   INTRODUCTION   9

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II   CREATING ANIMATION IN FLASH   9

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III   3D ANIMATION & ITS CONCEPTS   9

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV   MOTION CAPTION   9

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V   CONCEPT DEVELOPMENT   9

Story Developing – Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

Total Hours: 45

TEXTBOOK:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1.	Malay K. Pakhira	Computer Graphics, Multimedia and Animation	PHI Learning PVT Ltd	2010

REFERENCES:

S.NO	Author(s) Name	Title of The Book	Publisher	Year of Publication
1.	Ranjan Parekh	Principles of Multimedia	TMH	2007
2.	Ashok Banerji, Ananda Mohan Ghosh	Multimedia Technologies	McGraw Hill Publication	2010
3.	Pankaj Dhaka	Encyclopedia of Multimedia and Animations	Anmol Publications	2011

17BECSOE03   PC HARDWARE AND TROUBLE SHOOTING   L T P C
                                                                    3 0 0 3

OBJECTIVES:

- Assemble/setup and upgrade personal computer systems
- Perform installation, configuration, and upgrading of microcomputer hardware and software.
- Install/connect associated peripherals.
- Diagnose and troubleshoot microcomputer systems hardware and software, peripheral equipment.

UNIT I   INTRODUCTION   9
Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II   PERIPHERAL DEVICES   9
Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III   PC HARDWARE OVERVIEW   9
Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV   INSTALLATION AND PREVENTIVE MAINTENANCE   9
Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V   TROUBLESHOOTING   9
Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

                                                              Total Hours: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of The Book	Publisher	Year of Publication
1.	B. Govindarajalu	IBM PC Clones Hardware, Troubleshooting and Maintenance	TMH	2002

REFERENCES:

S.NO.	Author(s) Name	Title of The Book	Publisher	Year of Publication
1.	Peter Abel, Niyaz Nizamuddin	IMB PC Assembly Language and Programming	Pearson Education	2007
2.	Scott Mueller	Repairing PC's	PHI	1992

17BECSOE04   **JAVA PROGRAMMING**   **L T P C**
                                                          3 0 0 3

OBJECTIVES:

- Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Be aware of the important topics and principles of software development.
- Have the ability to write a computer program to solve specified problems.
- Be able to use the Java SDK environment to create, debug and run simple Java programs

UNIT I   **INTRODUCTION TO JAVA**   **9**

Object oriented programming concepts – objects – classes – methods and messages –abstraction and encapsulation – inheritance – abstract classes – polymorphism.- Objects and classes in Java – defining classes – methods - access specifiers – static members –constructors – finalize method

UNIT II   **PACKAGES**   **9**

Arrays – Strings - Packages – Java-Doc comments –- Inheritance – class hierarchy –polymorphism – dynamic binding – final keyword – abstract classes

UNIT III   **I/O STREAMS**   **9**

The Object class – Reflection – interfaces – object cloning – inner classes – proxies - I/O Streams - Graphics programming – Frame – Components – working with 2D shapes.

UNIT IV   **EXCEPTION HANDLING**   **9**

Exceptions – Syntax of exception handling code – Multiple catch statements – Using finally statements – Throwing our own exceptions – Using exceptions for debugging

UNIT V   **THREADS**   **9**

Introduction, Creating Threads, The Life Cycle of a Thread, Thread Methods, Using Threads, Synchronization of Threads, Summary

Total Hour: 45

TEXTBOOK:

S.NO.	Author(s) Name	Title of The Book	Publisher	Year of Publication
1.	Cay S. Horstmann and Gary Cornell	Core Java: Volume I - Fundamentals	Sun Microsystems Press	2008

REFERENCES:

S.NO.	Author(s) Name	Title of The Book	Publisher	Year of Publication
1.	K. Arnold and J. Gosling	The JAVA programming language Third edition	Pearson Education	2009
2.	Timothy Budd	Understanding Object-oriented programming with Java Updated Edition	Pearson Education	2002
3.	C. Thomas Wu	An introduction to Object-oriented programming with Java Fourth Edition	Tata McGraw-Hill Publishing company Ltd	2008

WEBSITES:

1. http://elvis.rowan.edu/~kay/cpp/vc6_tutorial/
2. http://www.winprog.org/tutorial/msvc.html
3. http://www.tutorialized.com/tutorials/Visual-C/1
4. http://www.freeprogrammingresources.com/visualcpp.html

17BEEEOE01   **ELECTRIC HYBRID VEHICLES**   **L T P C**
                                                              3 0 0 3

OBJECTIVES:

- To understand the basic concepts of electric hybrid vehicle.
- To gain the knowledge about electric propulsion unit.
- To gain the concept of Hybrid Electric Drive-Trains.
- To gain the different Energy Management Strategies.
- To study about the efficiency manipulation in drives
- To understand and gain the knowledge about various energy storage devices

INTENDED OUTCOMES:

- Summarize the basic concepts in bioprocess Engineering.
- Explain the concept of Hybrid Electric Vehicles.
- Understand the concept of Hybrid Electric Drive-Trains.
- Identify the different Energy Management Strategies.
- Understand the concept of different Energy Storage devices.
- Analyze the different motor drives used in Hybrid Electric Vehicles.

UNIT I   INTRODUCTION   9
History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II   HYBRID ELECTRIC DRIVE-TRAINS   9
Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III   ELECTRIC PROPULSION UNIT   9
Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motr drives, drive system efficiency.

UNIT IV   ENERGY STORAGE   9
Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V   ENERGY MANAGEMENT STRATEGIES   9
Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

                                                      Total Hours: 45

TEXTBOOK:

S. NO.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals – 2nd edition.	CRC Press	2010

REFERENCES:

S. NO.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design-2nd edition	Standards media	2009
2	James Larminie, John Lowry	Electric Vehicle Technology Explained – 2nd editions.	Wiley	2012

17BEEEOE02   ENERGY MANAGEMENT AND ENERGY AUDITING   L T P C
                                                                3 0 0 3

OBJECTIVES:

- To gain the knowledge about energy management.
- To understand the basic concepts in economic analysis in energy management.
- To understand the basic principles of energy audit.
- To gain the knowledge about the basic concept of types of Energy Audit
- To gain and Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.
- To study about the behaviour changes of PF requirement in motor currents

INTENDED OUTCOME:

At the end of this course, students will demonstrate the ability to
- Understand the concept of Energy Management.
- Analyze the different methods for economic analysis
- Knowledge about the basic concept of Energy Audit and types.
- Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.
- Investigate the different methods to improve power factor.

UNIT I   ENERGY MANAGEMENT   9
Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II   ECONOMIC ASPECTS AND ANALYSIS   9
Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III   BASIC PRINCIPLES OF ENERGY AUDIT   9
Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV   ENERGY EFFICIENT MOTORS   9
Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-
Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system- energy efficient transformers.

UNIT V   POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY
                INSTRUMENTS   9
Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice-lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

                                                Total Hours: 45

TEXTBOOK:

S. NO.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butter worth	Energy Management	Heinemann Publications	2007

REFERENCES:

S. NO.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors – 3rd edition	Marcel Dekker Inc Ltd.	2005
2	W.C.Turner Steve Doty	Energy Management Handbook - 8th Edition Volume II	Lulu Enterprises, Inc.	2013

17BEEEOE03   **PROGRAMMABLE LOGIC CONTROLLER**   **L T P C**
                                                                   3 0 0 3

OBJECTIVES:

- To understand the basic principles of PLC systems.
- To gain the knowledge about data handling functions.
- To gain the knowledge of storage techniques in PLC
- To acquire the knowledge about how to handle the data and functions
- To study about flow charts of ladder and spray process system
- To understand the principles of PID.

INTENDED OUTCOME:

- At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
- To acquire the knowledge of storage techniques in PLC
- Students know how to handle the data and functions
- Students known about advanced controller in PLC applications
- Students gather real time industrial application of PLC
- Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I   INTRODUCTION   9
PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment
Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II   PLC PROGRAMMING   9
PLC Programming input instructions, outputs, operational procedures, programming examples
using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean
algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and
sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III   REGISTERS AND PLC FUNCTIONS   9
PLC Registers: Characteristics of Registers module addressing holding registers input registers,
output registers. PLC Functions Timer functions and industrial applications counters counter
function industrial applications, Architecture functions, Number comparison functions, number
conversion functions.

UNIT IV   DATA HANDLING FUNCTIONS   9
Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and
Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence
functions and applications, controlling of two axes and three axis Robots with PLC, Matrix
functions.

UNIT V   PID PRINCIPLES   9
Analog PLC operation: Analog modules and systems Analog signal processing multi bit data
processing , analog output application examples, PID principles position indicator with PID
control, PID modules, PID tuning, PID functions

                                                      Total Hours: 45

TEXTBOOK:

S. NO.	Author(s) Name	Title of the Book	Publisher	Year of

				Publication
1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006

REFERENCES:

S. NO.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications Fifth edition,	PHI	2004
2	W.Bolton	Programmable Logic controller 5th Edition	Elsevier Newnes Publications	2009

WEBSITE:

1. http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm,- Introduction to programmable Logic controller.

17BEEEOE04   RENEWABLE ENERGY RESOURCES   L T P C
                                                                   3 0 0 3

OBJECTIVES:

- To gain the knowledge about environmental aspects of energy utilization.
- To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
- To study about solar energy collectors and its storages
- To study about the inter connected system in wind power
- To understand the basic principles fuel cell, Geo thermal power plants.
- To gain the knowledge about hydro energy.

INTENDED OUTCOME:

- Analyze the Energy Scenario in india
- Understand the concept of Solar Energy
- Understand the concept of Wind Energy
- Understand the concept of Hydro Energy
- Analyze the different energy sources
- Students gathered the real time inter connected system modelling in wind power

UNIT I   INTRODUCTION   9
Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II   SOLAR ENERGY   9
Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III   WIND ENERGY   9
Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV   HYDRO ENERGY   9
Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V   OTHER SOURCES   9
Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

                                                                   Total Hours: 45

TEXTBOOKS:

S. NO.	Author(s) Name	Title of the Book	Publisher	Year of Publication

1	Rai.G.D	Non-conventional sources of energy	Khanna publishers	2011
2	Khan.B.H	Non-Conventional Energy Resources Second edition	The McGraw Hills,	2009

REFERENCES:

S. NO.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rao.S. & Parulekar.	Energy Technology.	Khanna publishers, Eleventh Reprint.	2013
2	Godfrey Boyl.	Renewable Energy: Power sustainable future Third edition.	Oxford University Press.	2012
3	John W Twidell and Anthony D Weir.	Renewable Energy Resources – 3rd edition.	Taylor and Francis.	2015

WEBSITES:

1. www.energycentral.com
2. www.catelelectricpowerinfo.com

17BTBTOE01   **BIOREACTOR DESIGN**   **L T P C**
                                                                          3 0 0 3

OBJECTIVES:

- To understand the basic design of bioreactors
- To understand the principle of heat transfer inside a bioreactor

INTENDED OUTCOMES:

After completion of this course students will be able to
- Design bioreactors for various operations.
- Select the appropriate separation equipment based on the nature of the product.

UNIT I   ENGINEERING PROPERTIES AND STORAGE TANK   9
Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNIT II   REACTOR DESIGN   9
Design of Airlift fermentor, Bubble column reactor and Continuous stirred tank reactor.

UNIT III   HEAT TRANSFER EQUIPMENTS   9
Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulation evaporator.

UNIT IV   MASS TRANSFER EQUIPMENTS   9
Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNIT V   SEPARATION EQUIPMENTS   9
Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rotary drum drier and Swenson –walker crystallizer.

Total Hours:45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	James Edwin Bailey, David F. Ollis	Biochemical Engineering Fundamentals	McGraw-Hill	2007
2	Don W. Green, Robert H.Perry	Chemical Engineer Hand book	The McGraw- Hill Companies, Inc.	2008

REFERENCE:

S.NO	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Pauline. M. Doran	Bioprocess Engineering Principles	Academic Press	2013

17BTBTOE02   **FOOD PROCESSING AND PRESERVATION**   **L T P C**
                                                                      3 0 0 3

OBJECTIVES:
- To understand the importance of food processing
- To make the students learn the various processing and preservation techniques.

INTENDED OUTCOMES:

The students are exposed to
- Properties of food material.
- Various methods used for preserving fruits and vegetables.

UNIT I   SCOPE AND IMPORTANCE OF FOOD PROCESSING   9
Properties of food- Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning, sorting, grading, peeling.

UNIT II   PROCESSING METHODS   9
Heating- Blanching and Pasteurization. Freezing- Dehydration- canning-additives- fermentation- extrusion cooking- hydrostatic pressure cooking- dielectric heating- micro wave processing and aseptic processing – Infra red radiation processing- Concepts and equipment used.

UNIT III   FOOD CONVERSION OPERATIONS   9
Size reduction- Fibrous foods, dry foods and liquid foods- Theory and equipments- membrane separation- filtration- equipment and application.

UNIT IV   FOOD PRESERVATION BY COOLING   9
Refrigeration, Freezing-Theory, freezing time calculation, methods of freezing, freezing equipments, freeze drying, freeze concentration, thawing, effect of low temperature on food. Water activity, methods to control water activity.

UNIT V   PRESERVATION METHODS FOR FRUITS AND VEGETABLES   9
Pre processing operations - preservation by reduction of water content: drying / dehydration and concentration – chemical preservation – preservation of vegetables by acidification, preservation with sugar - Heat preservation– Food irradiation- Combined preservation techniques.

Total Hours: 45

TEXTBOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of Publication
1	R. Paul Singh, Dennis R. Heldman	Introduction to food engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Wood head Publishing Ltd	2000
3	Mircea Enachescu Dauthy	Fruit and Vegetable Processing	FAO agricultural services bulletin no.119	1995

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of Publications
1	M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta	Engineering properties of foods	CRC Press	2005
2	B. Sivasankar	Food processing and preservation	PHI Learning Pvt. Ltd	2002

17BTBTOE03   **BASIC BIOINFORMATICS**   **L T P C**
                                                                                3 0 0 3

OBJECTIVES:

- To enable the students to get aware of available tools and databases for performing research in bioinformatics.
- To provide the thorough understanding of protein structure in detail.

INTENDED OUTCOMES:

At the end of the course,

- The students will understand the importance of Bioinformatics in various sectors.
- The students will be exposed to biological database management and microarray technology.

UNIT I   OVERVIEW OF BIOINFORMATICS   9

The scope of bioinformatics; bioinformatics & the internet; useful bioinformatics sites. Data acquisition: sequencing DNA, RNA & proteins; determination of protein structure; gene & protein expression data; protein interaction data. Databases – contents, structure & annotation: file formats; annotated sequence databases; miscellaneous databases.

UNIT II   RETRIEVAL OF BIOLOGICAL DATA   9

Data retrieval with Entrez & DBGET/ LinkDB; data retrieval with SRS (sequence retrieval system).Searching sequence databases by sequence similarity criteria: sequence similarity searches; amino acid substitution matrices; database searches, FASTA & BLAST; sequence filters; iterative database searches & PSI-BLAST.Multiple-sequence alignment, gene & protein families: multiple-sequence alignment & family relationships; protein families & pattern databases; protein domain families.

UNIT III   PHYLOGENETICS   9

Phylogenetics, cladistics & ontology; building phylogenetic trees; evolution of macromolecular sequences.Sequence annotation: principles of genome annotation; annotation tools & resources.

UNIT IV   STRUCTURAL BIOINFORMATICS   9

Conceptual models of protein structure; the relationship of protein three-dimensional structure to protein function; the evolution of protein structure & function; obtaining, viewing & analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure: CATH & SCOP; introduction to protein structure prediction; structure prediction by comparative modeling; secondary structure prediction; advanced protein structure prediction & prediction strategies.

UNIT V   MICROARRAY DATA ANALYSIS   9

Microarray data, analysis methods; microarray data, tools & resources; sequence sampling & SAGE.Bioinformatics in pharmaceutical industry: informatics & drug discovery; pharmainformatics resources.Basic principles of computing in bioinformatics: running computer software; computer operating systems; software downloading & installation; database management.

Total Hours: 45

TEXTBOOKS:

S. NO.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Dan E. Krane, Michael L. Rayme	Fundamental Concepts of Bioinformatics	Pearson education	2004
2	Andreas D. Baxevanis, B. F. Francis Ouellette	Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins	Wiley-Interscience	2004
3	David W. Mount	Sequence and Genome Analysis	Cold Spring Harbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCE BOOK:

S. NO.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: Methods and Applications	Springer Science & Business Media	2007

17BTBTOE04   FUNDAMENTALS OF NANOBIOTECHNOLOGY   L T P C
                                                                    3 0 0 3

OBJECTIVES:

- To develop skills of the students in the field of nano biotechnology and its applications in various fields.
- The course will serve as an effective course to understand Socio-economic issues of Nanobiotechnology.

INTENDED OUTCOMES:

At the end of the course,

- The students will be able to identify the potential areas where nanoparticles can be utilized.
- The students will be exposed to the ethical issues regarding the use of nanoparticles.

UNIT I   INTRODUCTION   (9)

Introduction, Scope and Overview, Length scales , Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concept, Controversies and confusions, Understanding advanced capabilities, Nanotechnology in Different, Fields: Nanobiotechnology, Materials, Medicine, Dental care.

UNIT II   NANO PARTICLES   (9)

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications- MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/ Dip- pen Nanolithography, Soft Lithography, PDMS Molding, Nano Particles, Nano wires and Nanotubes.

UNIT III   APPLICATIONS   (9)

Nanomedicine, Nanobiocensor and Nanofludics.Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems.Nano-Biodevices and Systems.Fabrication of Novel Biomaterials through molecular self assembly- Small scale systems for in vivo drug delivery- Future nanomachine.

UNIT IV   NANOBIOTECHNOLOGY   (9)

Clinical applications of nanodevices.Artificial neurons.Real-time nanosensors- Applications in cancer biology.Nanomedicine.Synthetic retinyl chips based on bacteriorhodopsins.High throughput DNA sequencing with nanocarbon tubules.Nanosurgical devices.

UNIT V   ETHICAL ISSUES IN NANOTECHNOLOGY   (9)

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With Especial Reference to Nanomedicine, Nanomedicine Applied in Nonmedical Contexts, Social Issues Relating to Nanomedicine. Social and Ethical Issues, Economic Impacts, Other Issues, Nanotechnology and Future Socio-economic challenges.

                                                              Total Hours: 45

TEXTBOOKS:

S. NO.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Niemeyer, C.M. and Mirkin, C.A	Nanobiotechnology: Concepts, Applications and	Wiley-VCH	2004
2	Goodsell, D.S.	Bionanotechnology	John Wiley and Sons, Inc	2004

REFERENCES:

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shoseyov, O. and Levy, I	Nanobiotechnology: Bioinspired Devices and Materials of the Future	Humana Press	2007
2	Bhushan, B.	Springer Handbook of Nanotechnology	Springer-Verlag Berlin Heidelberg	2004
3	FreitasJr R.A	Nanomedicine	Landes Biosciences	2004
4	Kohler, M. and Fritzsche, W.	Nanotechnology – An Introduction to Nanostructuring Techniques	Wiley-VCH	2004

17BEMEOE01   **COMPUTER AIDED DESIGN**   **L T P C**
      3 0 0 3

OBJECTIVE:

- To apply basic concepts to develop construction (drawing) techniques.

- To ability to manipulate drawings through editing and plotting techniques.

- To understand geometric construction and Produce template drawings.

- To understand and demonstrate dimensioning concepts and techniques.

- To understand Section and Auxiliary Views.

- To become familiar with Solid Modelling concepts and techniques.

Course Outcome
1. Apply basic concepts to develop construction (drawing) techniques.
2. Ability to manipulate drawings through editing and plotting techniques.
3. Understand geometric construction and Produce template drawings.
4. Understand and demonstrate dimensioning concepts and techniques
5. Understand Section and Auxiliary Views
6. Become familiar with Solid Modelling concepts and techniques.

UNIT I   OVERVIEW OF CAD SYSTEMS   9
Conventional and computer aided design processes-advantages and disadvantages. Subsystems of CAD-CAD hardware and software, analytical and graphics packages, CAD workstations. Networking of CAD systems.

UNIT II   INTERACTIVE COMPUTER GRAPHICS AND GRAPHICS
                  TRANSFORMATIONS   9
Generative, cognitive and image processing graphics. Static and dynamic data graphics. Transport of graphics data. Graphic standards. Generation of graphic primitives - display transformation in Two- and Three – Dimensional graphics concepts, Graphical input technique, Geometric transpformations, Visual Realism, Computer animation, customizing graphics software.

UNIT III   GEOMETRIC MODELING   9
Wireframe, surface, NURBS and solid modeling-applications and advantages. Creating primitive solids, sweeping solids, boolean operations. Extracting entities from a solid. Filleting of edges of solids. Boundary representation (B-rep) Constructive Solid Geometry(CSG) and Analytical Solid Modeling(ASM)

UNIT IV   PARAMETRIC DESIGN AND OBJECT REPRESENTATION   9

Types of co-ordinate systems. Parametric design - definition and advantages. Parametric representation of analytic and synthetic curves. Parametric representation of surfaces and solids - manipulations.

UNIT V   PRODUCT DESIGN AND DEVELOPMENT   9
Automated 2D drafting - basics, mechanical assembly - bill of materials generation. Mass property calculations.

Total Hours: 45

TEXTBOOKS:

S. NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Vera B Anand	Computer Graphics and Geometric Modeling for Engineers	John Wiley & Sons, New York	2000
2	Radhakrishnan P and Subramanyan S	CAD/CAM/CIM	New Age International Pvt. Ltd	2004

REFERENCES:

S. NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Radhakrishnan P and Kothandaraman C P	Computer Graphics and Design	Dhanpat Rai & Sons, New Delhi	2002
2	Ibrahim Zeid	CAD/CAM Theory and Practice	McGraw Hill Inc., New York	2003
3	Barry Hawhes	The CAD/CAM Process	Pitman Publishing, London	1998
4	William M Newman and Robert Sproul	Principles of Interactive Computer Graphics	McGraw Hill Inc., New York	1994

5	Sadhu Singh	Computer-Aided Design and Manufacturing	Khanna Publishers, New Delhi	1998
6	Rao S S	Optimisaiton Techniques	Wiley Eastern, New Delhi	2003

17BEMEOE02   INDUSTRIAL SAFETY AND ENVIRONMENT   L T P C
                                                                3 0 0 3

OBJECTIVE

- To recognize and evaluate occupational safety and health hazards in the workplace.

- To determine appropriate hazard controls following the hierarchy of controls.

- To analyse the effects of workplace exposures, injuries and illnesses, fatalities.

- To prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.

- To teach student the concept of Industrial Safety & provide useful practical knowledge   for workplace safety.

- To prevent or mitigate harm or damage to people, property, or the environment.

Course Outcome
1. Recognize and evaluate occupational safety and health hazards in the workplace.
2. Determine appropriate hazard controls following the hierarchy of controls.
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. Prevent or mitigate harm or damage to people, property, or the environment.

UNIT I   INTRODUCTION TO LOGISTICS   9
Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II   PHASES OF SUPPLY CHAIN   9
The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III   EVOLUTION OF SUPPLY CHAIN MODELS   9
Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV   SUPPLY CHAIN ACTIVITIES   9
Structuring the SC, SC and new products, functional roles in SC - SC design frame- work - Collaborative product commerce (CPC).

UNIT V   SCM ORGANISATION AND INFORMATION SYSTEM   9

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP,. - Case study, ERP Software's

Total Hours: 45

TEXTBOOKS:

S. NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shari.P.B and Lassen.T.S	Managing the global supply chain	Viva books, New Delhi	2000
2	Ayers.J.B	Hand book of supply chain management	The St. Lencie press	2000

REFERENCES:

S. NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nicolas.J.N	Competitive manufacturing management - continuous improvement, Lean production, customer focused quality	McGrawHill, New York	1998
2	Steudel.H.J and Desruelle.P	Manufacturing in the nineteen - How to become a mean, lean and world class competitor	Van No strand Reinhold, New York	1992

17BEMEOE03   TRANSPORT PHENOMENA   **L T P C**
                                                                       3 0 0 3

OBJECTIVE:

- To generalized equations for mass, momentum and heat.

- To understand the concepts of Reynolds and Gauss theorems.

- To learn combined diffusive and convective transport.

- To apply Film- and penetration models for mass and heat transfer.

- To apply Stefan-Maxwells equations for multi-component diffusion.

- To Solve the given set of equations either analytically or numerically.

Course Outcome
1. Generalized equations for mass, momentum and heat.
2. Understand the concepts of Reynolds and Gauss theorems.
3. Learn combined diffusive and convective transport.
4. Apply Film- and penetration models for mass and heat transfer.
5. Apply Stefan-Maxwells equations for multi-component diffusion.
6. Solve the given set of equations either analytically or numerically.

UNIT I   INTRODUCTION AND BASIC CONCEPTS   9
General overview of transport phenomena including various applications, Transport of momentum, heat and mass , Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II   PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS   9
Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III   MOMENTUM TRANSPORT   9
Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non- Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV   ENERGY TRANSPORT   9
Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometrics in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V   MASS TRANSPORT   9

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion- Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

Total Hours: 45

REFERENCE:

S. NO	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Geankoplis, C. J	Transport Processes and Separation Processes Principles	Prentice Hall	2003

WEB REFERENCE:

1. https://laulima.hawaii.edu/portal

17BEMEOE04   INTRODUCTION TO BIOMECHANICS   **L T P C**
                                                                    3 0 0 3

OBJECTIVE:

- To describe the principles of the study of human movement.
- To describe the range of factors that influence the initiation, production and control of human movement.
- To identify the body's lever systems and their relationship to basic joint movement and classification.
- To distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
- To explain joint and muscle function and the forces acting upon the human body during various sporting activities.
- To relate the different body systems necessary for human movement to occur.

Course Outcome
1. Describe the principles of the study of human movement.
2. Describe the range of factors that influence the initiation, production and control of human movement.
3. Identify the body's lever systems and their relationship to basic joint movement and classification.
4. Distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. Explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. Relate the different body systems necessary for human movement to occur.

UNIT I   INTRODUCTION   9
Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II   KEY MECHANICAL CONCEPTS   9
Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application of Biomechanics

UNIT III   HUMAN ANATOMY AND SOME BASIC TERMINOLOGY   9
Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements - Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV   ANATOMICAL DESCRIPTION   9
Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V   MECHANICS OF THE MUSCULOSKELETAL SYSTEM   9
Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch-Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

Total Hours: 45

REFERENCES:

S. NO	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Duane Knudson	Fundamentals of Biomechanics	Springer Science+ Business Media, LLC	2007
2	C. Ross Ethier Craig A. Simmons	Introductory Biomechanics	Cambridge University Press	2007

17BEAEOE01 **AUTOMOBILE ENGINEERING** **L T P C**
3 0 0 3

INTENDED OBJECTIVES:

- This course enables the students to know about all the main and auxiliary systems of automobile with its base construction and working.

UNIT I **ENGINE AND FUEL FEED SYSTEMS** **9**
Classification of Engine, construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburetor working principle, requirements of an automotive carburetor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI)

UNIT II **TRANSMISSION SYSTEMS** **9**
Requirements of transmission system. Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propeller Shaft Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT III **SUSPENSION SYSTEM** **9**
Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension – Pneumatic suspension – Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT IV **BRAKES** **9**
Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory, Brake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT V **ELECTRICAL SYSTEM** **9**
Principle and construction of lead acid battery. Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator. Starting System and charging system.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2.	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3.	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2.	Crouse.W.H	Automobile Electrical Equipment", 3rd Edition	McGraw-Hill Book Co., Inc., New York.	1986
3.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

17BEAEOE02   **BASICS OF TWO AND THREE WHEELERS**   **L T P C**
                                                               3 0 0 3

OBJECTIVES:

- The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.

UNIT I   INTRODUCTION   9
Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II   POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL
               SYSTEMS   9
2 stoke and 4 stoke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburetor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III   CLUTCHES AND TRANSMISSION   9
Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV   FRAMES, SUSPENSION, WHEELS AND TYRES   9
Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V   THREE WHEELERS   9
Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992
2.	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988.

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978
2.	Bruce A. Johns, David D.Edmundson and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

17BEAEOE03   **AUTOMOBILE MAINTENANCE**   **L T P C**
                                                              3 0 0 3

OBJECTIVES:

> • The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems in Automobile.

UNIT I   MAINTENANCE OF RECORDS AND SCHEDULES   9
Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II   ENGINE MAINTENANCE   9
Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III   CHASSIS MAINTENANCE   9
Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV   ELECTRICAL SYSTEM MAINTENANCE   9
 Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

 UNIT V   MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS,
                LUBRICATION SYSTEM AND VEHICLE BODY   9
Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing, greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

                                                              Total hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	John Doke	Fleet Management	McGraw Hill Co	1984
2.	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011
3.	Service Manuals from Different Vehicle Manufacturers			

17BEAEOE04   INTRODUCTION TO MODERN VEHICLE TECHNOLOGY   L T P C
                                                                   3 0 0 3
OBJECTIVES:

> • This course enables the students to have a knowledge about the recent technologies that is in use in automobile.

UNIT I   TRENDS IN POWER PLANTS   9
Hybrid vehicles - Stratified charged / learn burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II   DRIVER ASSISTANCE SYSTEMS   9
Collision Avoidance Systems, Adaptive cruise control, adaptive noise control, anti-spin regulation, traction control systems, cylinder cut- off technology, ABS, Driver Drowsiness Detection system

UNIT III   SUSPENSION BRAKES AND SAFETY   9
Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT IV   NOISE & POLLUTION   9
Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT V   TELEMATICS   9
Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition

                                                    Total hours: 45
TEXTBOOKS

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Ljubo Vlacic, Michael Saren and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001
2.	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems – Progress in Technology	Automotive Electronics Series,SAE, USA.	1998

REFERENCES

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	William B Riddens	"Understanding Automotive Electronics", 5th Edition	Butterworth Heinemann Woburn.	1998
2.	Bechhold,	"Understanding Automotive Electronics"	SAE	1998

3.	Robert Bosch,	"Automotive HandBook", 5th Edition	SAE	2000

17BECEOE01   **HOUSING, PLAN AND MANAGEMENT**   **L T P C**
                                                                              3 0 0 3

OBJECTIVE:

- To examine the role and tasks of basic housing policies and building bye laws
- Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
- Analyze the Innovative construction methods and Materials
- Analyze city management strategies and strengthen the urban governance through a problem solving approach
- To know the Importance of basic housing policies and building bye laws
- To use Housing Programmes and Schemes

COURSE OUTCOME

The students will be able to

1. Know the Importance of basic housing policies and building bye laws
2. Use Housing Programmes and Schemes
3. Plan and Design of Housing projects
4. Examine Innovative construction methods and Materials
5. Know Housing finance and loan approval procedures
6. Understand Construction as well as managing techniques

UNIT I   INTRODUCTION TO HOUSING   9

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II   HOUSING PROGRAMMES   9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III   PLANNING AND DESIGN OF HOUSING PROJECTS   9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV   CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V   HOUSING FINANCE AND PROJECT APPRAISAL   9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing o f Housing Units, Rents, Recovery Pattern (Problems).

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Meera Mehta and Dinesh Mehta	Metropolitan Housing Markets	Sage Publications Pvt. Ltd., New Delhi	2002
2.	Francis Cherunilam and Odeyar D Heggade	Housing in India	Himalaya Publishing House, Bombay	2001

REFERENCES:

S.NO.	Title of the book	Year of publication
1.	Development Control Rules for Chennai Metropolitan Area,CMAM Chennai	2002
2.	UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi	2000

17BECEOE02   **BUILDING SERVICES**   **L T P C**
                                                                  3 0 0 3
OBJECTIVE:

- Defining and identifying of eng. services systems in buildings.
- The role of eng. services systems in providing comfort and facilitating life of users of the building.
- The basic principles of asset management in a building & facilities maintenance environment
- Importance of Fire safety and its installation techniques
- To Know the principle of Refrigeration and application
- To Understand Electrical system and its selection criteria

COURSE OUTCOME
The students will be able to
1. Machineries involved in building construction
2. Understand Electrical system and its selection criteria
3. Use the Principles of illumination & design
4. Know the principle of Refrigeration and application
5. Importance of Fire safety and its installation techniques
6. Know the principle behind the installation of building services and to ensure safety in buildings

UNIT I   MACHINERIES   9
Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II   ELECTRICAL SYSTEMS IN BUILDINGS   9
Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III   PRINCIPLES OF ILLUMINATION & DESIGN   9
Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV   REFRIGERATION PRINCIPLES & APPLICATIONS   9
Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V   FIRE SAFETY INSTALLATION   9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	E.R.Ambrose	Heat Pumps and Electric Heating	John and Wiley and Sons, Inc., New York	2002
2.	Handbook for Building Engineers in Metric systems		NBC, New Delhi	2005

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Philips Lighting in Architectural Design		McGraw-Hill, New York	2000
2.	A.F.C. Sherratt	Air-conditioning and Energy Conservation	The Architectural Press London	2005
3.	National Building Code			

17BECEOE03   MANAGEMENT OF IRRIGATION SYSTEMS   L T P C
3 0 0 3
OBJECTIVE:

- To enable the students for a successful career as water management professionals.
- To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
- To expose the students the need for an interdisciplinary approach in irrigation water management
- To providing a platform to work in an interdisciplinary team.
- To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
- To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

OUTCOME
At the end of this the students will be in a capacity to
1. Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.
2. Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management
3. Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.
4. Gain insight on local and global perceptions and approaches to participatory water resource management
5. Learn from successes and failures in the context of both rural and urban communities of water management.
6. Exposure on the use of economic concepts in irrigation development and to impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector.

UNIT I   IRRIGATION SYSTEM REQUIREMENTS   9
Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II   IRRIGATION SCHEDULING   9
Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation.

UNIT III   MANAGEMENT   9
Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV   OPERATION   9
Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study.

UNIT V   INVOLVEMENT OF STAKE HOLDERS   9

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Dilip Kumar Majumdar	Irrigation Water Management – Principles and Practice	Prentice Hall of India Pvt. Ltd., New Delhi	2000
2.	Hand book on Irrigation Water Requirement R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi			

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi			2000
2.	Maloney, C. and Raju, K.V	Managing Irrigation Together Practice and Policy in India	Stage Publication, New Delhi, India	2000

17BECEOE04   ADVANCED CONSTRUCTION TECHNOLOGY   L T P C
**   3 0 0 3**

OBJECTIVE:

- To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
- To study different methods of construction to successfully achieve the structural design with recommended specifications.
- To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
- To study of construction equipment's, and temporary works required to facilitate the construction process
- To provide a coherent development to the students for the courses in sector of Advanced construction technology.
- To present the new technology of civil Engineering and concepts related Advanced construction technology.

OUTCOMES:

1. Implementation of new technology concepts which are applied in field of Advanced construction.
2. Different methods of construction to successfully achieve the structural design with recommended specifications.
3. Application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. Will gain the Knowledge of construction equipment's, and temporary works required to facilitate the construction process
5. Development to the students for the courses in sector of Advanced construction technology.
6. The new technology of civil Engineering and concepts related Advanced construction technology.

UNIT - I   MODERN CONSTRUCTION METHODS   9
Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT - II   CONSTRUCTION METHODS FOR SPECIAL STRUCTURES   9
Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines.

UNIT - III   MODERN CONSTRUCTION EQUIPEMENTS -I   9
Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting, Tunneling and hoisting.

UNIT - IV   MODERN CONSTRUCTION EQUIPEMENTS -II   9
Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant.

UNIT - V   PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES   9
Principles and Practices of Temporary structures, Shoring, and Strutting,Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments

Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Peurifoyu , R. L., , Ledbette, W.B	Construction Planning , Equipment and Methods	Mc Graw Hill Co.	2000
2.	Antill J.M	PWD, Civil Engineering Construction	Mc Graw Hill Book Co	2005

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1.	Varma, M	Construction Equipment and its Planning & Applications	Metropoltian Book Co	2000
2.	Nunnaly, S.W	Construction Methods and Management	Prentice – Hall	2000
3.	Ataev, S.S	Construction Technology	MIR , Pub	2000

17BEECOE01   REAL TIME EMBEDDED SYSTEMS   **L T P C**
                                                                      3 0 0 3

OBJECTIVES:

- To introduce students to the embedded systems, its hardware and software.

- To introduce devices and buses used for embedded networking.

- To study about task management

- To learn about semaphore management and message passing

- To study about memory management
- To imparts knowledge on task management

INTENDED OUTCOMES:

At the end of the course the students will be able to

- Understand overview of embedded systems architecture

- Acquire knowledge on embedded system, its hardware and software.

- Gain knowledge on overview of Operating system

- Discuss about task Management

- Gain knowledge about semaphore management and message passing.

- Gain knowledge about memory management.

UNIT-I   INTRODUCTION TO EMBEDDED SYSTEM   9

Introduction- Embedded systems description, definition, design considerations & requirements- Overview of Embedded System Architecture (CISC and RISC)-Categories of Embedded Systems- embedded processor selection & tradeoffs-   Embedded design life cycle -Product specifications- hardware / software partitioning- iterations and implementation- hardware software integration – product testing techniques–ARM7.

UNIT-II   OPERATING SYSTEM OVERVIEW   9

Introduction–Advantage and Disadvantage of Using RTOS–Multitasking–Tasks-Real Time Kernels – Scheduler- Non-Preemptive Kernels – Preemptive Kernels – Reentrancy- Reentrant Functions– Round Robin Scheduling- Task Priorities- Static Priorities– Mutual Exclusion– Deadlock– Inter task Communication–Message Mailboxes–Message Queues- Interrupts- Task Management–Memory Management-Time Management–Clock Ticks.

UNIT-III   TASK MANAGEMENT   9

Introduction-µ C/OS-II Features-Goals ofµ C/OS-II-Hardware and Software Architecture–Kernel Structures: Tasks–Task States–Task Scheduling–Idle Task–Statistics Task–Interrupts Under µC/OS-II –Clock Tick-µ   C/OS- II Initialization. Task Management: Creating Tasks–Task Stacks–

StackChecking–Task'sPriority–SuspendingTask–ResumingTask.TimeManagement: Delaying a Task–Resuming a Delayed Task–System Time. Event Control Blocks-Placing a Task in the ECB Wait List–Removing a Task from an ECB wait List.

UNIT-IV   SEMAPHORE MANAGEMENT AND MESSAGE PASSING   9
Semaphore Management: Semaphore Management Overview– Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox –Deleting Mailbox–Waiting for a Message box– Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message Queue– Deleting a Message Queue–Waiting for a Message Queue–Sending Message to a Queue– Flushing a Queue.

UNIT-V   MEMORY MANAGEMENT   9
Memory Management: Memory Control Blocks–Creating Partition-Obtaining a Memory Block– Returning a Memory Block. Getting Started withμ C/OS-II–Installingμ C/OS-II–Portingμ C/OS-II: Development Tools–Directories and Files– Testing a Port -IAR Workbench withμ   C/OS-II-μ C/OS- II Porting on a 8051CPU– Implementation of Multitasking- Implementation of Scheduling and Rescheduling –Analyze the Multichannel ADC with help ofμ C/OS-II.

Total hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	JeanJ. Labrosse	Micro C/OS–II The Real Time Kernel	CMPBOOKS	2009
2	David Seal	ARM Architecture Reference Manual.	Addison-Wesley	2008
3	Steve Furbe,	ARM System-on-Chip Architecture,	Addison-Wesley Professional, California	2000

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	K.V.K.K.Prasad	Embedded Real-Time Systems: Concepts, Design & Programming	Dream Tech Press	2005
2	Sriram V Iyer, Pankaj Gupta	Embedded Real Time Systems Programming	Tata Mc Graw Hill	2004

17BEECOE02   CONSUMER ELECTRONICS   **L T P C**
                                                               3 0 0 3
OBJECTIVES:

- To study about various speakers and microphone
- To learn the fundamental of television systems and standards
- To learn the process of audio recording and reproduction
- To study various telephone networks
- To discuss about the working of home appliances
- To familiarize with TV services like ISDN.

INTENDED OUTCOMES:

At the end of the course the students will be able to
- Understand working of various type of loud speakers
- Acquire knowledge on various types of picture tubes
- Demonstrate the working of various optical recording systems
- Distinguish various standards for color TV system
- Acquire knowledge on various telecommunication networks
- Demonstrate the working of various home appliances

UNIT I   LOUDSPEAKERS AND MICROPHONES   9
Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters – Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT II   TELEVISION STANDARDS AND SYSTEMS   9
Components of a TV system–interlacing–composite video signal. Colour TV– Luminance and Chrominance signal; Monochrome and Colour Picture Tubes- Color TV systems– NTSC, PAL, SECAM-Components of a Remote Control.

UNIT III   OPTICAL RECORDING AND REPRODUCTION   9
Audio Disc– Processing of the Audio signal–readout from the Disc –Reconstruction of the audio signal–Video Disc–Video disc formats- recording systems–Playback Systems.

UNIT IV   TELECOMMUNICATION SYSTEMS   9
Telephone services-telephone networks–switching system principles–PAPX switching–Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems.

UNIT V   HOME APPLIANCES   9
Basic principle and block diagram of microwave oven; washing machine hardware and software; Components of air conditioning and refrigeration systems.

                                                               Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	S.P. Bali	Consumer Electronics	PearsonEducation	2007
2	J.S.Chitode	Consumer Electronics	Technical Publications	2007

REFERENCE:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Philip Hoff, Philip Herbert Hoff.	Consumer Electronics for Engineers.	Cambridge University Press	1998

17BEECOE03   NEURAL NETWORKS AND ITS APPLICATIONS   L T P C
                                                                    3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of neural networks and its applications in various domain

- To educate how to use Soft Computing to solve real-world problems

- To have a solid understanding of Basic Neural Network.

- To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.

- To gain exposure in the field of neural networks and relate the human neural system into the digital world

- To provide knowledge of computation and dynamical systems using neural networks

INTENDED OUTCOMES:

At the end of the course the students will be able to
- Understand the basic concepts of neural networks and its applications in various domains

- Gain knowledge about learning process in Neural Networks

- Apply perception concept in design

- Design using ART phenomena

- Gain knowledge on SOM concepts

- Ability to develop the use of Soft Computing to solve real-world problem.

UNIT I   INTRODUCTION TO NEURAL NETWORKS   9
Introduction-biological neurons and their artificial models-learning, adaptation and neural network's learning rules-types of neural networks-single layer, multiple layer-feed forward, feedback networks

UNIT II   LEARNING PROCESS   9
Error– correction learning– memory based learning- hebbian learning-competitive learning-Boltzmann learning-supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III   PERCEPTION   9
Single layer Perception-Adaptive filtering-unconstrained Optimization-Least-mean square algorithm-Leaning Curve-Annealing Technique-perception convergence Theorem-Relationship between perception and Baye's Classifier-Back propagation algorithm

UNIT IV   ATTRACT OR NEURAL NETWORK AND ART   9
Hopfield model-BAM model -BAM Stability-Adaptive BAM -Lyapunov function-effect of gain-Hopfield Design-Application to TSP problem-ART-layer 1-layer 2-orienting subsystem- ART algorithm-ARTMAP.

UNIT V   SELF ORGANIZATION   9
Self-organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical Vector Quantization. Applications of self-organizing maps: The Neural Phonetic Type Writer Learning

Ballistic Arm Movements.

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	SimonHaykin	Neural Networks and Learning Machines 3rd Edition	Pearson/Prentice Hall	2009
2	SatishKumar	Neural Networks: A Classroom Approach	TMH	2008

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Rajasekaran.S, Vijayalakshmi Pai.G.A	Neural Networks, Fuzzy Logic and Genetic Algorithms,	PHI, New Delhi.	2003
2	LaureneFausett	Fundamentals of Neural Networks: Architectures, Algorithms, and Applications	Pearson/Prentice Hall	1994
3	Wasserman P.D	Neural Computing Theory & Practice	Van Nortrand Reinhold	1989
4	Freeman J.A., S kapura D.M	Neural networks, algorithms, applications, and programming techniques.	AdditionWesley	2005

17BEECOE04   FUZZY LOGIC AND ITS APPLICATIONS   L T P C
                                                         3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of Fuzzy logic and its applications in various domain

- To educate how to use Fuzzy computation to solve real-world problems

- To have a solid understanding of Basic fuzzy models.

- Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.

- To learn about applications on Fuzzy based systems

- To familiarize with fuzzy fiction and de fuzzy fiction procedures

INTENDED OUTCOMES:

At the end of the course the students will be able to
- Understand the basic concepts of Fuzzy logic and its applications in various domain
- Gain knowledge on theory of Reasoning
- Develop fuzzy controllers
- Understand concepts of adaptive fuzzy control

UNIT I   9
Basics of Fuzzy Logic: Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT II   9
Theory of Approximate Reasoning: Linguistic variables, Fuzzy proportions, Fuzzy if-then statements, inference rules, compositional rule of inference-fuzzy models

UNIT III   9
Fuzzy Knowledge Based Controllers (Fkbc): Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzzy fiction and de fuzzy fiction procedures–Design of Fuzzy
Logic Controller

UNIT IV   9
Adaptive Fuzzy Control: Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Set organizing controller model based controller.

UNIT V   9
Fuzzy based systems: Simple applications of FKBC-washing machines-traffic regulations-lift control-fuzzy in medical Applications-Introduction to ANFIS.
                                                    Total Hours: 45

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	D .Diankar ,H. Hellendoom and M .Rein frank	An Introduction to Fuzzy Control	Narosa Publishers India	1996
2	G.J. KlirandT.A. Folger	Fuzzy Sets Uncertainty and Information	PHI IEEE	1995

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Timothy J. Ross	Fuzzy Logic with Engineering Applications	McGraw Hill	1997
2	George. J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic	Prentice Hall, USA	1995