16BECC 101   **COMMUNICATIVE ENGLISH**   **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.

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.
- Acquire good vocabulary for easy communication.
- Be familiar with sentence structure and sentence formation

Unit I   **(9)**

Listening– Types of listening - Listening to class reading - Video tapes/ Audio tapes. **Speaking** – Introduction on self - Introduction on one's friend. Reading - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative.**Writing** – Formal and Informal letters- Free writing on any topic –My favorite place, hobbies, dreams, goals, etc- - To fill in different application forms. Grammar – Articles- WH questions –Yes/No Question - Subject Verb agreement. Vocabulary - Word Formation – Word expansion (Root word) - Prefix and Suffix.

Unit II   **(10)**

Listening – Understanding the passage in English –Pronunciation practice. **Speaking** – Asking and answering questions - Telephone etiquette. **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**– Parts of speech – Noun – Verb – Adjectives - Adverbs. **Vocabulary**– Compound Nouns/Adjectives – Irregular verbs.

Unit III   **(10)**

Listening – Listening for specific task – Fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** – Reading and Comprehension. **Writing** - Autobiographical writing – Biographical writing - Instruction writing. **Grammar** – Preposition – Infinitive – Gerund – Tenses. **Vocabulary** – Foreign words used in English – British and American usage.

Unit IV   **(8)**

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) Letters to the Editor. **Grammar** – Sentence pattern – Voice (active and passive voice). **Vocabulary** – One word substitution.

Unit V   **(8)**

Listening - Listening to different accents, speeches/presentations. **Speaking**- Extempore talk –Just-a-minute talk. **Reading**-Reading strategies–Intensive reading – Text analysis. **Writing** - Creative writing – Writing circulars and notices – Writing proposal. **Grammar** – 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-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:

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically
www.Dictionary.com – Semantic / Grammar

16BECC102   **ENGINEERING MATHEMATICS -I**   **L T P C**
                                                                                    3 2 0 4
OBJECTIVES:

- To develop analyzing skills for solving different engineering problems.

- To understand the concept of Matrices.

- To remember the basics of differential calculus and its applications.

- To apply the problems in differential equations.

- To Create knowledge about functions of several variables and Sequence and Series.

INTENDED OUTCOMES:

The student will be able to
- Acquire the basic knowledge and understanding of mathematics

- Apply advanced matrix knowledge to engineering problems.

- Improve their ability in evaluating geometrical applications of differential calculus problems.

- To solve the problems by applying the differential Equations.

- Evaluating engineering problems involving functions of several variables.

- Understand the concepts of sequences and series.

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)
Overview of Derivatives - Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes- Evolutes as Envelope of normals – Maxima and Minima of functions of two or more Variables – Method of Lagrangian Multipliers

UNIT III   DIFFERENTIAL EQUATIONS   (11)
Linear Differential equations of second and higher order with constant coefficients - Euler's form of Differential equations – Method of variation parameters.

UNIT -IV   FUNCTIONS OF SEVERAL VARIABLES   (12)
Partial derivatives – Euler's theorem for homogeneous functions – Total derivatives – Differentiation of implicit functions – Jacobians –Maxima and Minima of functions of two or more Variables - Method of Lagrangian multipliers.

UNIT V   SEQUENCES AND SERIES   (13)
Sequences: Definition and examples – **Series:** Types and Convergence – Series of positive terms – Tests of convergence: Comparision test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Series of positive and negative terms – Absolute and conditional convergence.

TEXT BOOKS:

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

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

16BEPH103   **ENGINEERING PHYSICS**   **L T P C**
16BEPH203   **3 0 0 3**

OBJECTIVE:
- To enhance the fundamental knowledge in Physics and its applications relevant to various branches of Engineering and Technology
- Understand the basics of laser and optical fiber with appropriate applications.
- Introduce the concepts of quantum mechanics for diverse applications.
- Impart the basic knowledge of crystal and its various crystal structures.
- Disseminate the fundamentals of nuclear physics and their applications

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

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS   **(9)**
Three types of modulus of elasticity – basic definitions, relation connecting the modulii (Derivation), poison ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending
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-Photo electric effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave

function, Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box- scanning electron microscope.

UNIT IV CRYSTAL PHYSICS (9)
Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – 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 – SonogramIntroduction – basics about nuclear fission and fusion, nuclear composition –Radiation detectors – semi conductor detector. Reactors – essentials of nuclear reactor- power reactor.

Total- 45

TEXT BOOK:

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-641 001	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 Modern Physics	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 Modern Applications	Jones & Bartlett Learning	2009

WEBSITES:

- www.nptel.ac.in
- www.physicsclassroom.com
- www. oyc.yale.edu
- www.physics.org

16BECH103   **ENGINEERING CHEMISTRY**   **L T P C**
16BECH203   **3 0 0 3**

OBJECTIVES:
- To gain knowledge on adsorption phenomena.
- To make the students conversant with basics of water technology.
- To make the student acquire sound knowledge of electrochemistry and storage devices.
- To acquaint the student with concepts of fuels and rocket propellants.
- To develop an understanding of the basic concepts of corrosion science.
- To acquaint the students with the basics of surface chemistry.

INTENDED OUTCOME:
- Outline the basic principles of chemistry for water treatment (K)
- Examine the electrochemical properties to design non – conventional energy storage devices (S)
- Apply the concepts combustion of different fuels (S)
- Identify the concepts of corrosion and its protection in the engineering field (S)
- Apply the concepts of surface chemistry in the field of engineering (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I WATER TECHNOLOGY   **(9)**
Sources-Characteristics – Specification for drinking water, BIS &WHO-Alkalinity – Types of alkalinity and determination – Hardness – Types and estimation by EDTA method (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)**
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) –Electrolytic conductance-application (conductometric titration)-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-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 (Au) and Electro less plating (Ni) - Surface conversion coating - Hot dipping.

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: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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

16BEEC104   BASIC ELECTRICAL ENGINEERING   L T P C
3 0 0 3

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.
- To understand the fundamentals of mutual inductance and self inductance.
- To imparts a good knowledge about mesh analysis and nodal analysis.

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.

UNIT I – FUNDAMENTALS OF DC CIRCUITS
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
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)

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 IV–ELECTRICAL MACHINES (Elementary treatment only)

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

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.

TEXT BOOK

1. Dash.S.S,Subramani.C,Vijayakumar.K, ”Basic Electrical Engineering”, First edition, Vijay Nicole Imprints Pvt.Ltd,2013

REFERENCES

1. SmarajtGhosh, "Fundamentals of Electrical & Electronics Engineering",Second edition, PHI Learning, 2007.
2. Metha.V.K, RohitMetha, "Basic Electrical Engineering", Fifth edition,Chand.S& Co, 2012.
3. Kothari.D.P and Nagrath.I.J, "Basic Electrical Engineering", Second edition,Tata McGraw - Hill, 2009.
4. Bhattacharya.S.K, "Basic Electrical and Electronics Engineering", Firstedition, Pearson Education, 2011.

16BEEC105   **BASIC ELECTRONICS ENGINEERING**   **L T P C**
                                                              3 0 0 3

UNIT I- ELECTRONIC COMPONENTS

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

UNIT II- SEMICONDUCTOR DEVICES

Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT, JFET.

UNIT III – OPTOELECTRONIC DEVICES

LED, LCD, LDR, Photodiode, Phototransistor, Solar cell, Opto couplers

UNIT IV- TRANSDUCERS

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

UNIT V- DIGITAL ELECTRONICS

Number systems – binary codes - logic gates - Boolean algebra, laws & theorems- simplification of Boolean expression - implementation of Boolean expressionsusing logic gates - standard forms of Boolean expression.

TEXT BOOKS

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

REFERENCES

1. Thomas L. Floyd, "Electronic Devices", Pearson Education, 9th Edition, 2011.
2. Rajput.R.K, "Basic Electrical and Electronics Engineering", LaxmiPublications, First Edition, 2007.

16BEPH111   **ENGINEERING PHYSICS LABORATORY**   **L T P C**
16BEPH211   **0 0 4 2**

OBJECTIVES:

- 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.

OUTCOMES:

- 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

16BECH111   ENGINEERING CHEMISTRY LABORATORY   L T P C
16BECH211   0 0 4 2

OBJECTIVES:
- 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

OUTCOMES:
- 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.

16BEEC112   ENGINEERING WORKSHOP PRACTICE   L T P C
                                                                0 0 4 2

Course 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
- Prepare the student for future Engineering positions.
- To divulge the basics of metal casting.
- To make the students familiar with welding and brazing.
- To learn about the CNC machining.

Course Outcomes
- 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.
- Students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.
- Gain good knowledge of various manufacturing methods.
- Clear idea about fitting operations and its power tools.

PART – A (MECHANICAL)

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

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

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

PART –B (ELECTRICAL & ELECTRONICS)

i. ELECTRICAL ENGINEERING
   i. Study of electrical symbols and electrical equipments.
   ii. Construct the wiring diagram for Stair case wiring and Fluorescent lamp 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.

ii. 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.
   iv. Study of HWR and FWR.

REFERENCES

1. Jeyachandran, K., Natarajan, S. and Balasubramanian, S, "A Premier on Engineering Practices Laborator y", 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.

16BEEC113	ELECTRICAL ENGINEERING LABORATORY	L T P C
		0 0 3 2

OBJECTIVES
- To introduce the basic electrical equipments in the lab.
- To enable the students to understand the DC circuit analysis and network theorems.
- To understand the measurement of three phase power by using two wattmeter method.
-

INTENDED OUTCOMES
- At the end of this course Students are able to deal with some of the frequently used instruments and equipments like the digital multimeter and DC Power supply and are able to deal with some Network Theorems.

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 method.

16BECC151   **HUMAN VALUES**   **L T P C**
                                                                   1 0 0 -

Course Objectives

1.To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings

2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence.

3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

4.To know the value of being a human being.

5.To provide a much needed orientational input in value education to the young enquiring minds.

6.To study the value of being a useful citizen.

Course Outcomes

1.To involves a systematic and rational study of the human being vis-à-vis the rest of existence.

2. To make free from any dogma or value prescriptions.

3. To analysis process of self-investigation and self-exploration, and not of giving sermons.

4. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student leading to continuous self-evolution.

5. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

6. To Educate the values and meaning of life in the young minds and to transform them as responsible citizens

UNIT I   **3**

Human life on Earth - Concept of Human Values - Value Education - Aim of education and value education - Types of values - Components of values – Attitudes – types of attitudes

UNIT II   **3**

Self Development : Self analysis – Goal Setting - Thought Analysis – Guarding against Anger - Respect to age, experience, maturity, family members, neighbors, co-workers

UNIT III   **3**

Individual Qualities – Truthfulness – Constructivity – Sacrifice – Sincerity - Self Control – Altruism – Tolerance - Scientific Vision – Regulating Desire

UNIT IV   **3**

Mind Culture - Modern Challenges of Adolescent - Emotions and behavior - Sex and spirituality - Adolescent Emotions - Meditation

UNIT V   **3**

Body and Mind Fitness : (a) Physical Exercises (b) Activities: (i) Moralization of Desires (ii) Neutralization of Anger (iii) Eradication of Worries (iv) Benefits of Blessings

                                                       TOTAL   **15**

REFERENCE BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Subramanian. R	Professional Ethics	Oxford, New Delhi	2013
2	Govindarajan. M, Natarajan. S, Senthil Kumar. V.S	Engineering Ethics	Prentice Hall of India, New Delhi	2004
3	Tripathi. A.N	Human Values	New Age International	2009
4	Pope. G. U.	Thirukkural with English Translation	Uma Publication, Thanjavur.	2002

16BECC201A   **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

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

UNITII

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- Description of Graphics and visual aids - interpretation of graphs using expressions of comparison and contrast .

UNIT III

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

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

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

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Meenakshi Raman ; Prakash Singh	Business Communication	Oxford University Press	2012

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
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

http://tribehr.com/social-hr-software/talent-management/skills-tracking
www.ispeakyouspeak.blogspot.com
https://alison.com/subjects/6/Personal-Development-Soft-Skills
www.learning-development.hr.toolbox.com
http://www.niit.com/solution/soft-skill-training
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.

16BECC201B   **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 be 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-1   (10)
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** – Regular & Irregular verbs - Kinds of sentences - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT-II   (8)
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** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT – III   (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** - Active and Passive voice - Purpose expression. **Vocabulary** - Same words used as noun and verb - Often misspelt and confused words.

UNIT-IV   (8)
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** – Job application - Resume writing - Checklist preparation. **Grammar** - Numerical expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns)
UNIT- V   (10)

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**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - 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-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	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 :

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically
www.Dictionary.com – Semantic / Grammar

16BECC202   ENGINEERING MATHEMATICS- II   L T P C
3 2 0 4

OBJECTIVES:

- 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.
- To understand the concepts and applications of partial differential equations

- 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.

OUTCOMES:

- The students will be able to understand mathematical tools needed in evaluating multiple integrals and their usage. Find the areas and volumes using multiple integrals

- To calculate with them and apply them and also to calculate grad, div and curl in Cartesian and other simple coordinate systems.

- Improve their ability in Vector calculus

- The student will be able to Understand how to solve the given standard partial differential equations.

- 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. They 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   MULTIPLE INTEGRALS   (11)
Double integral – Cartesian coordinates – Polar coordinates – Change of order of integration – Triple integration in Cartesian co-ordinates – Area as double integrals.

UNIT-II   VECTOR CALCULUS   (13)
Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem, Gauss divergence theorem and Stoke's theorems (Statement Only)- Surfaces : hemisphere and rectangular parallelopipeds.

UNIT- III   PARTIAL DIFFERENTIAL EQUATIONS   (11)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

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   (13)

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 : 60

TEXT BOOKS:

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.wolfrmae.com

16BECC204　　　　**ENVIRONMENTAL SCIENCES**　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　3 0 0 3

OBJECTIVES:

- To give a comprehensive insight into natural resources, 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:

- Students will prepare themselves to go ecofriendly and help preserving the nature and environment.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES
　　　　　　　　　　　　　　　　　　　　　　　　　　　　(9)

Definition, Scope and Importance – Need for public awareness -Forestresources:　　　Useandover-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: 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.newagepublishers.com/samplechapter/001281.

ELECTIVE PAPER
(COMMON TO ALL UG COURSES AND PG COURSES 2015 – 2016)

16BEEC205   **CIRCUIT THEORY**   **L T P C**
                                                                3 1 0 4

OBJECTIVES

- To understand the concept of circuit elements lumped circuits, waveforms, circuit laws and network reduction. To solve the electrical network using mesh and nodal analysis by applying network theorems.
- To understand the concept of active, reactive and apparent powers, power factor and resonance in series and parallel circuits
- To know the basic concepts of coupled circuits, three phase loads and power measurement.
- To analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform

INTENDED OUTCOMES:

- To become familiar with various network theorems
- To analyze circuits
- To understand various resonant, coupled circuits and transient response

UNIT- I   DC CIRCUIT ANALYSIS
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
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
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
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

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.

TEXT BOOKS :

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	William .H.Hayt,Jack. Jr , Kemmerl y. E, Steven .Durbin .M.	Engineering Circuit Anal ysis.	Tata McGraw-Hill, New Delhi.	2006
2	David .A. Bell.	Electric Circuits.	PHI, New Delhi.	2006

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	Sudhakar and Shyammohan .S. Palli.	Electric Circuits.	Tata Mc Graw – Hill.	2007
4	Cunningham .D.R., Stuller .J.A.	Basic Circuit Anal ysis.	Jaico Publishing House.	2002
5	David.E.Johnson, John y .R. Johnson, John.L.Hilburn.	Electric Circuit Anal ysis.	Prentice-Hall.	2012

16BEEC212 **ELECTRIC CIRCUIT LABORATORY** **L T P C**
0 0 3 2 3

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 PSP ICE or MultiSim.

16BEEC213 **ENGINEERING GRAPHICS** **L T P C**
1 0 4 3

OBJECTIVES

1.   To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
2.   To expose them to existing national standards related to technical drawings.

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   45

TEXT BOOKS

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	BIS, New Delhi	2003

		Colleges SP 46-2003		
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.

16BEEC251   HANDS ON TRAINING IN ELECTRONIC WORKSHOP   L T P C
**   1 0 0 -**

1. Study of Electronics Components
    i.   Resistor Colour Coding
    ii.   Pin Configutration Details
    iii.   Basic IC pin Configuration
2. Study of Measuring Instruments(Analog and Digital)
    i.   Ammeter
    ii.   Voltmeter
    iii.   Multimeter
3. Study and Trouble Shooting of Function Generator
4. Study of CRO and waveform patterns from CRO
5. Study of PCB
6. Design of Simple circuit using PCB
7. Trouble shooting PCB
8. De soldering from Trouble shooted PCB
9. Refix Component from De solder place
10. Quality Control PCB
    i.   Placing of Components in board
    ii.   Dip soldering
    iii.   Dry soldering
    iv.   Improper soldering

16BEEC301A   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, Transportation and Assignment problems
- To make the students to study about the Integer Programming and Network Analysis

INTENDED OUTCOMES:

- Be able to solve problems in different environments and develop critical thinking
- Be able to build and solve Transportation Models, Assignment Models, integer programming and Non linear programming

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

Total : 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

16BEEC301B   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 – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors - 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 : 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	Tata McGraw-Hill, New Delhi.	2008

		with Application		

WEBSITES:

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

16BEEC302   ELECTRONIC DEVICES AND CIRCUITS   L T P C

3 0 0 3

OBJECTIVES

- To understand the operational characteristics of a Semiconductor in Equilibrium and Non-Equilibrium conditions.
- To understand the working of PN junction diodes and special purpose diodes.

- To understand the basic working physics of BJT and FET both in ideal and non- ideal conditions.
- To understand the working of Rectifiers 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

- Understand the fundamental concepts
- Logically analyze any electronic circuit
- 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
Overview on Physics and Properties of Semiconductors: Intrinsic semiconductor – extrinsic semiconductor – Fermi level in an intrinsic semiconductor – conductivit y of a metal, intrinsic semiconductor and extrinsic semiconductor – drift – diffusion – recombination – carrier life time. 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- recover y diode – schottky diode, PNPN diode – RF diode.

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

UNIT III-FIELD EFFECT TRANSISTORS
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
Rectifiers and Filters: Block schematic of a t ypical DC power suppl y, single phase HWR, FWR, full- wave bridge rectifier, power suppl y 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 suppl y circuit.

UNIT V-INTEGRATE D CIRCUIT FABRICATION

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.

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'	Prentice Hall Of India,6th edition	2005
2	Mathur Kulshrestha and Chadha	Electron devices and Applications and Integrated circuits'	Umesh Publications	2005
3	Thomas L. Flo yd	Electron Devices	Charles and Messil Publications	2012
4	G.K.Mithal	Electronic Devices and Circuits	Khanna Publishers	2013
5	Robert L. Bo ylestad and Louis Nashelsk y	Electronic Devices and Circuit Theor y	Pearson Education, 9th Edition,	2009.
6	B. Somanathan Nair	Electronic Devices and Applications	PHI,	2006

16BEEC303   **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 the methods for simplifying Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concept of memories and programmable logic devices.
- To illustrate the concept of s ynchronous and as ynchronous sequential circuits
- To imparts the knowledge of memory devices like FPGA

INTENDED OUTCOMES:
- Understand number systems and codes
- Understand basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- Understand the methods for simplifying Boolean expressions
- Understand the formal procedures for the analysis and design of combinational circuits and sequential circuits
- Understand the concept of memories and programmable logic devices.
- Gain knowledge about various memory devices and implement using PLAs

UNIT-I   NUMBER SYSTEMS AND BOOLEAN ALGEBRA
Binar y, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binar y numbers. Binar y Arithmetic- Binar y codes: Weighted –BCD-2421-Gra y code-Excess 3 code-ASCII – Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan's Theorem- Principle of Dualit y- 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
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- Carr y 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
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 –As ynchronous / Ripple counters – S ynchronous counters –Modulo – n counter –Classification of sequential circuits – Moore and Meal y -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

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- c ycles – Races –Hazards: Static –Dynamic –Essential –Hazards elimination.

UNIT-V   MEMORY DEVICES

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 –D ynamic RAM cell –ROM organization - PROM –EPROM –EEPROM – EAPROM –Programmable Logic Devices –Programmable Logic Arra y (P LA)- Programmable Arra y Logic (PAL)-Field Programmable Gate Arra ys (FPGA). Implementation of combinational logic using ROM, PAL and P LA

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:

http://www.allaboutcircuits.com/vol_2/chpt_9/2.htmlhttp://www.educypedia.b   e/electronics/di gital.html

16BEEC304   **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 a program in 'C' language
- Ability to work with arrays and structures.
- To discuss the implementation of different non linear data structures such as trees and graphs.

LEARNING 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:
1.   E. Balagurusamy, "Computing Fundamentals and C Programming", TMH Education, 5th Edition, 2014
2.   Yashavant Kanetkar, "Let us C", BPB Publications, 13th Edition, 2013

3.   H. M. Deitel and D. J. Deitel, 'C: How to Program', Prentice Hall, 7th Edition, 2012
4.   E. Balagurusamy, "Programming in ANSI C", TMH Education, 6th edition, 2012

16BEEC305   ELECTRO MAGNETIC 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:

- 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

UNITI   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.

UNITII   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.

UNITIII   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.

UNITIV   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.

UNITV   TIME VARYING FIELDS AND MAXWELL'S EQUATIONS   9
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.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	WilliamH Haytand Jr.JohnA Buck	Engineering Electromagnetics	TataMcGraw-Hill PublishingCompanyLtd NewDelhi	2008
2	SadikuMH	PrinciplesofElectro magnetics	OxfordUniversityPressInc, NewDelhi	2009

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	DavidKCheng	FieldandWaveElect romagnetics	PearsonEducationInc,Delhi	2004
2	JohnDKrausandDaniel AFleisch,"	Electromagneticswi thApplications	McGrawHillBookCo	2005
3	KarlELongmanandSava VSavov	FundamentalsofEle ctromagnetics	PrenticeHallofIndiaNewD elhi	2006
4	AshutoshPramanic	Electromagnetism	PrenticeHall ofIndia,NewDelhi	2006

16BEEC311   **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 EXERCISES
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.

16BEEC312   ELECTRON DEVICES AND CIRCUITS LABORATORY   **L T P C**
                                                              0 0 3 2

OBJECTIVES
- To study experimentally the characteristics of diodes,BJT's and FET's.
- To verify practically, there sponse of various special purpose electron devices.
- 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:

- Familiarize the electronic devices and basic electronic components.
- Familiarize with basic electronic design.
- Gain in-depth core knowled gein the design of electronic devices
- Gain knowledge inverifying the characteristics of electronic devices by simulation.
- 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.

16BEEC313   DIGITAL ELECTRONICS LABORATORY   L T P C
                                                                0 0 3 2

OBJECTIVES
- To verify operation of logic gates and flip-flops.
- To design and construct digital circuits
- 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:
- 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.

LISTOFEXPERIMENTS
1. Study of Gates &Flip-flops.
2. HalfAdder and FullAdder.
3. Magnitude Comparator (2-Bit).
4. Encoders and Decoders.
5. Multiplexer and Demultiplexer.
6. Code Converters.
7. Implementation of combinational logic functions using standard ICs
8. Synchronous Counters.

9. Ripple Counter.
10. Mod–N Counter.
11. Shift Registers and Shift Register Counters.
12. Implementation of sequential logic functions using standard ICs.
13. Simulation Experiments using VHDL

16BEEC351   PCB DESIGNING   L T P C
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                                                          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

16BEEC401   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 theory and applications of analog multipliers and P LL.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- To teach the theory of ADC
- To learn the theory of DAC.

INTENDED OUTCOMES:
- Knowledge about the basic building blocks of linear integrated circuits.
- Knowledge about the linear and non-linear applications of operational amplifiers.
- Knowledge about the theory and applications of analog multipliers and P LL.
- Knowledge about the theory of ADC and DAC
- Knowledge about a few special function integrated circuits
- Design of Filters and Voltage regulators

UNIT I-OPERATIONAL AM PLIFIER CHARACTERISTICS

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
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
Waveform Generators: Sine-wave Generators – Square / Triangle / Sawtooth Wave generators. IC 555 Timer: Monostable operation and its applications, Astable operation and its applications
P LL: Operation of the Basic P LL-Closed loop analysis of P LL-Voltage Controlled Oscillator-P LL Applications

UNIT IV-ACTIVE FILTERS & VOLTAGE REGULATOR
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
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.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Roy Choudhur y and Shail Jain	Linear Integrated Circuits	New Age International Publishers	2003
2	Ramakant A.Ga yakwad	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

16BEEC402   **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:
- 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   REPRESENTATION OF SIGNALS
Classification of Signals – Periodic, aperiodic, even, odd – energy and power signals – Deterministic and random signals – complex exponential and sinusoidal signals – periodicity – unit impulse – unit step impulse functions – Transformation in independent variable of signals: time scaling, time shifting. Determination of Fourier series representation of continuous time and discrete time periodic signals – Explanation of properties of continuous time and discrete time Fourier series.

UNIT-II   ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS
Continuous time Fourier Transform and Laplace Transform analysis with examples – properties of the Continuous time Fourier Transform and Laplace Transform basic properties, Parseval's relation, and convolution in time and frequency domains. Basic properties of continuous time systems: Linearity, Causality, time invariance, stability of frequency response of LT I systems -Analysis and characterization of LT I systems using Laplace transform: Computation of impulse response and transfer function using Laplace transforms.

UNIT-III   SAMPLING THEOREM AND Z-TRANSFORMS
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 using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion, Relationship between z - transform and Fourier transform.

UNIT-IV   DISCRETE TIME SYSTEMS
Computation of Impulse response & Transfer function using Z Transform. DTFT Properties and examples – LTI-DT systems - Characterization using difference equation – Block diagram representation – Properties of convolution and the interconnection of LTI Systems – Causality and stability of LTI Systems.

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

TEXT 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:

www.relisoft.comwww.astro.berkele y.edu
www.dsp guide.com

16BEEC403   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:
- Familiar with propagation of signals through lines.
- Gain knowledge about calculation of various line parameters by conventional and graphical methods.
- Gain knowledge about Need for impedance matching and different impedance matching techniques.
- 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.

UNITI-TRANSMISSION LINE THEORY

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.

UNITII-HIGH FREQUENCY TRANSMISSION LINES
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.

UNITIII-IMPEDANCE MATCHING IN HIGH FREQUENCY LINES
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.

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

UNITV-ATTENUATORS AND EQUALIZERS
Attenuators: Lattice Attenuators, Bridged– Tattenuator, L-Type Attenuator. Equalizers:Inversenetwork, series, fullseries, shunt, fullshunt, constant resistanceT, constant resistance constant resistance lattice and bridged Tnetwork.

TEXTBOOKS:

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

16BEEC404   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:
* Knowledge on various Amplitude modulation and demodulation systems.
* Knowledge on various Angle modulation and demodulation systems.
* Knowledge on some depth analysis in noise performance of various receiver.
* Knowledge on some basic information theory with some channel coding theorem.
* Some basic information theory with some channel coding theorem.
* Transmission of a Random Process through a LTI filter.

UNIT-I   AMPLITUDE MODULATION
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
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   NOISE PERFORMANCE OF DSB, SSB RECEIVERS
Noise – Shot noise, thermal noise, White noise, Noise equivalent Bandwidth, Narrowband noise, Representation of Narrowband noise in terms of envelope and phase components, Sine wave plus Narrowband Noise, Receiver model, Noise in DSB-SC receiver, Noise in SSB receiver

UNIT-IV   NOISE PERFORMANCE OF AM AND FM RECEIVERS
Noise in AM receivers threshold effect, Noise in FM receivers capture effect, FM threshold effect, FM threshold reduction, Pre-emphasis and de-emphasis in FM, Comparison of performance of AM and FM systems.

UNIT-V   INFORMATION THEORY
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.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Simon Ha ykin	Communication Systems	John Wiley & sons, New Jersy.	2001
2	Wayne Tomasi	Electronic Communication theory systems	PearsonEdition, New Jersy	2003

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

WEBSITES:

http://williamson-labs.com/480_mod.htmwww.mit.eduhttp://www.sfu.ca/~truax/fmtut.html

16BEEC405   **ELECTRONIC CIRCUITS**   **L T P C**
                                                 3 0 0 3

OBJECTIVES
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.
- Impart knowledge on feedback and oscillator circuits.
- Understand the concept of multivibrators.

INTENDED OUTCOMES:
- The purpose of this course is to introduce to the students
- The basics of biasing transistor circuits, feedback amplifiers, large signal amplifiers, tuned amplifiers, oscillators, wave shaping circuits, and to design and analyze various electronic circuits and systems
- 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
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 -SIGN AL AMPLIFIERS - AN ALYSIS AND FREQUENCY RESPONSE
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 OSCILLATO R CIRCUITS
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
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
Transistor switching times – multivibrators – astable multivibrator – monostable multivibrator – bistable multivibrator – Schmitt trigger .Oscillator-Sweep generators.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	David A Bell,	Fundamentals of Electronic Devices and Circuits	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 Theor y	Pearson Education, 9th Edition	2009
4	David A. Bell	Solid State Pulse Circuits	Oxford Universit y Press	2007

16BEEC406A   **CONTROL SYSTEMS**   **L T P C**
                                                    3 0 0 3

OBJECTIVES:

- To understand the open loop and closed loop (feed back) systems
- To understand time domain and frequency domain analysis of control systems required for stability analysis.
- To understand the compensation technique that can be used to stabilize control systems
- 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.

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
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
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-IIIFREQUENCY DOMAIN ANALYSIS
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-IVCOMPENSATORS
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-VCONTROL SYSTEM COMPONENTS AND APPLICATION OF CONTROL SYSTEMS
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.

TEXT BOOKS:

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	New Age International Edition, New Delhi.	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Benjamin.C.Kuo	Automatic Control Systems	Prentice Hall of India, New Delhi	2002
2	Gopal.M	Control Systems	Tata McGraw-Hill, New Delhi	1997

16BEEC406B   COMPUTER NETWORKS   L T P C
3 0 0 3

OBJECTIVES

- To introduce the students 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:

- Adequate knowledge about the functions of different layers.
- Adequate knowledge about IEEE standard employed in computer networking.
- Familiarize with different protocols and network components.
- 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

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

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

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

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

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

TEXT BOOK:

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

16BEEC411 ELECTRONIC CIRCUITS AND SIMULATION LABORATORY   L T P C
0 0 3 2

OBJECTIVES

- 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
5. Integrators, Differentiators, Clippers and Clampers
6. Design of Astable, Monostable and Bistable multivibrators

SIMULATION USING PSPICE:

7. Differentiate amplifier
8. Activefilter: Butter worth IInd order LPF
9. Astable, Monostable and Bistable multivibrator – Transistor bias
10. D/A and A/D converter (Successive approximation)
11. Analog multiplier
12. CMOS Inventor, NAND and NOR

16BEEC412   LINEAR INTEGRATED CIRCUITS LABORATORY   L T P C
$$0 \quad 0 \quad 3$$
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:

- 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

16BEEC451	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 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

16BEEC452 **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

16BEEC501 **DIGITAL SIGNAL PROCESSING** **L T P C**
3 1 0 4

OBJECTIVES

- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the fundamentals of digital signal processors
- To study the concept of Adaptive Filters
- To understand Direct I and Direct II structures

INTENDED OUTCOMES:

- Understand the structures of Discrete time signals and s ystems
- Understand Frequenc y response and desi gn of FIR and IIR filters.
- Understand Finite word length effect
- Understand DSP Processor- TMS320C5X.
- Apply Adaptive Filters to equalization.
- Apply direct form I and direct form II structures.

UNIT I-REVIE W OF D ISCRETE TIME SIGNALS AND SYSTEMS
Overview of signals and systems – DFT–FFT using DIT and DIF algorithms – Inverse DFT- FFT using DIT and DIF al gorithms – Applications – Circular convolution – MATLAB programs for DFT and FFT.

UNIT II-DESIGN AND IM PLE MENTATION OF IIR FILTERS
Design of analog filters using Butterworth and Chebyshev approximations – IIR digital filter design from analog filter using impulse invariance technique and bilinear transformations – Matlab programs for IIR filters.

UNIT III-DESIGN AN D IM PLE M ENTA TIO N OF FIR FILTERS
Linear phase response – Design techniques for FIR filters – Fourier series method and frequency sampling method –Design of Linear phase FIR filters using windows: Rectangular, Hanning and Hamming windows – Matlab programs for FIR filters.

UNIT IV- FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS
Fixed point arithmetic – effect of quantization of the input data due to Finite word length. Product round off – need for scaling – Zero input limit cycle oscillations - Limit cycle oscillations due to overflow of adders – Table look up implementation to avoid multiplications.

UNIT V-PROCESSOR FUNDAMENTALS
Features of DSP processors – DSP processor packaging(Embodiments) – Fixed point Vs floating point DSP processor data paths – Memory architecture of a DSP processor (Von Neumann – Harvard) – Addressing modes – pipelining – TMS320 family of DSPs (architecture of C6x).

TEXTBOOKS:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publication
1	AlanVOppenheim, RonaldW Schafer, JohnRBack	DiscreteTimeSignal processing	PHI,NewDelhi.	2000
2	VenkataramaniB& M.Bhaskar	DigitalSignalProcessor Architecture,Programmin gandApplication	TMH,NewDelhi	2003

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publicati
1	JohnGProakis,Dimtris GManolakis	DigitalSignalProcessing Principles,Algorithms andApplication	PearsonEducation, Fourthedition.	2007
2	Avtarsingh, Srinivasan.S,	DSP Implementation usingDSPmicroprocesso r withExamplesfrom TMS32C54XX	Thamson/Brooks colePublishers,Ne w Delhi	2003
3	M.H.Hayes	DigitalSignalProcessing	TataMcGraw-Hill, NewDelhi	2009
4	JohnyR.Johnson	IntroductiontoDigital SignalProcessing	PrenticeHall,New York	2001
5	SanjitMitra	DigitalSignalProcessing-AComputerbased approach	TataMcGraw-Hill, NewDelhi	2011

WEBSITES:

www.cnx.orgwww.dspguide.comhttp://mathworld.wolfram.com/Z-Transform.html

16BEEC502 **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.
- Baseband pulse transmission which deal swith the transmission of pulse amplitude modulated signals in their baseband form Pass band data transmission methods
- To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.
- 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:

- Gain knowledge in pulse modulation and discuss the process of sampling, quantization and coding that is fundamental to the digital transmission of analog signals.
- Gain adequate knowledge in baseband pulse transmission,which deals with the transmission of pulse-amplitude,modulated signals in their baseband form.
- Gain adequate knowledge in M-ary signaling and spread spectrum Technique.
- 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
Sampling Process – Aliasing – Instantaneous sampling – Natural Sampling – Flat Sampling – Quantization of signals – sampling and quantiz ing effects – channel effects – SNR for quantiz ation pulses – data formattin g techniques – Time division multiplexing.

UNIT II-DIGITAL M O DUL ATIO N SYSTEMS
PCM Systems – Noise Considerations in PCM s ystem – Overall Signal-to- noise ratio for PCM system – Threshold effect – Channel Capacity – Virtues, Limitations & Modification of PCM system – PCM Signal Multiplexing – Differential PCM – Delta Modulation – Noise Considerations in Delta Modulation – SNR Calculations – Comparison of PCM, DPCM & DM.

UNIT III-B ASE BAND PULSE TRANSMISSION
Maximum likelihood receiver structure – Matched filter receiver – Probabilit y error of the Matched filter – Inter symbol interference – Nyquist criterion for distortionless baseband transmission – Correlative coding – Eye pattern.

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

UNIT V-M-ARY SIGNALING AND INTRODUCTION TO SPREAD SPECTRUM TECHNIQUES
M-ary signaling, vectoral view of MPSK and MFSK signalin g, symbol error performance of M-ary systems – Introduction – Discrete Sequence Spread Spectrum technique – Use of Spread Spectrum with CDMA-Ranging Using Discrete Sequence Spread Spectrum – Frequency Hopping Spread Spectrum – Generation & Characteristics of PN Sequence.

TEXTBOOK:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publication
1	SimonHaykins	CommunicationSystems	JohnWileyPHI, NewDelhi	2001
2	Taub& Schilling	PrinciplesofDigital Communication	TataMcGraw-Hill,NewDelhi	2003

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publication
1	SamK.Shanmugam	Analog&Digital Communication	JohnWiley Publication, New Delhi	2007
2	JohnG.Proakis	DigitalCommunication	McGrawHill,Inc, 5th Edition	2008
3	Singh,R.P. &Sapre,S.D	Communication Systems:Analog& Digital	TataMcGraw-Hill, 5threprint	2000

16BEEC503   **ANTENNAS AND WAVE PROPAGATION**   **L T P C**
                                                          3 0 0 3

OBJECTIVES
- To stud y various antennas, arra ys and radiation patterns of antennas.

- To learn the basic working of antennas
- To understand various techniques involved in various antenna param eter measurements.
- 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:
- Gain knowledge in various antennas, arra ys and radiation patterns of antennas.
- Gain knowledge in the basic workin g of antennas.
- Understand various techniques involved in various antenna parameter measurements.
- Understand the propagation of radio waves in the atmosphere.
- Choose appropriate antennas based on applications
- Analyze the antenna arrays and special antennas with introduction nto CAD modeling

UNIT I-ANTENNA FU ND AM E NTALS AND RADIATION
Definition and function of antennas – Antenna theorems-Antenna parameters – Radiation Mechanism – Antenna field z ones – 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-ANTENN A A RRAYS AND SYNTHESIS
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
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
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.

UNITV-RADIO WAVE PROPAGATION
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.

TEXTBOOK:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publication
1	JohnDKraus, Ronald JMarhefka, AhmadSKhaN	Antennaand WavePropagation	TataMcGrawHill, 4thEdition	2010
2	R.E.Collins	Antennaand WavePropagation	McGraw-Hill,	1998

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publication
1	ConstantineA.Balanis	AntennaTheory: Analysisand Design	ThirdEdition,John WileyandSons	2012
2	G.S.N.Raju	Antennasand wavepropagation	StPearson Education	2012
3	RobertS.Elliott	AntennaTheory andDesign	JohnWileyand Revised Edition	2007
4	R.L.Yadava	Antennasand WavePropagation	PHI	2011

16BEEC504 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 of ARM processor
- To introduce the h/w architecture, instruction set, programming and interfacing of 8051 microcontroller.
- To study advanced processor architecture
- To expose them to programming concepts

INTENDED OUTCOMES:
- Adequate knowledge about the architecture and programming of 8085 microprocessor.
- Adequate knowledge about the architecture of ARM processor
- Adequate knowledge about the architecture and programming of 8086 microprocessor.
- 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
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
Addressing Modes- Instruction format-Instruction set-Assembly language programs in 8086. RISC architecture – introduction to ARM Programming-register configuration and instruction set – sample program.

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

UNIT IV-PROGRAMMINGANDINTERFACINGOF8051
Timer-Serial Communication-Interrupts Programming- Interfacing t oExternal Memory-Interfacing to ADC,LCD,DAC,Keyboard and stepper motor.

UNIT V-OVERVIEWOFARMPROCESSOR
Review of ARM v7 core and its architecture, Introductionto Advanced ARM CORTEX M4 architecture,Peripherals over view,Advantages of using Cortex M4, Instructionset implementation, CPU timers introduction.

TEXTBOOKS:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publication
1	K.RayandK.M. Bhurchandi,	AdvancedMicroprocessors and Peripherals–Architectures, ProgrammingandInterfacing	Indianedition.Tata McGrawHill,New Delhi	2001 Reprint
2	MuhammadAli Mazidi,Janice GillispieMazidi, RolinD.MCKinlay	The8051Microcontrollerand Embedded Systems	PearsonEducation, NewJersy.	2008

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publication
1	KrishnaKant	Microprocessorand MicrocontrollerArchitecture, programmingandsystemdesign using8085,8086,8051and8096	PHI,NewDelhi.	2007
2	KennethJ.Ayala	The8051Microcontroller	ThompsonDelmar Learning,NewDelhi	2007
3	Ray.A.K, Bhurchandi.K.M	AdvancedMicroprocessorand Peripherals	TataMcGraw-Hill, NewDelhi	2007
4	BarryB.Brey	TheIntelMicroprocessors Architecture,Programmingand Interfacing	PearsonEducation, NewDelhi	2007
5	RameshS.Goankar	MicroprocessorArchitecture, Programming,andApplications withthe8085	PHI,NewDelhi.	2002
6	DouglasV.Hall	MicroprocessorandInterfacing, ProgrammingandHardware	Indianedition.Tata McGrawHill,New Delhi	2007
7	JonathanW Valvano	IntroductiontoArm(r)Cortex-M Microcontrollers	Createspace Independent Publisher	2012

16BEEC5E**   **PROFESSIONAL ELECTIVE**   **L T P C**
        3 0 0 3

16BEEC511 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:

- 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

USING MATLAB
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

16BEEC512   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:

- 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.

LISTOFEXPERIMENTS

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

16BEEC513 MICROPROCESSOR AND MICROCONTROLLER LABORATORY
                                                          L T P C
                                                          0 0 3 2

OBJECTIVES
- 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:
- 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 Di gital clock and Stop watch (Using 8086).
5. Programs on Subroutines (Using 8086)
6. Interfacing ADC and DAC(Using MSP 430 CONTROLLER).
7. 8255 PP I.
8. Transfer data seriall y between two kits (8253/8251).
9. 8279 Keyboard & displa y
10. Temperature control.
11. Traffic Control Using MSP 430 CONTRO LLER.
12. 8259 Programmable Interrupt Controller.
13. Interfacing and Programming of DC Motor Speed control(Using MSP 430 CONTROLLER)
14. Interfacing and Programming of Stepper Motor and (8051).
15. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051 microcontroller.

16BEEC551   **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

16BEEC601   **MOBILE 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 analog and digital modulation techniques used in mobile communication
- To learn various coders and multiple access techniques used in mobile communication
- To study the architectures of AMPS, GSM, WLL, Bluetooth, DECT, GPRS
- To provide ideas about digital modulation techniques used in mobile communication

INTENDED OUTCOMES:

- Gain adequate knowledge in the fundamentals of cellular radio concepts
- Gain adequate knowledge in radio propagation models
- Ability to provide ideas about analog and digital modulation techniques used in mobile communication
- Provide ideas about digital 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 S YSTEM DESIGN FUNDAMENTALS

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

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   MODUL ATION T ECH NIQUES AND EQUILISATION

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   CO DING AND MULTIPLE ACCESS

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.

UNIT V   WIREL E SS SYSTEMS ANTEN NAS AND STANDARDS

AMPS, GSM, W LL, Bluetooth, IS-95 and DECT - RFID antennas – Mobile Antennas - GPRS

TEXTBOOKS:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publication
1	Rappaport.T.S	Wireless Communications: PrinciplesandPractice	PearsonEducation/ PrenticeHallof India,NewDelhi	2003
2	JochenSchiller	MobileCommunication	PHI,NewDelhi.	2003

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof publication
1	RoyBlake	WirelessCommunication Technology	ThomsonDelmar, NewDelhi.	2003
2	Lee.W.C.Y	MobileCommunications Engineering:Theoryand applications	McGraw-Hill International,New York	1998
3	StephenG.Wilson	DigitalModulationand Coding	PearsonEducation, NewDelhi	2003

16BEEC602A **VLSIDESIGN** **L T P C**
3 0 0 3

OBJECTIVES
- To learn the basic MOS Circuits.
- To learn the MOS process technology
- To learn the concepts of modeling a digital system using Hardware Description Language.
- To learn techniques of chip design using programmable devices.
- To learn the concepts of designing V LS I subsystems.
- To learn the concepts of VLSI implementation strategies.

INTENDED OUTCOMES:
- Gain knowledge in the basic MOS Technology.
- Gain knowledge in the MOS Process Technology and its second order effect.
- Gain knowledge in the concepts of modeling a digital system using Hardware DescriptionLanguage.
- Gain knowledge in basic concept of V LS I implementation strategies based on CMOS and FPGA.
- Explore high speed adders and multipliers
- Gain exposure on clocking Strategies

UNIT I-MOS TECHNOLOGY
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 CIRCUIT DESIGN PROCESS
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 – V LS I Circuit Design Flow.

UNIT III-CMOS LOGIC GATES & OTHER COMPLEX GATES
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-VERIL OG HDL
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 IM PLE MENTATION STRATEGIES
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.

TEXTBOOKS:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof the publication
1.	DouglasA. Pucknell	BasicVLSISystemsand Circuits	Prentice HallofIndia,3rd Edition,reprint	**2008**
2.	JohnP.Uyemura,	IntroductiontoVLSI CircuitsandSystems	John Wiley&Sons, Reprint	2009

REFERENCES:

S.NO.	Author(s)Name	Title ofthebook	Publisher	Yearofthe publication
1.	Smith.M.J.S	ApplicationSpecific integratedcircuits	PearsonEducation,New York	2008
2.	Weste& Eshraghian,	PrinciplesofCMOS VLSIDesign	AddisonWesley,2nd Edition	2008
3.	JohnP Uyemura	ChipDesignfor Submicron VLSI: CMOSlayoutand simulation	ThomsonIndiaEdition	2010
4	SamirPalnitkar,	VerilogHDL– Guide to Digital Design and S ynthesis	PearsonEducation,3rd Edition	2003

16BEEC602B   **OPTICAL COMMUNICATION**   **L T P C**

                                                            3 0 0 3

OBJECTIVES

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To understand the different kind of losses, signal distortion in optical wave guides and other
- signal degradation factors.Design optimization of SM fibers, R I profile and cut-off wave length.
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
- To learn the fiber optical receivers such as P IN AP D diodes, noise performance in photo detector, receiver operation and configuration.
- To learn fiber slicing and connectors, noise effects on system performance, operational principles W DM and solutions.

INTENDED OUTCOMES:

- Gain knowledge in basic elements of optical fiber transmission link, fiber modes configurations and structures.
- Gain knowledge in different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, R I profile and cut-off wave length.
- Gain knowledge in the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
- Gain knowledge in the fiber optical receivers such as P IN APD diodes, noise performance in photo detector, receiver operation and configuration.
- Gain knowledge in fiber slicing and connectors, noise effects on system performance, operational principles WDM and solutions.
- Gain knowledge on optical amplifiers and networks.

UNIT-I   INTROD UCTION TO OPTICA L FIBERS

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

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 G I fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT-III   FIBER OPTICAL SOURCES AND COUPLING

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

P IN 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

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.

TEXTBOOK:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof the publication
1.	GerdKeiser	OpticalFiber Communication	McGraw Hill International, Singapore	2000
2	Senior.J	Optical Communication Principlesand Practice	PrenticeHallof IndiaNewDelhi	2001

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof the publication
1.	Gower.J	Optical Communication System	PrenticeHallof India,NewDelhi	2001

16BEEC603A   **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:
- 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.

UNITI   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.

UNITII   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.

UNITIII   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 toMIC.

UNITIV   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.

UNITV   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.

TEXTBOOKS:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof the publication
1.	Reinhold Ludwiga ndGeneB ogdanov	RFCircuitDesign: TheoryandApplications	Pearson EducationInc	2011
2.	Robert EColin	FoundationsforMicrowa veEngineering	JohnWiley &SonsInc	2005

REFERENCES:

S.NO.	Author(s)Name	Title ofthebook	Publisher	Yearofthe publication
1.	DavidM.Pozar	MicrowaveEngineering	WileyIndia(P)Ltd, NewDelhi	2008
2.	ThomasHLee	PlanarMicrowaveEngineering:APracticalGuideto	CambridgeUniversityPress	2004
3.	Mathew.M.Radmanes	RFandMicrowave Electronics	PrenticeHall	2000
4.	AnnapurnaDasandSisirKDas	MicrowaveEngineering	TataMcGrawHill PublishingCompany Ltd, NewDelhi	2005

16BEEC603B   **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 ARMCORTEXM4 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
- Suggest design approach using advanced controllers to real-life situations.
- Gain knowledge on buses and devices for network

UNIT-I   INTRODUCTION TO EMBEDDED SYSTEMS
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
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-'12C','USB','CAN'and advanced I/O Serial high speed buses.

UNIT-III   OVERVIEW OF ARCHITECTURE
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
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
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.

TEXTBOOK:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof Publication
1.	JonathanW Valvano	Embedded Systems(r) Architecture, Microcontrollers Design	Createspace Independent, publish	2013

REFERENCE:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof Publication
1.	AndrewSloss, DominicSymes, ChrisWright	ARMSystem Developer'sGuide	Elsevier/Morgan Kaufman	2004

16BEEC6E**   **PROFESSIONAL ELECTIVE**   **L T P C**
     3 0 0 3

16BEEC6E**   **PROFESSIONAL ELECTIVE**   **L T P C**
     3 0 0 3

16BEEC6E**   **PROFESSIONAL ELECTIVE**   **L T P C**
     3 0 0 3

16BEEC611A **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:
- 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
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.

16BEEC611B **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:

- 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

LISTOFEXPERIMENTS

1. Numerical aperture determination for fibers and Attenuation Measurement in 3 mm cable Fibers.
2. Numerical aperture determination for fibers and 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

16BEEC612A   MICROWAVE ENGINEERING LABORATORY   **L T P C**
0 0 3 2

OBJECTIVES

- 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

INTENDED OUTCOMES:

- 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 (fixedandvariable)

8. Conduct an experiment using microwave test bench.

9. Study of resonant cavity

10. Simulation using CAD tools.

16BEEC612B	EMBEDDED SYSTEMS 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.

INTENDED OUTCOMES:

- 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.

1. Program for arithmetic operations and LED interface using PIC microcontroller.

2. Program for PWM Generation and motor speed control or Servo motor control using PICmicrocontroller.

3. Program for Key Board Interfacing using PICmicrocontroller.

4. Program for LCD Interfacing using PIC microcontroller.

5. Program for ADC interface and temperature control.

6. Program for DAC interface and generate waveforms.

7. Program for RS232C Serial port interfacing using PICmicrocontroller.

8. Program for I2C basedRTC/Memory interface using PIC microcontroller.

9. Program for Timer using PIC microcontroller.

10. Program for Compare and capture operation using PICmicrocontroller.

16BEEC651	COMMUNICATION SKILLS AND DEVELOPMENT	L T P C
		1 0 0 -

16BEEC652   BASIC SIMULATION LABORATORY   **L T P C**
                                                                    1 0 0 -

1. Simulation using PSPICE
2. Simulation using OR CAD
3. Basic Bio signal pre processing using MATLAB
4. Basic Bio saignal pre processing using LabVIEW
5. Image processing using MATLAB

16BECC701 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:

- 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

UNIT V ENTREPRENEURSHIP AND MOTIVATION 9

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 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/

16BEEC702A 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:
- Basic measurement concepts
- Concepts of electronic measurements
- Importance of signal generators and signal analyzers in measurements
- Relevance of digital instruments in measurements
- The need for data acquisition systems
- Measurement techniques in optical domains.

UNIT-I BASIC MEASUREMENT CONCEPTS
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

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

Function generators – RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer.

UNIT-IVDIGITAL INSTRUMENTS

Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – measurement errors.

UNIT-VDATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS

Elements of a digital data acquisition system – interfacing of transducers – multiplexing –computer controlled instrumentation – IEEE 488 bus – fiber optic measurements for power and system loss – optical time domains reflect meter.

TEXT BOOKS:

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

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

WEBSITES:

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

16BEEC702B   **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 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:
  Uponcompletionof thecourse, thestudent shouldbeableto:
- 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.

UNITI   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 ofrobots.

UNITII POWER SOURCESAND 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.

UNITIII 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.

UNITIV KINEMATICSAND PATH PLANNING 9

Solution of inverse kinematics problem–multiple solution jacobian workenvelop–hill Climbing Techniques– robot programminglanguages

UNITV CASESTUDIES 9

Multiplerobots–machine interface–robots in manufacturing and non-manufacturing applications–robotcell design–selection of robot.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Mikell P.WeissG.M.,Nagel R.N., OdrajN.G,	Industrial Robotics	McGraw-Hill Singapore	1996
2	Ghosh	Control inRoboticsandAutomation: SensorBasedIntegration	AlliedPublishers,Chennai	1998

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Deb.S.R	RoboticsTechnologyandflexibleAutomation	JohnWiley,USA	1992
2	KlafterR.D., Chimielewski T.A.,NeginM	RoboticEngineering– Anintegratedapproach	PrenticeHall ofIndia, NewDelhi	1994
3	McKerrowP.J	Introduction to Robotics	AddisonWesley,USA,	1991
4	IssacAsimov	Robot	BallantineBooks,NewYork	1986
5	BarryLeatham- Jones	Elementsofindustrial Robotics	PITMAN Publishing	1987
6	Mikell P.Groover, MitchellWeiss,Roger N.Nagel Nicholas G.Odrey	Industrial RoboticsTechnology,Programmingand Applications	McGrawHill BookCompany	1986
7	FuK.S.Gonzaleaz R.C.andLee C.S.G	RoboticsControl Sensing, Visionand Intelligence	McGrawHill International Editions	1987

16BESHOE**/16BECSOE**/16BEEEOE   OPEN ELECTIVE   **L T P C**
/16BTBTOE/16BEMEOE**/16BTAS   **3 0 0 3**
OE**/16BEAEOE**/ 16BECEOE**

16BEEC711A   **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:
- 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.

LISTOFEXPERIMENTS

AlltheexperimentsmustbeimplementedusingCadencetool

1.   StudyofSimulatortools

2.   StudyofSynthesistools

3. PlaceandRootandBackannotationforFPGAs

4. StudyofdevelopmenttoolforFPGAsforschematicentryandverilog

5. Designoftrafficlightcontrollerusingverilogandabovetools

6. Designandsimulationofpipelinedserialandparalleladdertoadd/subtract t8numberofsize,13bits eachin2'scomplement

7. Design and simulation of back annotated Verilog files for multiplying two signed, 8 bit numbers in2'scomplement. Design must be pipelined and completelyRTLcompliant

8. StudyofFPGAboardandtestingonboardLEDsandswitchesusingverilogcodes

9. Testingthetraffic controllerdesigndevelopedinSI.NO.5ontheFPGAboard

10. DesignaReal-time Clock(2digits,7segmentsLEDdisplayseach for HRS., MTS,andSECS.) and demonstrateits working on the FPGAboard.Anexpansioncard is requiredforthe displays.

16BEEC711B	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:

- 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

LISTOFEXPERIMENTS

1. Numerical aperture determination for fibers and Attenuation Measurement in Fibers.

2. Mode Characteristics of Fibres–SM Fibres.

3. Fiber optic analog link for 3mm cable

4. Fiber optic analog link for 6mm cable

5. Fiber optic digital link for 3mm cable

6. Fiber optic digital link for 6mm cable

7. LED Characteristics of fiber optic transmitter

8. Photo Diode Characteristics of fiber optic receiver

9. Study of fiber optic tools

10. StudyofCoupling FiberstoSemi-ConductorSources–Connectors&Splices.

16BEEC791   **PROJECT WORK- PHASE I**   **L T P C**
                                                                             0 0 8 4

16BEEC751A   **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

16BEEC751B   **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.

16BEEC801A   **MEDICAL ELECTRONICS**   **L T P C**
                                                                          3 0 0 3

OBJECTIVES
- To study the method s of recording various bio potentials
- To study how to measure biochemical and various physiological information
- To understand the working of units whichwill help to restore normal functioning
- To understand the use of radiation for diagnostic and therapy
- To understand the need and technique of electrical safety in Hospitals
- To imparts good knowledge in diagnostic x-ray equipments.

INTENDEDOUTCOMES:
- Gainknowledgeaboutthemethodsofrecording variousBio potential
- Gainknowledgeabouthowto measurebiochemicalandvariousphysiological information
- Gainknowledgeabouttheworking ofunitswhichwillhelptorestorenormal functioning
- Gainknowledgeabouttheuseofradiationfordiagnosticandtherapy
- Gainknowledgeabouttheneedandtechniqueofelectrical safety inHospitals
- Gain knowledge on recent medical instruments

UNIT-I   ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING
Theorigin 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
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
Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Bio-telemetry radio- pill and tele-stimulation.

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

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

TEXTBOOK:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof Publication

	1.	LeislieCromwell	Biomedical instrumentation and measurement	PrenticeHallof India,NewDelhi.	2002
	2.	Khandpur,R.S.	Handbook of Biomedical	TataMcGraw-Hill, NewDelhi.	1997

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof Publication
1.	JosephJ.Carrand JohnM.Brown	Introductionto Biomedicalequipment Technology	JohnWileyand Sons,NewYork	1997

16BEEC801B **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 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.
- To study smoothing and sharpening of images

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
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
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
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
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-IMA GE CO M PRESSIO N AND SEGMENTATION

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.

TEXTBOOKS:

S.No	Author(s)Name	Titleof thebook	Publisher	Yearof the publication
1.	Rafael C Gonzalez and Richard E Woods,	Digital Image Processing	PearsonEducation, 3rdEdition	**2003**
2.	S.Jayarman,S. EsakkirajanandT.V eerakumar	Digital Image Processing	TataMcGrawHill	**2010**
3.	A.K.Jain	Fundamentalsof DigitalImage Processing	PearsonEducation	**1989**

REFERENCES:

S.NO.	Author(s)Name	Titleof thebook	Publisher	Yearof the publication
1.	WilliamKPratt	DigitalImage Processing	JohnWilley	**2001**
2.	Millman Sonka, Vaclav Hlavac, Roger Boyle, and BroosColic	ImageProcessing Analysisand MachineVision	Thompson learning	1999

16BEEC8E**   **PROFESSIONAL ELECTIVE**   **L T P C**
3 0 0 3

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

16BEEC5E01   **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.
- To learn design of RF amplifiers using transistors.

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
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   RFTRANSISTOR AMPLIFIER DESIGN
Impedance matching using discrete components. Micro strip line matching networks. Amplifier classes of operation and biasing networks – Amplifier power gain, Unilateral design (S13 =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 SUPPLIES
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
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
Introduction to technology of printed circuit boards (PCB), General la y out and rules and parameters, PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits, Computer Aided design of PCBs.

TEXT BOOKS:

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.	S ydney 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	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

16BEEC5E02   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 and digital hierarchy namely SONET/SDH
- [ ] To introduce the concepts of space switching, times switching and combination switching, example of a switch namely No.4ESS Toll switch.
- [ ] To introduce the need for network synchronization and study synchronization issues. To outline network control and management issues.
- [ ] To study the enhanced local loop systems in digital environment. To introduce ISDN, DSL/ ADSL, and fiber optic system sine subscriber loop.
- [ ] To introduce statistical modeling of telephone traffic. To study blocking system characteristics and queuing system characteristics.
- [ ] To characterizeblockingprobabilityholdingservicetimedistributionsforinspeechanddata networks.

INTENDED OUTCOMES:
- [ ] Knowledge about the concepts of Frequency and Time division multiplexing.
- [ ] Knowledge about digital multiplexing and digital hierarchy namely SONET/ SDH
- [ ] Knowledge about the concepts of space switching, time switching and combination switching, example of a switch namely No.4ESS Toll switch.
- [ ] Knowledge about the need for network synchronization and study synchronization issues. To outline network control and management issues.
- [ ] 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. Knowledge
- [ ] about blocking system characteristics and queuing system characteristics.
- [ ] Knowledge about characterize blocking probability holding service time
- [ ] distributions for in speech and data networks.

UNIT-I   MULTIPLEXING
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. SONET/SDH: SONET Multiplexing Overview, SONET Frame Formats, SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Standards, SONET Networks. SONET Rings: Unidirectional Path-Switched Ring, Bidirectional Line-Switched Ring.

UNIT-II   DIGITAL SWITCHING
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
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

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

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.

TEXT BOOK:

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

16BEEC5E03   TELEVISION   AND   VIDEO ENGINEERING   **L T P C**
                                                                                        3 0 0 3

OBJECTIVES
   ☐ To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver
   ☐ Picture Tubes and Television Camera Tubes
   ☐ To study the principles of Monochrome Television Transmitter and Receivers systems.
   ☐ To study the various Color Television systems with a greater emphasis on PAL system.
   ☐ To   study the advanced topics in Television systems and Video Engineering
   ☐ To gain knowledge about ISDN, DSL/ADSL, and fiber optic system sin subscriber loop.
   ☐ Togain knowledge about statistical modeling of telephone traffic.

INTENDED OUTCOMES:
   ☐ Gain adequate knowledge about the analysis and synthesis of TV Pictures,
      Composite   Video Signal, Receiver Picture Tubes and Television Camera Tubes
   ☐ Gain adequate knowledge about the principles of Mono Chrome Television
      Transmitter and Receiver systems.
   ☐ Gain adequate knowledge about the various Color Television systems with a greater
      Emphasis on PAL system
   ☐ Gain adequate knowledge about the advanced topic sin Television systems and
      Video Engineering
   ☐ Understand blocking probability holding service time distributions for in speec hand data
      networks.

UNIT-I   FUNDAMENTAL SOF TELEVISION
Geometry form and Aspect Ratio-Image Continuity-Number of scanning Lines-Interlaced scanning-
Picture resolution- Camera Tubes-Image Orthicon-Videocon-plumb icon-silicon diode array Videocon-
solid state image scanners-monochrome picture tubes-composite video signal-video signal dimension-
horizontal sync. Composition-vertical sync. Details – functions of vertical pulse train – scanning sequence
details. Picture signal transmission–positive and negative modulation–VSB transmission sound signal
transmission–standard channel bandwidth.

UNIT-II   MONOCHROME TELEVISION TRANSMITTER AND RECEIVER
TV transmitter–TV signal propagation–Interference–TV transmission Antennas–Monochrome TV
receiver–RF tuner–UHF, VHF Tuner-Digital tuning techniques-AFT-IF subsystems-AGC–Noise
cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers
Requirements and configurations-DC re-Insertion-Video Amplifier Circuits-Sync separation–typical
Sync processing Circuits-Deflection current wave form– Deflection Oscillators– Frame deflection
Circuits–Requirements-Line Deflection circuits–EHT generation–Receiver Antennas.

UNIT-III   ESSENTIAL SOF COLOUR TELEVISION
Compatibility– colour perception-Three colour theory- luminance, hue and saturation-colour television
cameras-values of luminance and colour difference signals-colour television display tubes- delta–gun-
precision–in-line and Trinitron colour picture tubes-purity and convergence-purity and static and dynamic
convergence adjustments- pincushion correction techniques-automatic degaussing circuit-grey scale
tracking–colour signal transmission-bandwidth-modulation of colour difference signals–weighting factors-
Formation of chrominance signal.

UNIT-IV   COLOUR TELEVISION SYSTEMS
NTS colour TV system-NTSC colour receiver-limitations of NTSC system–PAL colour TV system

–cancellation of phase errors-PAL–D colour system-PAL coder–Pal-De colour receiver-chromo signal amplifier-separation of U and V signals-colour burst separation–Burst phase Discriminator– ACC amplifier- Reference Oscillator-Indented colour killer Circuits-U and V demodulators-Colour signal mixing–merits and demerits of the PAL system–SECAM system–merits and demerits of SECAM system.

UNIT-V ADVANCED TELEVISIONSYSTEMS

Satellite TV technology- Cable TV–VCR-Video Disc recording and play Back-Tele Text broadcast receiver–digital television–Transmission and reception-projection Television–Flat panel display TV receiver–Stereo sound in TV–3DTV–EDTV–Digital equipment's for TV studios.

TEXT BOOKS:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of Publication
1.	Gulati,R.R.	Monochrome Television Practice, Principles, Technology and servicing	New age International Publishes, New Delhi	2004
2.	R.R.Gulati	Mono chrome and colour television	New age International Publisher, New Delhi	2003

REFERENCE

S.NO.	Author(s)Name	Title of the book	Publisher	Year of Publication
1.	Dhake.A.M.	Television and Video Engineering	TMH, New Delhi	2003
2.	S.P.Bali	Colour Television, Theory and Practice	TMH, New Delhi	1994

16BEEC5E04   COMPUTER ARCHITECTURE   **L T P C**
                                                           3 0 0 3

OBJECTIVES
- ☐ To have a thorough understanding of the basic structure and operation of a digital computer.
- ☐ To discuss in detail, the operation of the arithmetic unit including the algorithms &
- ☐ Implementation of fixed-point and floating-point addition, subtraction, multiplication & Division.
- ☐ To study in detail, the different types of control and the concept of pipelining.
- ☐ To study the hierarchical memory system including cache memories and virtual memory.
- ☐ To study the different way so for communicating with I/O devices and standard I/O
- ☐ Interfaces.

INTENDED OUTCOMES:
- ☐ Through knowledge about the basic structure and operation of a digital computer.
- ☐ Understand the 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.
- ☐ Detailed exposure about the different ways of communicating with I/O devices and standard I/O interfaces.

UNIT-I   ARCHITECTURE OF COMPUTING SYSTEMS
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
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
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
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
Accessing I/O devices–Interrupts–Direct Memory Access–Buses–Interface Circuits–Standard I/O Interfaces
(PCI, SCSI, USB).

 TEXT BOOK:

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:

www.webopedia.com/quick_ref/OSI_Layers.aspwww.yale.
edu/pclt/COMM/TCPIP.HTM

LIST OF ELECTIVES FOR VI SEMESTER- ELECTIVE II, III, IV
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

16BEEC6E01   **ADVANCED MICROPROCESSORS**   **L T P C**

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

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

Modular programming–UsingkeyboardandVideodisplay–DataConversions-Diskfiles-Interrupt hooks-using assembly languages with C/C++

UNIT-III   PENTIUM PROCESSORS

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

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

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.

TEXT BOOKS:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of Publication
1.	Barry B.Brey	The Intel Microprocessors 8086/8088, 80,86,80286,8038680486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium4, Architecture, Programming and	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 microntrollers68HC11,8051and 8096	S Chand Publishers, New Delhi.	2000
2.	Alan Clements	The principles of computer Hardware	Oxford University Press, Oxford.	2003

16BEEC6E02   **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:
  ☐ 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   PHYSICAL AND WIRELESS MAC LAYER ALTERNATIVES
Wired transmission techniques: design of wireless modems, power efficiency, out of band radiation, applied wireless transmission techniques, short distance base band transmission, VWB pulse transmission, broad Modems for higher speeds, diversity and smart receiving techniques, random access for data oriented networks, integration of voice and data traffic.

UNIT-II   WIRELESS NETWORK PLANNING AND OPERATION
Wireless networks topologies, cellular topology, cell fundamentals signal to interference
Ratio calculation, capacity expansion techniques, cell splitting, use of directional antennas for cell sectoring, microcell method, overload cells, channels allocation techniques and capacity expansion FCA, channel borrowing techniques, DCA, mobility management, radio resources and power management securities in wireless networks.

UNIT-III   WIRELESS WAN
Mechanism to support a mobile environment, communication in the infrastructure, IS-95CDMA Forward channel, IS–95CDMA reverse channel, pallet and frame formats in IS–95, IMT–2000; Forward channel in W-CDMA and CDM A 2000, reverse channels in W-CDMA and CDMA-2000, GPRS and higher data rates, short messaging service in GPRS mobile application protocols.

UNIT-IV   WIRELESS LAN
Historical overviews of the LAN industry, evolution of the WLAN industry, wireless home networking, IEEE 802.11. The PHY Layer, MAC Layer, wireless ATM, HYPERLAN, HYPERLAN –2.

UNIT-V   WPAN AND GEOLOCATIONS YSTEMS
IEEE 802.15WPAN, Home RF, Bluetooth, interface between Bluetooth and 802.11, wireless geo location technologies for wireless geo location, geo location standards for E.911 service.

TEXT BOOK:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of Publication
1.	Kaveh Pahlavan, Prashant Krishnamoorthy	Principles of Wireless Networks	Pearson Education, New Delhi	2002
2.	Jochen Schiller	Mobile Communications	Person Education, New Delhi	2003

REFERENCES:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of Publication
1.	Wang.Xand Poor.H.V	Wireless Communication Systems	Pearson education, New Delhi	2004
2.	Mallick.M	Mobile and Wireless design essentials	Wiley Publishing Inc., New Delhi	2003
3.	Nicopolitidis.P, Obaidat.M.S, Papadimitria.G.I, Pomportsis.A.S	Wireless Networks	John Wiley &Sons, New Jersy	2003

16BEEC6E03   SATELLITE COMMUNICATION   L T P C
                                                              3 0 0 3

OBJECTIVES

- Overview of satellite systems in relation to the terrestrial systems.
- Study of satellite orbits and launching.
- Study of earth segment and space segment components
- Study of satellite access by various users.
- Study of DTH and compression standards.
- To familiarize the students with the drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions.

INTENDED OUTCOMES:
- Gain knowledge in the overview of satellite systems in relation too the terrestrial systems.
- Gain adequate knowledge in satellite orbit sand launching.
- Gain adequate knowledge in earth segment and space segment components
- Gain adequate knowledge in satellite access by various users.
- Gain adequate knowledge in DTH and compression standards.
- Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions

UNIT-I   OVERVIEW OF SATELLITE SYSTEMS, ORBITS AND   LAUNCHING METHODS
Introduction– Frequency Allocations for Satellite Services–Intelsat–U.S. Domsats– Polar Orbiting Satellites– Problems–Kepler's First Law–Kepler's Second Law–Kepler's Third Law–Definitions of Terms for Earth-orbiting Satellites–Orbital Elements–Apogee and Perigee Heights–Orbital Perturbations–Effects of a Non spherical Earth–Atmospheric Drag–Inclined Orbits–Calendars– Universal Time– Julian Dates– Sidereal Time– The Orbital Plane– The Geocentric-Equatorial CoordinateSystem– EarthStationReferredtotheIJKFrame–TheTopcentric-HorizonCo-ordinate System–The Sub-satellite Point– Predicting Satellite Position.

UNIT-II   GEO STATIONARY ORBIT & SPACE SEGMENT
Introduction–Antenna Look Angels–The Polar Mount Antenna– Limits of Visibility– Near Geostationary Orbits–Earth Eclipse of Satellite–Sun Transit Outage–Launching Orbits–Problems– Power Supply–Attitude Control–Spinning Satellite Stabilization–Momentum Wheel Stabilization–
Station Keeping–Thermal Control–TT & C Subsystem–Transponders–Wide band Receiver–Input De multiplexer – Power Amplifier– Antenna Subsystem– Morelos– Anik- E– Advanced Tiros -N Spacecraft

UNIT-III   EARTH SEGMENT & SPACE LINK
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
Single Access–Pre assigned FDMA, Demand-Assigned FDMA, SPADE System. Bandwidth- limited a Power-limited TWT amplifier operation, FDMA downlink analysis.
TDMA: Reference Burst; Preamble and Post amble, Carrier recovery, Network synchronization, unique word detection, Traffic Date, Frame Efficiency and Channel capacity, Pre assigned TDMA, Demand assigned TDMA, Speech Interpolation and Prediction, Downlink analysis for Digital transmission. Companion of uplink Power requirements for FDMA&TDMA. On-board signal Processing for TDMA / FDMA operation,

Satellite switched TDMA Code-Division Multiple Access – Direct- Sequence spread spectrum– code signal c(t) – auto correlation function for c(t)– Acquisition and tackling–Spectrum spreading and dispreading– CDMA throughput–Problems–Network Layers– TCP Link– Satellite Links and TCP – Enhancing TCP Over Satellite Channels Using Standard Mechanisms(RFC-2488)–Requestsforcomments–SplitTCPconnections– Asymmetric Channels– Proposed Systems.

UNIT-V   DIRECT BROADCAST SATELLITE SERVICES

Introduction–Orbital Spacing–Power Rating and Number of Transponders–Frequencies and Polarization – Transponder Capacity– Bit Rates for Digital Television – MPEG Compression Standards–Forward Error Correction–Home Receiver Outdoor Unit(ODU)–Home Receiver Indoor
Unit (IDU)–Downlink Analysis–Uplink-Problems-Satellite Mobile Services–VSATs–Radar sat
–Global Positioning Satellite System–Orbcomm.

TEXT BOOK:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	Dennis Roddy	Satellite Communications	McGraw-Hill Publication, New York.	2001
2	Timothy Pratt– Charles Bostian & Jeremy Allmuti	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 RobertA.Nelson	Satellite Communication Systems Engineering	Pearson Education Ltd.,	200 3
2	M. Richharia	Satellite Communication Systems-Design Principles	Macmillan Press Ltd.	2003

16BEEC6E04   **DISASTER MANAGEMENT**   **L T P C**
                                                        3 0 0 3

OBJECTIVES
- To understand the six elements of disaster management.
- To understand the "relief system" and the "disaster victim."
- To understand traditional patterns off foreign assistance
- To understand the tools of post-disaster management
- To gain knowledge about the organization of disaster management

INTENDED OUTCOMES:
- Understand the six elements of disaster management.
- Understand the "relief system "and the "disaster victim."
- Understand traditional patterns of foreign assistance
- Understand the tools of post-disaster management
- Gain knowledge about the organizations that are involved in natural disaster assistance
- Gain knowledge on seismicity

UNIT I: INTRODUCTION

Introduction – Disaster preparedness–Goals and objectives of ISDR Programme-Risk identification–Risk sharing–Disaster and development: Development plans and disaster management–Alternative to dominant approach–disaster-development linkages-Principle of risk partnership

UNIT II:APPLICATION OF TECHNOLOGY IN DISASTER RISK REDUCTION

Application of various technologies: Databases–RDBMS–Management Information systems–Decision support system and other systems–Geo graphic information systems–Intranets and extranets–video teleconferencing. Trigger mechanism–Remote sensing-an insight–contribution of remote sensing and GIS-Case study.

UNIT III: AWARENESS OF RISK REDUCTION

Trigger mechanism– constitution of trigger mechanism– risk reduction by education– disaster information network– risk reduction by public awareness

UNIT IV: DEVELOPMENT PLANNING ON DISASTER

Implication of development planning–financial arrangements–areas of improvement–disaster preparedness–community based disaster management–emergency response.

UNIT V: SEISMICITY

Seismic waves–Earthquakes and faults–measures of an earthquake, magnitude and intensity–ground damage–Tsunamis and earthquakes

TEXT BOOKS:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	Amitasinvhal	Understanding Earthquake disasters	TMH	2010
2	Pardeep Sahni, Madhavimalalgoda And ariyabandu	Disaster risk reduction In south asia	PHI	2003

REFERENCES:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	Pardeepsahni, Alka Dhameja and Uma medury	Disaster mitigation: Experiences and reflections	PHI	2004

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	Pardeepsahni, Alka Dhameja and Uma medury	Disaster mitigation: Experiences and reflections	PHI	2004

16BEEC6E05   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 adequate knowledge about RADAR Navigation.
- Gain adequate knowledge about RADAR systems and components.
- Gain adequate knowledge Decca Navigation System

UNIT I-RADAR QUATIONS
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
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
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
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
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.

TEXTBOOK:

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

REFERENCES:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of the 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	Mc-Graw Hill, Electronic Engineering, 1stEdition	2005
4.	V.S.Bagad	Radar Systems	Technical publications,1st edition	2008

16BEEC6E06   **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
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
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
HTTP protocol, Web browsers net scape, Internet explorer, Website and Web page design, HTML, XML, Dynamic HTML, CGI.

UNIT-IV   JAVA PROGRAMMING
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
E-Commerce, Network operating systems, Web Design case studies.

TEXT BOOK:

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.	WilliamStallings.	High Speed Networks.	Prentice Hall Inc, New Delhi.	1998

REFERENCES:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of Publication
1.	Eric Laddand Jim O'Donnell.	UsingHTML4, XML andJava1.2, Que Platinum edition.	Prentice Hall of India, New Delhi.	1999

16BEEC6E07   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

UNIT1   INTRODUCTION
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.

UNIT2   TQM PRINCIPLES
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.

UNIT3   STATISTICAL PROCESS CONTROL(SPC)
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.

UNIT4   TQM TOOLS
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.

UNIT5   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.

TEXTBOOKS:

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

16BEEC6E08   **PHOTONICS**   **L T P C**
                                                                   3 0 0 3

OBJECTIVES
 □ To study about Nature of light and the production of EM radiation for photonics application
 □ To study about the production of EM radiation for photonics application
 □ To study about applications &Trends and new direction sin photonic applications

INTENDEDOUTCOMES:
 □ Knowledge about Nature of light and the production of EM radiation for photonics application
 □ Knowledge about the production of EM radiation for photonics application
 □ Knowledge about applications &Trends and new directions in photonic applications

UNIT-I NATURE OF LIGHT AND THE PRODUCTION OF EM RADIATION FOR PHOTONICS APPLICATION

Wave descriptions (spectrum, superposition, interference effects), photon effects (photo electric effect, momentum, interaction with matter). Sources of light: thermal, discharge lamps, lasers, solid-state sources (such as LED's and laser diodes).

UNIT-II THEPRODUCTIONOFEMRADIATIONFORPHOTONICSAPPLICATION

Characteristics of light (polarization, coherence, mono chromaticity), ways to define these mathematically (Stokes parameters, Jones vectors & matrices) and how to determine these characteristics

UNIT-III TRANSMISSION & DETECTION OF LIGHT RADIATION

Ray optics ABCD matrix methods for transmission of light. Stability of a cavity. The q-parameter of a laser beam. Light detectors: photo multiplier tubes, Photodiodes, thermal detectors, Bolometers, CCD's, single photon detectors. Generic system issues: sources of noise and signal-to-noise ratio, limitation son temporal response and effective bandwidth.

UNIT-IV IMPARTING INFORMATION ON TO EM RADIATION & COMMUNICATION TECHNIQUES

Acousto-optic and electro-optic techniques, LED switching, analogue and digital techniques using lasers, AM, FM, phase modulation techniques Delivery methods. Basics of optical fiber techniques: step index fiber; acceptance angles, single and multimode fibers, dispersion limitations, transmission characteristics.

UNIT-V APPLICATIONS

Spectroscopy using etalons, spectrometers, interferometers Display systems (LCD's, plasmas etc.) Range-finding systems and applications (LIDAR etc.). More exotic applications (laser trapping, laser tweeze ring, different forms of measurements) Trends and new directions in photonic applications: Laser safety, practical tips on experimental techniques, different forms of laser systems used in research.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Smith,F.G. and King.T.A,	Optics and Photonics	Wiley & Sons, Chichester,	2000
2	Wilson,J. and Hawkes, J.F.B.	Optoelectronics: An introduction	Prentice-Hall, New York	1983

REFERENCES:

S.NO.	Author (s)Name	Title of the book	Publisher	Year of Publication
1.	Harry J.R. Dutton	Understanding Optical Communications	Prentice Hall Series in Networking, New Delhi	1998
2.	Shoichi Sudo, Katsunari Okamoto	New photonics Technologies for the information age	Technology & Engineering, New Delhi	2004

16BEEC6E09   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 top Program in C
- To efficiently implement the different data structures
- To efficiently implement solutions for specific problems
- To learn lists, stacks and queues

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 adequate knowledge to program in C
- Gain adequate knowledge to implement the different data structures
- Gain learn lists, stacks and queues.
- Gain adequate knowledge about to implement solutions for specific problems

UNIT-I PROBLEM SOLVING

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

UNIT-II LISTS, STACKS AND QUEUES

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

UNIT-III TREES

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

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

UNIT-V   GRAPHS

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

TEXT BOOKS:

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

REFERENCES:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	Langsam .YAugenstein.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:

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

16BEEC6E10   PROBABILITY AND RANDOMPROCESS   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

Random Variables- Moments- Moment generating function- Binomial, Poisson, Geometric, Exponential and Normal Distributions-Functions of Random Variables.

UNIT II-TWO DIMENSIONAL RANDOM VARIABLES

Two dimensional Random Variables-Marginal and conditional distributions–Transformation of Random Variables-central limit theorem-simple problems.

UNIT III-RANDOM PROCESSES

Classification of Random Processes-Stationarity-WSS and SSS Processes-Poisson Random Process-Renewal Process-Markov Chain and transition probabilities.

UNIT IV-CORRELATION FUNCTIONS

Auto correlation function and its Properties-Cross Correlation function and its Properties-Linear System with Random Inputs-Ergodicity.

UNIT V-SPECTRAL DENSITY

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.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Veerarajan,T.	Probability, Statistics and Random processes	3rdEdition, Tata McGraw Hill Publications, New Delhi	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	Prentice Hall of India,2nd revised edition, 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

16BEEC6E11   **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-1 REMOTE SENSING

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 EMRINT ERACTION WITH ATMOSPHERE AND EARTH MATERIALS

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

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 GEOGRAPHICINFORMATIONSYSTEM

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

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.

TEXT BOOKS:

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

WEBSITES:

http://www.research.umbc.edu/
http://rst.gsfc.nasa.gov/start.html
IEEE Transaction Son Geo-science and Remote sensing.
Manual of Remote Sensing–American society of photogrammetry & remote sensing,1993.

16BEEC6E12   OPTO ELECTRONIC DEVICES   **L T P C**
                                                                3 0 0 3

OBJECTIVES
   □   To know the basics of solid state physics and understand the nature and characteristics of light.

☐ To understand different methods of luminescence, display devices and laser types and their applications.
☐ To learn the principle of optical detection mechanism in different detection devices.
☐ To understand different light modulation techniques and the concepts and applications of optical switching.
☐ To study the integration process and application of optoelectronic integrated circuits in Transmitters and receivers.
☐ To study the design of opto electronic modulator.

INTENDED OUTCOMES:
☐ Thorough knowledge in the basics of solid state physics and characteristics of light.
☐ Knowledge in different methods of luminescence, display devices and laser types and their applications.
☐ Adequate knowledge about the principle of optical detection mechanism in different detection devices.
☐ Adequate knowledge about different light modulation techniques and the concepts and applications of optical switching.
☐ Adequate knowledge about the integration process and application of opto electronic integrated circuits in transmitters and receivers.
☐ Understand the design of optoelectronic integrated circuits.

UNIT-I ELEMENTS OF LIGHTAND SOLID STATE PHYSICS
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
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
Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT-IV   OPTO ELECTRONIC MODULATOR
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
Introduction, hybrid and Mono Lithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

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:

	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Bhattacharya	Semiconductor Opto Electronic Devices	Prentice Hall of India Pvt., Ltd, New Delhi	1996
2.	Jasprit Singh	Opto Electronics–As Introduction to materials and devices	McGraw-Hill International Edition, New York	1998

LIST OF ELECTIVES FOR VII SEMESTER-ELECTIVE V
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

16BEEC7E01   **SENSORS AND TRANSDUCERS**   **L T P C**

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.

INTENDED 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
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
Resistive Potentiometer, strain gauge, Inductive sensors and transducer, capacitive sensors, ultrasonic sensors.

UNIT III-THERMAL AND RADIATION SENSOR
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
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
Auto mobile sensor, Home appliance sensor, Aero space sensors, sensors for manufacturing, medical diagnostic sensors, environmental monitoring.

TEXT BOOK:

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	Sensorand Transducers	Elsevier India Pvt Ltd, 3rd Edition	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	Tata McGraw Hill Publishing Company Ltd.,5th Edition	2008

16BEEC7E02   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
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
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
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
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
Buses–Industry standard architecture(ISA), peripheral component Interconnect(PCI)–Accelerated Graphics port(AGP)–plug-and-play devices–SCSI concepts–USB architecture.

TEXT BOOK:

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.Govindarajul u	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 Publication
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

16BEEC7E03 **HIGH SPEED NETWORKS** **L T P C**
3 0 0 3

OBJECTIVES
- To introduce about ATM and Frame relay.
- Overview of an up-to-date survey of developments in High Speed Networks.
- To know techniques involved to support real-time traffic and congestion control.
- To learn different levels of quality of service (Q.S) to different applications.
  - To divulge the basics of RSVP.
  - To make the student acquire Integrated Services Architecture.

INTENDED OUTCOMES:
- Knowledge about ATM and Frame relay.
- Knowledge on up-to-date survey of developments in High Speed Networks.
- Enable the students to know techniques involved to support real-time traffic and congestion control.
- Understand different levels of quality of service (Q.S) to different applications.
  - Knowledge about ISDN architecture and its services
  - Gain exposure on various protocols for QoS support.

UNIT-I HIGH SPEED NETWORKS
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
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
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
Integrated Services Architecture–Approach, Components, Services-Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ–Random Early Detection, Differentiated Services

UNIT-V PROTOCOLSFORQOSSUPPORT
RSVP–Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms–Multiprotocol Label Switching–Operations, Label Stacking, Protocol details–RTP–Protocol Architecture, Data Transfer Protocol, RTCP.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	William Stallings	High Speed Networks And Internet	Pearson Education, New Delhi.	2002
2.	Irvan Pepelnjk, JimGuichard 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

16BEEC7E04   **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
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.

UNITII: QUANTUM ELECTRON DEVICES
 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
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
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

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.

TEXTBOOK:

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

16BEEC8E01   **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
Neuro-Physiology-General Processing Element-ADALINE-LMS learning rule-MADALINE- MR2 training algorithm.

UNIT II: BPN AND BAM
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
Annealing, Boltzmannmachine-learning-application-CounterPropagationnetwork-architecture-Training-Applications.

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

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

TEXTBOOK:

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

| 2 | Laurene Fausett | Fundamentals of Neural Networks: Architecture, Algorithms and Applications | Prentice Hall | 1994 |

REFERENCES:

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

16BEEC8E02   VIRTUAL INSTRUMENTATION USING LABVIEW   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:
- ☐ The students will be able to am iliarize the basic sand need of VI.
- ☐ The students will be able to learn LabVIEW software basics.
- ☐ To get better understanding of data acquisition techniques.
- ☐ The students can have an exposure to different interfacing techniques.
- ☐ The students can able to design some real time application using LabVIEW software.
  - ☐ Learn programming techniques

UNIT I-VIRTUAL INSTRUMENTATION
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-VIPRO GRAMMING TECHNIQUES
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
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 NIM y DAQ and NIELVIS.

UNIT IV-LabVIEW IN SIGNAL PROCESSING
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.

UNITV-FREQUENCY DOMAIN PROCESSING
Discrete Fourier Transform and Fast Fourier Transform, STFT, Wavelet Transform, Signal Processing applications.

TEXTBOOK:

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	LabVIEW Graphical Programming	Fourth Edition, McGraw-Hill publications	2006

16BEEC8E03   **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

UNIT1 Introduction to Gate Array and CMOS Logic
Types of gate array–Design flow-CMOS Logic-Combinational–Sequential–Data path–Transistor as resistor–Capacitance-Hardware description language.

UNIT2 Field Programmable Gate Array
FPGA Architecture- Altera FPGA technologies- Xilinx FPGA technologies – Lattice FPGA technologies-Actel FPGA technologies.

UNIT 3 FPGA Implementation Issues
Lookuptables–Memoryavailability-Fixedcoefficientdesigntechnique–Distributedarithmetic.

UNIT 4 Floor Planning, Place and Route Optimization
Design Partitioning-Optimal floor planning–Relationship between placement and routing–Logical Replications-I/O registers–Register Ordering-Placement seed.

UNIT 5 Low Power FPGA Implementation
Sources of power Consumption-Power consumption reduction Techniques-Voltage scaling FPGA's–Data reordering- Pipeline.

TEXTBOOK

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, Dr. Ying Yi, Gaye Light bod	FPGA-based Implementation of Signal Processing Systems	Wiley	2008

REFERENCES:

S.NO.	Author(s)Name	Title of the book	Publisher	Year of Publication
1.	M.J. S. Smith	Application Specific Integrated Circuits	Pearson	2003

16BEEC8E04   **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
Introduction to ASICs: Full-custom and Semi-custom ASIC–CMOS logic –ASIC library design.

UNIT II-PROGRAMMABLE ASICS
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
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
Boundary scantest– Faults–Fault simulation–Automatic test pattern generation algorithm: D-
algorithm, PODEM –Built in self-test.

UNIT V-ASIC CONSTURCTION
System partitioning–power dissipation–partitioning methods–floor planning and placement: –
Routing: Global routing, detailed routing, special routing–Introduction to SOC.

TEXTBOOKS:

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

OPEN ELECTIVES - OFFERED BY OTHER DEPARTMENTS
SCIENCE AND HUMANITIES

16BESHOE01 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

Measures of central tendency–Mean, Median, Mode-Standard Deviation
Probability-Random Variable-Axioms of Probability-Conditional Probability-Total probability–Bayes' theorem.

UNIT-II   STANDARD DISTRIBUTIONS

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 in equality.

UNIT-III   TWO DIMENSIONAL RANDOM VARIABLES

Joint Distributions-Marginal and conditional Distributions-Probability Mass Function-Probability density functions–Covariance-Correlation and regression

UNIT-IV   CLASSIFICATION OF RANDOM PROCESS

Definition and examples-first order, second order, strictly stationary, wide–sense stationary and Ergodic Processes-Markov Process-Binomial, Poisson and Normal Processes-Sinewave process.

UNIT-V   CORRELATION AND SPECTRAL DENSITIES

Autocorrelation-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– Autocorrelation and cross correlation functions of input and output.

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	Henry Starkand John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002
2	Ochi, M. K	Applied Probability and Stochastic Process	John Wiley &Sons, New York	1990
3	Ross, S	A first Course in Probability	Pearson Education, New Delhi(Chap2to8)	2002
4	Gupta, S.C .and Kapur, V. K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2007
5	Veerarajan, T.	Probabilitiy, Statistics and Random process	Tata McGraw-Hill Publications, Second Edition, New Delhi	2002

WEBSITES:

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld.Wolfram.com

16BESHOE02   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 SET   (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, tonearms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III   FUZZY RELATION   (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 MEASURE   (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 : 45
TEXT BOOK:

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	Fuzzy Control	Addison Wesley	1998

	Stephen Yurkovich		Longman publishers, USA	

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld. Wolfram.com
3. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm

16BESHOE03 **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, Croute's method, iterative methods, Gauss-Jacobi method, Gauss–Seidel method, convergence criteria.

UNIT IV   LINEAR TRANSFORMATIONS   (9)
Linear Transformations - The Null Space and Range - I isomorphism - 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: 45

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	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
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:

4. www.sosmath.com
5. www.nptel.ac.in
6. www.mathworld.wolfram.com

16BESHOE04   ENGINEERING ACOUSTICS   **L T P C**
                                                                            3 0 0 3

OBJECTIVES:

□ To provide mathematical basis for acoustics waves and the characteristic behavior 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 behavior 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 endo sure – 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: 45

TEXT BOOK:

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

165BESHOE05   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 Classification, 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, Remediation, 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: 45

TEXT BOOK:

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

REFERENCE BOOKS:

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- 2ndedition	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/

16BESHOE06   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 OUTCOMES:
- 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 BIO TECHNOLOGY 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: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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

16BESHOE07   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 OUTCOMES:
   □ 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)- Electro plating for electronic industry- Alloy plating, brass plating- Electro less plating of nickel- anodizing – Electroforming – Electro winning.

UNIT II   CONDUCTING POLYMERS AND ELECTROCHEMICALS (9)
Lector polymerization- 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: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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

16BESHOE08   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 OUTCOMES:
  ☐ 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 port land cement – re gauging 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 color-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: 45

TEXT BOOKS:

S.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF

NO.	NAME			PUBLICATION
1.	Hari krishan	Industrial Chemistry	Goel Publishing House, Meerut.	2014
2.	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut.	2000

REFERENCE BOOKS:

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

	L	T	P	C
16BECSOE01 **INTERNET PROGRAMMING**	3	0	0	3

16BECSOE01   **INTERNET PROGRAMMING**

Course Objectives:

- 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 Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II   HTML   **9**

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue. 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

TEXT BOOKS:

1. Paul Deitel, Harvey Deitel and Abby Deitel, "Internet and World Wide Web-How to Program", 5th Edition, 2011.
2. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.

REFERENCES:

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**
16BECSOE02	**MULTIMEDIA AND ANIMATION**	**3**	**0**	**0**	**3**

Course Objectives:

- To 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

Text Books:
1. Computer Graphics, Multimedia and Animation-Malay K. Pakhira,PHI Learning PVT Ltd,2010

References:
1. Principles of Multimedia – Ranjan Parekh, 2007, TMH. (Unit I, Unit V)
2. Multimedia Technologies – Ashok Banerji, Ananda Mohan Ghosh – McGraw Hill Publication.
3. Encyclopedia of Multimedia and Animations-Pankaj Dhaka, Anmol Publications-2011

	L	T	P	C

16BECSOE03   PC HARDWARE AND TROUBLE SHOOTING

L T P C
3 0 0 3

Course 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

Text Books:

1. B. Govindarajalu, "IBM PC Clones Hardware, Troubleshooting and Maintenance", 2/E,

   TMH, 2002.

References:

1. Peter Abel, Niyaz Nizamuddin, "IMB PC Assembly Language and Programming", Pearson

   Education, 2007
2. Scott Mueller, "Repairing PC's", PHI, 1992

16BECSOE04   JAVA PROGRAMMING

L T P C
3 0 0 3

Course 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

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

Arrays – Strings - Packages – Java-Doc comments –- Inheritance – class hierarchy –polymorphism – dynamic binding – final keyword – abstract classes

UNIT III I/O STREAMS

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

Exceptions – Syntax of exception handling code – Multiple catch statements – Using finally statements – Throwing our own exceptions – Using exceptions for debugging

UNIT V THREADS

Introduction, Creating Threads, The Life Cycle of a Thread, Thread Methods, Using Threads, Synchronization of Threads, Summary

TEXT BOOKS:

1. Cay S. Horstmann and Gary Cornell Core Java: Volume I – Fundamentals Sun Microsystems
Press 2008

REFERENCE BOOKS:

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:
http://elvis.rowan.edu/~kay/cpp/vc6_tutorial/
http://www.winprog.org/tutorial/msvc.html
http://www.tutorialized.com/tutorials/Visual-C/1
http://www.freeprogrammingresources.com/visualcpp.html

LIST OF OPEN ELECTIVES OFFERED BY
ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

16BEEEOE01   **ELECTRIC HYBRID VEHICLE**   **L T P C**
                                                                      3 0 0 3

Course 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

Course 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 Motor 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: 45 HOURS
TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press – 2nd edition	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	Standards media – 2nd edition	2009
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley – 2nd edition	2012

16BEEEOE02   ENERGY MANAGEMENT AND ENERGY AUDITING   L T P C
                                                                                    3 0 0 3

Course 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

Course Outcomes:
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 blower's 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 nonlinear 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: 45 HOURS

TEXT BOOK

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	Marcel Dekker Inc Ltd – 3rd edition	2005
2	W.C.Turner Steve Doty	Energy Management Handbook	Lulu Enterprises, Inc. - 8th Edition Volume II	2013

16BEEEOE03   **PROGRAMMABLE LOGIC CONTROLLER**   **L T P C**
                                                                    3 0 0 3

Course 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.

Course 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: 45 HOURS
TEXT BOOKS

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	Elsevier Newnes Publications, 5th Edition	2009

WEBSITE

http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm,- Introduction to programmable Logic controller

16BEEEOE04   **RENEWABLE ENERGY SOURCES**   **L T P C**
                                                              3 0 0 3

Course 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.

Course Outcomes
At the end of this course, students will demonstrate the ability to
- 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: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional sources	Khanna publishers	2011

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
		of energy		
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	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	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis – 3rd edition	2015

WEBSITES
1. www.energycentral.com
2. www.catelelectricpowerinfo.com

16BTBTOE01   **BIO REACTOR DESIGN**   **L T P C**
                                                                            3 0 0 3

INTENDEDOUTCOMES
- To understand the basic design of bioreactors
- To understand the principle of heat transfer inside a bioreactor
- To understand the principle of heat transfer inside bioreactor
- To design bio reactors for various operations

UNITI   ENGINEERINGPROPERTIES AND STORAGE TANK   (9)
Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNITII   REACTOR DESIGN   (9)
Design of Airlift ferment or, Bubble column reactor and Continuous stirred tank reactor.

UNITIII   HEATTRANSFER EQUIPMENTS   (9)
Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulation evaporator.

UNITIV   MASSTRANSFER EQUIPMENTS   (9)
Design of Boll man extractor, fractionating column, packed tower and spray tray absorber

UNITV   SEPERATIONEQUIPMENTS   (9)
Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rot art drum drier and Swenson–walker crystallizer.

TEXTBOOKS:

S.No	Author(s)Name	Title of the book	Publisher	Year o Publications
1	James Edwin Bailey, DavidF.Ollis	Biochemical Engineering Fundamentals	McGraw-Hill	2007
2	DonW.Green,RobertH. Perry	Chemical Engineer Handbook	The McGraw-Hill Companies	2008

REFERENCE BOOKS

S.No	Author(s)Name	Title of the book	Publisher	Year of Publications
1	Pauline.M.Doran	Bioprocess Engineering Principles	Academic Press	2013

16BTBTOE02 **FOOD PROCESSING AND PRESERVATION**   **L T P C**
                                                        3 0 0 3

INTENDED OUTCOMES

The students are exposed to
- Properties of food material
- Various methods used for preserving fruits and vegetables.

UNITI   SCOPE AND IMPORTANCE OF FOOD PROCESSING   (9)

Properties of food- Physical, thermal, mechanical, sensory. Raw material
Preparation -Cleaning, sorting, grading, peeling.

UNITII   PROCESSING METHODS   (9)

Heating- Blanching and Pasteurization. Freezing - De hydration- canning- additives-
fermentation- extrusion cooking -hydrostatic pressure cooking- dielectric heating- micro
wave processing and aseptic processing –Infrared radiation processing- Concepts and
equipment used.

UNITIII   FOOD CONVERSION OPERATIONS   (9)

Size reduction- Fibrous foods, dry foods and liquid foods- Theory and
equipments- membrane separation-filtration-equipment and application.

UNITIV   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.

UNITV   PRESERVATION METHODS FOR FRUITS ANDVEGETABLES   (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.

TEXT BOOKS

S.No	Author(s)Name	Title of the book	Publisher	Year of Publications
1	R.PaulSingh,DennisR .	Introduction to food Engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Wood head Publishing Ltd	2000

| 3 | MirceaEnachescuDau thy | Fruit and Vegetable Processing | FAO agricultural services bulletin | 1995 |

REFERENCEBOOKS

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

16BTBTOE03   **BASIC BIO INFORMATICS**   **L T P C**
                                                              3 0 0 3

INTENDED OUTCOMES

1. To enable the students to get aware of available tools and databases for performing research in bioinformatics.
2. To provide the thorough understanding of protein structure in detail.

UNITI   OVERVIEW OFBIOINFORMATICS   (9)
The scope of bio informatics; bio informatics & the internet; useful bio informatics 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.

UNITII   RETRIEVAL OF BIOLOGICAL DATA   (9)
Data retrieval with Entrez &DBGET/ Link DB; 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.

UNITIII PHYLO GENETICS   (9)
Phylogenetic, cladistics &ontology; building phylogenetic trees; evolution of
Macro molecular sequences. Sequence annotation: principles of genome annotation; annotation tools & resources.

UNITIV   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.

UNITV   MICROARRAYDATAANALYSIS   (9)
Microarray data, analysis methods; microarray data, tools & resources; sequence sampling &SAGE. Bioinformatics in pharmaceutical industry: informatics &drug discovery; pharma informatics resources. Basic principles of computing in bio informatics: running computer software;   computer operating systems; software downloading &installation; data base management.

TEXTBOOK

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

1	Dan E. Krane,Micha 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-Inter science	2004
3	David W. Mount	Sequence and Genome Analysis	Cold Spring Harbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCEBOOKS

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

16BTBTOE04   **FUNDAMENTALS OF NANO BIOTECHNOLOGY**   **L T P C**

                                                                    3 0 0 3

INTENDED OUTCOMES

1. To develop skills of the students in the field of Nano biotechnology and its applications in various fields.
2. The course will serve as an effective course to understand Socio-economic issues of Nano biotechnology.

UNIT I   INTRODUCTION   (9)

Introduction, Scope and Overview, Length scales , Importance of Nano scale 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,Dentalcare.

UNIT II   NANOPARTICLES   (9)

Introduction, Types of Nano particles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterial's, Significance of Nanoparticles Nanofabrications-MEMS/NEMS,AtomicForceMicroscopy,Selfassembledmonolayers/Dip-pen Nanolithography, Soft Lithography, PDMS Molding, Nanoparticles, Nanowires and Nanotubes.

UNIT III   APPLICATIONS   (9)

Nano medicine, Nano biosensor and Nano fluidics. Nano crystals in biological detection, Electrochemical DNA sensors and Integrated Nano liter systems. Nano-Bio devices and Systems. Fabrication of Novel Biomaterials through molecular self-assembly- Small scale systems for in vivo drug delivery-Future Nano machine.

UNIT IV   NANO BIOTECHNOLOGY   (9)

Clinical applications of Nano devices. Artificial neurons. Real-time Nano Sensors-Applications in cancerbiology. Nanomedicine.Syntheticretinylchipsbasedonbacteriorhodopsins. Highthroughput DNA sequencing with Nano carbon tubules. Nano surgical devices.

UNIT V   ETHICAL ISSUES IN NANOTECHNOLOGY   (9)

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With Especial Reference to Nano medicine, Nano medicine Applied in Nonmedical Contexts, Social Issues Relating to Nano medicine. Social and Ethical Issues, Economic Impacts, Other Issues, Nano technology and Future Socio-economic challenges.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Niemeyer, C.M. and Mirkin, C.A	Nano biotechnology: Concepts, Applications and Perspectives	Wiley-VCH	2004
2	Good sell, D.S.	Bio nanotechnology	John Wiley and Sons, Inc	2004

REFERENCEBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Shoseyov,O. and Levy,I	Nano biotechnology: Bio inspired Devices and Materials of the Future	Humana Press	2007
2	Bhushan,B.	Springer Handbook of Nanotechnology	Springer-VerlagBeri Heidelberg	2004
3	FreitasJrR.A	Nano medicine	Landes Bioscience	2004
4	Kohler,M.and Fritzsche,W.	Nanotechnology–An Introduction to Nano structuring Techniques	Wiley-VCH	2004

16BEMEOE01   **COMPUTER AIDED DESIGN**   **L T P C**
3 0 0 3

OBJECTIVE

| 1. | To provide an overview of how computers are being used in mechanical component design |

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   9
TRANSFORMATIONS
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 transformations, 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   45

TEXT BOOKS

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	Optimization Techniques	Wiley Eastern, New Delhi	2003

16BEMEOE02   **INDUSTRIAL SAFETY AND ENVIRONMENT**   **L T P C**
                                                              3 0 0 3

OBJECTIVE

1. Upon completion of this course, the students can able to understand the role of logistics and understand the phases of supply chain

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   45

TEXT BOOKS

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

16BEMEOE03   **TRANSPORT PHENOMENA**   **L T P C**
                                                                              3 0 0 3

OBJECTIVE

> 1. Upon completion of this course, the students can able to understand the relationship between free energy, entropy, internal energy, and enthalpy

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   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

OBJECTIVE

1. Biomechanics provides key information on the most effective and safest movement patterns, equipment, and relevant exercises to improve human movement.

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   45

REFERENCE

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

16BEAEOE01   **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

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

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

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

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

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.

TEXT BOOKS

SL.NO.	AUTHOR(S)	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

SL.NO.	AUTHOR(S)	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

16BEAEOE02   **BASICS OF TWO AND THREE WHEELERS**   **L T P C**
                                                              3 0 0 3

INTENDED 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
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
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
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
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
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.

TEXT BOOKS:

SL.NO.	AUTHOR(S)	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:

SL. NO.	AUTHOR(S)	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

16BEAEOE03　　　　　　**AUTOMOBILE MAINTENANCE**　　　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 0 0 3

INTENDED 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
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
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
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
 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
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.

TEXT BOOKS

SL.NO.	AUTHOR(S)	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			

16BEAEOE04 INTRODUCTION TO MODERN VEHICLE TECHNOLOGY   L T P C
                                                                   3 0 0 3

INTENDED 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
Hybrid vehicles - Stratified charged / learn burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II   DRIVER ASSISTANCE SYSTEMS
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
Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT IV   NOISE & POLLUTION
Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT V   TELEMATICS
Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition

TEXT BOOKS

SL. NO	AUTHOR(S)	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

SL. NO	AUTHOR(S)	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

16BECEOE01   **HOUSING, PLAN AND MANAGEMENT**   **L T P C**
                                                             3 0 0 3

COURSE OBJECTIVES
1. To examine the role and tasks of basic housing policies and building bye laws
2. Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
3. Analyze the Innovative construction methods and Materials
4. Analyze city management strategies and strengthen the urban governance through a problem solving approach
5. To know the Importance of basic housing policies and building bye laws
6. 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, Neighborhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organizations.

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 of Housing Units, Rents, Recovery Pattern (Problems).

TOTAL HRS : 45

TEXT BOOKS

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
1.	Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2.	UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 2000.

16BECEOE02 **BUILDING SERVICES** **L T P C**
                                              3 0 0 3

COURSE OBJECTIVES
1. Defining and identifying of eng. services systems in buildings.
2. The role of eng. services systems in providing comfort and facilitating life of users of the building.
3. The basic principles of asset management in a building & facilities maintenance environment
4. Importance of Fire safety and its installation techniques
5. To Know the principle of Refrigeration and application
6. 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 – Utilization 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 HRS : 45

TEXT BOOKS

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

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.

16BECEOE03 MANAGEMENT OF IRRIGATION SYSTEMS L T P C
3 0 0 3

OBJECTIVES

1. To enable the students for a successful career as water management professionals.
2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
3. To expose the students the need for an interdisciplinary approach in irrigation water management
4. To providing a platform to work in an interdisciplinary team.
5. 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.
6. 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 HRS : 45

TEXT BOOKS

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

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

16BECEOE04   ADVANCED CONSTRUCTION TECHNOLOGY   L T P C
                                                                3 0 0 3

OBJECTIVE:

1. To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
2. To study different methods of construction to successfully achieve the structural design with recommended specifications.
3. To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. To study of construction equipment's, and temporary works required to facilitate the construction process
5. To provide a coherent development to the students for the courses in sector of Advanced construction technology.
6. 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 equipment's
                                                                TOTAL HRS : 45
TEXT BOOKS

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

REFERENCE

1.Varma, M Construction Equipment and its Planning & Applications, Metropolitan Book Co., 2000

2.Nunnaly, S.W., Construction Methods and Management , Prentice – Hall, 2000

3.Ataev, S.S., Construction Technology, MIR , Pub. 2000

16BEECOE01   REAL TIME EMBEDDED SYSTEMS   L T P C
3 0 0 3

Course 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

Course 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
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
Introduction–AdvantageandDisadvantageofUsingRTOS–Multitasking–Tasks-RealTime
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
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
μ C/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

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

Memory Management: Memory Control Blocks–Creating Partition-Obtaining a Memory Block–Returning a Memory Block. Getting Started withµC/OS-II–Installingµ C/OS-II–PortingµC/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 ofµC/OS-II.

REFERENCES

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

16BEECOE02   CONSUMER ELECTRONICS   L T P C
**   3 0 0 3**

Course 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.

Course 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
 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
 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
 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
 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–VHOME APPLIANCES
Basic principle and block diagram of microwave oven; washing machine hardware and software;
Components of air conditioning and refrigeration systems.

TEXT BOOK:

1.S.P. Bali, "Consumer Electronics", PearsonEducation,2005.

16BEECOE03 NEURAL NETWORKS AND ITS APPLICATIONS   **L T P C**
                                                                          3 0 0 3

Course 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

Course 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 problems

UNIT I INTRODUCTION TO NEURAL NETWORKS
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
Error– correction learning– memory based learning- hebbian learning-competitive learning-Boltzmann learning-supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III PERCEPTION
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
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
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

REFERENCES:
1. SimonHaykin, "Neural Networks and Learning Machines"-3/E-Pearson/Prentice Hall2009
2. SatishKumar-"Neural Networks: A Classroom Approach"-TMH-2008
3. Freeman J.A., S kapura D.M." Neural networks, algorithms, applications, and programming techniques"-AdditionWesley,2005.
4. LaureneFausett, "Fundamentals of Neural Networks: Architectures, Algorithms, and Applications"

-Pearson/PrenticeHall5. Robert JS chalk off- "Artificial Neural Networks, McGrawHill"-1997

16BEECOE04   FUZZY LOGIC AND ITS APPLICATIONS   L T P C
3 0 0 3

Course 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

Course 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
- Ability to develop how to use Fuzzy computation to solve real- world problems
- Design fuzzy based model for any application

UNIT-I
Basics of Fuzzy Logic: Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT–II
Theory of Approximate Reasoning: Linguistic variables, Fuzzy proportions, Fuzzy if-then statements, inference rules, compositional rule of inference-fuzzy models

UNIT-III
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
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
Fuzzy based systems: Simple applications of FKBC-washing machines-traffic regulations-lift control-fuzzy in medical Applications-Introduction to ANFIS.

TEXTBOOKS:
1. An Introduction to Fuzzy Control-D .Diankar ,H. Hellendoom and M .Rein frank- Narosa Publishers India,1996.
2. Fuzzy Sets Uncertainty and Information-G.J. KlirandT.A. Folger-PHIIEEE,1995.