Estd. 1995

SETHU INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

Pulloor, Kariapatti - 626115

ISO 9001:2008
FS 70913

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATION 2015

CURRICULAM & SYLLABI

(1st SEMESTER To 8th SEMESTER)

Approved in the Academic Council Meeting held on 06.10.2016

26/12/16

HAIRMAN
ARD OF STUDIES
Chairperson
Board of Studies
Electronics & Communication Engineering
Sethu Institute of Technology
Kariapatti - 626 115

CHAIRMAN
ACADEMIC COUNCIL

Chairperson
Academic Council
Sethu Institute of Technology

Estd : 1995

SETHU INSTITUTE OF TECHNOLOGY

Pulloor, Kariapatti – 626 115

(An Autonomous Institution)

B.E. Degree Programme

CURRICULUM

Regulations 2015

Bachelor of Engineering in Electronics & Communication Engineering

OVERALL COURSE STRUCTURE

Category	Total No. of Courses	Credits	Percentage
Humanities & Social Sciences	**6**	**14**	**8.19**
Basic Sciences	**10**	**28**	**16.37**
Engineering Sciences	**8**	**20**	**11.70**
Professional Core	**27**	**67**	**39.18**
Professional Elective	**6**	**18**	**10.53**
Open Electives	**3**	**9**	**5.26**
Project Work	**2**	**15**	**8.77**
TOTAL	**62**	**171**	**100**

COURSE CREDITS – SEMESTER WISE

Branch	I	II	III	IV	V	VI	VII	VIII	TOTAL
ECE	**22**	**21**	**23**	**24**	**22**	**23**	**16**	**20**	**171**

Semester I

Course Code	Course Title	L	T	P	C
THEORY					
15UEN101	Technical English (Common to all Branches)	2	0	0	2
15UMA102	Engineering Mathematics – I(Common to all Branches)	3	2	0	4
15UPH103	Engineering Physics(Common to all Branches)	3	0	0	3
15UCY105	Applied Chemistry(Common to CSE,ECE,EEE,IT,EIE & Bio Medical)	3	0	0	3
15UCS107	Computer Programming(Common to all Branches)	3	0	0	3
15UME108	Engineering Graphics(Common to all Branches)	3	2	0	4
PRACTICAL					
15UCS109	Computer programming laboratory (Common to all Branches)	0	0	2	1
15UCS111	Engineering Fundamentals Laboratory (Common to CSE,ECE,IT)	0	0	2	1
15UGS112	Basic Sciences Laboratory-I (Common to all Branches)	0	0	2	1
	TOTAL	**16**	**2**	**10**	**22**
Total No. of Credits : 22					

Semester II

Course	Course Title	L	T	P	C
THEORY					
15UEN201	Business English & Presentation Skills (Common to all Branches)	3	0	0	3
15UMA202	Engineering Mathematics – II(Common to all Branches)	3	2	0	4
15UPH205	Semi conductor Physics & Opto Electronics (Common to CSE,ECE,IT)	3	0	0	3
15UCY207	Environmental Science (Common to all Branches)	3	0	0	3
15UEC208	Electronic Devices	3	0	0	3
15UEC209	Basic Electronic Measurements	3	0	0	3
PRACTICAL					
15UGS210	Basic Sciences Laboratory-II (Common to all Branches)	0	0	2	1
15UEC211	Electronic Devices Laboratory	0	0	2	1
	TOTAL	**18**	**2**	**4**	**21**
Total No. of Credits : 21					

Semester III

Course Code	Course Title	L	T	P	C
THEORY					
15UMA321	Transforms and Partial Differential Equations (Common to MECH, ECE, EEE, CIVIL,CHEMICAL,AGRI,BIOMEDICAL)	3	2	0	4
15UEC302	Digital Electronics and Design	3	0	0	3
15UEC303	Circuit Theory	3	2	0	4
15UEC304	Electronic Circuits	3	0	0	3
15UEC305	Analog Communication	3	0	0	3
15UIT326	Data Structures and Algorithm Analysis	3	0	2	4
PRACTICAL					
15UEC307	Digital Electronics Laboratory	0	0	2	1
15UEC308	Circuits Laboratory	0	0	2	1
	TOTAL	**18**	**4**	**6**	**23**
Total No. of Credits : 23					

Semester IV

Course Code	Course Title	L	T	P	C
THEORY					
15UMA424	Probability and Random Processes (Common to ECE,BIOMEDICAL)	3	2	0	4
15UEC402	Analog Circuits	3	0	0	3
15UEC403	Electromagnetic Fields	3	0	0	3
15UEC404	Signals and Systems	3	2	0	4
15UEC405	Digital Communication	3	0	0	3
15UEE426	Principles of Electrical Machines	3	0	0	3
15UGS431	Reasoning and Quantitative Aptitude (Common to all Branches)	1	0	0	1
PRACTICAL					
15UEC407	Analog Circuits Laboratory	0	0	2	1
15UEC408	Communication System Laboratory	0	0	2	1
15UCS429	Programming with C Laboratory	0	0	2	1
	TOTAL	**19**	**4**	**6**	**24**
Total No. of Credits : 24					

Semester V

Course Code	Course Title	L	T	P	C
THEORY					
15UEC501	Digital Signal Processing	3	2	0	4
15UEC502	Transmission Lines and Waveguides	3	0	0	3
15UEC503	Microprocessors, Microcontrollers and Applications	3	0	0	3
15UEC504	Data Communication and Networks	3	0	0	3
	Professional Elective I	3	0	0	3
	Professional Elective II	3	0	0	3
PRACTICAL					
15UEC507	Digital Signal Processing Laboratory	0	0	2	1
15UEC508	Microprocessors, Microcontrollers and Applications Laboratory	0	0	2	1
15UGS531	Soft Skills and Communication Laboratory (Common to CSE, ECE, EEE, IT)	0	0	2	1
	TOTAL	**18**	**2**	**6**	**22**
Total No. of Credits : 22					

Semester VI

Course Code	Course Title	L	T	P	C
THEORY					
15UEC601	Wireless Communication Systems	3	0	0	3
15UEC602	Antenna and Wave Propagation	3	0	0	3
15UEC603	VLSI Design	3	0	0	3
	Open Elective I	3	0	0	3
	Professional Elective III	3	0	0	3
	Professional Elective IV	3	0	0	3
PRACTICAL					
15UEC607	Networks Laboratory	0	0	2	1
15UEC608	VLSI Design Laboratory	0	0	2	1
15UEC609	Technical Project	0	0	6	3
	TOTAL	**18**	**0**	**10**	**23**
Total No. of Credits : 23					

Semester VII

Course Code	Course Title	L	T	P	C
THEORY					
15UME701	Project Management and Finance (Common to MECH,CSE, ECE,EEE,IT,EIE)	3	0	0	3
15UEC702	Optical Communication and Networks	3	0	0	3
15UEC703	Microwave Engineering	3	0	0	3
	Open Elective II	3	0	0	3
	Professional Elective V	3	0	0	3
PRACTICAL					
15UEC706	Optical and Microwave communication Laboratory	0	0	2	1
	TOTAL	**15**	**0**	**2**	**16**
Total No. of Credits : 16					

Semester VIII

Course Code	Course Title	L	T	P	C
THEORY					
15UME801	Professional Ethics (Common to all Branches)	2	0	0	2
	Open Elective III	3	0	0	3
	Professional Elective VI	3	0	0	3
PRACTICAL					
15UEC804	Project Work	0	0	24	12
	TOTAL	**8**	**0**	**24**	**20**
Total No. of Credits : 20					

LIST OF PROFESSIONAL ELECTIVES

SUBJECT CODE	SUBJECT NAME	L	T	P	C
15UEC901	Advanced Microcontrollers	3	0	0	3
15UEC902	Mobile Ad-hoc Networks	3	0	0	3
15UEC903	ARM Processor	2	0	2	3
15UEC904	Linear Control Engineering	3	0	0	3
15UEC905	DSP Processor Architecture	3	0	0	3
15UEC906	Advanced Digital System Design	3	0	0	3
15UEC907	High Speed Networks	3	0	0	3
15UEC908	Soft Computing Techniques	3	0	0	3
15UEC909	Digital Image Processing	2	0	2	3
15UEC910	Multimedia Compression and Communication	3	0	0	3
15UEC911	Television and Video Engineering	3	0	0	3
15UEC912	RF Circuit Design	3	0	0	3
15UEC913	Wireless Networks and Standards	3	0	0	3
15UEC914	FPGA-Based System Design	3	0	0	3
15UEC915	Internet of Things	3	0	0	3
15UEC916	Satellite Communication Principles and Applications	3	0	0	3
15UEC917	Speech and Audio Signal Processing	3	0	0	3
15UEC918	Remote Sensing and Information System	3	0	0	3
15UEC919	Nano electronics	3	0	0	3
15UEC920	Advanced Trends in Telecommunication	3	0	0	3
15UEC921	Embedded and Real Time Systems	2	0	2	3
15UEC922	Medical Electronics	3	0	0	3
15UEC923	Advanced Wireless technologies	3	0	0	3
15UEC924	Artificial Intelligence And Machine Learning	3	0	0	3
15UMA952	Numerical Techniques and Linear Algebra	2	2	0	3

INTERDISCIPLINARY ELECTIVE

Course Code	Course Title	L	T	P	C
15UGM953	Embedded Programming (Common to CSE &ECE)	3	0	0	3

OPEN ELECTIVES

Course Code	Course Title	L	T	P	C
15UEC971	Consumer Electronics	3	0	0	3
15UEC972	Remote Sensing and its Applications	3	0	0	3
15UEC973	Embedded Systems and Programming	3	0	0	3
15UEC974	Fundamentals of Digital Signal Processing	3	0	0	3
15UEC975	Fundamentals of Digital Image Processing	3	0	0	3
15UEC976	Sensors And Actuators	3	0	0	3

LIST OF MANDATORY COURSES

CATEGORY	COURSES
Personality and Social Development	Sports
	National Service Scheme
	Club Activities (ECO Club, Red Ribbon Club, YRC, Photography Club)
	Extra Curricular Activities
Skills Development	English Proficiency Certificate such as BEC, TOFEL, IELTS
	Foreign Languages
	Soft Skills and Aptitude
	Aptitude Proficiency certificate such as GRE, GMAT, CAT
	Co-Curricular Activities
	Intellectual Property Rights
Value Education	Value Education and Human Rights

LIST OF ONE CREDIT COURSES

Course Code	Course Title	L	T	P	C
15UEC861	PIC Embedded Programming	1	0	0	1
15UEC862	PCB Design	1	0	0	1
15UEC863	PYTHON Programming	1	0	0	1
15UEC864	ANDROID	1	0	0	1
15UEC865	Programming in R	1	0	0	1

SEMESTER I

15UEN101	TECHNICAL ENGLISH (Common to all Branches of Engineering)	L	T	P	C
		2	0	0	2

OBJECTIVES :

- To enhance the vocabulary of students
- To strengthen the application of traditional grammar and basic skills
- To improve the language proficiency of students

UNIT I 6

Grammar - Parts of Speech-Tense – **Vocabulary** – Technical Word Formation- Prefix- suffix - Synonyms and Antonyms– **Writing** – Instructions – Formal Letters - **Reading** Comprehension - Prose: A Nation's Strength – Dr. Karan Singh.

UNIT II 6

Grammar – Concord -'Wh' Questions – **Vocabulary** – One Word Substitutes – Listening & Speaking – Conducting Meetings – **Writing** - Preparation of the Checklist – **Reading** -Prose: My Vision of India-Dr.A.P.J.Abdul Kalam

UNIT III 6

Grammar – Voice – **Vocabulary** – Compound Nouns **Writing** – Minutes – Agenda -Transformation of Information (Transcoding)- **Reading Prose:** Professions of Women-Virginia Woolf.

UNIT IV 6

Grammar - Conditional clauses - Vocabulary - Idioms & Phrases - Writing Letters to Editor - Making Invitations - Acceptance & Declining - Summarizing – Reading - Prose: Computers-Peter Laurie

UNIT V 6

Grammar – Determiners – Vocabulary – Homophones & Homonyms – Writing Recommendations-Note Making - Report Writing- Reading – Prose: What We Must Learn From the West-Narayana Murthy

TOTAL : 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Use grammar effectively in writing meaningful sentences and paragraphs.
- Exhibit improved reading comprehension and vocabulary.
- Demonstrate writing skills in various formal situations.
- Demonstrate improved oral fluency.
- Presenting reports on various purposes.

TEXT BOOKS:

1. Meenakshi Raman, Sangeetha Sharma: Technical Communication English for Engineers, Chennai, Oxford University Press, 2008.

REFERENCE BOOKS:

1. Asraf Rizvi.M, Effective Technical Communication, New Delhi, Tata McGraw-Hill Publishing Company Limited, 2007.
2. Lakshminarayanan. K.R,English for Technical Communication, Chennai, Scitech Publications (India) Pvt. Ltd, 2004.
3. Faculty members of English, SIT, *Technical English,* 2015.

15UMA102	ENGINEERING MATHEMATICS – I (Common to ALL Branches)	L	T	P	C
		3	2	0	4

OBJECTIVES :

- To make the students capable of identifying algebraic eigen value problems from practical areas and obtain the eigen solutions in certain cases.
- To make the students knowledgeable in integrating various types of functions using various integration methods.
- To familiarize the students with the basic rules of differentiation and use them to find derivatives of products and quotients that they might encounter in their studies of other subjects in the same or higher semesters.

UNIT I DIFFERENTIAL CALCULUS 9 + 6

Introduction – Definition of derivatives – Limits and Continuity – Differentiation techniques (Product rule, Quotient rule, Chain rule) – Successive differentiation (n^{th} derivatives) – Leibnitz theorem (without proof) – Maclaurin's series – Physical Applications (Newton's law of cooling – Heat flow problems, Rate of decay of radioactive materials - Chemical reactions and solutions, Ohm's law, Kirchoff's law – Simple electric circuit problems)

UNIT II FUNCTIONS OF SEVERAL VARIABLES 9 + 6

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Differentiation of implicit functions – Jacobian – Taylor's expansion – Maxima and Minima – Method of Lagrangian Multipliers.

UNIT III INTEGRAL CALCULUS 8 + 6

Definitions and concepts of integrals – Methods of integration (Decomposition method, Substitution method, Integration by parts) – Definite integrals – Properties and problems – Reduction formulae – Beta and Gamma functions – Integration using Beta and Gamma functions.

UNIT IV MULTIPLE INTEGRALS 8 + 6

Double integration – Cartesian and Polar coordinates – Change of order of integration – Change of variables between Cartesian and Polar coordinates – Triple integration in Cartesian coordinates – Area as double integral – Volume as triple integral.

UNIT V MATRICES 8 + 6

Eigen value and eigenvector of a real matrix – Characteristic equation – Properties – Cayley-Hamilton theorem (excluding Proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation – Applications of Matrices.

SUPPLEMENT TOPIC (for internal evaluation only) 3

Evocation / Application of Mathematics, Quick Mathematics – Speed Multiplication and Division.

TOTAL : 45 (L) + 30 (T) = 75 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Analyze functions using limits, continuity and derivatives to solve problems involving these functions.
- Use the Lagrange multiplier method to predict extreme values of functions with constraints and to find the absolute maximum and minimum of a function on different domains.
- Apply the various methods of integration for evaluating definite integrals.
- Apply the knowledge of multiple integrals to find the area and volume of region bounded by the given curves.

- Find Eigen values and Eigenvectors for symmetric and non-symmetric matrices

TEXT BOOKS:

1. BALI N. P and MANISH GOYAL, "A Text book of Engineering Mathematics", Laxmi Publications (P) Ltd, New Delhi, 8th Edition, (2011).
2. GREWAL. B.S, "Higher Engineering Mathematics", Khanna Publications, New Delhi, 42nd Edition, (2012).
3. KREYSZIG. E, "Advanced Engineering Mathematics", John Wiley & Sons, New York, 10th Edition, (2011).

REFERENCE BOOKS:

1. RAMANA B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 11th Reprint, (2010).
2. GLYN JAMES, "Advanced Engineering Mathematics", Pearson Education, New Delhi, 7th Edition, (2007).
3. JAIN R.K and IYENGAR S.R.K," Advanced Engineering Mathematics", Narosa Publishing House, New Delhi, 3rd Edition, (2007).
4. BHARATI KRISHNA TIRTHAJI, "Vedic Mathematics - Mental Calculation", Motilal Banarsidass Publications, New Delhi, 1st Edition, (1965).

15UPH103	ENGINEERING PHYSICS (Common To All Branches)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To develop knowledge on principles of Thermal Physics
- To make students to understand classification of sound and applications of Ultrasonics
- To use the principles of Lasers and its types
- To apply principles of Quantum physics in engineering field
- To develop the research interest in crystal physics

UNIT I ICRYSTAL PHYSICS 9

Crystalline – Amorphous materials – single and poly crystal- Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – parameters of Unit cell – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – crystal growth technique- Bridgman method.

UNIT II ACOUSTICS AND ULTRASONICS 9

Classification of sound – decibel- weber- Fechner law – Units of Loudness- decibel- phon- sone- Reverberation – Absorption Coefficient –Introduction to ultrasonics- magnetostriction effect – piezoelectric effect - piezoelectric generator- Detection of ultrasonic waves - properties – Cavitations -Velocity measurement – acoustic grating - Industrial applications – SONAR .

UNIT III WAVE OPTICS AND LASERS 9

Introduction – interference – refractive index –Expression for plane, circularly and elliptically polarized light LASER: Introduction- Principles of Laser- Einstein theory of stimulated emission- Population inversion Methods - Types of lasers – Co_2 laser - semiconductor laser – homojunction –heterojunction - Applications.

UNIT IV QUANTUM PHYSICS 9

Quantum Physics- de Broglie wavelength – Schrödinger's wave equation – Time dependent – Time independent equation – Physical significance of wave function - Compton Effect – Theory and experimental verification .

UNIT V PROPERTIES OF SOLIDS AND THERMAL PHYSICS 9

Elasticity- Hooke's law - Relationship between three modulii of elasticity (qualitative) – stress - strain diagram – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young's modulus by uniform bending - Thermal conductivity- Newton's law of cooling – Lee's disc method - Thermal insulation in buildings- Concept of Entropy

TOTAL:45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- apply the crystal growth techniques
- discuss the basic concepts of Acoustics and Ultrasonics.
- acquire knowledge about wave optics and Lasers
- summarize the principles of quantum physics
- explain the methods of thermal conduction.

TEXT BOOKS:

1. Dr. Mani.P, “A Text Book of Engineering Physics”, Dhanam Publications, Edition ,2014, Chennai.

2. Rajendran.V, “Engineering,Physics”, Tata Mc-Graw Hill Publishing Company limited, New Delhi, Revised Edition 2013.
3. Palanisami P.K., “Physics For Engineers”, Scitech Publications (India), Pvt Ltd., Chennai, 2014.

REFERENCE BOOKS:

1. Raghuvenshi G.S., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition 2014.

2. Arul doss .G., “Engineering Physics”, PHI Learning Limited, New Delhi, Revised Edition 2013.

3. Marikani .A., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition 2012.

4. Sankar B.N., and Pillai .S.O., “A Text book of Engineering Physics”, New Age International Publishers Private Limited, New Delhi, Revised Edition 2013.

5. Avadhanulu M.N. and Kshirsagar P.G., “A Textbook: of Engineering Physics”, S.Chand& Company Ltd., New Delhi, 2015.

15UCY105	APPLIED CHEMISTRY (Common to ECE, EEE, EIE, CSE , IT,& Biomedical Engineering)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Understand the concept of electrochemistry and sensors.
- Apply the usage of chemistry in electrical and electronic devices.
- Acquire knowledge of smart materials
- Gain knowledge about energy storage devices & the concept of green chemistry.
- Understand the principles of spectroscopy and applications.

MODULE I CHEMICAL BONDING 9

Chemical Bonding: Electronic Configuration– Ionic Bond - Covalent Bond – Metallic bond –Aufbau principle, Octet Rule, Pauli Exclusion principle, Molecular Orbital theory, Valence bond theory and its limitations, Various types of hybridization(Homo nuclear& Hetero nuclear diatomic molecules) and shapes of molecules based on MO theory -bond strength and bond energy, Born-Haber cycle, Fajan's rule–Non Covalent Bonding-Hydrogen bonding, Vander Waals forces.

MODULE II ELECTRO CHEMISTRY AND CORROSION 9

Electrochemistry: Introduction -Electrochemical cells- reversible and irreversible cells – EMF – measurement of EMF-Single electrode potential-Nernst equation.

Chemical corrosion: Introduction- Definition- Types - (Dry corrosion, mechanism and its Example)-Electrochemical corrosion (Wet corrosion, mechanism and its Types – Galvanic & Differential aeration Corrosion- Pitting, crevice & Wire fence corrosion). Factors influencing rate of corrosion. Corrosion prevention - Cathodic protection, Corrosion inhibitors, and Protective coatings – Paint, Electroplating – Gold plating-Risk Analysis -Electroless plating – Nickel plating

MODULE III CONVENTIONAL ENERGY STORAGE DEVICES AND SENSORS 9

Conventional devices - Batteries- Primary and secondary batteries- Construction, working and applications of Zn – MnO_2, Lead acid storage and Cd batteries. Fuel cells – Differences between battery and fuel cell, construction and working of H_2 – O_2 fuel cell.

Electrochemical sensors: Chemically modified electrode (CMEs) – Concept, CMEs sensors, Chemical sensors – gas sensors – ion selective electrodes, principle, types (solid state membranes and liquid membranes) and applications. Biosensors – electrochemical biosensors – glucose biosensors.

MODULE IV INSTRUMENTATION FOR ANALYTICAL METHODS AND GREEN CHEMISTRY 9

Beer-Lamberts law - Principle, instrumentation and applications –UV-Visible spectrophotometer-X-ray diffractometer - Thermo Gravimetric Analysis (TGA) - Differential Thermal Analysis (DTA)-Differential Scanning Colorimetry (DSC).

Green chemistry – Concept, importance, principles – e- waste disposal

MODULE V POLYMERS& SMART MATERIALS 9

Introduction- Terminology- structure and properties - Conducting polymers – Chemical and Electrochemical doping; Charge transfer polymer – Polymers filled with conductive solids, Organic Light emitting diodes – Principles and applications, Liquid crystals – definition and applications.

TOTAL:45 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able to

- Have sound knowledge on the basics of chemistry related to bonding.
- Know the principles, various types of corrosion and corrosion control techniques.
- Realize the need of green practices in energy storage devices.
- Identify the instruments for chemical analysis.
- Gain knowledge on polymers in electronics and its applications.

TEXT BOOKS:

1. Jain P.C. and Monica Jain, “Engineering Chemistry”, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2002.
2. Dr.Sunita Rattan, “A Textbook of Engineering Chemistry” S.K.Kataria& Sons., New Delhi,2013.

REFERENCE BOOKS:

1. Derek Pletcher and Frank C. Walsh, “Industrial Electrochemistry”, Chapman and Hall, New York, 1993.
2. Peter Grundler, “ Chemical Sensors – An introduction for Scientists and Engineers”, Springer, New York, 2007.
3. ArnostReiser, “Photoreactive Polymers the Science and Technology of Resists”, Wiley Interscience, New York,1989.
4. Paul T. Anastas, John C. Warner, ‘Green Chemistry: Theory and Practice’, Oxford University Press, (2000).

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15UCS107	COMPUTER PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To impart the concepts in basic organization of computers and problem solving techniques.
- To familiarize the programming constructs of C.
- To explain the concepts of arrays, strings, functions, pointers, structures and unions in C.

UNIT I INTRODUCTION **8**

Generation and Classification of Computers - Basic Organization of a Computer – Problem formulation – Problem Solving - Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

UNIT II C PROGRAMMING BASICS **9**

Introduction to ' C' programming – fundamentals – structure of a 'C' program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in 'C' – Managing Input and Output operations

UNIT III DECISION MAKING AND LOOPING STATEMENTS **10**

if - if-else - nested if-else – else-if ladder statement – switch – goto – for- while – do-while – break – continue statements – Problem solving with decision making and looping statements

UNIT IV ARRAYS, STRINGS AND FUNCTIONS **9**

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays - String - String operations – string arrays - Function – definition of function – Declaration of function – Parameter passing methods – Recursion - Storage classes – Problem solving with arrays, strings and functions

UNIT V POINTERS, STRUCTURES AND UNIONS **9**

Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays - Dynamic Memory allocation – Structure - need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Pre-processor directives

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Illustrate the basics about computer
- Develop simple programs using branching and looping constructs
- Write C program to manage data using arrays
- Develop programs using functions
- Write C programs for simple applications

TEXT BOOKS :

1. Sutha . J, “Computer Programming”, Third edition 2015, Little moon Publications, Kariapatti.
2. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, Oxford University Press, First Edition, 2009.
3. Behrouz A. Forouzan, Richard F.Gilberg, “A Structured Programming Approach using C”, Third Edition, Thomson Course Technology, 2007.

REFERENCE BOOKS :

1. Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011.
2. Kernighan.B.W ,Ritchie.D.M, “The C Programming language”, Pearson Education, Second Edition, 2006.
3. Stephen G.Kochan, “Programming in C”, Pearson Education India, Third Edition, 2005.
4. Anita Goel ,Ajay Mittal, ” Computer Fundamentals and Programming in C””, Dorling Kindersley (India) Pvt. Ltd, Pearson Education in South Asia, 2011.
5. Byron S Gottfried, ” Programming with C ”, Schaum’s Outlines, Tata McGraw-Hill, Second Edition, 2006.

15UME108	ENGINEERING GRAPHICS (Common to ALL Branches)	L	T	P	C
		3	2	0	4

OBJECTIVES:

- To develop in students graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings
- To impart knowledge in development of surfaces, isometric and perspective projections

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) **1**

Importance of Graphics in Engineering Applications – Use of Drafting Instruments – BIS Conventions and Specifications – Size, Layout and Folding of Drawing Sheets – Lettering and Dimensioning

UNIT I PLANE CURVES, PROJECTION OF POINTS, LINES AND PLANE SURFACES **9+5**

Plane Curves: (Not for Examination)

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of squad and circle – Drawing of tangents and normal to the above curves.

Projections:

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

UNIT II PROJECTION OF SOLIDS **9+6**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to Horizontal plane (HP) only.

UNIT III SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES **9+6**

Sectioning of above solids in simple vertical position by cutting planes inclined to Horizontal plane (HP) and perpendicular to the VP – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids inclined to Horizontal plane (HP) only – Prisms, pyramids, cylinders and cones

UNIT IV ISOMETRIC AND PERSPECTIVE PROJECTIONS **9+6**

Isometric Projections

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones when cutting plane inclined to Horizontal plane (HP) only.

Perspective Projections (Not for Examination)

Perspective projection of prisms, pyramids and cylinders by visual ray method.

UNIT V ORTHOGRAPHIC PROJECTION **9+6**

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 of multiple views from pictorial views of objects.

TOTAL: 45(L)+30(T)=75 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

1. Discuss first angle projection to project straight line, planes and solids.
2. Illustrate simple solids like prisms, pyramids, cylinder and cone.
3. Construct section of solids and development of surfaces for engineering applications.
4. Prepare isometric views of objects like truncated solids and frustums.
5. Prepare orthographic views from isometric drawings.Analysis of DT-LTI systems using Z Transform.

TEXT BOOKS:

1. SeeniKannan P., PitchayyaPillai G., and ArunBalasubramanian K., "Engineering Graphics", Little Moon Publication, Revised edition 2016.
2. Bhatt N.D., "Engineering Drawing", 46th Edition, Charotar Publishing House, (2003).

REFERENCE BOOKS:

1. Natarajan K.V., "A Text book of Engineering Graphics", Dhanalakshmi Publishers, (2006).
2. Venugopal K., and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, (2008).
3. Gopalakrishnan K.R., "Engineering Drawing" (Vol .I&II), Subhas Publications,(1998).
4. DhananjayA.Jolhe, "Engineering Drawing with an introduction to Auto CAD", Tata McGraw Hill Publishing Company Limited, (2008).

15UCS109	COMPUTER PROGRAMMING LABORATORY (Common to ALL Branches)	L	T	P	C
		0	0	2	1

OBJECTIVES :

- To make the students to work with Office software.
- To familiarize the implementation of programs in C.

LIST OF EXPERIMENTS

a) **Word Processing**

Document creation, Formatting, Table Creation, Mail merge

b) **Spread Sheet**
Chart - Line, XY, Bar and Pie, Formula - formula editor.

c) **C Programming**

- Programs using simple statements
- Programs using decision making statements
- Programs using looping statements
- Programs using one dimensional and two dimensional arrays
- Solving problems using string functions
- Programs using user defined functions and recursive functions
- Programs using pointers
- Programs using structures and unions

Total : 30 Periods

COURSE OUTCOMES:
After the successful completion of this course, the student will be able to

- Create the document in Word Processing software.
- Write programs using control constructs.
- Apply functions to reduce redundancy.
- Design and implement C programs for simple applications.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS
HARDWARE

LAN SYSTEM WITH 30 NODES (OR) STANDALONE PCS – 30 NOS.

SOFTWARE

OS – UNIX CLONE **(License free Linux)**
APPLICATION PACKAGE – OFFICE SUITE
COMPILER – C

15UCS111	ENGINEERING FUNDAMENTALS LABORATORY (Common to CSE, ECE & IT)	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To demonstrate the hardware components of a computer
- To train the students to assemble the hardware components of a computer
- To train the students to install softwares
- To demonstrate residential house wiring, fluorescent lamp wiring, measurement of earth resistance, colour coding of resistors, logic gates and soldering.

LIST OF EXPERIMENTS

GROUP A (COMPUTER)

I) COMPUTER ENGINEERING PRACTICE 15

a) Demonstration on basic Hardware Components of Computer
b) Assembling of Hardware Components of Computer
c) Installation of Operating Systems (Windows Xp, Windows 7)
d) Installation of Drivers for Windows xp
e) Installation of Application software
f) Installation of Anti Virus Software
g) Preventive maintenance of a PC
h) Install and configure network interface card in LAN system

GROUP B (ELECTRICAL & ELECTRONICS)

II) ELECTRICAL ENGINEERING PRACTICE 7

(a) Residential house wiring using switches, fuse, indicator, lamp and energy meter and Stair case wiring
(b) Fluorescent lamp wiring.
(c) Measurement of resistance to earth of electrical equipment.

III) ELECTRONICS ENGINEERING PRACTICE 8

(a) Study of Electronic components and equipments – Resistor, colour coding measurement of AC Signal parameter (peak-peak, rms, period, frequency) using CRO.
(b) Study of logic gates AND, OR, EX-OR and NOT Gate.
(c) Soldering practice – Components, Devices and Circuits – Using general purpose PCB.

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Identify the Hardware Components of Computer
- Perform installation of software
- Demonstrate the basic network settings
- Execute the basic wiring, soldering etc.

- Solve the problems that are encountered in basic engineering work

TOTAL: 30 PERIODS

EQUIPMENT REQUIREMENT

ELECTRICAL ENGINEERING

Sl. No.	Name of the equipment/software	Quantity Required
1	Assorted electrical components for house wiring	15 sets
2	Electrical measuring instruments	10 sets
3	Megger (250V/500V)	1 No.
4	Study purpose items: Iron box, fan and regulator, emergency lamp	One each
5	Power Tools: (a) Range Finder (b) Digital Live-wire detector	2 No. 2 No

ELECTRONICS ENGINEERING

Sl. No.	Name of the equipment/software	Quantity Required
1	Logic trainer kit	2
2	CRO,AFO	2 each
3	Small multipurpose PCBs	10 No.
4	Soldering guns	10
5	Multimeters	5 No.
6	Assorted electronic components for making circuits	Required quantity

15UGS112	BASIC SCIENCES LABORATORY- I (Common to ALL Branches)	L	T	P	C
		0	0	2	1

PHYSICS LABORATORY

COURSE OBJECTIVES :

- To create scientific Temper among the students.
- To know how to execute experiments properly, presentation of observations and arrival of conclusions.
- To view and realize the theoretical knowledge acquired by the students through experiments

LIST OF EXPERIMENTS:

1. Laser – determination of particle size and wavelength of laser source using diode laser.
2. Ultrasonic interferometer - determination of velocity of sound and compressibility of liquid.
3. Poiseuille's method - determination of viscosity of liquid.
4. Spectrometer – determination of dispersive power of a prism.
5. Compound pendulum – determination of the acceleration due to gravity
6. Air wedge method - determination of thickness of a thin wire.

- **A minimum of five experiments shall be offered.**

COURSE OUTCOMES:

After the successful completion of this course, the student shall be able to

- Determine the thickness of various micro level objects using air wedge method.
- Analyze the viscous properties of various liquids using Poiseuille's method.
- Compare the velocity of ultrasonic waves in various liquids by ultrasonic interferometer method.

CHEMISTRY LABORATORY

COURSE OBJECTIVES :

- To impart knowledge on basic concepts in application of chemical analysis.
- To train the students in instrumental methods.
- To develop skills in estimation of various ions by chemical and instrumentation methods.

LIST OF EXPERIMENTS:

(Common to ECE, EEE, EIE, CSE. IT, &Biomedical Engineering Branches)

1.Preparation of molar and normal solutions of the following substances – Oxalic acid , Sodium Carbonate , Sodium Hydroxide and Hydrochloric acid
2.Conductometric Titration of strong acid with strong base
3.Estimation of Fe^{2+} ion by potentiometry
4. Determination of Strength of given acid using pH metry
5.Determination of molecular weight of polymer by viscometry
6.Comparison of the electrical conductivity of two samples-conductometric method
7.Estimation of copper in brass by EDTA method

COURSE OUTCOMES:

After the successful completion of this course, the student shall be able to

- Estimate the ions present in the given sample
- Determine the rate of corrosion,molecular weight and amount of solids in water.
- Estimate the acidity of water sample.

A minimum of FIVE experiments shall be offered

TOTAL: 30Periods

SEMESTER II

15UEN201	BUSINESS ENGLISH & PRESENTATION SKILLS (Common to all Branches of Engineering)	L	T	P	C
		3	0	0	3

OBJECTIVES :

- To use linguistic tools confidently in an English speaking context
- To listen and speak during normal business activities such as interviews, meetings, telephone conversations and negotiations.
- To write business letters, emails, reports, articles and comprehend information on the Internet and other media.
- To gain language skills for real business life situations

UNIT I 9

Grammar- Numerical Adjective; **Vocabulary** - Job title and describing jobs; **Listening** - Listening to company culture; **Reading** - Quiz; **Writing** - Writing formal and semi formal business letters; **Speaking** – Personal information, Companies and products

UNIT II 9

Grammar –Modals; **Vocabulary –** Collocations; **Listening** - Business Proceedings; **Reading** - Designing websites and e– mail ; **Writing** – Memo - **Speaking -** Role play on various business situation.

UNIT III 9

Grammar – prepositions – Articles; **Vocabulary –**Jargons related to Shares and stock; **Listening** – Interviews of celebrities; **Reading –** Shares and stock exchange transactions; **Writing** – Business report – Minutes of the Meeting; **Speaking** – Presentations, Making a business talk.

UNIT IV 9

Grammar - Connectives; **Vocabulary** –Words related to finance; **Listening** - Listening to statistical information; **Reading** - Interpreting business related bar charts; **Writing** - Letters to express interest in new products; **Speaking** - Presenting a summary of an article.

UNIT V 9

Grammar - Reported speech; **Vocabulary** – Words related to employment ; **Listening**-Listening to audio and video speech of business people; **Reading** - Reading News paper article/magazine articles on business; **Writing** - Writing a Proposal; **Speaking** - Discussing company policies.

TOTAL : 45(L) = 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to:

- Use business vocabulary effectively to present the ideas.
- Accomplish verbal and written communications.
- Write effectively in a wide range of business letters.
- Prepare Business Proposals and Business Reports for various business purposes.
- Make a presentation in English in various business avenues.

TEXT BOOKS:

1. Elankathiravan B.A, *Business English and Presentation Skills,* Sivakasi, Wakeup Publications, 2016.

REFERENCE BOOKS:

1. Michael McCarthy, Felicity O'Dell, English Collocations in Use, Noida, Cambridge University Press, 2006.
2. Allan Pease, Body Language, New Delhi, Sudha Publications (P) Ltd, 2005.
3. Malcolm Goodale, Professional Presentations, New Delhi, Cambridge University Press, 2006.
4. Randolph Hudson. H & Bernard Selzler. J. Business Communication, Jaico Publishing House, 2006

15UMA202 **ENGINEERING MATHEMATICS – II**

(Common to ALL Branches)

L	T	P	C
3	2	0	4

OBJECTIVES :

- To develop an understanding of the basics of vector calculus comprising of gradient, divergence and curl, and line, surface and volume integrals and the classical theorems involving them.
- To acquaint the student with the concepts of analytic functions and their interesting properties which could be exploited in a few engineering areas, and be introduced to the host of conformal mappings with a few standard examples that have direct application.
- To make the student acquire sound knowledge of Laplace transform and its properties and sufficient exposure to the solution of certain linear differential equations using the Laplace transform technique.

UNIT I **ANALYTICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS** **8 + 6**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Applications of ODE (Bacterial growth, Population growth, Decayed problems).

UNIT II **VECTOR CALCULUS** **8+ 6**

Gradient Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopiped.

UNIT III **ANALYTIC FUNCTIONS** **8 + 6**

Functions of a complex variable – Analytic function – Necessary and Sufficient Conditions (excluding Proofs) – Harmonic function - Properties of an analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w = z+c, cz, 1/z, and Bilinear transformation.

UNIT IV **COMPLEX INTEGRATION** **9 + 6**

Statement and applications of Cauchy's integral theorem, Cauchy's integral formula and Cauchy Residue Theorem – Taylor's and Laurent's expansions – Applications of residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding Poles on the real axis).

UNIT V **LAPLACE TRANSFORM** **9+ 6**

Existence conditions – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function, impulse function and periodic function - Inverse Laplace transform – Convolution theorem (excluding Proof) –Solution of linear ODE of second order with constant coefficients.

SUPPLEMENT TOPIC (for internal evaluation only) **3**

Evocation / Application of Mathematics, Arithmetical, Ability – Time and Work – Time and Distance.

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TOTAL : 45 (L) + 30 (T) = 75 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Solve first and higher order ordinary differential equations analytically and apply in real life engineering problems.
- Calculate the gradients and directional derivatives of functions of several variables.
- Find the image of a region under conformal mapping and construct analytic functions using its properties.
- Apply the knowledge of standard techniques of complex variables for evaluating different functions

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- Apply Laplace Transform methods to solve initial value problems for constant coefficient linear ODEs.

TEXT BOOKS:

1. BALI N. P and MANISH GOYAL, “Text book of Engineering Mathematics”, Laxmi Publications (P) Ltd., New Delhi, 3rd Edition, (2008).
2. GREWAL. B.S, “Higher Engineering Mathematics”, Khanna Publications, New Delhi, 43rd Edition, (2014).
3. SANKAR RAO. K, “Numerical Methods for Scientists and Engineers”, Prentice Hall of India, New Delhi, 3rd Edition, (2007).

REFERENCE BOOKS:

1. RAMANA B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, 11th Reprint, (2010).
2. KREYSZIG. E, “Advanced Engineering Mathematics”, John Wiley & Sons, New York, 10th Edition, (2011).
3. JAIN R.K and IYENGAR S.R.K, “Advanced Engineering Mathematics”, Narosa Publishing House Pvt. Ltd., New Delhi, 3rd Edition, (2007).
4. GERALD C.F. and WHEATELEY, P.O. “Applied Numerical Analysis”, Pearson Education, New Delhi, 7th Edition, (2003).
5. AGARWAL R.S., “Quantitative Aptitude”, S. Chand Publications, New Delhi, 7th Edition, (2008), pp. 341-370, 384-404.

15UPH205	SEMICONDUCTOR PHYSICS AND OPTO ELECTRONICS (COMMON TO ECE, CSE & IT BRANCHES)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the essential principles of physics for information science and related Engineering applications.
- To demonstrate the concepts of conduction in conductors.
- To apply fundamental knowledge in the area of fiber optics.
- To enable the students to understand the dielectric and superconducting materials.

UNIT – I CONDUCTING MATERIALS **9**

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

UNIT – II TRANSPORT PROPERTIES OF SEMICONDUCTORS AND MAGNETIC MATERIALS **9**

Introduction- Types of semiconductor –Expression for conductivity of a semiconductor- Hall effect-Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials .

UNIT –III DIELECTRICS AND SUPERCONDUCTING MATERIALS **9**

Introduction- Types of polarization -Local or Internal field- Types of Dielectric Materials- Applications- Introduction of superconductors- Properties- Types of superconductors- High temperature superconductors- Applications of superconductors-– SQUID – Maglev.

UNIT – IV OPTOELECTRONICS **9**

Introduction -Modulations- Pulse code modulation- Franz- Keldysh and stark effect eletroabsorbtion modulators- Optical switching- Bipolar controller- Applications of Bipolar controller.

UNIT-V FIBRE OPTICS **9**

Introduction- Principle and propagation of optical fibres - Types of optical fibre- Losses in fibres- Advantages of opicalfibre-Fibre optic communication systems (Block diagram)- Splicing- Fusion and Mechanical splicing- Fibre optic sensors –Temperature and pressure sensor.

TOTAL:45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Summarize the structure, properties, performance, and processing of conductors to solve engineering problems.

- Understand how semiconducting and magnetic materials are influencing engineering design.
- Discuss the various polarization mechanisms in dielectrics.
- Familiarize with the basics of optoelectronic materials and their applications.
- Outline the principle of Fibre optical communication.

TEXT BOOKS:

1. William D. Callister, Jr. “Material Science and Engineering”, Seventh Edition, John Wiley & Sons Inc. New Delhi, 2010
2. Dr. Mani.P, “Engineering Physics II ”, Dhanam Publications, Edition ,2014, Chennai
3. Rajendran.V, “Engineering,Physics”, Tata Mc-Graw Hill Publishing Company limited, New Delhi, Revised Edition 2013.

REFERENCE BOOKS:

1. Raghuvenshi G.S., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition 2014.
2. Arul doss .G., “Engineering Physics”, PHI Learning Limited, New Delhi, Revised Edition 2013.
3. Marikani .A., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition 2012.
4. Sankar B.N., and Pillai .S.O., “Engineering Physics – I”, New Age International Publishers Private Limited, New Delhi, Revised Edition 2015.

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15UCY207	ENVIRONMENTAL SCIENCE (COMMON TO ALL BRANCHES)	L	T	P	C
		3	0	0	3

OBJECTIVES :

- Understanding the concepts of ecosystem and biodiversity.
- Acquire knowledge about the impact of environmental pollution.
- Awareness on various types of resources.
- Understand the importance of social issues and the environment.
- Impart awareness about the value education and population growth.

MODULE I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 10

Definition, scope and importance of environment – Need for public awareness – Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity – Definition: genetic, species and ecosystem diversity – Biogeographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

MODULE II ENVIRONMENTAL POLLUTION 9

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

MODULE III FUTURE POLICY AND ALTERNATIVES 9

Future policy and alternatives-fossil fuels-nuclear energy-solar energy-wind energy-hydroelectric energy-geothermal energy-tidal energy-sustainability-green power-nanotechnology-international policy.

MODULE IV SOCIAL ISSUES AND THE ENVIRONMENT 9

From unsustainable to sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization - Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – Consumerism and waste products – Environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation – Public awareness.

MODULE V HUMAN POPULATION AND THE ENVIRONMENT 8

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health

.

TOTAL : 45 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Comprehend the importance of environmental impact on ecosystem and biodiversity
- Understand current environmental challenges like pollution and its management.
- Remembering the fundamentals of physical and biological principles that govern natural processes.
- Perform their role in protecting the environment from social issues.
- Learn the importance of population explosion and its controlling measures.

TEXT BOOKS:

1. AnubhaKaushik, kaushik C.P., “Environmental Science and Engineering”, Third Edition, New Age International, New Delhi, 2009.
2. Benny Joseph “Environmental Science and Engineering”, Tata Mc-Graw Hill, New Delhi, 2006

REFERENCE BOOKS:

1. Gilbert M.Masters, ‘Introduction to Environmental Engineering and Science’, Pearson Education,Upper saddle River, New Jersey, 2008.
2. Miller T.G. Jr., Environmental Science”, Wadsworth Publishing Company, Belmont, California, 2005.
3. De A.K., “Environmental Chemistry”, Wiley Eastern Ltd., New Delhi, 2001.
4. Trivedi R.K., Goel P.K., “Introduction to Air Pollution”, Techno-Science Publication, Jaipur, 2005.

15UEC208	ELECTRONIC DEVICES	L	T	P	C
		3	0	0	3

OBJECTIVES :

- To explain the basic physical structure, principles of operation & electrical characteristics of diode
- To make the students understand the construction, operation and characteristics of BJT, FET and MOSFET
- To give an idea about the characteristics and behavior of special semiconductor devices

UNIT I INTRODUCTION TO SEMICONDUCTORS 9

Classification of solids based on energy band theory - classification of semiconductors- conductivity of semiconductors- carrier concentration in intrinsic semiconductor-mass action law – variation in semiconductor parameters with temperature – drift and diffusion currents.

UNIT II SEMICONDUCTOR DIODES 9

Theory of PN junction diode – Energy band structure – current equation – space charge and diffusion capacitances – effect of temperature and breakdown mechanism- Zener diode and its characteristics.

Applications: Rectifiers - Half-wave, full-wave and bridge rectifiers with resistive load Analysis for V_{dc} and ripple voltage with C, L filters, types of voltage regulator, Zener diode regulator

UNIT III TRANSISTORS 9

Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors - The transistor as a switch, as an amplifier, transistor regulator, principles of obtaining a regulated power supply, regulator with current limiting, Over voltage protection, Switched mode power supply (SMPS)

UNIT IV FIELD EFFECT TRANSISTORS 9

Construction of N-Channel JFET – Operation of N-Channel JFET – Characteristic parameters of the JFET – Expression for saturation drain current – Slope of the transfer characteristics at IDSS – Comparison of JFET and BJT – Applications of JFET – Metal oxide semiconductor field effect transistor (MOSFET) – Enhancement MOSFET – Depletion MOSFET – Comparison of MOSFETwith JFET – Handling precautions for MOSFET – Comparison of N-with P-Channel MOSFETs

UNIT V SPECIAL SEMICONDUCTOR DEVICES (QUALITATIVE TREATMENT ONLY) 9

Tunnel diodes – PIN diode, varactor diode – SCR characteristics, Power control using SCR and two transistor equivalent model – UJT – Diac and Triac – Laser, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells – LED, LCD

.

TOTAL : 45 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Explain the mechanism of current flow in semiconductors.
- Design power supplies and DC regulator circuit using zener diode.
- Discuss CE, CC and CB configurations of transistor and their characteristics.
- Summarize the operation of JFET & MOSFET.
- Outline the operation of special semiconductor devices.

TEXT BOOKS:

1. Salivahanan S., Suresh kumar N. and Vallavanraj A., "Electronic Devices and Circuits ", Tata McGraw Hill., 3rd Edition, 2012.
2. David A. Bell, "Electronic Circuits and Electron Devices ", Oxford University Press, Anna Edition, 2010.

REFERENCE BOOKS:

1. Robert T. Paynter, "Introducing Electronics Devices and Circuits ", Pearson Education, Seventh Edition, 2010.
2. Millman J. & Halkins and Satyebranta Jit, "Electronic Devices & Circuits ", Tata Mc-Graw Hill, Second Edition, 2008.

15UEC209	BASIC ELECTRONIC MEASUREMENTS	L	T	P	C
		3	0	0	3

OBJECTIVES :

- To explain the basic measurement concepts
- To give an idea about the measuring instruments
- To describe the importance of oscilloscopes and signal generators in measurements

UNIT I MEASUREMENT, ERROR, STANDARDS AND UNITS 9

Measurement systems, accuracy and precision, Types of error, statistical analysis, probability of error, limiting error, Units- Fundamental and derived units, systems of units, Electric and magnetic units, International system of units, other system of units, conversion of units.

Standards- Classification of standards, standards for mass, length and volume, Time and frequency standards, Electrical standards, Standards of temperature and luminous intensity, IEEE standards.

UNIT II ELECTROMECHANCIAL INDICATING INSTRUMENTS 9

Suspension Galvanometer, Torque and deflection of the galvanometer, Permanent magnet moving coil mechanism, DC Ammeter, DC Voltmeter, Voltmeter Sensitivity, Series type Ohm meter, Shunt type Ohmmeter, Multimeter or VOM

UNIT III BRIDGE MEASUREMENTS 9

Wheatstone bridge, Kelvin bridge, Guarded Wheatstone bridge, AC bridges and their applications, Maxwell bridge, Hay bridge, Schering bridge, Anderson bridge and Wien bridge, Wagner Ground Connection.

UNIT IV OSCILLOSCOPES 9

Cathode ray oscilloscopes - block diagram, Cathode ray tube, CRT circuits, Vertical Deflection system, Delay line, Multiple trace, Horizontal Deflection system, Oscilloscope probe and transducers, Oscilloscope technique, Special oscilloscopes- Analog and Digital Storage oscilloscope.

UNIT V SIGNAL GENERATORS AND ANALYZERS 9

Signal generators - sine wave generators, Frequency synthesized signal generator, Frequency divider generator, Signal generator modulation, Sweep Frequency generators, pulse and square wave generators, Function generator, Audio frequency signal generator, spectrum analyzer.

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TOTAL : 45 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Explain the basic concepts of electronic measurements
- Explain the working principle of measuring instruments
- Compare Bridge Measurements
- Outline the operation of oscilloscopes
- Describe the working of Signal generators and spectrum analyzer

TEXT BOOKS

1.Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Pearson / Prentice Hall of India, 2007.
2. Ernest O. Doebelin, Measurement Systems- Application and Design, TMH, 2007.

REFERENCES

1.Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, Pearson Education, 2003.
2. Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Hall of India, 2003.
3. David A. Bell, Electronic Instrumentation and measurements, Prentice Hall of India Pvt Ltd, 2003.
4. B.C. Nakra and K.K. Choudhry, Instrumentation, Measurement and Analysis, 2nd Edition, TMH, 2004.
5. James W. Dally, William F. Riley, Kenneth G. McConnell, Instrumentation for Engineering Measurements, 2nd Edition, John Wiley, 2003.

15UGS210	BASIC SCIENCES LABORATORY –II	L	T	P	C
		0	0	2	1

PHYSICS LABORATORY(Common to CSE, ECE, EEE, EIE, IT& Bio-Medical Branches)

COURSE OBJECTIVES:

- To introduce the experimental procedure for the Band gap of a semiconductor, B-H curve and Potentiometer.
- To demonstrate the working of Spectrometer and Lee's Disc apparatus.

LIST OF EXPERIMENTS

1. Laser – Determination of numerical aperture and acceptance angle of an optical fibre.
2. Carey Foster's Bridge – Determination of specific resistance of the given coil.
3. Spectrometer – Determination of wavelength of mercury source using grating.
4. Newton's ring – Determination of radius curvature of convex lens.
5. B-H curve - Study of Hysteresis Loop
6. Determination of Band gap of a semiconductor.

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Analyze the thermal conductivities of bad conductors and also the properties of semiconductors.
- Know the elastic properties of materials using uniform&non-uniform bending method of young's modulus.
- Understand the theory behind the signal communication through laser in optical fiber.

CHEMISTRY LABORATORY(Common to ALL Branches)

COURSEOBJECTIVES:

- Develop the practical skills to evaluate the quality parameters of water and industrial effluents
- Apply the theoretical principles and perform experiments**.**

LIST OF EXPERIMENTS

1. 1. Estimation of hardness of water by EDTA method.
2. Estimation of alkalinity of water sample.
3. Estimation of Chloride in water sample (Argentometric method)
4. Determination of DO in water
5. Estimation of silver ion by Dichrometry
6. Determination of quality of Surface water (River/pond/lake) and Ground water (well/ bore well) with respect to Hardness, TDS, Chloride and pH.
7. Determination of acidity of industrial effluents.

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Analyze the properties of water by applying the chemical concepts.
- Determine the acid quality in the industrial effluents.
- Use specific methods to analyse the oxygen in water.

A minimum of FIVE experiments shall be offered

TOTAL: 30Periods

15UEC211 ELECTRONIC DEVICES LABORATORY L T P C

0 0 2 1

OBJECTIVE

- To familiarize with different active and passive electronic devices / components.

LIST OF EXPERIMENTS

1. Characteristics of PN diode
2. Characteristics of Zener diode
3. Half wave rectifier with capacitive filter
4. Full wave rectifier with capacitive filter
5. Bridge rectifier with capacitive filter
6. Characteristics of CE configuration
7. Characteristics of CB configuration
8. Characteristics of UJT and SCR
9. Characteristics of JFET and MOSFET
10. Characteristics of Diac and Triac.
11. Characteristics of LED.
12. Characteristics of Photodiode and Phototransistor
13. Voltage regulator using Zener diode

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Demonstrate the working of diodes, BJT and FETs
- Test the characteristics of triggering devices, photo diode and photo transistor
- Discuss the role of semiconductor devices in various applications

HARDWARE AND SOFTWARE REQUIREMENT

Sl.No	Name the Equipment	Quantity Required
1	Variable DC Power Supply	8
2	CRO(30 MHz)	10
3	Multimeter Digital	6
4	Function Generator 1 MHz	8
5	DC Ammeter	10
6	DC Voltmeter	10

SEMESTER III

15UMA321	**TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (Common to MECH, ECE, EEE, CIVIL, CHEMICAL, AGRI, BIO MEDICAL)**	**L**	**T**	**P**	**C**
		3	**2**	**0**	**4**

OBJECTIVES :

- To make the student knowledgeable in formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- To familiarize the students to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them numerically and interpret the results.
- To acquaint the student with the basics of Z - transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the Z - transform technique bringing out the elegance of the procedure involved.

UNIT I FOURIER SERIES 9 + 6

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic analysis - Application of Fourier series - Gibb's Phenomenon.

UNIT II FOURIER TRANSFORM 9 + 6

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity - Application of Fourier Transform.

UNIT III Z-TRANSFORM AND DIFFERENCE EQUATIONS 9 + 6

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value Theorems - Formation of difference equations – Solution of difference equations.

UNIT IV PARTIAL DIFFERENTIAL EQUATIONS 9 + 6

Formation of partial differential equations – Singular integrals -- Solutions 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 of both homogeneous and non-homogeneous types.

UNIT V APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9 + 6

Introduction of Partial differential equations - Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

TOTAL : 45 (L) + 30 (T) = 75 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Write any periodic function as a combination of series of sine and cosine which are harmonically related to each other.
- Apply the acquired knowledge of Fourier transform and its properties which are used to transform signals between time and frequency domain.
- Apply the acquired knowledge of Z transform and its properties for the analysis of linear discrete systems.
- Form partial differential equation and solve linear first order and second order partial differential equations.
- Apply Fourier series to solve partial differential equations representing one dimensional and two dimensional heat and wave equations.

TEXT BOOKS:

1. GREWAL B.S, “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 42nd Edition, (2012).
2. KANDASAMY.P, THILAGAVATHY.K, and GUNAVATHY.K, Engineering Mathematics III, S.Chand & Company Ltd., New Delhi, 3rd Edition, (1996).

REFERENCE BOOKS:

1. BALI N.P., MANISH GOYAL and WATAINS, “Advanced Engineering Mathematics”, Firewall Media (An imprint of Laxmi Publication Private limited) New Delhi, 7th Edition, (2009).
2. RAMANA.B.V, “Higher Engineering Mathematics” Tata McGraw Hill, New Delhi, 11th Reprint (2010).
3. GLYN JAMES, “Advanced Modern Engineering Mathematics”, Pearson Education, New Delhi, 3rd Edition, (2007).
4. ERWIN KREYSZIG, “Advanced Engineering Mathematics”, Wiley India, 10th Edition, (2011).

15UEC302	DIGITAL ELECTRONICS AND DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To Introduce basic postulates of Boolean algebra
- To outline the formal procedures for the analysis and design of combinational and sequential circuits
- To introduce the concept of memories, programmable logic devices, synchronous and asynchronous circuits

UNIT I LOGIC GATES AND MINIMIZATION TECHNIQUES 9

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR-Minimization Techniques: Boolean postulates and laws – De-Morgan's Theorem -Principle of Duality - Boolean expression - Minimization of Boolean expressions- Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions - Quine-McCluskey method of minimization, - Implementations of Logic Functions using gates, NAND–NOR implementations – Multilevel gate implementations- Multi output gate implementations

UNIT II COMBINATIONAL CIRCUITS 9

Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor - Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator

UNIT III SEQUENTIAL CIRCUITS 11

Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation–Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – Asynchronous Ripple or serial counter –Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters –Design of Synchronous counters: state diagram-State table – State minimization –State assignment - Excitation table and maps-Circuit implementation - Modulo–n counter, Registers – shift registers - Universal shift registers– Shift register counters – Ring counter – Shift counters - Sequence generators

UNIT IV SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits.

UNIT V LOGIC FAMILIES and MEMORY DEVICES 7

Logic families- TTL and CMOS Logic and their characteristics – Tristate gates, Classification of memories – ROM organization -Types of ROM - RAM organization -Types of RAM – Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Choose appropriate theorems and Boolean laws for simplification
- Design combinational circuits using logic gates
- Construct sequential circuit using appropriate flip-flops
- Analyze the synchronous and asynchronous circuits using sequential circuits
- Explain the Concept of Logic Families

TEXT BOOKS:

1. Morris Mano.M, "Digital Design", Prentice Hall of India Pvt. Ltd., 2008 /Pearson Education Singapore) Pvt. Ltd., New Delhi, 4th Edition, 2003.
2. Salivahanan.S, Arivazhagan.S, "Digital Circuits and Design", Vikas Publishing House Pvt. Ltd, New Delhi, 3rd Edition, 2006.

REFERENCE BOOKS:

1. John F.Wakerly, "Digital Design", Pearson/PHI, 4th Edition, 2006.
2. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2002.
3. Donald P.Leach, Albert Paul Malvino, "Digital Principles and Applications", MH, 6th Edition, 2003.
4. Thomas L. Floyd, "Digital Fundamentals", Pearson Education Inc, New Delhi, 8th Edition, 2003.

15UEC303 **CIRCUIT THEORY**

L	T	P	C
3	2	0	4

OBJECTIVES:

- To outline the concepts of Ohm's and Kirchhoff's law to analyze the circuits.
- To explain Network theorems and their applications to electric circuits.
- To familiarize resonant, transient, two port and coupled circuits.

UNIT I CIRCUIT ANALYSIS 9+6

Circuit elements-Network graphs- Concept of branch, link, tree and co-tree- dual networks- Ohm's Law-Kirchoff's voltage law – Kirchoff's current law – Mesh analysis – Super mesh analysis – Nodal analysis – Supernode analysis – Source transformation technique – Voltage and current source transformations- Star delta transformation (Both AC & DC)

UNIT II NETWORK THEOREMS (BOTH DC & AC CIRCUIT ANALYSIS) 9+6

Superposition theorem – Thevenin's theorem – Norton's theorem – Reciprocity theorem – Compensation theorem – Maximum power transfer theorem – Tellegen's theorem – Millman theorem

UNIT III RESONANT CIRCUITS 9+6

Series and parallel resonance circuits – bandwidth and selectivity of resonant circuits. Concept of complex frequency – pole – Zero plots – frequency Response of RL,RC and RLC circuits

UNIT IV TRANSIENT CIRCUITS AND TWO PORT NETWORKS 9+6

Transient response of RL,RC and RLC series and parallel circuits – frequency response – step and sinusoidal responses – natural frequency , damped frequency, damping factor and logarithmic decrement. Driving point and transfer impedances/admittances – voltage and current ratios of two port networks – admittance , impedance, hybrid , transmission and image parameters for two-port networks

UNIT V COUPLED AND THREE PHASE CIRCUITS 9+6

Coupled Circuits – Co-efficient of Coupling – self and mutual inductances – analysis of coupled circuits – single and double tuned coupled circuits – coefficient of critical coupling – analysis – frequency response of tuned coupled Circuits-Three phase circuits – balanced circuits – star and delta connected loads – unbalanced circuits – solution of unbalanced star and delta connected loads

TOTAL: 45(L)+30(T)=75 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Analyze ac/dc circuits using different circuit analysis techniques.
- Apply different network theorems to analyze the circuit.
- Determine the frequency response of resonant circuits.
- Compute the two port network parameters and the time response of RL,RC and RLC series circuits.
- Analyze single and double tuned coupled circuits using different performance parameters.

TEXT BOOKS:

1. A.Sudhakar, Shyam Mohan S P “Circuits, Network Analysis & Synthesis”, Tata McGraw - Hill, 2nd edition, 2007
2. William H.Hyte, J.E.Kemmerly, Steven M.Durban “Engineering Circuit Analysis Processes”, Tata McGraw – Hill, 6th edition, 2003

REFERENCE BOOKS:

1. Joseph Edminister, “Electric circuits”, Schaums Outline Series, McGraw-Hill, 5th edition, 2011.
2. M.Arumugam, N.Premkumar “Electric circuit Theory”, Khanna Publishers, New Delhi 2006.
3. M.L.Soni, J.C Gupta “Electrical Circuit Analysis”, Dhanpat Rai and Sons, New Delhi 2006.
4. Theodre F.Bogrart, “Jr.Electric circuits”, Macmillan /McGraw-Hill, 2nd edition, 1992

15UEC304	ELECTRONIC CIRCUITS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To explain the methods of biasing of transistors.
- To familiarize the students about the mid band analysis of amplifier circuits using small - signal equivalent circuits.
- To summarize the method of analyzing large signal and feedback amplifiers.

UNIT I TRANSISTOR BIAS STABILITY 9

BJT – Need for biasing – Stability factor - Fixed bias circuit, Load line and quiescent point- Variation of quiescent point due to h_{FE} variation within manufacturers tolerance - Stability factors - Different types of biasing circuits - Method of stabilizing the Q point ,Bias compensation – Diode, Thermistor and Sensistor compensations, Biasing the FET and MOSFET

UNIT II MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 9

CE, CB and CC amplifiers - Method of drawing small-signal equivalent circuit – Mid band analysis of various types of single stage amplifiers to obtain gain, input impedance and output impedance - Miller's theorem - Comparison of CB, CE and CC amplifiers and their uses - Methods of increasing input impedance using Darlington connection and bootstrapping - CS, CG and CD (FET) amplifiers - Multistage amplifiers, Basic emitter coupled differential Amplifiers.

UNIT III FREQUENCY RESPONSE OF AMPLIFIERS 9

General shape of frequency response of amplifiers - Definition of cutoff frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cutoff frequency – High frequency analysis of BJT amplifiers to obtain upper cutoff frequency - High frequency equivalent circuit of FETs - High frequency analysis of FET amplifiers –Hybrid-π equivalent circuit of BJTs -Gain-Bandwidth product of FETs-General expression for frequency response of multistage amplifiers - Calculation of overall upper and lower cutoff frequencies of multistage amplifiers –amplifier rise time and sag time and their relation to cutoff frequencies.

UNIT IV LARGE SIGNAL AMPLIFIERS 9

Classification of amplifiers, Class A large signal amplifiers and second harmonic distortion, higher order harmonic distortion, transformer-coupled Class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency - push-pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C, Class D amplifiers – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.

UNIT V FEEDBACK AND TUNED AMPLIFIERS 9

Block diagram, Loop gain, Gain with feedback, Effects of negative feedback – Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Negative feedback connections – voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of feedback amplifiers.

Introduction to tuned amplifiers-large signal tuned amplifiers-class C tuned amplifiers-Efficiency and applications of class C amplifiers.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Explain the biasing stability of various electronic circuits.
- Analyze the small signal equivalent circuit of BJT and FET.
- Explain the low frequency and high frequency characteristics of BJT and FET Amplifiers.
- Analyze the efficiency of various Power amplifiers.
- Compare different types of feedback amplifiers.

TEXT BOOKS:

1. Salivahanan.S, Suresh Kumar. N, Vallavaraj. A "Electronic Devices and Circuits", TMH, 3rd Edition, 2012.
2. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education/ PHI, 11th Edition,2013.

REFERENCE BOOKS:

1. Millman.J, Halkias.C, "Integrated Electronics", TMH, 2nd edition, 2010.
2. David A. Bell, "Electronic Devices & Circuits", PHI, 4th Edition, 2007.
3. Floyd, "Electronic Devices", Pearson Education, 6th Edition, 2002.
4. Nagrath.I.J, "Electronic Devices and Circuits", PHI, 2007.

15UEC305	ANALOG COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the various modulation and demodulation systems
- To familiarize the students with the noise performance of various receivers
- To provide the knowledge of Random Process theory of noise in Communication System

UNIT I AMPLITUDE MODULATION SYSTEMS 10

Generation and Demodulation of AM, DSBSC, SSB and VSB Signals; Non – Linear Distortion; Comparison of Amplitude Modulation Systems; Frequency Translation; Multiplexing-FDM and TDM;

UNIT II ANGLE MODULATION SYSTEMS 8

Phase and Frequency Modulation; Single tone, Narrow Band and Wideband FM; Transmission Bandwidth; Generation and Demodulation of FM Signal.

UNIT III RANDOM PROCESS AND NOISE THEORY 8

RANDOM PROCESS: Random variables: Several random variables.
Statistical averages: Function of Random variables, moments, Mean, Correlation and Covariance function: Principles of autocorrelation function, cross – correlation functions. Central limit theorem, Properties of Gaussian process.
NOISE**:** Introduction, shot noise, thermal noise, white noise, Narrow band noise, Noise equivalent bandwidth, Noise Figure, Equivalent noise temperature, cascade connection of two-port networks.

UNIT IV PERFORMANCE OF CW MODULATION SYSTEMS 10

Super heterodyne Radio receiver and its characteristics; SNR; Noise in DSBSC and SSBSC systems using coherent detection; Noise in AM system using envelope detection and FM system; Comparison of performances, FM threshold effect; Capture Effect and FM threshold Reduction ,Pre-emphasis and De-emphasis in FM

UNIT V ANALOG PULSE MODULATION 9

Sampling Process-Impulse Sampling and Natural Sampling-Generation and Demodulation of Pulse Amplitude Modulation-Pulse Width Modulation -Pulse Position Modulation-Bandwidth-Noise Trade off-Quantization Process- Uniform and Non-Uniform Quantization

TOTAL: 45 PERIODS

COURSE OUTCOMES

After successful completion of this course the students will be able to:

- Apply the analog modulation signal expressions to determine spectrum and waveform components
- Explain fundamental statistical parameters used in the design and analysis of communication systems
- Determine the effect of noise in analog communication system
- Design a pulse modulation system as per the given specifications
- Design an analog modulation system as per the given specifications

TEXT BOOKS

1. Simon Haykin, “Communication Systems”, John Wiley & sons, NY , 4th Edition, 2011
2. Herbert Taub & Donald L Schilling, “Principles of Communication Systems” , Tata McGraw Hill, 3rd Edition,2008

REFERENCES

1. Dennis Roddy & John Coolen, “Electronic Communication Systems”, Prentice Hall of India,4th Edition,1995.
2. Bruce Carlson, “Communication Systems”, Tata Mc Graw, 3rd Edition, 2002.
3. B.P.Lathi, “Digital and Analog Communication Systems”, Oxford Press, 3rd Edition, 2007.
4. R.P Singh and S.D.Sapre, “Communication Systems – Analog and Digital”, Tata McGraw Hill, 2nd Edition, 2007.

15UIT326	DATA STRUCTURES AND ALGORITHM ANALYSIS	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To review the basic concepts of OOPs
- To explain the systematic way of solving problems using various data structures
- To demonstrate implement the different data structures

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 9

Introduction – Tokens – Expressions-Control Structures-Functions in C++, Classes and Objects, Constructors and Destructors, Operator overloading.

UNIT II ADVANCED OBJECT ORIENTED PROGRAMMING 9

Inheritance-Extending classes, pointers, virtual functions and polymorphism, File Handling, Exception handling.

UNIT III DATA STRUCTURES AND ALGORITHMS 9

Algorithm Analysis, Abstract Data Types, Lists, Stacks and queues, Priority queues**,** Heaps – hashing.

UNIT IV NONLINEAR DATA STRUCTURES 9

Trees-Binary trees, Search tree ADT, AVL trees, Graph Algorithms - Topological sort and Shortest path algorithm-Minimum spanning tree.

UNIT V SORTING AND APPLICATIONS OF DATA STRUCTURES 9

Sorting – Bubble Sort, Insertion sort, Selection Sort, Shell sort, Merge sort, Quick sort, Introduction to Algorithm Design Techniques –Greedy algorithm (Minimum Spanning Tree), Divide and Conquer (Merge Sort), Dynamic Programming (All pairs Shortest Path Problem).

LABEXPERIMENTS 30

1. Implement Operator overloading
2. Implement Classes with constructor, destructor and copy constructor
3. Implement Classes with inheritance concepts
4. Implement Templates & Manipulating string
5. Stack ADT - Array and Linked list implementations
6. Queue ADT – Array and Linked list implementations
7. Implement Search Tree ADT - Binary Search Tree
8. Implement insertion and Deletion in AVL trees
9. Implement Merge Sort
10. Implement Quick Sort

TOTAL: 45(L) + 30 (P)=75 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the principles of Object Oriented Programming
- Demonstrate exception handling mechanisms to handle runtime errors
- Design and implement an appropriate data structure for various applications
- Identify the suitable non-linear data structures to solve real time problems
- Implement various sorting techniques

TEXT BOOKS:

1. E.Balagurusamy,"Object oriented programming with C++", Tata McGrawHill, 6th Edition,2013.
2. Weiss. M.A,"Data Structures and Algorithm Analysis in C++ ", Pearson Education, 4th Edition,2014.

REFERENCE BOOKS:

1. JoshvaDevadas.T, A.Chandrababu,"A Programming with C++", Narosa Publishing House, 1st Edition,2009.
2. Stroustrup.B,"The C++ Programming language ", Pearson Education, 4th Edition,2013.
3. Aho.V, Hopcroft.J.E, Ullman.J.D,"Data Structures and Algorithms", Pearson Education, 1st Edition Reprint,2006.
4. Gilberg.R.F, Forouzan.B.A,"DataStructures:APseudocode Approach with C++", Thomson IndiaEducation, 2nd Edition,2005.

HARDWARE AND SOFTWARE REQUIRMENTS

Computer Required: 30 No's

Minimum Requirement: Processor: Pentium IV, Ram: 1 GB, Hard Disk: 80 GB

Software Requirements:

Operating System: Linux (Ubuntu / Fedora / Debian / Mint OS) / Windows
Turbo C Version 3 or GCC Version Unit III UNIT III4 / Built in Linux / DEVC++

15UEC307	DIGITAL ELECTRONICS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To construct digital circuits using standard ICs
- To expose the students in the aspect of designing and implementing combinational and sequential circuits

LIST OF EXPERIMENTS

1. Design and implementation of Adder and Subtractor using logic gates.
2. Design and implementation of code converters using logic gates
   (i) BCD to excess-3 code and vice versa
   (ii) Binary to gray and vice-versa
3. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483
4. Design and implementation of 2 bit Magnitude Comparator using logic gates, 8 Bit Magnitude Comparator using IC 7485
5. Design and implementation of 16 bit odd/even parity checker generator using IC74180.
6. Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154
7. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74017
8. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.
9. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters.
10. Design and implementation of 3-bit synchronous up/down counter.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to :

Design combinational circuits using logic gates
Construct combinational circuits using MSI devices
Develop sequential circuits using flip flops

HARDWARE AND SOFTWARE REQUIREMENT

1. Digital IC Tester – 2
2. Digital IC Trainer – 15

15UEC308	CIRCUITS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To demonstrate the students on Kirchoff's law and network's theorems.
- To demonstrate the frequency response of BJT and FET amplifiers.

LIST OF EXPERIMENTS

1 Verification of KVL and KCL
2. Verification of Thevenin and Maximum power transfer Theorems
3. Verification of Norton and superposition Theorem
4. Design and construct BJT Common Emitter Amplifier using Fixed Bias
    I. Measurement of gain
    II. Plot the frequency response
5. Design and construct BJT Common Emitter Amplifier using voltage divider bias (self-bias)
    I. Measurement of gain.
    II. Plot the frequency response
6. Design and construct Darlington Amplifier using BJT
    I. Measurement of gain and input resistance.
    II. Plot the frequency response
7. Design and construct Source follower with Bootstrapped gate resistance
    I. Measurement of gain, input resistance and output resistance
8. Design and construct Class A and Class B Complementary symmetry power amplifier
    I. Observation of the output waveform with crossover Distortion
    II. Modification of the circuit to avoid crossover distortion
    III. Measurement of maximum power output
    IV. Determination of efficiency
    V. Comparison with calculated values
9. Design and construct Class C Power amplifier
    I. Observation of the output waveform
    II. Measurement of maximum power output
    III Determination of efficiency
    IV. Comparison with calculated values
10. Design and construct Series feedback amplifiers
    I. Plot the frequency response, Input and output impedance calculation

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Examine the Kirchoff's law and network's theorems.
- Demonstrate the frequency response of various BJT and FET amplifier configurations.
- Design Feedback Amplifier for the given specifications and obtain the frequency response.

HARDWARE REQUIREMENT

1. Variable DC Power Supply - 8
2. CRO - 10
3. Multimeter Digital - 6
4. Function Generator - 8
5. DC Ammeter - 10
6. DC Voltmeter – 10

SEMESTER IV

15UMA424	PROBABILITY AND RANDOM PROCESSES (ECE, BIO MEDICAL)	L	T	P	C
		3	2	0	4

OBJECTIVES :

- To provide necessary basic probability concepts and standard distributions that can describe real life phenomena.
- To make the student acquire skills in handling situations involving more than one random variable and functions of random variables.
- To make the student understand and characterize phenomena which evolve with respect to time in probabilistic manner.
- To familiarize the student to analyze the response of random inputs to linear time invariant systems.

UNIT I RANDOM VARIABLES 9 + 6

Axioms of probability - Conditional probability - Total probability – Baye's theorem - Random variable - Probability mass function - Probability density functions- Properties – Moments - Moment generating functions and their properties - Binomial, Poisson, Normal, Geometric, Uniform, Exponential and Gamma distributions.

UNIT II TWO DIMENSIONAL RANDOM VARIBLES 9 + 6

Joint probability distributions – Marginal and Conditional distributions – Covariance – Correlation and Regression – Transformation of random variables.

UNIT III CLASSIFICATION OF RANDOM PROCESSES 9 + 6

Classification - Stationary Process - Markov Process - Poisson Process - Random Telegraph Process – Markovian queueing system (M/M/1).

UNIT IV CORRELATION AND SPECTRAL DENSITIES 9 + 6

Auto Correlation Functions - Cross Correlation Functions – Properties - Power Spectral density - Cross spectral density - Applications of correlations and Spectral Densities.

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS 9 + 6

Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – White noise.

TOTAL : 45 (L) + 30 (T) = 75 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the acquired knowledge of standard distributions in real life phenomena**.**
- Find the relationship involving more than one random variable and analyze the functions.
- Apply the acquired fundamental mathematical knowledge on correlation, spectral density and power spectrum which is used in communication systems and control systems in their higher classes.
- Apply the acquired fundamental knowledge on random process to analyse the linear system with random inputs in the areas of communication and signal processing
- Apply basic probability techniques and models to analyze the performance of systems.

TEXT BOOKS:

1. OLIVER C. IBE, “Fundamentals of Applied probability and Random processes”, Elsevier, Lowell, Massachusetts, 1st Indian Reprint, (2007).
2. PEEBLES. P.Z., "Probability, Random Variables and Random Signal Principles", Tata McGraw Hill, New Delhi, 4th Edition, (2002).
3. GROSS D, and HARRIS C.M., “Fundamentals of Queuing Theory”, Wiley Students, India, 3rd Edition, (2004).

REFERENCE BOOKS:

1. YATES. R.D. and GOODMAN. D.J., "Probability and Stochastic Processes", Wiley India, Bangalore, 2nd Edition, (2012).
2. STARK. H., and WOODS. J.W., "Probability and Random Processes with Applications to Signal Processing", Pearson Education, Asia, 3rd Edition, (2002).
3. HWEI HSU, "Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata Mc Graw Hill, New Delhi, 1st Edition, (2004).
4. SIMON HAYKIN, “Communication Systems”, John Wiley and Sons, New Delhi, 7th Edition, (2007).

15UEC402	ANALOG CIRCUITS	L	T	P	C
		3	0	0	3

PREREQUISITE:ELECTRONIC CIRCUITS

OBJECTIVES:

- To impart knowledge on design of LC and RC oscillators, wave shaping circuits and multivibrators
- To introduce the basic building blocks of linear integrated circuits
- To summarize the linear and non-linear applications of operational amplifiers

UNIT I OSCILLATORS 9

Classification, Barkhausen Criterion - Mechanism for start of oscillation RC oscillators - phase shift –Wienbridge - Twin-T Oscillators. General form of an Oscillator, Design of LC oscillators - Hartley, Colpitts – concept of Clapp, Franklin, Armstrong, Tuned collector oscillators,Frequency range of RC and LC Oscillators, Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal oscillators, frequency stability of oscillators and stabilization of amplitude

UNIT II WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

RC & RL Integrator and Differentiator circuits. Diode clippers, Diode comparator -Clampers-Collector coupled and Emitter coupled Astable multivibrator - Monostable multivibrator - Bistable multivibrators - Triggering methods for Bistable multivibrators. Speed-up Capacitor.

UNIT III IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR IC 9

Advantages of ICs over discrete components – Manufacturing process of monolithic ICs – Construction of monolithic bipolar transistor – Monolithic diodes – Integrated Resistors –Monolithic Capacitors – Inductors. General operational amplifier stages - internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations. Basic applications –Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor.

UNIT IV APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, Low-pass, high-pass and band-pass Butterworth filters- Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565.

UNIT V ADC, DAC, WAVEFORM GENERATORS AND REGULATORS 9

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, high speed sample-and-hold circuits, A/D Converters –specifications - Flash type - Dual Slope type. Low frequency Sine-wave generators, Multivibrators using Timer IC 555, IC Voltage regulators - Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Design the RC and LC oscillator for the desired frequency.
- Construct the Wave shaping and multivibrator circuit for the desired time period.
- Explain the internal structure and fabrication of IC
- Summarize the applications of Operational amplifier
- Design waveform generators using op-amp
- Explain the working principle of ADC,DAC and Regulators.

TEXT BOOKS:

1. Sedra / Smith, “Micro Electronic Circuits”, Oxford University Press, 2004.
2. D.Roy Choudhry, Shail Jain, “Linear Integrated Circuits ”, New Age International Pvt. Ltd., 2000.

REFERENCE BOOKS:

1. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, “Electronic Devices and Circuits ”, 2ndEdition, TMH, 2007
2. Sergio Franco, “Design with operational amplifiers and analog integrated circuits”, Tata McGraw-Hill, 3rd Edition, 2007.
3. Ramakant A.Gayakwad, “OP-AMP and Linear ICs”, Prentice Hall / Pearson Education,4th Edition, 2001.
4. Schilling and Belove, “Electronic Circuits”, TMH, 3rd Edition, 2002.

15UEC403	ELECTROMAGNETIC FIELDS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To outline the overview of fields and potentials due to static charges
- To familiarize the students how materials affect electric and magnetic fields
- To explain the relation between the fields under time varying situations

UNIT I STATIC ELECTRIC FIELDS 9

Introduction to Co-ordinate System- Introduction to line, Surface and Volume Integrals – Gradient, Divergence and Curl – Stokes theorem,Divergence theorem and Coulomb's Law – Electric Field Intensity – Principle of Superposition – Field due to discrete and continuous charges - Electric Field due to charges distributed uniformly on an infinite and finite line – Electric Field on the axis of a uniformly charged circular disc – Electric Field due to an infinite uniformly charged sheet - Electric Scalar Potential – Potential due to infinite uniformly charged line – Potential due to electrical dipole - Electric Flux Density – Gauss Law and Applications

UNIT II STATIC MAGNETIC FIELD 9

The Biot-Savart Law in vector form – Magnetic Field intensity due to a finite and infinite wire carrying a current I – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I – Ampere's circuital law and simple applications - Magnetic flux density – The Lorentz force equation for a moving charge and applications – Force on a wire carrying a current I placed in a magnetic field – Torque on a loop carrying a current I – Magnetic moment – Magnetic Vector Potential.

UNIT III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS 9

Poisson's and Laplace's equation – Electric Polarization-Nature of dielectric materials- Definition of Capacitance – Capacitance of various geometries using Laplace's equation – Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – point form of ohm's law – continuity equation for current, Definition of Inductance – Inductance of loops and solenoids – Definition of mutual inductance – simple examples, Energy density in magnetic fields – Nature of magnetic materials – magnetization and permeability - magnetic boundary conditions.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS 9

Faraday's law – Maxwell's Second Equation in integral form from Faraday's Law – Equation expressed in point form - Displacement current – Ampere's circuital law in integral form – Modified form of Ampere's circuital law as Maxwell's first equation in integral form – Equation expressed in point form, Maxwell's four equations in integral form and differential form - Poynting Vector and the flow of power – Power flow in a co-axial cable – Instantaneous Average and Complex Poynting Vector.

UNIT V ELECTROMAGNETIC WAVES 9

Derivation of Wave Equation – Uniform Plane Waves – Maxwell's equation in Phasor form – Wave equation in Phasor form – Plane waves in free space and in a homogenous material-Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good

conductors – Skin effect - Linear, Elliptical and circular polarization – Reflection of Plane Wave from a conductor – normal incidence – Reflection of Plane Waves by a perfect dielectric – normal and oblique incidence, Brewster angle.

TOTAL:45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to

- Apply vector calculus to study the behaviour of static electric and magnetic fields
- Apply laws to study the intensity of electric, magnetic and electromagnetic fields.
- Analyze current and charge distributions with respect to various geometries of conductors
- Explain Maxwell's equations for static and time varying fields
- Apply Maxwell's Equations to derive the wave equations for propagation of uniform plane waves.

TEXT BOOKS:

1. Hayt.W.H., BuckJ.A, "Engineering Electromagnetics" , TATA McGraw-Hill, 7th Edition , 2007
2. Jordan.E.C, & Balmain. K.G., "Electromagnetic Waves and Radiating Systems ", Pearson Education/PHI, 4th edition, 2006.

REFERENCE BOOKS:

1. Matthew, Sadiku.N.O., "Elements of Engineering Electromagnetics" , Oxford University Press, 4th edition, 2007.
2. Narayana Rao, N, "Elements of Engineering Electromagnetics" , Pearson Education, 6th edition, New Delhi, 2006.
3. Ramo, Whinnery, and Van Duzer, "Fields and Waves in Communications Electronics ",John Wiley & Sons,3rd edition, 2003 .
4. David K.Cheng, "Field and Wave Electromagnetics ", Pearson Edition, Second Edition, 2004.
5. Raju G.S.N., "Electromagnetic Field Theory & Transmission Lines ", Pearson Education, 2006 .

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15UEC404	SIGNALS AND SYSTEMS	L	T	P	C
		3	2	0	4

OBJECTIVES:

- To Introduce the concept and techniques related to signals and systems
- To familiarize the various transformation techniques for analyzing the continuous and discrete time systems

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9+6

Continuous time signals (CT signals), discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic and aperiodic, random signals, CT systems and DT systems, Basic properties of systems - Linear Time invariant Systems and properties. Energy and Power Signals

UNIT II CONTINUOUS TIME SIGNALS AND SYSTEM ANALYSIS USING FOURIER SERIES AND FOURIER TRANSFORM 9+6

Fourier Series Signal Analysis: Introduction – Trigonometric Fourier Series for Periodic Signals – Complex Exponential Fourier Series – Symmetry Properties – Parseval's Theorem
Fourier Transform: Introduction – Fourier Integral – Energy Spectral Density – Fourier Transform Theorems – System Analysis – Impulse response and Steady-state response of Linear System

UNIT III CONTINUOUS TIME SIGNALS AND SYSTEM ANALYSIS USING LAPLACE TRANSFORM 9+6

Introduction – Laplace Transform Theorems – Inversion of Rational Functions – Inverse Laplace Transform; Laplace transform properties, Differential equations - Time Domain Solution – Frequency Domain Solution – Impulse response and Steady-state response of Linear System ,convolution integral-Block diagram representation State-Variable Techniques: Introduction – State Equations –matrix representation of systems

UNIT IV DISCRETE TIME SIGNALS AND SYSTEM ANALYSIS USING DTFT 9+6

Sampling of CT Signals and aliasing: Introduction – DTFT -Comparison of DTFT and Fourier Series –Properties of DTFT - Impulse response, Convolution sum, LTI systems analysis using DTFT

UNIT V DISCRETE-TIME SIGNALS AND SYSTEMS ANALYSIS USING Z TRANSFORM 9+6

The Z-Transform –Properties – Inverse Z-Transform -Difference Equations -solutions– Frequency Response of Linear Discrete Time System - Block diagram representation - State variable equations and matrix representation of systems

TOTAL: 45(L)+30(T)=75 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to :

- Classify the given CT/DT signals/systems according to the properties.
- Represent CT signals in the Frequency domain using Fourier series, Fourier Transform.
- Analysis of CT-LTI systems using Laplace transform, Fourier transform.
- Compute the required sampling rate for CT signal to DT signal conversion and represent DT signals in frequency domain using DTFT.
- Analysis of DT-LTI systems using Z Transform.

TEXT BOOKS:

1. Simon Haykins, Barry Van Veen, " Signals and Systems ", John Wiley & sons Inc, 2004
2. Allan V.Oppenheim, S.Wilsky, S.H.Nawab ,"Signals and Systems ", Pearson Education ,2nd Edition, 2007.

REFERENCE BOOKS:

1. H P Hsu, Rakesh Ranjan, "Signals and Systems", Schaum's Outlines, Tata McGraw Hill, Indian Reprint, 2007.
2. M J Roberts, "Signals and Systems – Analysis using Transform Methods and MATLAB", TataMcGraw-Hill, 2003.
3. Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin, "Signals & systems", Pearson Education, Fourth Edition, 2002.
4. Steven T. Karris, "Signals and Systems: With Matlab Applications", Orchard Publications, 2003.

15UEC405	DIGITAL COMMUNICATION	L	T	P	C
		3	0	0	3

PREREQUISITE:ANALOG COMMUNICATION

OBJECTIVES:

- To introduce the basic concepts of information and Digital Communication in baseband and pass band domains
- To illustrate the signal space representation of signals and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals
- To impart the knowledge on spread spectrum communication

UNIT I INFORMATION THEORY 9

Measure of information – Entropy – Source coding theorem – Discrete memoryless channels – lossless, deterministic, noiseless, BEC, BSC – Mutual information – Channel capacity – Shannon-Hartley law - Transform coding – LPC – Shannon-Fano coding, Huffman Coding, Run length coding, LZW algorithm.

UNIT II ERROR CONTROL CODING TECHNIQUES 9

Channel coding theorem – Linear block codes – Hamming codes – Cyclic codes – Convolutional codes – Viterbi decoding.

UNIT III BASEBAND TECHINIQUES 9

Digital Communication Systems – Functional description , PCM- Sampling, Quantizing and Encoding, Line codes – RZ,NRZ, Manchester, Binary N-zero substitution codes - PSDs – ISI – Nyquist criterion for distortionless transmission – Pulse shaping – Correlative coding - M-ary schemes – Eye pattern

UNIT IV BANDPASS SIGNALING 9

Geometric representation of signals – ML detection -Correlator and matched filter detection - Representation and Spectral characteristics, ASK, PSK, QAM, QPSK, FSK;, Error performance – Coherent and Non-coherent detection systems

UNIT V SYNCHRONISATION AND SPREAD SPECTRUM TECHNIQUES 9

Synchronization – Carrier, symbol, Chip and frame synchronization techniques, Spread Spectrum - PN Sequences, Direct Sequence and Frequency Hopping Spread Spectrum Systems, Processing gain and Jamming Margin

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to:

- Calculate the measurement of information and entropy for a given source
- Design error control coding schemes
- Convert analog signal into digital signal as per the given specifications
- Analyze the error performance of various digital modulation techniques
- Describe the various spread spectrum modulation techniques

TEXT BOOKS:

1. R Bose, "Information Theory, Coding and Crptography", TMH ,2007
2. Amitabha Bhattacharya, "Digital Communications" , Tata McGraw Hill, 2006.

REFERENCE BOOKS:

1. Simon Haykin, "Digital Communications", John Wiley , 2006
2. John.G. Proakis, "Fundamentals of Communication Systems", Pearson Education, 2006.
3. Michael. B. Purrsley, "Introduction to Digital Communication" , Pearson Education, 2006.
4. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw Hill,3rd Edition, 2008.

15UEE426	PRINCIPLES OF ELECTRICAL MACHINES (Qualitative treatment only)	L	T	P	C
		3	0	0	3

OBJECTIVES :

- To impart knowledge on constructional details and principle of operation of D.C. machines and Transformers
- To explain the construction and working principle of Induction machines, Synchronous machines and Special machines

UNIT I D.C. MACHINES 9

Construction of D.C. Machines - Principle and theory of operation of D.C. generator - EMF equation - Characteristics of D.C. generators –Principle of operation of D.C. motor - Voltage equation - Torque equation - Types of D.C. motors and their characteristics -Starters - Applications.

UNIT II TRANSFORMERS 9

Construction details of transformer(shell and core type) -Principle - Theory of ideal transformer - EMF equation -Tests on transformers - Equivalent circuit - Phasor diagram -Regulation and efficiency of a transformer - Introduction to three - phase transformer connections.

UNIT III THREE PHASE INDUCTION MACHINES 9

Induction motor - Construction and principle of operation, Classification of induction motor, Torque equation, Condition for maximum torque, Equivalent Circuit, Starting methods of induction motors.

UNIT IV SYNCHRONOUS MACHINES 9

Alternators-Construction details, Principle, Equation of induced EMF and Vector diagram - Synchronous motor - Starting methods, Torque, Hunting.

UNIT V SINGLE PHASE INDUCTION MOTOR AND SPECIAL MACHINES 9

Types of single phase motor –Capacitor start capacitor run motors – Stepper motor – Repulsion type motor – Universal motor – Hysteresis motor - Permanent magnet synchronous motor – Switched reluctance motor – Brushless D.C motor.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe the construction and performance characteristics of DC machines
- Calculate the regulation and efficiency of Transformers
- Explain the construction and performance of three phase induction machines
- Explain the construction and performance of synchronous machines
- Illustrate the construction and operating principles of induction motor and special machines

TEXT BOOKS:

1. Nagrath I.J., and Kothari D.P., " Electrical Machines", Tata McGraw - Hill, 1997.

2. Fitzgerald A.E., Kingsley C., Umans S. and Umans S.D., “Electric Machinery”, McGraw-Hill, Singapore, 2000.

REFERENCE BOOKS:

1. Theraja B.L., “A Text book of Electrical Technology”, Vol.II, S.C Chand and Co.,New Delhi, 2007.
2. Bimbhra P.S., “Electrical Machinery”, Khanna Publishers, 2003.
3. Battacharya S K., “Electrical Machines”, Technical Teachers Training institute, 2nd edition. 2003.
4. Murugesh Kumar K., “Electric Machines”, Vikas publishing house Pvt Ltd, 2002.

15UGS431	REASONING AND QUANTITATIVE APTITUDE (Common to All Branches)	L	T	P	C
		1	0	0	1

OBJECTIVES :

- To make the student acquire sound knowledge of the characteristic of quantitative and qualitative aptitude.
- To familiarize the student with various principles involved in solving mathematical problems.
- To develop an understanding of the basic concepts of reasoning skills.

UNIT I QUANTITATIVE APTITUDE 8

Numbers – HCF and LCM - Arithmetic and Geometric Progression – Averages –Percentages – Problems on ages – Profit and Loss – Simple and Compound Interest - Ratio and Proportion – Time – Speed –Distance- Work – Pipes and Cistern – Problems on Trains – Permutation and Combination – Clocks – Calendars.

UNIT II VERBAL AND NON VERBAL REASONING 7

Analytical Reasoning – Circular and Linear arrangement – Direction problems – Blood relations – Analogy – Odd Man Out – Venn Diagrams – Statement and Conclusion, Statement and Implications – Letter series & arrangement – Alpha Numeric Series – Syllogism - Coding – Decoding.

TOTAL = 15 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Solve the problems on commercial mathematics.
- Solve problems on Ratio and Proportions.
- Choose appropriate statistical tools for data analysis.
- Interpret the graphical and numerical data.
- Solve many Brain Teasers problems.

WEBSITES:

www.tcyonline.com , www.m4maths.com, www.indiabix.com , www.fresherworld.com, www.careerbless.com

TEXT BOOKS:

1. Dr. R.S.AGARWAL, “Quantitative Aptitude”, S. Chand Publications, New Delhi, 17th Edition, (2010).
2. TRISHNA KNOWLEDGE SYSTEMS, “Quantitative Aptitude”, Pearson Education, South Asia, 2nd Edition, (2009).

REFERENCE BOOKS:

1. ABIJIT GUHA, “Quantitative Aptitude for Competitive Examinations”, Tata McGraw Hill Publication, New Delhi, 4th Edition, (2011).
2. Dr. V.A.SATHGURUNATH’S “A Guide for Campus Recruitment”, Sagarikka Publications, Thiruchirapalli, 3rd Edition, (2011).
3. NISHIT K.SINHA “Quantitative Aptitude for CAT”, Pearson Publication, New Delhi, 2nd Edition, (2009).

4. Dr. N.K.SINGH, “Quantitative Aptitude Test”, Upkars Prakashan Publications, Agra, Revised Edition, (2013).

15UEC407	ANALOG CIRCUITS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To demonstrate the operation of various circuits using BJT and Op-Amp
- To construct oscillators and wave shaping circuits using Simulation Software

LIST OF EXPERIMENTS

ANALYSIS USING BJT

1. RC Phase shift oscillator
2. Colpitts Oscillator
3. Integrator, Differentiator, Clippers and Clampers
4. Astable multivibrator

USING OP-AMP AND TIMER

5. Measurement of operational Amplifier Parameters

Design and testing of

6. Inverting, Non inverting and Differential amplifiers
7. Integrator and Differentiator
8. Instrumentation amplifier
9. Active low pass and band pass filters
10. Schmitt Trigger
11. Wien bridge oscillator
12. Monostable multivibrator using NE555 Timer
13. DC power supply using LM317
14. Simulation of Experiments 8, 9, 10, 11 and 12.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to :

- Design and construct the various oscillator and wave shaping circuits using BJT and OP-AMP
- Implement various OP-AMP Applications
- Simulate analog circuits using PSPICE.

HARDWARE AND SOFTWARE REQUIREMENT

1.Variable DC Power Supply - 10
2.Fixed Power Supply - 4
3.CRO - 10
4.Multimeter Digital - 10
5.Function Generator - 8
6. Digital LCR Meter - 1
7. IC Tester (Analog) – 1
8. PC with PSPICE Simulation Software – 6 user

15UEC408	COMMUNICATION SYSTEM LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To provide an overview of discrete time signals using simulation software
- To implement the various modulation and demodulation techniques**.**
- To demonstrate line coding

LIST OF EXPERIMENTS

1. Generation of standard and Continuous time and Discrete time signals
2. Verification of Sampling Theorem
3. Modulation and Demodulation of AM.
4. Modulation and Demodulation of FM.
5. Pulse Modulation
6. Preemphasis and Deemphasis
7. Pulse Code Modulation(Sampling and Quantization)
8. Delta Modulation/Adaptive Delta Modulation
9. Digital Modulation and Demodulation techniques-ASK,PSK and FSK(Hardware and simulation)
10. Design of Quadrature Modulation techniques-QPSK and QAM using simulation software
11. BER analysis of digital modulation schemes using simulation software
12. Line coding

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Choose and implement suitable digital modulation technique for given constraints on data rate, bandwidth, power, fidelity, and complexity
- Analyze the performance of a digital communication link when additive noise is present in terms of the signal to noise ratio and bit error rate
- Calculate the power and bandwidth requirements of modern communication systems, including those employing ASK, PSK, FSK, and QAM modulation formats
- Design and implement error control codes

SOFTWARE AND HARDWARE REQUIREMENT

1. PC -15
2. Simulation software with Signal Processing Tool Box-10 Users license
3. AM Transceiver Kit-2
4. FM Transceiver Kit- 2
5. PAM, PPM, PWM Trainer Kits-2
6. CRO - 6
7. Power supply – 6
8. Function Generator - 6

15UCS429	PROGRAMMING WITH C LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES :

- To familiarize the concepts of arrays, structures and union in C language
- To learn to access memory using pointers
- To know the manipulation of data in permanent storage

LIST OF EXPERIMENTS

- Programs using one dimensional and two dimensional arrays
- Programs using user defined functions and recursive functions
- Programs using pointers and dynamic memory allocation
- Programs using structures and unions
- Programs using text files
- Programs using binary files

TOTAL: 30PERIODS

LISTOF SAMPLE EXERCISES :

1. An election is contested by 5 candidates. The candidates are numbered 1 to 5 and the voting is done by marking the candidate number on the ballot paper. Write a program to read the ballots and count the votes cast for each candidate using an array variable count. In case, a number read is outside the range 1 to 5, the ballot should be considered as a 'spoilt ballot' and the program should also count the number of spoilt ballots.
2. A company ABC pays their employers on a monthly basis. It pays their employers with DA=60% of BASIC PAY, HRA=20% of BASIC PAY, Allowance=Rs.2000.The company needs to automate the salary computation based on the basic pay. Develop an application to compute the gross salary of an employee given their basic pay
3. A banking application need to be developed for a bank. The operational features contain a list of the transactions that can be performed. These transactions are as follows:
    - Deposit funds to an account
    - Withdraw funds from an account
    - Transfer funds from one account to another
    - Query the balance ofany account

    Develop an application to automate the above operational features.
4. A class contains a total strength of 60 in which there 35 girls and 25 boys. The department needs to assign roll number for the students based on their names in alphabetical order. Develop a software to automate the task
5. A telephone directory contains information such as name, phone number and address. For advertising a product a company needs software to get the phone number of the people in a specific location and display their name and phone number in sorted order
6. Write a program to declare a structure called cricket that contain the following information
    - Player name
    - Team name
    - batting average

- highest score
- no. of matches.

Using cricket structure display the above details of 10 players.

7. Define a structure called hotel that contain the following members, name, address, average room charge, no. of rooms, etc.,. Write functions to perform the following
    - Display the details of 5 hotels
    - Display the details of the hotels with room charge less than a given value.
8. Declare a union data type time to maintain the time in hour, minutes and seconds. Develop a program to get a time from the user and display the time in the following format: 3:19:20.
9. C Program to Compare two Binary Files, Printing the First Byte Position where they Differ
10. C Program to Create Employee Record and Update it

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Manipulate data stored in arrays.
- Access data in memory using pointers.
- Manipulate data stored on permanent storage
  Design and implement C programs for simple applications.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

HARDWARE

LAN SYSTEM WITH 30 NODES (OR) STANDALONE PCS – 30 NOS.

SOFTWARE

OS – UNIX CLONE **(License free Linux)**

APPLICATION PACKAGE – OFFICE SUITE

COMPILER – C

SEMESTER V

15UEC501	DIGITAL SIGNAL PROCESSING	L	T	P	C
		3	2	0	4

PREREQUISITE:SIGNALS AND SYSTEMS

OBJECTIVES:

- To introduce about DFT and its computation techniques
- To impart knowledge on design techniques of digital filters
- To outline the concept of finite word length effects and digital signal processor

UNIT I DISCRETE FOURIER TRANSFORM 9+6

Introduction to DFT –Relation between DTFT and DFT -Properties of DFT - Circular Convolution – Filtering methods based on DFT – Linear Filtering of long data sequences - Overlap-add and save methods - FFT Algorithms - Decimation in time and Decimation in frequency algorithms- Use of FFT in linear filtering

UNIT II INFINITE IMPULSE RESPONSE DIGITAL FILTERS 9+6

Review of design of analog Butterworth and Chebyshev Filters, Frequency transformation in analogue domain – Design of IIR digital filters using impulse invariance technique –bilinear transformation – pre warping – Realization using direct, cascade and parallel forms

UNIT III FINITE IMPULSE RESPONSE DIGITAL FILTERS 9+6

Symmetric and Antisymmetric FIR filters – Linear phase FIR filters – Filter Design using windowing techniques (Rectangular, Hamming, and Hanning Windows) – Frequency sampling method – Realization of FIR filters – Transversal, Linear phase and Polyphase structures

UNIT IV FINITE WORD LENGTH EFFECTS 9+6

Fixed point and floating point number representations – Truncation and Rounding errors - Quantization noise – coefficient quantization error – Product quantization error - Overflow error – Round off noise power - limit cycle oscillations due to product round off and overflow errors – signal scaling

UNIT V DIGITAL SIGNAL PROCESSOR 9+6

Introduction to Programmable DSPs- Architecture of TMS320C5x – Assembly language Instructions - Addressing Modes - TMS320C5x Instructions Pipelining – Application programs in C5X- An overview of TMS320C54xx and TMS320C67xx

TOTAL: 45(L)+30(T)=75 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Apply various FFT algorithms for efficient computation of DFT and compute linear and circular convolution
- Design Infinite Impulse Response (IIR) filters
- Analyze the performance of FIR filters for different window functions
- Analyze the effects due to quantization of inputs and filter coefficients in digital filters
- Develop simple programs for DSP functions using processor

TEXT BOOKS:

1. John G Proakis and, Dimitris G Manolakis," Digital Signal Processing- Principles, Algorithms and Applications", Prentice Hall India, New Delhi, 2010.
2. S.Salivahanan, A.Vallavaraj, C.Gnanapriya " Digital Signal Processing ", Tata McGraw Hill, 2007

REFERENCE BOOKS:

1. Oppenheim A V, " Discrete Time Signal Processing ", Prentice Hall India, New Delhi, 2010
2. Mitra S K, " Digital Signal Processing – A Computer based Approach ", Tata McGraw Hill, New Delhi, 2010
3. David J. Defatta, Joseph G. Lucas, William S. Hodgkiss, " Digital signal processing : a system design approach ", John Wiley, 1995
4. B.Venkataramani, M.Bhaskar, " Digital Signal Processor, Architecture, Programming and Applications ", Tata McGraw Hill, 2011

15UEC502	TRANSMISSION LINES AND WAVEGUIDES	L	T	P	C
		3	0	0	3

PREREQUISITE:ELECTROMAGNETIC FIELDS

OBJECTIVES:

- To give an idea about symmetrical networks and various transmission line parameters
- To introduce the propagation of signals through lines
- To explain about radio propagation in guided systems and resonators

UNIT I FILTERS ??

The neper - the decibel - Characteristic impedance of Symmetrical Networks – Current and voltage ratios - Propagation constant - Properties of Symmetrical Networks – Filter fundamentals – Pass and Stop bands. Behaviour of the Characteristic impedance. Constant K Filters - Low pass, High pass, band pass, band elimination filters - m-derived sections – Filter circuit design – Filter performance

UNIT II TRANSMISSION LINE PARAMETERS ??

A line of cascaded T sections - Transmission lines - General Solution, Physical Significance of the equations, the infinite line, wavelength, velocity, propagation, Distortion line, the telephone cable, Reflection on a line not terminated in Zo, Reflection Coefficient, Open and short circuited lines, Insertion loss.

UNIT III THE LINE AT RADIO FREQUENCY ??

Parameters of open wire line and Coaxial cable at RF – Line constants for dissipation - voltages and currents on the dissipation less line - standing waves – nodes - standing wave ratio - input impedance of open and short circuited lines - power and impedance measurement on lines –$\lambda/4$ line,$\lambda/2$ line,$3\lambda/4$ line Impedance matching – single and double-stub matching circle diagram, smith chart and its applications – Problem solving using Smith chart.

UNIT IV GUIDED WAVES BETWEEN PARALLEL PLANES ??

Application of the restrictions to Maxwell's equations – transmission of TM waves between Parallel planes – Transmission of TE waves between Parallel planes. Transmission of TEM waves between Parallel planes – Manner of wave travel. Velocities of the waves – characteristic impedance – Attenuators

UNIT V WAVEGUIDES ??

Application of Maxwell's equations to the rectangular waveguide. TM waves in Rectangular guide. TE waves in Rectangular waveguide – Cylindrical waveguides. The TEM wave in coaxial lines. Excitation of wave guides. Guide termination and resonant cavities.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Design the constant K-filter& m-derived filter for the given cutoff frequency.
- Compute the transmission line parameters
- Analyze the transmission lines and their parameters using the Smith Chart
- Compare rectangular and cylindrical waveguides
- Classify the Guided Wave solutions -TE,TM and TEM

TEXT BOOKS:

1. John D.Ryder, "Networks, lines and fields" , Prentice Hall of India, 2nd Edition, 2006.
2. E.C.Jordan, K.G. Balmain, "E.M.Waves & Radiating Systems", Pearson Education, 2006

REFERENCE BOOKS:

1. Joseph Edminister, "Schaum's Series, Electromegnetics" , Tata Mc-graw Hill,2007
2. G S N Raju, "Electromagnetic Field Theory and Transmission Lines", Pearson Education, 2006.
3. Philip C. Magnusson, Andreas Weisshaar, Vijai K. Tripathi, Gerald C. Alexander, "Transmission Lines and Wave Propagation" , CRC Press, Fourth Edition, 2006
4. Ramo, Whineery and Van Duzer, "Fields and Waves in Communication Electronics" , John Wiley, 2003.

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15UEC503	MICROPROCESSORS, MICROCONTROLLERS AND APPLICATIONS	L	T	P	C
		2	2	0	3

OBJECTIVES :

- To develop an in-depth understanding of the operation of microprocessors and Microcontrollers, assembly language programming & interfacing techniques
- To introduce the hardware architecture, instruction set, programming and interfacing of 8051 microcontroller and PIC microcontroller

UNIT I 8086 CPU- H/W ARCHITECTURE, INSTRUCTION SET AND PROGRAMMING 9

Intel 8086 internal architecture-Minimum and Maximum mode signals -8086 addressing modes-Assembler directives-Instruction set-8086 Assembly language programming-Interrupts.

UNIT II PERIPHERAL INTERFACING 9

Interfacing Serial I/O (8251)- parallel I/O (8255) -Keyboard and Display controller (8279) – Programmable Interval Timer(8253/8254) – Interrupt Controller(8259)-DMA Controller

UNIT III 8051 MICROCONTROLLER- H/W ARCHITECTURE, INSTRUCTION SET AND PROGRAMMING 9

8051 Micro controller hardware- I/O pins, ports and circuits- External memory -Counters and Timers-Serial Data I/O- Interrupts-Interfacing to external memory and 8255- 8051 instruction set - Addressing modes - Assembly language programming - I/O port programming -Timer and counter programming - Serial Communication - Interrupt programming

UNIT IV 8051 INTERFACING AND APPLICATIONS 9

8051 Interfacing: LCD, ADC, DAC, Sensors, Stepper Motor and Keyboard. Case studies – Traffic light control, washing machine control.

UNIT V ATMEL AVR MICROCONTROLLER 9

Atmel AVR 8 – bit Architecture-Pin diagram – AVR family of microcontrollers -addressing modes-Instruction set- programming in assembly

TOTAL : 45 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Describe the architecture of 8086 and its programming
- Explain peripheral interfacing to Microprocessor
- Describe the architecture of microcontroller and its interfacing
- Analyze the architectural differences between Microprocessor and Microcontroller
- Design and Develop code for Microprocessor/Microcontroller based applications

TEXT BOOKS:

1. Douglas V Hall, “Microprocessors and Interfacing, Programming and Hardware”,Tata McGraw Hill,2006.
2. Kenneth J Ayala, “The 8051 Microcontroller Architecture Programming and Application” , Penram International Publishers (India), 2nd Edition,1996

REFERENCE BOOKS:

1. Ramesh S Gaonkar, “Microprocessor Architecture, Programming and Application with 8085”, Penram International Publishing, 4th Edition, New Delhi, 2000
2. Thomas Grace, ”Programming and interfacing Atmel’s AVR microcontroller”. 1st Edition Publisher: Cengage Learning
3. Mohammed Ali Mazidi and Janice Gillispie Mazidi,“The 8051 Microcontroller and Embedded Systems” ,Pearson Education Asia, New Delhi, 2003
4. Krishna Kant, “Microprocessors and Microcontrollers Architecture, programming and system design using 8085, 8086, 8051 and 8096”, PHI, 2007

15UEC504	DATA COMMUNICATION AND NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To give an overview of the functions of different layers
- To impart knowledge on IEEE standards employed in computer networking
- To familiarize the students with different protocols and network components

UNIT I PHYSICAL LAYER 8

Data communication Components – Data representation and Data flow – Networks – Types of Connections – Topologies – Protocols and Standards – OSI model, TCP/IP model – Transmission Media, Switching.

UNIT II DATA LINK LAYER 10

Framing -Flow Control and Error control – Stop and Wait – Go back – N ARQ – Selective Repeat ARQ – Sliding Window – Piggybacking – Random Access – controlled access. – LAN –Wired LANs, Wireless LANs, Connecting LANs And Virtual LANs.

UNIT III NETWORK LAYER 10

Logical addressing – IPV4, IPV6, Addresses–IV4, IV6, Address mapping–ARP, RARP, BOOTP, ICMP, IGMP and DHCP–Routing-Unicast Routing protocols.

UNIT IV TRANSPORT LAYER 8

Process to Process Delivery – User Datagram Protocol – Transmission Control Protocol – Congestion Control with Examples. QoS and techniques to improve QoS.

UNIT V APPLICATION LAYER 9

Domain Name Space – EMAIL – FTP, WWW – HTTP – Cryptography – Basic concepts, symmetric key and public key cryptography.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the Students will be able to :

- Explain the importance of data communications and the Internet in daily activities.
- Discuss the IEEE standards used in LAN
- Compare IPV6 addressing with IPV4 addressing
- Summarize the protocols used in Network and transport layers
- Explain the functions of Application Layer.

TEXT BOOKS:

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw– Hill, Fourth Edition,2011.
2. Andrew S. Tanenbaum , David J. Wetherall, Computer Networks, 5th Edition, 2010.

REFERENCES:

1. William Stallings, “Data and Computer Communication”, Eighth Edition, Pearson Education, 2007.
2. Larry L.Peterson, Peter S. Davie, “Computer Networks”, Elsevier, Fifth Edition, 2012
3. James F. Kurose, Keith W. Ross, “Computer Networking: A Top–Down Approach Featuring the Internet”, Pearson Education, 2005.

PROFESSIONAL ELECTIVE I	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

PROFESSIONAL ELECTIVE II	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

15UEC507	DIGITAL SIGNAL PROCESSING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To demonstrate signal processing techniques using DSP processor.
- To demonstrate signal processing functions using simulation software

USING SIMULATION SOFTWARE

1. Linear and circular convolution of two sequences
2. Sampling and effect of aliasing
3. Calculation of FFT of a signal
4. Design of FIR filters
5. Design of IIR filters

USING DSP PROCESSOR

1. Study of various addressing modes of DSP using simple programming examples
2. Implementation of linear convolution using Digital Signal Processor
3. Implementation of circular convolution using Digital Signal Processor
4. Waveform generation using Digital Signal Processor
5. Implementation of FIR using Digital Signal Processor

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the Students will be able to:

- Develop programs for digital signal processing algorithms using simulation software
- Utilize simulation software to design digital filters.
- Construct code for signal processing algorithms using digital signal processor.

HARDWARE AND SOFTWARE REQUIREMENT

1. PCs with Fixed / Floating point DSP Processors (Kit / Add-on Cards)-15 Units
2. Simulation software and Signal Processing Tool Box-10 Users license
3. Function Generators - 6
4. CRO -6

15UEC508	MICROPROCESSORS,MICROCONTROLLERS AND APPLICATIONS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To introduce the basics of Microprocessor Programming, interfacing and their applications
- To demonstrate the Microcontroller Programming and its interfacing

LIST OF EXPERIMENTS

1. Programs for 16 bit Arithmetic operations (Using 8086).
2. Programs for Sorting and Searching (Using 8086).
3. Programs for String manipulation operations (Using 8086).
4. Interfacing ADC and DAC.
5. Interfacing and Programming 8279, 8259, and 8253.
6. Interfacing and Programming of Stepper Motor and DC Motor Speed control
7. Programs for Arithmetic, Logical and Bit manipulation (Using 8051).
8. Programming and verifying Timer, Interrupts and UART operations (Using 8051).
9. Communication between 8051 Microcontroller kit and PC.
10. Traffic Light Control

TOTAL: 30 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to :

- Develop assembly language programs for arithmetic, logical, sorting and searching operations
- Develop assembly language program for timer and interrupts using 8051
- Demonstrate peripheral interface with Microprocessor
- Develop code for microprocessor/microcontroller based applications

HARDWARE AND SOFTWARE REQUIREMENT

1. 8086 Trainer -15
2. 8051 Trainer -15
3. 8255 Interfacing Card- 3
4. 8279 Interfacing Card -3
5. 8259 Interfacing card -3
6. 8251 Interfacing Card- 3
7. ADC Interfacing card -3
8. DAC Interfacing Card -3
9. Stepper motor Interfacing card- 3
10. DC motor Interfacing card -3
11. Traffic light controller-3

15UGS531 SOFTSKILLS AND COMMUNICATION LABORATORY L T P C
(Common to CSE,ECE,EEE and IT)

0 0 2 1

OBJECTIVES:

- To develop a requisite knowledge in communication skills and soft skills .
- To enhance the students' acumen in sharpening the skills to meet the global challenges and industrial needs.

UNIT I COMMUNICATION SKILL 10

Listening to the Conversation - Introducing Oneself Before Audience - Group Discussion - Formal Letter writing - E Mail Etiquettes - power point presentation

UNIT II PREPARATION FOR INTERVIEWS 10

Preparation of Resume - Difference between Bio-data and CV- Visiting Company Web site - Gathering Information about Company - Mode of Selection - Different types of Selection Methods – Pre-Placement Talk - Attitude Before Interview.

UNIT III INTERVIEW SKILL 10

Body Language - Types of Interview – Attending to Telephonic Interview – Do's and Don'ts during and after the Interview - Expectations of the Interviewer - Mock Interview.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the students will be able to:

- Present ideas and viewpoints in a very flexible manner in order to differentiate and eliminate ambiguity
- Write well-structured and easily readable reports, e-mails and articles on complex topics in an appropriate style
- Comprehend any spoken language delivered face to face and through different media like telephone and public announcement

SEMESTER VI

15UEC601	WIRELESS COMMUNICATION SYSTEMS	L	T	P	C
		3	0	0	3

PREREQUISITE:DIGITAL COMMUNICATION

OBJECTIVES:

- To give Knowledge on characteristic of wireless channel and various cellular architectures
- To introduce the concepts behind various digital signaling schemes for fading channels
- To be familiar the various multipath mitigation techniques and wireless system standards

UNIT I TYPES OF WIRELESS SERVICES & CELLULAR ARCHITECTURE 10

Types of services, Requirement for types of services. —Cellular concept- Frequency reuse – channel assignment- hand off- interference & system capacity – Coverage and capacity improvement. Multiple Access techniques – FDMA, TDMA, CDMA , SDMA and CSMA.

UNIT II WIRELESS CHANNELS 10

Basic propagation mechanisms, Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading, Narrowband and Wideband models.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS 8

Structure of a wireless communication link, Principles of QPSK, Offset-QPSK, π /4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, OFDM- Principle, Cyclic prefix ,Transceiver implementation, Error performance in fading channels.

UNIT IV MULTIPATH MITIGATION TECHNIQUES 8

Equalization – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques.

UNIT V WIRELESS NETWORKING AND SYSTEM STANDARDS 9

Introduction to Wireless Networks, Limitations in Wireless Networking, Development of wireless networks. Wireless systems and standards: -Basics and architectures of Second Generation, Third, fourth and Fifth Generation.

Total: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Design a cellular system
- Describe various wireless channels
- Apply the various signaling schemes for fading channels
- Compare multipath mitigation techniques and understand their performance
- Classify the diverse wireless systems and study their performance

TEXT BOOKS:

1. Rappaport,T.S., “Wireless communications”, Second Edition, Pearson Education, 2010.
2. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.

REFERENCES:

1. Andrea Goldsmith, “wireless communications: principles and practice”, second edition, PHI,2006.
2. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
3. Upena Dalal, “ Wireless Communication”, Oxford University Press, 2009.
4. Jonathan Rodriguez, “Fundamentals of 5G Mobile Networks” Wiley Publications, 2015.

15UEC602	ANTENNA AND WAVE PROPAGATION	L	T	P	C
		3	0	0	3

PREREQUISITE:TRANSMISSION LINES AND WAVEGUIDES

OBJECTIVES:

- To introduce the various parameters of an antenna.
- To impart knowledge on aperture antennas and frequency independent antennas.
- To give knowledge on Radio Wave Propagation.

UNIT I ANTENNA FUNDAMENTALS **9**

Antenna characteristics: Radiation pattern, Beam solid angle, Directivity, Gain, Input impedance, Polarization, Bandwidth, Reciprocity, Equivalence of Radiation patterns, Equivalence of Impedances, Effective aperture, Vector effective length, Antenna temperature.

UNIT II WIRE ANTENNAS AND ANTENNA ARRAYS **9**

Review of electromagnetic theory: Vector potential, Retarded case. Wire antennas: Hertizian dipole, Half wave Dipole, Monopole - Radiation resistance and Directivity, Small loop antennas. Antenna Arrays: Linear Array and Pattern Multiplication, Two-element Array, Uniform Array, Array with non-uniform Excitation-Binomial Array

UNIT III APERTURE ANTENNAS **9**

Magnetic Current and its fields, Uniqueness theorem, Field equivalence principle, Slot antenna, Horn Antenna, Pyramidal Horn Antenna, Reflector Antenna-Flat reflector, Corner Reflector, Common curved reflector shapes, Lens Antenna.

UNIT IV SPECIAL ANTENNAS AND ANTENNA MEASUREMENTS **9**

Special Antennas: Long wire, V and Rhombic Antenna, Yagi-Uda Antenna, Turnstile Antenna, Helical Antenna- Axial mode helix, Normal mode helix, Log periodic Dipole Array, Spiral Antenna, Microstrip Patch Antennas, Wearable antennas, Mobile phone antennas.
Antenna Measurements: Radiation Pattern measurement, Gain and Directivity Measurements, Anechoic Chamber measurement

UNIT V RADIO WAVE PROPAGATION **9**

Ground Wave Propagation, Free-space Propagation, Ground Reflection, Surface waves, Diffraction, Wave propagation in complex Environments, Tropospheric Propagation, Tropospheric Scatter. Ionospheric propagation: Structure of ionosphere, Sky waves, skip distance, Virtual height, Critical frequency, MUF, Electrical properties of ionosphere, Effects of earth‟s magnetic fields, Faraday rotation, Whistlers.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the Students will be able to :

- Explain the parameters of antenna
- Design wire antennas and antenna arrays
- Describe the working of aperture antennas
- Apply the measurements techniques for testing an antenna
- Explain the concept of radio wave propagation

TEXT BOOKS:

1. K.D Prasad, “Antennas and Wave Propagation”,Sathya Prakasan Publications, 3rd Edition,2005.
2. E.C.Jordan and Balmain, “Electromagnetic waves and Radiating Systems”,Pearson Education,2006.

REFERENCE BOOKS:

1. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, “Antennas for all Applications””, Tata McGraw-Hill Book Company, 3rd Edition, 2007.
2. G.S.N.Raju, “Antenna Wave Propagation”, Pearson Education, 2004.
3. Constantine A. Balanis, “Antenna Theory Analysis and Desin, John Wiley”, 3rd Edition,2009.
4. A.R.Harish, M.Sachidanada, “Antennas and Wave propagation””,Oxford University Press 2007.
5. Wearable antenna, Mobile phone antennas
https://www.researchgate.net/publication/224089551_A_review_of_wearable_antenna

http://www.antenna-theory.com/design/cellantenna.php

15UEC603	VLSI DESIGN	L	T	P	C
		3	0	0	3

PREREQUISITE:DIGITAL ELECTRONICS AND DESIGN

OBJECTIVES:

- To introduce the basic concepts of CMOS Technologies and testing
- To outline the formal procedures for the design of combinational and sequential circuits

UNIT I SPECIFICATION USING VERILOG HDL 9

Basic concepts- identifiers- gate primitives, gate delays, operators, timing controls, procedural assignments conditional statements, Data flow and RTL, structural gate level switch level modeling, Design hierarchies, Behavioral and RTL modeling, Test benches, Structural gate level description of decoder, equality detector, comparator, priority encoder, half adder, full adder, Ripple carry adder, D latch and D flip flop.

UNIT II CMOS TECHNOLOGY 9

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

UNIT III CIRCUIT CHARACTERIZATION AND SIMULATION 9

Delay estimation, Logical effort and Transistor sizing, Power dissipation, Interconnect, Design margin, Reliability, Scaling- SPICE tutorial, Device models, Device characterization, Circuit characterization, Interconnect simulation

UNIT IV COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN 9

Circuit families –Low power logic design – comparison of circuit families – Sequencing static circuits, circuit design of latches and flip flops, Static sequencing element methodology- sequencing dynamic circuits – synchronizers

UNIT V CMOS TESTING 9

Need for testing- Testers, Text fixtures and test programs- Logic verification- Silicon debug principles- Manufacturing test – Design for testability – Boundary scan

TOTAL: 45 PERIODS

COURSE OUTCOMES

After successful completion of this course, the Students will be able to :

- Construct any digital circuit using HDL
- Outline the concept of MOS transistor.
- Analyze the power estimation & delay calculations in CMOS circuits.
- Construct combinational and sequential circuit using CMOS logic.
- Demonstrate the importance of testing and its types in VLSI circuits

TEXT BOOKS:

1. Weste and Harris, “CMOS VLSI DESIGN”, Pearson Education,4th Edition,2011.
2. J.Bhasker,“Verilog HDl Primer”, BS publication,2001.
3. John P. Uyemura,“ Introduction to VLSI Circuits And Systems”, John Wiley & Sons, Inc., 2009.
4. Jan M. Rabaey, Anantha P. Chandrakasan, Borivoje Nikolic ,“ Digital Integrated Circuits: A design perspective”, Pearson Education,2nd Edition,2016.

REFERENCE BOOKS:

1. D.A Pucknell & K.Eshraghian, ‘’Basic VLSI Design’’, 3rd Edition, 2003.
2. Wayne Wolf, “Modern VLSI design”, Pearson Education, 2003.
3. M.J.S.Smith,“Application specific integrated circuits”,Pearson Education,1997.
4. Ciletti, “Advanced Digital Design with the Verilog HDL”,Prentice Hall of India,2003..

OPEN ELECTIVE I	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

PROFESSIONAL ELECTIVE III	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

PROFESSIONAL ELECTIVE IV	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

15UEC607	NETWORKS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To create the scenario and study the performance of different network protocol through simulation
- To understand the fundamental concepts of routing protocols and their algorithms.

LIST OF EXPERIMENTS

1. Ethernet LAN protocol
2. Wireless LAN protocol
3. Implementation and study of stop and wait protocol
4. Implementation and study of Go back-N and selective repeat protocols
5. Implementation of distance vector routing algorithm
6. Implementation of Link state routing algorithm
7. Implementation of Data encryption and decryption
8. Study the performance of token bus and token ring protocols through simulation
9. Study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
10. Study of UDP Performance

TOTAL: 30 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Demonstrate LAN protocols
- Compare the performance of different routing protocols
- Describe the various Data Link Protocols

HARDWARE AND SOFTWARE REQUIREMENT

1. Ethernet LAN Trainer kit- 2
2. Wireless LAN trainer- 2
3. Network simulator software- 20 user
4. Simulation software

15UEC608	VLSI DESIGN LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To implement verilog coding for combinational and sequential circuits
- To provide the knowledge of synthesis, simulation and generation of configuration file for combinational and sequential circuits

LIST OF EXPERIMENTS

1. Design and implementation of Adders, Subtractors.
2. Design and implementation of Multiplexer, Demultiplexer, Encoders and Decoders.
3. Design and implementation of Magnitude Comparator, Parity checker and Generator.
4. Design and implementation of Code Convertors.
5. Design and implementation of Flip-Flops.
6. Design and implementation of Shift Registers.
7. Design and implementation of Counters.
8. Design and implementation of Sequence Generator, PRBS Generator and MAC.
9. Design CMOS Inverter and basic gates using EDA Tool.
10. Design static and dynamic CMOS circuits using EDA Tool.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Develop Verilog coding for combinational logic circuits
- Develop Verilog coding for sequential logic circuits
- Demonstrate Synthesis and simulation of combinational and sequential circuits

HARDWARE AND SOFTWARE REQUIREMENT

1. No. of systems required-15
2. List of software required
   a) Simulator and Synthesizer tool with down loader (VHDL/Verilog) - 15 User license each
   b) Transistor level Spice modelling tool-15 User license each
   c) Tanner EDA -15 User license each

3. No. of FPGA kits required with
   a) I/O cards-15
   b) Add on cards for FPGA-15

15UEC609	TECHNICAL PROJECT	L	T	P	C
		0	0	6	3

OBJECTIVES

- To engage the student in integrated activities of reading ,research, discussion and presentation around a designated subject

This course is introduced to enrich the communication skills of the student and to create awareness on recent development in Electronics and communication through Technical presentation. In this course, a student has to present at least two Technical papers on recent advances in engineering/technology that will be evaluated by a committee constituted by the Head of the Department.

COURSE OUTCOMES

After successful completion of this course the students will be able to:

- Communicate the technical information effectively through oral presentation and writing report
- Analyze small technical problems and develop proto type model

SEMESTER VII

		L	T	P	C
15UME701	PROJECT MANAGEMENT AND FINANCE (Common to MECH, CSE,ECE,EEE,IT,EIE)	3	0	0	3

OBJECTIVES :

- To impart knowledge to find solutions and approaches for various projects.
- To familiarize the utilization of project within time, resource and financial constraints.

UNIT I PROJECT MANAGEMENT CONCEPTS 9

Concept and characteristics of a project, importance of project management, types of project, project organizational structure, project life cycle, Statement of Work, Work Breakdown Structure.

UNIT II PROJECT PLANNING 9

Project Planning and Scheduling techniques - developing the project network using CPM/PERT, Limitations of CPM/PERT, Precedence Diagramming Method, constructing diagram and computations using precedence diagramming method, PERT/CPM simulation, reducing project duration.

UNIT III RESOURCE SCHEDULING & CRITICAL CHAIN SCHEDULING 9

Resource Scheduling - Resource allocation method, splitting and multitasking, Multi project resources scheduling - Critical Chain Scheduling -Concept of critical chain scheduling - critical chain scheduling method, application of Critical chain scheduling and limitations.

UNIT IV PROJECT QUALITY MANAGEMENT 9

Concept of project quality, responsibility for quality in projects, quality management at different stages of project, tools and techniques, Quality Management Systems, Project Performance Measurement and Control - Monitor and assess project performance, schedule, and cost. Project Closure/ Termination - Meaning of closure/ termination, project audit process, termination steps, final closure.

UNIT V FINANCIAL ACCOUNTING 9

Balance sheet and related concepts - Profit & Loss Statement and related concepts - Financial Ratio Analysis - Cash flow analysis - Funds flow analysis – Comparative financial statements. Investments - Average rate of return - Payback Period - Net Present Value - Internal rate of return.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

1. Discuss various characteristics and importance of project management.
2. Use CPM/ PERT network for finding minimum project duration.
3. Compare various scheduling methods.
4. Justify various tools and techniques at different stages of quality management.
5. Discuss financial ratios, cash flow and fund flow analysis.

TEXT BOOKS:

3. SeeniKannan.P, PitchayyaPillai.G, Arun Balasubramanian K, and Seenivasn.R, “Project Management and Finance”, Little Moon Publication, 2016.
2. Prasanna Chandra, “'Fundamentals of Financial Management' ”, Tata Mcgraw-Hill Publishing Ltd, 2005.

REFERENCE BOOKS:

1. Jack Meredith, Samuel J.Mantel, “Project Management- A Managerial Approach”, John Wiley and Sons.
2. Clifford F Gray, Erik W Larson, “Project Management-The Managerial Process ”, Tata Mcgraw-Hill Publishing Co Ltd.
3. John M Nicholas, “Project Management For Business And Technology”, Prentice Hall of India Pvt Ltd.
4. Paresh Shah, “Basic Financial Accounting for Management”, Oxford University Press, 2007.

15UEC702	OPTICAL COMMUNICATION	L	T	P	C
		2	0	2	3

OBJECTIVES:

- To familiarize the students about the basic elements of optical fiber transmission link, fiber modes, configurations and structures.
- To explain the various optical sources and detectors.
- To train the students about fiber optic components used in optical communication.

UNIT I INTRODUCTION 10

Introduction**,** Ray theory transmission- Total internal reflection-Acceptance angle – Numerical aperture – Skew rays – Electromagnetic mode theory of optical propagation – EM waves – modes in Planar guide – phase and group velocity – cylindrical fibers – SM fibers- Applications : Li-Fi.

UNIT II SOURCES AND DETECTORS 10

Optical sources: Light Emitting Diodes - LED structures - surface and edge emitters - internal - quantum efficiency, injection laser diode structures - comparison of LED and ILD

Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance.

UNIT III TRANSMISSION CHARACTERISTICS AND RECEIVER OPERATION 10

Attenuation – Material absorption losses in silica glass fibers – Linear and Non linear Scattering losses - Fiber Bend losses –Intra and inter Modal Dispersion – Over all Fiber Dispersion - Polarization .

Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration – Probability of Error – Quantum limit. Fiber Attenuation measurements-– Dispersion measurements- Fiber Numerical Aperture Measurements.

TOTAL: 30 PERIODS

LIST OF EXPERIMENTS

1. DC characteristics of LED,LASER and PIN Photo Diode.
2. Mode Characteristics of Fibers
3. Measurement of Connector and Bending Losses.
4. Fiber Optic Analog and Digital Link
5. Numerical Aperture Determination for Fibers
6. Attenuation Measurement in Fibers

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to

- Explain the basic elements of optical fiber transmission link, fiber modes, configurations and structures.
- Analyze the various optical sources and detectors.
- Explain the different kinds of losses, signal distortion in optical transmitters, receivers and measurement techniques.
- Demonstrate the characteristics of optical sources and detectors.
- Demonstrate the characteristics of various losses present in optical fiber .

TEXT BOOKS:

1. John M. Senior, “Optical Fiber Communication”, Pearson Education, 2nd Edition, 2007.
2. Gerd Keiser, “Optical Fiber Communication”, Mc Graw Hill – Third Edition, 2000.

REFERENCE BOOKS:

1. J.Gower, “Optical Communication System” , Prentice Hall of India, 2001.
2. Rajiv Ramaswami, “Optical Networks” , Elsevier, 2nd Edition , 2004.
3. Govind P. Agrawal, “Fiber-optic communication systems” , John Wiley & sons , 3rd Edition, 2004.
4. R.P. Khare, “Fiber Optics and Optoelectronics”, Oxford University Press, 2007
5. http://www.techworld.com/big-data/what-is-li-fi-everything-you-need-know-3632764/

HARDWARE REQUIREMENT

1. CRO -5
2. Power meter -2
3. Radiation table -1
4. Universal Waveguide stand- 25
5. Optical power source -4
6. Fiber Optic Power meter -4
7. Fiber optic trainer Kit- 5
8. Multiplexer / Demultiplexer Kit -2
9. Laser Trainer Kit -2
10. PIN Diode -3
11. LED mounted source at wavelength870nm-3

15UEC703	MICROWAVE ENGINEERING	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To familiarize the students with active and passive microwave components.
- To explain about Microwave semiconductor devices and their applications.
- To give knowledge on microwave measurements.
- To demonstrate the characteristics of microwave sources.
- To demonstrate the working of microwave components.

UNIT I PASSIVE MICROWAVE COMPONENTS AND THEIR S PARAMETERS 9

Microwave Frequencies, Microwave Devices, Microwave Systems, Microwave Units of Measure, Z & ABCD Parameters- Introduction to S parameters, Formulation of S parameters, Properties of S parameters, Reciprocal and lossless networks ,Waveguide Tees, Magic Tees (Hybrid Tees), Hybrid Rings (Rat-Race Circuits), Waveguide Corners, Bends and Twists, Directional Couplers, Two-Hole Directional Couplers, Hybrid Couplers, Microwave Circulators and Isolators, S matrix formulation of the above.

UNIT II TRANSFERRED ELECTRON DEVICES (TED) AND AVALANCHE TRANSIT- TIME DEVICES 9

Introduction: Gunn Diodes - GaAs Diode, Gunn Effect, Ridley-Watkins-Hilsum (RWH) Theory, Differential Negative Resistance, Two-Valley Model Theory, High-Field Domain, Modes of Operation, LSA Diodes, InP Diodes, CdTe Diodes, Microwave Generation and Amplification

Avalanche Transit-Time Devices: Introduction, Read Diode, Physical Description, Avalanche Multiplication, Carrier Current Io(t) and External Current Ie(t), Output Power and Quality Factor, IMPATT Diodes- Physical Structures, Negative Resistance, Power Output and Efficiency, TRAPATT Diodes- Physical Structures, Principles of Operation, Power Output and Efficiency, BARITT Diodes- Physical Description, Principles of Operation, Microwave Performance, Parametric Devices- Physical Structures, Nonlinear Reactance and Manley - Rowe Power Relations, Parametric Amplifiers, Applications.

UNIT III MICROWAVE LINEAR-BEAM TUBES (O TYPE) AND MICROWAVE CROSSED FIELD TUBES (M TYPE) 9

Klystrons-Reentrant Cavities, Two-Cavity Klystron, Multicavity Klystron Amplifiers-Velocity Modulation Process, Bunching Process, Output Power Beam Loading and Output Current, Reflex Klystron- Velocity Modulation, Power Output and Efficiency, Electronic Admittance. Helix Traveling-Wave Tubes (TWTs)- Slow-Wave structures, Amplification Process, Convection Current, Axial Electric Field, Wave Modes, Gain Consideration

Microwave Crossed Field Tubes: Magnetron Oscillators, Cylindrical Magnetron, Coaxial Magnetron, Tunable Magnetron, Rieke diagram.

UNIT IV PLANAR TRANSMISSION LINES AND MMICs 9

Introduction, Microstrip Lines, Characteristic Impedance of Microstrip Lines, Losses in Microstrip Lines, Quality Factor Q of Microstrip Lines, Parallel Strip Lines, Distributed Lines, Characteristic Impedance, Attenuation Losses, Coplanar Strip Lines, Shielded Strip Lines, Problems, Monolithic Microwave Integrated Circuits**:** Introduction, Materials - Substrate Materials, Conductor Materials, Dielectric Materials, Resistive Materials, Monolithic Microwave Integrated Circuit Growth, MMIC Fabrication Techniques, Fabrication Example

UNIT V MICROWAVE MEASUREMENTS 9

Slotted line VSWR measurement, VSWR through return loss measurement, Power measurement, Impedance measurement, Insertion loss and attenuation loss measurements- Measurement of scattering parameters - Measurement of 1 dB, dielectric constant measurement of a solid using waveguide

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS

1. Reflex Klystron – Mode characteristics
2. Gunn Diode – Characteristics
3. VSWR, Frequency and Wave Length Measurement
4. Directional Coupler – Directivity and Coupling Coefficient – S – parameter measurement
5. Isolator and Circulator – S - parameter measurement
6. Attenuation and Power measurement
7. S - matrix Characterization of E-Plane T, H-Plane T and Magic T.
8. Radiation Pattern of Antennas.
9. Antenna Gain Measurement

TOTAL:30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Find the S parameters for microwave passive components .
- Compute the output power and efficiency of Transferred Electron Devices and Avalanche transit time devices .
- Compute the efficiency and Power output of Microwave Microwave Tubes .
- Analyze different types of strip lines .
- Discuss the various microwave measurement techniques .
- Obtain the characteristics of microwave sources
- Analyze the performance of microwave components in terms of scattering parameters
- Determine the gain and radiation pattern of horn antenna

TEXT BOOKS:

1. Samuel Y.Liao," "Microwave Devices and Circuits" , " Prentice Hall of India,, 3rd Edition, , 2003. .
2. Annapurna Das, Sisir K.Das,, " "Microwave Engineering ", Tata McGraw-Hill,2000.

REFERENCE BOOKS:

"

1. R.E. Collin, ," Foundations for Microwave Engineering", 2nd Edition, IEEE Press,, 2002. . ,
2. David M.Pozar,, "Microwave Engineering" , John Wiley & Sons,, , IIEd,, , 2003. ,

3. P.A.Rizzi,, ," Microwave Engineering Passive Circuits ", Prentice Hall , 1988.
4. R. S. Rao," Microwave Engineering", PHI Learning Pvt. Ltd, 2012

HARDWARE REQUIREMENT

1. Klystron power supply- 3
2. Klystron tube- 3
3. Gunn power supply -3
5. PIN modulator -3
6. Isolator -5
7. Attenuator -5
8. Frequency meter -5 107
9. Slotted section- 5
10. Detector mount -5
11. Termination -10
12. Movable short -5
13. Slide screw tuner -4
14. Horn antenna -2
15. Fixed attenuator -3
16. Magic TEE- 2
17. E-Plane TEE -2
18. H-Plane TEE -2
19. Directional coupler- 2
20. VSWR meter- 5
21. CRO -5
22. Power meter -2
23. Radiation table -1
24. Universal Waveguide stand- 25

OPEN ELECTIVE II	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

PROFESSIONAL ELECTIVE V	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

SEMESTER VIII

15UME801	PROFESSIONAL ETHICS	L	T	P	C
	(Common to ALL Branches)	2	0	0	2

OBJECTIVES :

- To impart knowledge on a values-based approach and provide a method of thinking about and dealing with ethical issues in the work place.
- To explain what a profession is and what it means to act professionally.

UNIT I ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 10

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger

UNIT III GLOBAL ISSUES 11

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Engineers as Managers – Consulting Engineers – Honesty – Moral Leadership – Sample Code of Conduct.

TOTAL : 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

1. Explain the concept of ethics in engineering profession.
2. Discuss the code of ethics and industrial standards.
3. Discuss about globalization and cross cultural issues.

TEXT BOOKS:

1. Subramanian. R , "Professional Ethics", Oxford University press India, New Delhi First edition, 2013.
2. Dhinesh Babu.S, "Professional Ethics and Human Values", Laxmi Publications, New Delhi, Reprint, 2016.

REFERENCE BOOKS:

1. Jayakumar.V, "Professional Ethics in Engineering", Lakshmi Publications, Chennai.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003.
3. Edmund G Seebauer, Robert L Barry "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4. David Ermann, Michele S Shauf "Computers, Ethics and Society", Oxford University Press, 2003.

OPEN ELECTIVE III	L	T	P	C
	3	0	0	3

		L	T	P	C
	PROFESSIONAL ELECTIVE VI	**3**	**0**	**0**	**3**

		L	T	P	C
15UEC804	**PROJECT WORK**	**0**	**0**	**24**	**12**

OBJECTIVE:

- To deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer based project or management project.

PROJECT DESCRIPTION:

Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project. The progress of the project is evaluated based on a minimum of three reviews.

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Develop a system using comprehension of concepts by implementing their designs
- Evaluate the designed system with respect to different performance criteria
- Analyze the variety of issues in design concept through environmental issues and quality.
- Explain the systematic way of organizing various resources for completing the project on time.
- Engage in independent learning for effective implementation of the project

LIST OF OPEN ELECTIVES

15UEC901	ADVANCED MICROCONTROLLERS AND MICROPROCESSORS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the different type of microprocessors architecture
- To present PIC microcontroller and its programming

UNIT I 80186, 80286, 80386 AND 80486 MICROPROCESSORS 9

80186 Architecture, Enhancements of 80186 – 80286 Architecture – Real and Virtual Addressing Modes – 80386 Architecture – Special Registers – Memory Management – memory Paging mechanism – 80486 Architecture – Enhancements – Cache Memory Techniques – Exception Handling – Comparison of Microprocessors (8086 – 80186 – 80286 – 80386 – 80486).

UNIT II PENTIUM MICROPROCESSORS 9

Pentium Microprocessor Architecture – Special Pentium Registers – Pentium Memory Management – New Pentium Instructions – Pentium Pro Microprocessor Architecture – Special features – Pentium II Microprocessor Architecture – Pentium III Microprocessor Architecture –Pentium IV Architecture – Comparison of Pentium Processors.

UNIT III R8C 16 BIT MICROCONTROLLER 9

The R8C Architecture – CPU Register – Instruction Set –– On chip Peripherals- R8C Tiny Development Tools – Conversion,PWM,UART,Timer Interrupt – System Design using R8C Microcontroller.

UNIT IV HIGH PERFORMANCE RISC ARCHITECTURE – ARM PROCESSOR 9

Organization of CPU – Bus architecture –Memory management unit - ARM instruction set- Thumb Instruction set- addressing modes – Programming the ARM processor.

UNIT V CYPRESS'S PSOC 9

The PSoC 1 Family – Internal architecture of PSoC – The digital sub systems – GPIO pins – Digital application using PSoC – The Analog section – System Resources – Basics Concepts of PSoC 3 and PSoC 5

TOTAL: 45 Periods

COURSE OUTCOMES:

After successful completion of this course, the Students will be able to :

- Compare different versions of Intel microprocessor architectures
- Relate the different versions of Pentium processor
- Apply the programming knowledge of R8C microcontroller in real time applications
- Develop code for real time applications using ARM processor
- Describe the architecture of PSoC

TEXT BOOKS:

1. B.B.Brey, "The Intel Microprocessor 8086/8088 /80186/80188, 80286, 80386, 80486, PENTIUM, PENTIUM Pro, PII, PIII & IV Archietecture, Programming & Interfacing" , Pearson Education 2004.
2. Steve Furber, "ARM System –On –Chip architecture" , Addision Wesley ,2000 Edition.

REFERENCE BOOKS:

1. Douglas V.Hall, “Microprocessors and Interfacing’’, Tata McGraw Hill, II Edition, 2006.
2. Mohamed Rafiquzzaman,, “Microprocessors and Microcomputer Based System Design”, CRC Press,2nd Edition,2007.
3. Julio Sanchez Maria P.Canton, “Microcontroller Programming: The microchip PIC”, CRC Press, Taylor & Francis Group,2007.
4. Lyla B.Das,“Embedded systems an integrated approach” , Pearson, 2013

15UEC902	MOBILE ADHOC NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide the knowledge of mobile adhoc networks, design and implementation issues and available solutions.
- To provide the knowledge of routing mechanisms and the three classes of approach: proactive, on demand and hybrid

UNIT I INTRODUCTION 9

Introduction to adhoc networks – definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models:- Indoor and outdoor models.

UNIT II MEDIUM ACCESS PROTOCOLS 9

MAC Protocols: design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11g, 802.15. HIPERLAN.

UNIT III NETWORK PROTOCOLS 9

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing.

UNIT IV END-END DELIVERY AND SECURITY 9

Transport layer : Issues in designing - Transport layer classification, adhoc transport protocols, Security issues in adhoc networks: issues and challenges, Network security attacks, secure routing protocols, Key Management: Symmetric key Algorithm and Asymmetric key Algorithm.

UNIT V CROSS LAYER DESIGN AND INTEGRATION OF ADHOC FOR 4G 9

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective. Integration of adhoc with Mobile IP networks.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Explain the principles of Mobile adhoc networks
- Illustrate MAC routing protocols and various Wireless LAN standards
- Demonstrate the function of proactive routing protocols and their implications on bandwidth consumption
- Explain secure routing protocols to prevent the network security attacks
- Construct cross layer design for mobile adhoc network

TEXT BOOKS:

1. C.Siva Ram Murthy and B.S.Manoj,, , " "Ad hoc Wireless Networks Architectures and protocols" ", Pearson Education,, 2nd Edition, 2004.
2. Charles E. Perkins,, "Ad hoc Networking" , Pearson Education, Addison – Wesley, 2000.

REFERENCE BOOKS:

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic,, "Mobile adhoc networking " , Wiley-IEEE press, Addison – Wesley, 2004.
2. Mohammad Ilyas,, "The handbook of adhoc wireless networks" , CRC press, 2002.
3. T. Camp, J. Boleng, and V. Davies,, "A Survey of Mobility Models for Ad Hoc Network"., 2002.
4. Fekri M.Abduljalil and Shrikant K. Bodhe,, "A survey of integrating IP mobility protocols and Mobile Ad hoc networks", , IEEE communication Survey and tutorials, vol.9 no.1, 2007.
5. V.T. Raisinhani and S.Iyer,, "Cross layer design optimization in wireless protocol stacks" , Comp communication, vol 27 no. 8 2004.
6. V.T. Raisinhani and S.Iyer,, "ÉCLAIR; An Efficient Cross-Layer Architecture for wireless protocol stacks" , World Wireless cong., San francisco,CA May 2004.
7. V.Kawadia and P.P.Kumar, , "A cautionary perspective on Cross-Layer design", IEEE Wireless Communication Vol.12 No.1 2005.
8. Stefano Basagni and Sung-Ju Lee, , "Mobile Ad Hoc Networking Research -Trends and Applications" , Wireless Commun. and Mobile Comp., Special Issue, vol. 2, no. 5 2002.

15UEC903 ARM PROCESSOR ARCHITECTURE AND APPLICATIONS L T P C

2 0 2 3

OBJECTIVES :

- To introduce about ARM Architecture.
- To impart knowledge on ARM language and organization.
- To introduce the hardware architecture support, instruction set.

UNIT I ARM ASSEMBLY LANGUAGE PROGRAMMING AND ORGANIZATION 10

Introduction to ARM Processor – Processor architecture and organization – Abstraction in hardware design – MU0 a simple processor – The Acorn RISC Machine - Architectural inheritance - The ARM programmer's model – ARM development tools- Registers – Current Program Status Register – Pipeline – Data processing instructions – Data transfer instructions-– 3-stage pipeline ARM organization – 5-stage pipeline ARM organization – ARM instruction execution.

UNIT II ARM INSTRUCTION SET 10

Introduction – Exceptions – Conditional execution – Branch and Branch with Link Branch – Branch with Link and eXchange – Software Interrupt – Data processing instructions – Multiply instructions – Count leading zeros – Single word and unsigned byte data transfer instructions – Half-word and signed byte data transfer instructions – Multiple register transfer instructions – Swap memory and register instructions – Status register to general register transfer instructions – Coprocessor instructions – ARM architecture variants.

UNIT III EMBEDDED ARM APPLICATIONS 10

The VLSI Ruby II Advanced Communication Processor – The VLSI ISDN Subscriber Processor - ARM7100 - The Ericsson-VLSI Bluetooth Baseband Controller - The ARM7500 and ARM7500FE.

TOTAL : 30 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Discuss the ARM assembly language programming.
- Describe the ARM instruction set.
- Identify the application of ARM processor.

TEXT BOOKS:

3. Steve Furber, “ARM System - on - Chip Architecture", 2nd Edition, 2009.
4. Andrew N. Sloss, Dominic Symes, Chris Wright, “ARM System Developer’s Guide Designing and Optimizing System Software”, Morgan Kaufmann,2004.

REFERENCE BOOKS:

1. Mohammed Ali Mazidi and Janice Gillispie Mazidi,“The 8051 Microcontroller and Embedded Systems” ,Pearson Education Asia, 2nd Edition, 2009 .
2. David Seal," ARM Architecture Reference Manual", Addison-Wesley, 2001.
3. Joseph Yiu," The Definitive Guide to the ARM Cortex-M3"2007.

LABORATORY

LIST OF EXPERIMENTS

1. Study of ARM evaluation system.
2. Interfacing ADC and DAC.
3. Interfacing LED and PWM.
4. Interfacing real time clock and serial port.
5. Interfacing keyboard and LCD.
6. Interfacing EPROM and interrupt.
7. Interrupt performance characteristics of ARM and FPGA.
8. Interfacing stepper motor and temperature sensor.

TOTAL: 30 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Describe the architecture and programming of ARM processor and familiarize with conversion of C code to ARM instructions.
- Comprehend the embedded system design process and challenges in the embedded computing design.
- Explain the embedded system software development process .
- Use DDD debugger for C code debugging.
- Explain the design principles involved in various embedded system development.
- Write programs in ARM for a specific Application.
- Analyse the performance of interrupt.
- Write programmes for interfacing keyboard, display, motor and sensor.

15UEC904	INTELLECTUAL PROPERTY RIGHTS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the basics of Intellectual Property Rights and its types
- To provide the concept of copyrights, trademarks, design protection, utility models and patents.

UNIT I **9**

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property).

UNIT II **9**

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

UNIT III **9**

International convention relating to Intellectual Property – Establishment of WIPO –Mission and Activities – History – General Agreement on Trade and Tariff (GATT). Device patent for fulfilling the society needs.

UNIT IV **9**

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy –Present against unfair competition.

UNIT V **9**

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

Total: 45 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Describe the principles, function and basic legal rules of IP Law.
- Recognize the relevant criteria for generating and protecting Patents.
- Explain the establishment of WIPO and impact of IP Law on social needs.
- Analyze Indian position with WTO of IPR strategies.
- Describe various patents of industrial and integrated circuit design.

TEXT BOOKS:

1. Subbaram N.R,, Handbook of Indian Patent Law and Practice" , S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.
2. K. R. G. Nair, "Intellectual Property Rights " , Allied Publishers, 1995.

REFERENCE BOOKS:

1. Mu.Ramkumar,A.Jeyakumar, "Intellectual Property Rights Demystified " , New India Publishing 2008.
2. "Intellectual Property Today" , [www.iptoday.com], Volume 8, No. 5, May 2001.
3. Eli Whitney,, United States Patent Number : 72X", Cotton Gin, March 14, 1794.
4. "Using the Internet for non-patent prior art searches" , Derwent IP Matters, July 2000. [www.ipmatters.net/features/000707_gibbs.html.

15UEC905	DSP PROCESSOR ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To give an overview of TMS320C6474 processor.
- To impart knowledge on TMS320C6713 processor, ADSP processors and TMS320C672X processor.
- To give an overview of advanced Motorola DSP processor.

UNIT I TMS 320C6474 MULTICORE DIGITAL SIGNAL PROCESSOR 9

Functional Block Diagram-Device overview-Device configuration-System interconnect-C64x$^+$ mega module-Peripherals-Mapping an Application to a Multi core Processor-Inter process Communication-Data transfer Engines-DSP code and Data images-Memory Management-Simple Programs using TMS 320C6474.

UNIT II TMS 320C6713FLOATING POINT DIGITAL SIGNAL PROCESSOR 9

Functional Block Diagram of TMS 320C6713 Processor- Device Configurations- Device support and document support tool- CPU CSR register description- interrupts and interrupt selector- EDMA module and EDMA selector- PLL and PLL controller- multichannel audio serial port (McASP) peripherals- I2C

.

UNIT III ADSP PROCESSORS 9

Architecture of ADSP-21XX and ADSP-210XX series of DSP processors- Addressing modes and assembly language instructions – Application programs –Filter design, FFT calculation.

UNIT IV OVERVIEW OF MOTOROLA DSP563XX PROCESSORS 9

Data ALU- Multiplier Accumulator (MAC)- Address Generation Unit(AGU)- Program Control Unit- On Chip Peripherals- Chip Memory- Internal Buses – Direct Access Memory - Instruction Set and Addressing Modes of DSP56300 Processor

UNIT V TMS320C672X PROCESSORS 9

Functional Block Diagram of TMS 320C6713 Processor- Device Configurations- Peripheral and Electrical Specifications- External Memory Interface (EMIF)- Application Example

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Explain the architectural features of TMS320C6474 processor.
- Demonstrate the power of Floating point processors
- Implement Filters and FFT using ADSP processors.
- Explain the architecture of Motorola DSP563XX Processors
- Explain the architectural features of TMS320C672X Processors

TEXT BOOKS:

1. Venkataramani.B, Bhaskar.M, " Digital Signal Processors – Architecture, Programming and Applications" , 2003, Hill Publishing Company Limited.
2. http://www.ti.com/lit/ds/symlink/tms320c6713.pdf - TMS 320C6474 MULTICORE DIGITAL SIGNAL PROCESSOR
3. "http://www.fixya.com/support/t5478826-user_guides_texas_instrumentation_analog, Analog Devices", Motorola .
4. "TMS320C6474 Multicore Digital Signal Processor-Technical Reference", Revised Edition, Texas Instruments, 2011.
5. "http://www.ti.com.cn/cn/lit/ds/symlink/tms320c6727b.pdf-TMS320C672X Processors.

REFERENCES:

1. Avtar Singh, S. Srinivasan, "Digital signal processing implementations: using DSP microprocessors (with examples from TMS320C54xx)", 2004
2. Walt Kester (Editor), "Mixed-signal and DSP Design Techniques", Elsevier, 2002
3. Phil Lapsley, et.al., "DSP Processor Fundamentals: Architectures and Features", Wiley, 2000
4. Jonathan (Y) Stein, "Digital Signal Processing: A Computer Science Perspective", Wiley, 2000

15UEC906	VLSI SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various VLSI architectures for digital signal processing.
- To know the techniques of critical path and algorithmic strength reduction in the filter structures.
- To study the performance parameters, viz. area, speed and power.

UNIT I Introduction to DSP Systems **9**

Introduction; representation of DSP algorithms: Block Diagram, signal flow graph, data flow graph, dependence graph.

UNIT II Iteration Bound **9**

Data flow graph representations, loop bound and iteration bound, longest path matrix algorithm, iteration bound of Multi-rate data flow graphs.

UNIT III Pipelining and Parallel Processing **9**

Pipelining and parallel processing of FIR digital filters, pipeline interleaving in digital filters: signal and multichannel interleaving.

UNIT IV Retiming, Unfolding and Folding **9**

Retiming techniques; algorithm for unfolding, Folding transformation, systolic architecture design, systolic array design mythology.

UNIT V Fast Convolution, Filters and Transforms **9**

Cook-toom algorithm, modified cook-toom algorithm, winogard algorithm, iterated convolution Algorithm strength reduction in filters and transforms.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

- Describe the architectures for DSP algorithms.
- Apply the performance optimization techniques in VLSI signal processing.
- Analyze the incorporate pipeline based architectures in the design.
- Solve the retiming techniques, folding and register minimization path problems.
- Compare fast convolution algorithms and algorithmic strength reduction techniques.

TEXT BOOKS:

1. Keshab k. Parhi," VLSI Digital Signal Processing Systems: Design and Implementation ", Wiley, inter science, Indian Reprint, 2007.

REFERENCES:

1. S.Y.kung, H.J.White house, T. Kailath" VLSI and Modern Signal Processing ", Prentice hall, Indian Reprint, 1999.
2. Jose E. France, Yannis Tsividis," Design of Analog –Digital VLSI Circuits for elecommunications and Signal Processing ", Prentice hall, Indian Reprint, 1994.
3. Medisetti V. K," VLSI Digital Signal Processing ", IEEE Press, USA 1995.

15UEC907	HIGH SPEED NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce about ATM and Frame relay.
- To explain about congestion and traffic management in High Speed Networks.
- To outline the protocols for Qos support.

UNIT I HIGH SPEED NETWORKS **9**

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL, High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT **9**

Queuing Analysis- Queuing Models-Little's Theorem – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL **9**

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

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES **9**

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

UNIT V PROTOCOLS FOR QOS SUPPORT **9**

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

1. Explain the basics of high speed networks like ATM and Frame relay.
2. Apply the queuing concept to optimize the high-speed network.
3. Apply timer management techniques for the concept of retransmission.
4. Analyze & Compare integrated and differentiated services architecture.
5. Discuss about the Protocols for QOS support.

TEXT BOOKS:

1. 1. William Stallings, “High Speed Networks And Internet” , Pearson Education,2nd Edition, 2002.
2. Dimitri Bertsekas and Robert Gallager , “Data networks” ,Second Edition, Prentice Hall, Inc.,NJ, USA1992.
3. Warland, Pravin Varaiya, “High performance communication networks”, Jean Harcourt Asia Pvt. Ltd,2nd Edition, 2001.

REFERENCES:

1. 1. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, “MPLS and VPN architecture”, Cisco Press,vol 1 & 2, 2003.

2. Abhijit S. Pandya, Ercan Sea, “Technology for Broad Band Telecommunication networks”, CRC Press, New York, 2004

3. Warland, Pravin Varaiya, “High performance communication networks”, Jean Harcourt Asia Pvt. Ltd,2nd Edition, 2001.

4. Effelsberg, W., Spaniol, O., Danthine, A., Ferrari, “High-Speed Networking for Multimedia Applications”, Kluwer Academic Publishers, 1996.

15UEC908	SOFT COMPUTING TECHNIQUES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To determine the deviation between target and output in neural networks.
- To calculate fuzzy memberships.
- To determine fuzzy inferences.
- To model the neuro fuzzy systems

UNIT I OPTIMIZATION TECHNIQUES **9**

Derivative based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search, Ant colony optimization

UNIT II NEURAL NETWORKS **9**

Back Propagation for feed forward networks- Hybrid learning rule- Supervised Learning Neural Networks- perceptrons -Adaline- Back Propagation Multilayer Perceptrons- Radial Basis Function Networks-Modular Networks-Unsupervised Learning Neural Networks- Kohonen Self- Organizing Networks- Learning Vector Quantization

.

UNIT III FUZZY SET THEORY **9**

Fuzzy Sets-Basic Definition and Terminology-Set Theoretic Operations- Member Function Formulation and Parameterization- Fuzzy Rules and Fuzzy reasoning- Extension Principle and Fuzzy Relations-fuzzy If-Then Rules-Fuzzy Reasoning- Fuzzy Inference Systems- Mamdani Fuzzy Models-Sugeno Fuzzy Models- Tsukamoto Fuzzy models- Input space Partitioning and Fuzzy Modeling.

UNIT IV NEURO FUZZY MODELLING **9**

Neuro-Fuzzy and Soft Computing- Adaptive Neuro-Fuzzy Inference Systems-Architecture-Hybrid Learning Algorithm-Learning Methods that Cross-fertilize ANFIS and RBFN-Coactive Neuro Fuzzy Modeling-Frame Work Neuron Functions for Adaptive Networks-Neuro Fuzzy Spectrum, Classification and Regression Trees- Decision Trees- CART algorithm for tree induction and structure identification.

UNIT V APPLICATIONS OF NEURAL NETWORKS AND FUZZY LOGIC **9**

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction – CANFIS modeling for color prediction – Color paint manufacturing intelligence: Manufacturing intelligence architecture – Knowledge base-Multi-elites generator – Fuzzy population generator.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Apply optimization techniques in solving highly complex problems
- Analyze artificial neural networks for unsupervised learning
- Create fuzzy reasoning
- Understand neural networks architectures.
- Apply neuro fuzzy modeling for solving real world problems.

TEXT BOOKS:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, Pearson Education 2004.
2. George J. Klir, Ute St. Clair, Bo Yuan, "Fuzzy Set Theory: Foundations and Applications" Prentice Hall, 1997

REFERENCES:

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 3rd Edition, 2004.
2. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Pearson, 2006.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI 2010
4.James A. Freeman, David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.

15UEC909	DIGITAL IMAGE PROCESSING	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE:

To introduce the image fundamentals and mathematical transforms necessary for image processing.

- To explain the image enhancement and restoration techniques.
- To impart knowledge on image segmentation methods.
- To introduce basic image processing operations and histogram algorithms using MATLAB.

UNIT I DIGITAL IMAGE FUNDAMENTALS 10

Components of an Image processing system ,Elements of visual perception ,Brightness, Contrast, Hue, Saturation, Color Image Fundamentals -RGB ,HSI models– Image Sampling and Quantization, Two dimensional mathematical preliminaries–Basic relationship between pixels,2D Transforms-DFT,DCT, Hadamard.

UNIT II IMAGE ENHANCEMENT 10

Image Enhancement in the Spatial Domain-Gray Level Transformations-Histogram processing – Arithmetic and logic operations– Smoothing Spatial Filters- Sharpening Spatial Filters-Image Enhancement in the Frequency Domain– Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters– Homomorphic filtering- Color Models- Pseudocolor Image Processing

UNIT III IMAGE SEGMENTATION AND IMAGE MORPHOLOGY 10

Point detection – line detection – Edge detection –Edge linking and boundary detection - Thresholding – Role of Illumination – Global Thresholding – optimal thresholding – Threshold selection – Region oriented segmentation – Basic formulation – Region growing by pixel aggregation – Region splitting & merging. Morphology - dilation and erosion – opening and closing – Hit or miss transform – Basic morphological algorithm.

TOTAL: 30 PERIODS

LIST OF EXPERIMENTS:

1. Sampling and quantization of an Image.
2. Point processing in spatial domain (Negation of an image, Contrast Stretching of an image).
3. 2-D transform (DFT, DCT and Hadamard)
4. Histogram equalization and specification.
5. Linear and Non linear filtering using convolutional masks.(Mean filter& Median filter)
6. Geometric transformations. (image rotation, scaling, and translation)
7. Binary Image Processing(Thresholding, logic operations)
8. Edge detection.(Sobel,Prewitt,Robert mask)
9. Morphological operations.(erosion, dilation, opening, closing, open-close, close-open)

10. Color Image Processing.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Describe the fundamentals of an image processing system.
- Analyze 2D signals in frequency domain through transforms.
- Design different types of image enhancement filters.
- Analyze the different methodologies for image segmentation.
- Develop code for Image enhancement techniques.
- Develop code for Image segmentation algorithms.
- Develop code for Image Morphology.

TEXT BOOKS:

1. Rafael.C.Gonzalez, Richard.E.Woods, ” Digital Image Processing ”, Pearson Education, 2003.
2. Anil K.Jain,” Fundamentals of Digital Image Processing ”, Pearson Education, 2003.

REFERENCE BOOKS:

1. Rafael.C.Gonzalez and Richard.E. Woods,"Digital Image Processing " , Addison Wesley, 1993.
2. Santanu Chaudhury,Shree K Nayar, “Computer Vision, Graphics and Image Processing-Recent Advances " , Viva Books,1999.
3. Rafael.C.Gonzalez and Richard.E. Woods, “Digital Image Processing”, Instructor’s Manual Version 3.0, Third Edition,Prentice Hall.
4. Rafael.C.Gonzalez and Richard.E. Woods,” Digital Image Processing -Student Problem Solution Version 3.0”, Third Edition, Prentice Hall.
5. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.

15UEC910 MULTIMEDIA COMPRESSION AND COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce multimedia components and compression techniques
- To explain the Internet protocols
- To familiarize the multimedia communication across the networks

UNIT I MULTIMEDIA COMPONENTS **9**

Introduction - Multimedia skills - Multimedia components and their characteristics - Text, sound, images, graphics, animation, video.

UNIT II AUDIO AND VIDEO COMPRESSION **9**

Audio compression - DPCM- adaptive predictive coding - code excited LPC-perpetual coding . Video compression – principles - H.261-H.263- MPEG 1, 2, 4.

UNIT III TEXT AND IMAGE COMPRESSION **9**

Compression principles-source encoders and destination decoders-lossless and lossy compression-entropy encoding –source encoding -text compression –static Huffman coding dynamic Huffman coding –arithmetic coding –Lempel ziv – Lempel Ziv-welsh coding -image compression – GIFF-TIFF-JPEG.

UNIT IV VOIP TECHNOLOGY **9**

Basics of IP transport, VoIP challenges, H.323,SIP –Network Architecture, Protocols, Call establishment and release, VoIP and SS7, Quality of Service.

UNIT V MULTIMEDIA NETWORKING **9**

Multimedia networking applications -streaming stored audio and video -making the best Effort service- protocols for real time interactive applications -beyond best effort service-scheduling and policing Mechanisms-integrated services-differentiated Services-RSVP.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to :

- Describe the characteristic features of different multimedia components.
- Analyze the performance of various predictive coding techniques in audio and video.
- Compare the efficiency of various compression techniques in terms of storage and compression ratio.
- Compare H.323 and SIP network architecture for VOIP applications.

- Describe the operation and protocols of the different kinds of networks that are used to support streaming audio.

TEXT BOOKS:

1. Fred Halsall,“ Multimedia communication - applications, networks, protocols and standards ”, Pearson Education, 2007.
2. Kurose. J.F, & Ross. K.W, , “ Computer Networking- A top down approach featuring the internet ”, Pearson Education, 2nd edition, 2003.
3. Daniel Collins, “ Carrier Grade Voice over IP ”, Tata McGraw Hill, 2001.
4. Tay Vaughan, “ Multimedia: making it work ”, Tata McGraw Hill, 7th edition, 2007.

REFERENCE BOOKS:

1. KR. Rao,Z S Bojkovic, D A Milovanovic, “ Multimedia Communication Systems: Techniques, Standards, and Networks ”, Pearson Education, 2007.
2. R.Steimnetz, K.Nahrstedt, , “ Multimedia Computing, Communications and Applications”, Pearson Education.
3. Ranjan Parekh, “ Principles of Multimedia ”, Tata McGraw Hill, 2006.

15UEC911	TELEVISION AND VIDEO ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To explain the basic concepts in Television
- To familiarize principles used in Television broadcast systems with a greater emphasis on television standards
- To discuss the advanced topics in digital videos and High definition television

UNIT I FUNDAMENTALS OF TELEVISION 9

Characteristics of light and sound-Intensity of light in a frame-Image-Picture Frame-Aspect ratio-Picture elements- Fundamental Concepts of television -Television camera tubes-Picture tubes.

UNIT II TELEVISION BROADCAST SYSTEMS AND CIRCUITS 9

Television standards-Compatibility and colour television fundamentals-NTSC & PAL Colour systems-SECAM Transmitter and Receiver-Television antennas and propagation.

UNIT III ADVANCED SYSTEM AND TECHNIQUES FOR TELEVISION 9

Satellite Communication for television-Fundamental Concept-LNA-Satellite TV for Rebroadcast-DBS through CATV network-DTH satellite Digital television and other modern devices.

UNIT IV MODERN VIDEO CONCEPTS 9

Video recording and reproduction-Television studio and transmission Link-Non-Radiating video system-CCTV-MATV-CATV-Channels for Cable TV-Pay TV through Cables-Two way cable systems-Cable Radiation-Troubleshooting in video systems.

UNIT V REAL TIME APPLICATIONS 9

High definition TV systems, HDTV standards and compatibility, resolution and working,Wide dimensions high definition TV ,Standards of wide dimensions HDTV ,MUSE system, Principle, working, advantages and disadvantages of Plasma, LED,LCD,Touch systems,Smart TV,Curved TV

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the Students will be able to :

- Outline the fundamentals of television.

- Identify the circuits and television standards to effectively work with broadcasting applications in television.
- Explain the principle of satellite transmission and modern digital devices.
- Organize the techniques used in digital video for advance systems
- Apply the concepts of HDTV,LED,LCD in real time applications.

TEXT BOOKS:

1. R.G.Gupta,"Television Engineering and Video Systems", Tata McGraw-Hill Education, Publication ,2nd Edition 2005
2. Stan Prentiss, "High Definition TV", Tata McGraw Hill publication, second edition,1983

REFERENCE BOOKS:

1. A.M Dhake, "Television and Video Engineering", Tata McGraw Hill,2nd Edition, 2003.
2. R.P.Bali, "Color Television, Theory and Practice", Tata McGraw-Hill, 1994.
3. Charles Poynton, "San Francisco, Digital video and HDTV, Algorithms AndInterfaces," Morgan Kaufmann publishers, 2003.
4. Jerry C. Whitaker, Blair Benson, "Standard Handbook of Video and Television Engineering", Tata McGraw Hill, 4th Edition 2003.

15UEC912	RF CIRCUIT DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the fundamental radio frequency circuit design techniques
- To provide the knowledge of Impedance Matching network
- To familiarize the concept of filters and RF amplifier design

UNIT I INTRODUCTION TO RF 9

Importance of Radio Frequency Design- Dimensions and Units – Frequency Spectrum – RF behavior of passive components – Chip components and circuit board considerations – Low frequency parameters – High frequency parameters – Formulation of S parameters – Properties of S parameters.

UNIT II IMPEDANCE MATCHING NETWORKS WITH SMITH CHART 9

Smith chart for Reflection co-efficient to load impedance-Impedance Transformation-Admittance Transformation-Parallel and Series connection. Impedance matching using discrete components - Microstripline Matching Network-Amplifier classes of operation of Biasing Networks.

UNIT III RF FILTER DESIGN 9

Basic Resonator and Filter configurations-Special filter Realizations-Filter Implementations-Coupled Filters.

UNIT IV ACTIVE RF COMPONENTS 9

Semiconductor Basics-RF Diodes-RF Bipolar Junction Transistor-RF Field Effect Transistors- High Electron mobility transistor.

UNIT V RF TRANSISTOR AMPLIFIER DESIGN 9

Characteristics of Amplifiers-Amplifiers Power relations-Stability Considerations-Constant Gain-Noise Figure Circles-Constant VSWR circles-Broadband High Power and Multistage Amplifiers.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to

- Describe RF behavior of passive components and their S Parameters.
- Design and apply the concept of impedance matching for RF circuits.
- Design various types of filters used for RF circuits.

- Explain the active RF components.
- Design RF Amplifiers.

TEXT BOOKS:

1. Reinhold.Ludwig and Pavel Bretshko, “RF Circuit Design”, Pearson Education,2006.
2. M.M.Radmanesh, “RF & Microwave Electronics Illustrated”, Pearson Education,2007.

REFERENCE BOOKS:

1. Christopher Bowick, " RF Circuit Design”,Newnes,2011.
2. W. Alan Davis, Krishna Agarwal,"Radio Frequency Circuit Design”,John Wiley & Sons 2003.
3. Jeremy Everard, "Fundamentals of RF circuit design”,John Wiley,2001.
4. Joseph J. Carr,“RF Components and Circuits”,Newnes,2002.

15UEC913	WIRELESS COMMUNICATION AND NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce wireless MAC layer alternatives.
- To explain the operation of wireless networks.

UNIT I MULTIPLE RADIO ACCESS **9**

Medium Access Alternatives: Fixed-Assignment for Voice Oriented Networks Random Access for Data Oriented Networks , Handoff and Roaming Support, Security and Privacy.

UNIT II WIRELESS WANS **9**

First Generation Analog, Second Generation(2G) – GSM, Short Messaging Service in GSM, Second Generation – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000) – Fourth Generation - LTE.

UNIT III WIRELESS LANS **9**

Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services, Physical Layer- MAC sub layer- MAC Management Sub layer, Other IEEE 802.11 standards, HIPERLAN, WiMax standard.

UNIT IV ADHOC AND SENSOR NETWORKS **9**

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols, Application of Wireless sensor networks.

UNIT V WIRELESS MANS AND PANS **9**

Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture of Bluetooth Systems, Physical and MAC layer details, Standards-CAN.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Explain wireless MAC layer alternatives.
- Compare the various generation of wireless communication.
- Identify different types of WLAN Standards & their function within a network.

- Analyze the performance of ADHOC and Wireless sensor network protocols.
- Compare WLAN and WPAN concepts.

TEXT BOOKS:

1. William Stallings, “Wireless Communications and networks”, Pearson / Prentice Hall of India, 2nd Edition,2007.
2. Dharma Prakash Agrawal & Qing-An Zeng,“Introduction to Wireless and Mobile Systems” , Thomson India Edition, 2nd Edition, 2007.

REFERENCES:

1. Vijay. K. Garg,"Wireless Communication and Networking”,Morgan Kaufmann Publishers,2007.
2. Kaveth Pahlavan, Prashant Krishnamurthy,“Principles of Wireless Networks”,Pearson Education Asia 2007.
3. Gary. S. Rogers & John Edwards,“An Introduction to Wireless Technology”, Pearson Education, 2007.,Clint Smith, P.E. & Daniel Collins, “3G Wireless Networks” ,Tata McGraw Hill, 2nd Edition,
4. http://dspace.cusat.ac.in/jspui/bitstream/123456789/1184/1/4G%20Mobile%20Communication%20system.pdf.

15UEC914	FPGA-BASED SYSTEM DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the design flow of different types of ASIC
- To impart knowledge on ASIC types and tools used in the design

UNIT I INTRODUCTION TO ASICS, CMOS LOGIC AND ASIC LIBRARY DESIGN **9**

Types of ASICs - Design flow - CMOS transistors CMOS Design rules - Combinational Logic Cell– Sequential logic cell - Transistors as Resistors – Transistor Parasitic Capacitance- Logical effort

UNIT II PROGRAMMABLE ASICS, PROGRAMMABLE ASIC LOGIC CELLS AND PROGRAMMABLE ASIC I/O CELLS **9**

Anti fuse - static RAM - EPROM and EEPROM technology - PREP benchmarks - Actel ACT - Xilinx LCA –Altera FLEX - Altera MAX- DC & AC inputs and outputs - Clock & Power inputs - Xilinx I/O blocks.

UNIT III PROGRAMMABLE ASIC INTERCONNECT, PROGRAMMABLE ASIC DESIGN SOFTWARE **9**

Actel ACT -Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - Altera MAX 9000 – Altera FLEX –Design systems - Logic Synthesis - Half gate ASIC.

UNIT IV SIMULATION, TESTING AND ASIC CONSTRUCTION **9**

Types of simulation -boundary scan test – faults-fault simulation - System partition – FPGA partitioning- partitioning methods.

UNIT V FLOOR PLANNING, PLACEMENT AND ROUTING **9**

Floor planning - placement -physical design flow –global routing - detailed routing - special routing - circuit extraction -DRC.

Total: 45 PERIODS

COURSE OUTCOMES:

- Explain Programmable ASIC architecture
- Compare Programmable ASIC logic cells and I/O cells

- Construct combinational and sequential circuits using CMOS Logic
- Explain about Simulation and Testing
- Discuss different types of Floor planning, Placement and routing methods in Programmable ASIC

TEXT BOOKS:

1. Michael John Sebastian Smith," Application specific integrated circuits ", Addison-Wesley,1997.
2. Wayne Wolf," FPGA-Based System Design ", PTR Prentice Hall,2004.

REFERENCE BOOKS:

1. Farzad Nekoogar, Farzad Nekoogar,"From ASICs to SOCs: A Practical Approach", Prentice Hall, Ist Edition , 2003.
2. Rochit Rajsuman," System-on-a-Chip Design and Test ", Santa Clara, CA: Artech House Publishers, 2000.
3. Farzad Nekoogar," Timing Verification of Application-Specific Integrated Circuits (ASICs)", Prentice Hall, Ist Edition , 1999.
4. Himanshu Bhatnagar," Advanced ASIC Chip Synthesis ", kluwer academic publishers,2ndEdition, 2001.

15UEC915 RESOURCE MANAGEMENT TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the fundamental principles of optimization.
- To give the idea about mathematical modeling.
- To provide mathematical models of some real situations.
- To have knowledge about use of optimization in Computer Applications .

UNIT I LINEAR PROGRAMMING MODELS 9

Introduction to Optimization – Mathematical formulation of LPP – Graphical solution of linear programming models – Canonical and Standard forms of LPP – Simplex method – Artificial variable technique – Duality – Integer programming: Branch and Bound method (only two variables).

UNIT II TRANSPORTATION AND ASSIGNMENT MODELS 9

Mathematical formulation of transportation problem – Methods for finding initial basic feasible solution: NWC, LCM & VAM – Optimum solution: MODI method – Degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Travelling Salesmen Problem.

UNIT III SEQUENCING AND REPLACEMENT PROBLEMS 9

Problem of Sequencing- Processing n jobs through 2 machines – processing n jobs through k machines – Processing 2 jobs through k machines – Replacement problems – Replacement of Equipment/Asset that deteriorates gradually (value of money both does and does not change with time) – Replacement of items that fails suddenly.

UNIT IV SCHEDULING BY PERT AND CPM 9

Network Construction – Critical Path Method – Time – Cost trade off – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.

UNIT V QUEUEING MODELS 9

Characteristics of Queuing Models – Markovian Queues – (M / M / 1) :(FIFO / ∞ /∞), (M / M / 1) : (FIFO / N / ∞), (M / M / C) : (FIFO / ∞ / ∞), (M / M / C) : (FIFO / N / ∞) models – Little's formulae.

TOTAL PERIODS: 45 HOURS

COURSE OUTCOMES:

Upon completion of the course the students will be able to

- Identify and formulate mathematical models of real problems in optimization.
- Obtain the solution of some real life problems using optimization techniques.
- Solve Linear and integer programming problems.
- Sequence the jobs so that the duration for completion will be minimum and identify the best time of replacement of equipment.
- Know the techniques of minimizing the project duration and cost.
- Identify and solve the problems in areas of bottlenecks between waiting time and service

TEXT BOOK:

1. Taha H.A., "Operations Research : An Introduction" , Pearson Education, 9th Edition, 2012.

REFERENCE BOOKS:

1. Kanti Swarup, Gupta P.K. & Man Mohan, "Operations Research", Sultan Chand & Sons, New Delhi, 2013.

2. Gupta P.K., Hira D.S., "Operations Research", S.Chand & Company Ltd, New Delhi, 2012.

15UEC916	SATELLITE COMMUNICATION PRINCIPLES AND APPLICATIONS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of satellite orbits.
- To understand the satellite segment and earth segment.
- To analyze the various methods of satellite access.
- To understand the applications of satellites

UNIT I SATELLITE ORBITS 9

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

UNIT II SATELLITE LINK DESIGN 9

EIRP, Satellite uplink and downlink Analysis and Design, link budget, E/N calculation- performance impairments-system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.

UNIT III SATELLITE ACCESS 9

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption

UNIT IV EARTH AND SPACE SEGMENT 9

EARTH SEGMENT : Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.

SPACE SEGMENT: Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command.

UNIT V SATELLITE APPLICATIONS 9

INTELSAT Series, INSAT, VSAT, Radar Sat, Mobile satellite services: GPS, Orbcomm./Micro star satellite, Iridium mobile satellite system, INMARSAT,LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)-

Worldspace services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet, Software defined radio satellite communication.

Total: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Describe basic concepts in satellite orbits.
- Analyze the satellite link design.
- Compare the various modulation techniques.
- Acquire the knowledge about the space and earth segment.
- Discuss various satellite applications.

TEXT BOOKS:

1. Dennis Roddy, “Satellite Communication”, McGraw Hill International, 4th Edition, 2006.
2. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, “Satellite Communication Systems Engineering”, Prentice Hall/Pearson, ,2007.

REFERENCE BOOKS:

1 N.Agarwal, ," Design of Geosynchronous Space Craft”, ” Prentice Hall ”, 1986.

2.Bruce R. Elbert, ,"The Satellite Communication Applications Hand Book",

ArtechHouseBostan,London1997.

3.Tri T. Ha, “Digital Satellite Communication”,2nd Edition, 1990.

4.Emanuel Fthenakis, “Manual of Satellite Communications”,McGraw Hill Book Co.,1984.

5.http://ieeexplore.ieee.org/search/searchresult.jsp?newsearch=true&queryText=Software%20Defined%20Radio%20.LB.SDR.RB.%20architecture%20to%20support%20multi-satellite%20communications.

15UEC917	SPEECH SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVE:

- To introduce the basic concepts of speech.
- To discuss the analysis features of speech.
- To familiarize Speech quantization and coding.
- To explain the speech processing applications.

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UNIT I MECHANICS OF SPEECH 9

Basics of speech production, LTI model, LTV model, voiced and unvoiced decision making, speech parameters, pitch and formants, pitch frequency measurement using AMDF and autocorrelation, Parallel processing approach, pitch period measurement using spectral domain, cepstral domain, relation between formants and LPC, evaluation of formants using cepstrum, log spectrum and Power spectral density estimate.

UNIT II FEATURES OF SPEECH 9

Features of speech, Homomorphic processing, Cepstral analysis, mel scale, MFCC block schematic and function of each block, Perceptual linear prediction, STFT and wavelet analysis of speech, Linear prediction of speech, Forward linear prediction, autocorrelation method, Levinson Durbin algorithm, Burg algorithm Line spectral pair frequencies, transformation from LPC to LSP and LSP to LPC.

UNIT III SPEECH QUANTIZATION AND CODING 9

Speech quantization and coding, Uniform and non uniform quantizers, companded quantizer, forward and backward adaptive quantizers, waveform coding of speech, PCM, companded PCM, ADPCM, DM etc. Speech & audio coding standards.- G.726, LPC-10, DTW, HMM, speech enhancement techniques for periodic, wide band and interfering speech.

UNIT IV SPEECH PROCESSING APPLICATIONS 9

Speech processing applications - speech recognition, speaker recognition and speaker verification, Introduction to text –to- speech conversion system, speech morphing and transformation, speech enhancement, echo cancellation, speech evaluation standards – subjective (PESQ) and objective, ITU standards.

UNIT V LINEAR PREDICTIVE ANALYSIS OF SPEECH 9

Mathematical description of change of sampling rate – Interpolation and Decimation, Decimation by an integer factor, Interpolation by an integer factor, Sampling rate conversion by a rational factor, Polyphase filter structures, Multistage implementation of multi rate system, Application to sub band coding – Wavelet transform.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to :

- Classification of speech mechanics.
- Analyze features of speech .
- Demonstrate audio coding techniques.
- Design time domain and frequency domain for speech processing .
- Analyze the performance of various predictive coding techniques of speech.

TEXT BOOKS:

1. L R Rabiner and S.W. Schafer, “Digital processing of speech signals”; Pearson Education..
2. Dr. Shaila Apte- “Speech and audio processing”, Wiley India Publication, 2013.

REFERENCE BOOKS:

3. Deller J. R. Proakis J. G. and Hanson J.H., “Discrete Time Processing of Speech Signal”, Macmillian..
4. L.R Rabinar and B.H. Juang and Yegnanarayana, “Fundamentals of SpeechRecognition”, Pearson Publishers.
5. Saeed V. Vaseghi “ Advanced digital signal processing and noise reduction” Willey, 4th edition
6. Thomas F. Quateri 1ed, “Discrete Time Speech Signal Processing: Principles and Practice”.
7. Mark Kahrs, Karlheinz Brandenburg, “Applications of Digital Signal Processing to Audio And Acoustics ”, Kluwer Academic Publishers, New York, Boston, Dordrecht London , Moscow ,2014.

15UEC918 REMOTE SENSING AND INFORMATION SYSTEM L T P C

3 0 0 3

OBJECTIVES :

- To introduce the basic concepts of remote sensing and EMR interaction with earth atmosphere
- To impart the knowledge of optical &Microwave Remote sensing and its application
- To impart the knowledge on GIS

UNIT I REMOTE SENSING 9

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

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9

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

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING 9

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

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

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

UNIT V MISCELLANEOUS TOPICS 9

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications- Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems.Global positioning system – an introduction.

TOTAL : 45 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Explain the components of remote sensing and various EMR spectrum
- Discuss the scattering of EMR and spectral characteristics
- Discuss Multi Spectral Scanning and Sensors in LANDSAT
- Explain GIS and analysis using Raster and Vector data
- Develop code for Satellite image enhancement

TEXT BOOKS:

1. M.G. Srinivas, "Remote Sensing Applications", Narosa Publishing House, first edition 2001.

2. Reddy, Anji., M.," Textbook of Remote Sensing and Geographical Information Systems" 3rd Edition, BS Publications, Hyderabad, India,2006.

REFERENCE BOOKS:

1. Jensen, J.R, "Remote sensing of the environment", Prentice Hall, 2000.
2. Kang-Tsung Chang, "Introduction to Geograhic Information Systems", Tata McGraw Hill, 2002.
3. Lillesand 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 MischaelHord, 1986

15UEC919 **NANOELECTRONICS** **L T P C**

3 0 0 3

OBJECTIVES:

- To introduce the concept of nanoelectronics, nanodevices and molecular electronics.
- To explain the properties of Nano particles, Carbon nanostructures & Fuel Cells.

UNIT I NANO ELECTRONICS **9**

Nano electronics in recent scenario – Crystallography – XRD - Particle Size determination – Surface Structure, Microscopy – Transmission Electron Microscopy – Field Ion Microscopy – Scanning Microscopy, Spectroscopy – Infrared and Raman Spectroscopy – Photoemission and X-Ray Spectroscopy – Magnetic Resonance.

UNIT II PROPERTIES OF INDIVIDUAL NANOPARTICLES & CARBON NANO TUBES **9**

Semiconducting Nanoparticles – Optical Properties –Methods of Synthesis – RF Plasma – Chemical Methods. Carbon Nanotubes – Fabrication – Structure – Electrical Properties – Vibrational Properties – Mechanical Properties, Application of Carbon Nanotubes – Field Emission and Shielding – Computers

UNIT III NANO ORGANIC FETS AND SENSORS **9**

Nano Crystals in nanoelectronics and design of MOSFET-design and working-OFETS and OLEDS-Nucleic acids - DNA - Sensor – Transducer -,Nano Structure studies for Advanced Sensors and Applications.

UNIT IV PRODUCT DESIGN AND DEVELOPMENT PROCESS OF NANO DEVICES **9**

Product design, Architecture and Engineering, Systems and Assemblies, Modular design approaches, design flow charts, photolithography, characterizing forms and functions, functional characteristics, shape changing in shape memory alloys, nano product forms.

UNIT V NANOSTRUCTURED DEVICE APPLICATIONS **9**

Application of Nano Ferrite Material – Deposition of thin films by CVD – Plasma ace electrodepositing – Monolithography, Microstrip Patch Antenna, Photonic band Gap Antenna – simulation for antenna design - EMI, Absorption of Electro Magnetic Waves in Ferrites, Study of absorption coefficient, Giant and Colossal magneto resistance, Ferro fluids, quantum dots.

Solar cell – Organic Solar Cell and Green Solar cell.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Explain the basics of nano electronics and properties of nano particles
- Summarize the impact of carbon based nano electronic devices

- Describe the various nano organic FETs and their application as advanced sensor
- Explain the implementation of product design and development process of nano devices.
- Analyze the characteristics of nano ferrite material for various applications

TEXT BOOKS:

1. Charles P. Poole, Jr. and Frank J. Owens, "Introduction to Nano Technology" , John Wiley & Sons, 2006.
2. Raguse, "Nanotechnology: Basic Science and Emerging Technologies" Chapam & Hall / CRC, 2007.
3. Micheal F.Ashby, Paulo J.Ferreira and Daniel L.Schodek, " Nanomaterials, Nanotechnologies and Design" Butterworth-Heinemann, Elsevier Ltd, Burlington, USA, Jordan Hill, Oxford, UK, 2009.

REFERENCE BOOKS:

1. Rainer Waser (Ed.), "Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices"", Wiley-VCH, 2003.
2. T.Pradeep, "NANO: The Essentials-Understanding Nanoscience and Nanotechnology" , Tata McGraw Hill, 2007.
3. George W. Hanson, " Fundamentals of Nanoelectronics" , Prentice Hall ,2008.
4. Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, "Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications" , Cambridge University Press 2008.

15UEC920	ADVANCED TRENDS IN TELECOMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To outline the concepts of Green Information and Communication Technology
- To introduce the concepts of Software defined radio and Cognitive Radio Networks
- To explain the application of advanced Telecommunication

UNIT I GREEN INFORMATION AND COMMUNICATION TECHNOLOGY 9

Smart grid concept, smart meters, Grid side & customer side, Smart City, Electric vehicles, Substation and feeder monitoring, Wide area measurement (WAM), Distributed generation support, Energy measurements, Intelligent housing, Life-cycle efficient production, Use cases.

UNIT II SOFTWARE DEFINED RADIO 9

The motivation and purpose, Implementation scenarios and issues, Heterodyne Architecture of SDR, Related Technologies, Constraints for coexistence, Multi-channel modulations, Wideband RF processing, RF/IF re-configurability

UNIT III COGNITIVE RADIO NETWORKS 9

, Introduction to cognitive Radio concept, motivation and purpose, Spectrum sensing, Spectrum sharing, Spectrum Mobility, Spectrum Management, Regulatory Issues, Implications of Cognitive Radio Networks.

UNIT IV COOPERATIVE COMMUNICATIONS AND NETWORKS 9

Introduction to the cooperative communication, Basic techniques, MIMO and smart Antennas, Purpose, benefit and drawbacks, Applications of cooperative communications, Implementation scenarios and issues, Introduction to advanced issues in cooperative communication, Use cases.

UNIT V WIRELESS ASPECTS OF TELE-HEALTHCARE 9

The application of advanced telecommunication, the special requirements especially related to reliability, privacy and trust, Regulatory and safety aspects of tele-healthcare, Cooperative communications for Tele-health, Use cases.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Understand the need for green communication technology.
- Compare software defined radio networks and cognitive radio networks.
- Realize the importance of cooperative communication networks.
- Apply the concept of communication technology for health care.

TEXT BOOKS:

1. Markus Dillinger, Kambiz Madani,Nancy Alonistioti, “Software Defined Radio:Architectures, Systems and Functons”.(Wiley series in software Radio)

2. Shafiullah Khan, Jaime Lloret Mauri,' Green Networking and Communications-ICT for sustainability", CRC Press,2013

REFERENCE BOOKS:

1. Dieter Kranzimuller, A Min Tjoa, "Information and co,munication on Technology for the fight against global warning-ICT-GLOW 2011".
2. Alexander M.Wyglinski, Maziar Nekovee, Thomas Hou, "Coginitive Radio communication and Networks: Principles and Practice".

15UEC921	EMBEDDED AND REAL TIME SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To give an idea of embedded systems and its relation with microprocessor
- To introduce devices and buses used for embedded networking

UNIT I INTRODUCTION TO EMBEDDED COMPUTING 9

Complex systems and microprocessors – Design example: Model train controller –Embedded system design process – Formalism for system design – Instruction sets Preliminaries – ARM Processor – CPU: Programming input and output –Simple examples of C code conversion to ARM instructions-Supervisor mode, exception and traps – Circular bufffering

UNIT II COMPUTING PLATFORM AND DESIGN ANALYSIS 9

CPU buses – Component interfacing – Design with microprocessors – Development and Debugging – Debugging using DDD debugger-Program design – Model of programs – Assembly and Linking – Basic compilation techniques - Analysis and optimization of execution time, power, energy, program size.

UNIT III PROCESS AND OPERATING SYSTEMS 9

Multiple tasks and multi processes – Processes – Context Switching – Operating Systems – Scheduling policies –Pre emptive real time operating systems, Priorities, priority based scheduling mechanism: Rate-Monotonic Scheduling, Earliest deadline First scheduling, Multiprocessor – Inter Process Communication Mechanisms: shared memory, Message passing and Signals – Evaluating operating system performance -.C code for stack management and scheduling policies

UNIT IV HARDWARE ACCELERATES & NETWORKS 9

Accelerators – Accelerated system design – Distributed Embedded Architecture –Networks for Embedded Systems – Network based design – Internet enabled systems

UNIT V CASE STUDY(QUALITATIVE STUDY) 9

Hardware and software co-design - Data Compressor - Software Modem – Set–Top–Box. – FOSS Tools for embedded system development.

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Describe the architecture and programming of ARM processor and familiarize with conversion of C code to ARM instructions
- Comprehend the embedded system design process and challenges in the embedded computing design.
- Explain the embedded system software development process
- Compare different scheduling mechanisms and Inter Process Communication Mechanisms
- Analyze the characteristics of different networks used to build distributed embedded system
- Explain the design principles involved in various embedded system development.

TEXT BOOKS:

1. Wayne Wolf, “Computers as Components - Principles of Embedded Computer System Design”, Morgan Kaufmann Publisher, 2006.
2. David E-Simon, “An Embedded Software Primer” Pearson Education, 2007.

REFERENCE BOOKS:

1. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, dreamtech press, 2005.
2. Tim Wilmshurst, “An Introduction to the Design of Small Scale Embedded Systems”, Pal grave Publisher, 2004.
3. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc-Graw Hill, 2004.
4. Tammy Noergaard, “Embedded Systems Architecture”, Elsevier, 2006.

15UEC922 **MEDICAL ELECTRONICS**

L	T	P	C
3	0	0	3

OBJECTIVE:

- To interpret technical aspects of medicine.
- To explain medical diagnosis and therapy.
- To explain functioning of medical instruments.

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING 9

The origin of Bio-potentials; biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics .

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9

PH, PO2, PCO2, PHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III ASSIST DEVICES AND BIO-TELEMETRY 9

Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Biotelemetry, radio-pill and tele-stimulation.

UNIT IV MEDICAL IMAGING SYSTEMS 9

Modulation transfer function, radiography ,computed radiography, computer tomography, magnetic resonance imaging, ultrasonography

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermograph, endoscopy unit, Laser in medicine, Diathermy units, Electrical safety in medical equipment. Boron Neutron Capture Therapy (BNCT), Single Photon Emission Computer Tomography (SPECT) and Positron Emission Tomography (PET).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to :

- Explain the various recording technologies
- Measure the bio-chemical and non electrical parameters
- Explain the utilization of assist devices
- Explain the functioning of medical image systems
- Explain about the use of recent medical equipments

.

TEXT BOOK:

1. Leislie Cromwell,, " Biomedical instrumentation and measurement ", Prentice Hall of India, New Delhi, 2nd edition, 2010.
2. John G. Webster, , " Medical Instrumentation Application and Design ", Wiley India4th Edition, 2010

REFERENCE BOOKS:

1. Khandpur, R.S Farhang-Boroujeny, " Handbook of Biomedical Instrumentation ", TATA McGraw-Hill New Delhi, 2003.
2. Joseph J.Carr and John M.Brown " Introduction to Biomedical equipment Technology ", John Wiley and Sons, New York,, 2004.

15UMA952 NUMERICAL TECHNIQUES AND LINEAR ALGEBRA

L	T	P	C
2	2	0	3

OBJECTIVES :

- To acquaint the student with the roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- To familiarize the student with the methods discussed on interpolation which will be useful in constructing approximate polynomial to represent the data and to find the intermediate values, when huge amounts of experimental data are involved.
- To make the student acquire sound knowledge in applications of numerical methods in various fields, solving practical technical problems using scientific and mathematical tools when available in Engineering.

UNIT I SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS 6 + 6

Solution of equations : Bisection method – Secant method – Regula Falsi method – Newton's method. Solution of linear system by Gauss Elimination and Gauss Jordon methods - Gauss-Seidel iterative method. Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by Power method.

UNIT II INTERPOLATION 6 + 6

Newton's Forward and Backward interpolation – Newton's Divided difference interpolation formula – Lagrange's interpolation formula.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 6 + 6

Differentiation using interpolation formulae – Extrapolation method - Numerical integration by Trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two point and Three point Gaussian Quadrature formulae.

UNIT IV CURVE FITTING 6 + 6

Method of Group Averages – Least square method – Fitting a straight line, Parabola, curve of the form $y = ax^b$ and an exponential curve. Method of moments.

UNIT V LINEAR ALGEBRA 6 + 6

General vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space, change of basis.

TOTAL = 60 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Employ a number of techniques to solve linear and nonlinear equations.
- Use Interpolation technique for equal and unequal intervals to find new data points within the range of known data points
- Find numerical integration for single and double integrals.
- Fit a curve to derive an approximating function that broadly fits the general trend of the data.
- Apply the concepts of Linear algebra in the fields of communication systems and Signal processing.

TEXT BOOKS:

1. SANKAR RAO.K, "Numerical Methods for Scientists and Engineers", Prentice Hall of India, New Delhi, 3rd Edition, (2007).

2. TAHA, H.A. “Operations Research: An Introduction”, Pearson Education Edition, New Delhi, 9th Edition, (2002).
3. HOWARD ANTON and CHRIS RORRES, “Elementary Linear Algebra”, John Wiley & Sons, 10th Edition, (2005).

REFERENCE BOOKS:

1. KANDASAMY.P, THILAGAVATHY.K and GUNAVATHY.K, “Numerical Methods”, S.Chand Co. Ltd., New Delhi, 3rd Edition, (2003).
2. GERALD C.F. and WHEATELEY, P.O. “Applied Numerical Analysis”, Pearson Education, New Delhi, 6th Edition, (2006).
3. SASTRY S.S, “Introductory methods of Numerical Analysis”, Prentice Hall of India, New Delhi, 4th Edition, (2008).
4. DAVID C LAY, “Linear Algebra and its Applications”, Pearson Education, New Delhi, 3rd Edition, (2012).

OPEN ELECTIVES

15UEC971	CONSUMER ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES :

- To explain the various electronic audio and video devices and systems
- To familiarize the students with optical recording and telephone systems.
- To provide the knowledge of various home appliances.

UNIT I LOUDSPEAKERS AND MICROPHONES 9

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones

UNIT II TELEVISION SYSTEMS 9

Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control, LCD, LED, Dolby noise reduction digital and analog recording. Digital projection systems (LCD, DLP, SVGA to UXGA system) Block diagram and principles of working of cable TV and DTH, Set-up boxes, CCTV.

UNIT III OPTICAL RECORDING AND REPRODUCTION 9

Audio Disc – Processing of the Audio signal –read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT IV TELEPHONE SYSTEMS 9

Telephone services - telephone networks –Integrated Services Digital Network; Wireless Local Loop; VHF/UHF radio systems, Limited range Cordless Phones; cellular modems, Cellullar Phone System.

UNIT V APPLICATIONS 9

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems, Lap-top, ATM, UPS Inverter.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the Students will be able to:

- Describe the various audio components and systems.
- Explain the working principle of television systems.
- Describe the recording and reproduction methods.
- Explain the working of telephone systems.
- Describe the concepts of electronic appliances.

TEXT BOOKS:

1. S.P.Bali, “Consumer Electronics”, Pearson Education, 2005.
2. R.R Gulati, “Colour Television-principles & practice”, Wiley Eastern Limited, New Delhi, 2008

REFERENCE BOOKS:

1. K. Blair, Benson “Audio Engineering Hand book”, 2001
2. R.R Gulati, “Complete Satellite & Cable Television”, New age International Publisher, 2008
3. RC Vijay, “Colour Television Servicing”, BPB Publication, New Delhi, 2007
4. A.K. Maini, “Colour Television & Video Technology”, CSB Publishers, 2005
5. S.P. Sharma, “VCR-principles, maintenance & repair”, Tata Mc Graw Hill, New Delhi, 2003
6. A.Dhake, “Colour TV”, 2001
7. Service Manuals, BPB Publication, New Delhi, 2000

15UEC972 REMOTE SENSING AND ITS APPLICATIONS L T P C

3 0 0 3

OBJECTIVE:

- To introduce the basic concepts of remote sensing and GIS.
- To impart the knowledge of optical &Microwave remote sensing and its applications.
- To introduce various applications of remote sensing and GIS

UNIT I REMOTE SENSING 9

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

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9

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

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING 9

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

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

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

UNIT V APPLICATIONS 9

Applications in Agriculture, Forestry, Geology, Hydrology, cryospace studies, land use mapping and ocean related studies, military and surveillance applications, search and rescue operations, ground and air target detection and tracking - case studies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Recognize and explain fundamental principles of remote sensing, including the electromagnetic

spectrum.

- Discuss the scattering of EMR and spectral characteristics.
- Gain knowledge of optical and microwave remote sensing.
- Explain the concepts and fundamentals of GIS.
- Discuss various applications of remote sensing and GIS.

TEXT BOOKS:

1. M.G. Srinivas, " Remote Sensing Applications ", Narosa Publishing House, 2001.
2. Anji Reddy, "Remote Sensing and Geographical Information Systems",BS Publications, 2001

REFERENCE BOOKS:

1. Jensen, J.R, "Remote sensing of the environment", Prentice Hall, 2000.
2. Kang-Tsung Chang, "Introduction to Geographic Information Systems", Tata McGraw Hill, 2002.
3. Lillesand 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 MischaelHord, 1986.

15UEC973	EMBEDDED SYSTEMS AND PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide a clear understanding on the basic concepts and building Blocks of Embedded System
- To familiarize with programming in embedded systems
- To study on design issues of embedded system development
-

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Embedded systems – Challenges - Embedded system design process. Embedded processors – 8051 Microcontroller, ARM processor – Architecture, Instruction sets and programming.

UNIT II MEMORY AND I/O MANAGEMENT 9

Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupts handling.

UNIT III PROCESS AND OPERATING SYSTEMS 9

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Performance issues.

UNIT IV EMBEDDED SOFTWARE 9

Programming embedded systems in assembly and C – Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers.

UNIT V EMBEDDED SYSTEM DEVELOPMENT 9

Design issues and techniques – Case studies – Software Modem – Set – Top – Box - Complete design of example embedded systems

Total: 45 PERIODS

COURSE OUTCOMES:

- Describe the embedded system design process, challenges in the embedded computing design and architecture of processors.
- Explain the embedded systems memory and management mechanisms.
- Compare the various scheduling policies.
- Use C code for embedded system programming.
- Explain the design principles involved in various embedded applications.

TEXT BOOKS:

1. Wayne Wolf," Computers as Components: Principles of Embedded Computer System Design ", Elsevier, 2006.
2. Michael J. Pont," Embedded C ", Pearson Education, 2007.

REFERENCES:

1. Steve Heath," Embedded System Design ", Elsevier, 2005.
2. Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay " The 8051 Microcontroller and Embedded Systems ", Pearson Education, Second edition, 2007.
3. Raj Kammaal," Embedded Systems ", McGraw Hill, 1st Edition 2003.
4. W. Valvano, Thomson Brroks, " Embedded Microcomputer systems ", Jonathan, 1st Edition, 2002.

15UEC974	FUNDAMENTALS OF DIGITAL SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To have an overview of signals and systems

- To explain the different transform techniques to analyze the discrete time systems
- To introduce about DFT and its computation techniques
- To impart knowledge on design techniques of digital filters
- To study the applications of DSP

UNIT I INTRODUCTION 9

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Classification of systems: Continuous, discrete, linear, causal, stable, dynamic, recursive, time Variance; classification of signals: continuous and discrete, energy and power; Digital signal representation-mathematical representation of signals.

UNIT II DISCRETE TIME SYSTEM ANALYSIS 9

Z-transform and its properties, inverse z-transforms; difference equation – Solution by z transform, application to discrete systems - Stability analysis, frequency response – Convolution –Linear, Circular – Discrete Fourier series, DTFT.

UNIT III DISCRETE FOURIER TRANSFORM 9

DFT and its Properties, Relation between DTFT and DFT,FFT computations using in Time and Decimation in Frequency algorithms, Overlap-add and save methods.

UNIT IV DESIGN OF DIGITAL FILTERS 9

FIR & IIR filter realization – Parallel & cascade forms .FIR design: Windowing Techniques-Rectangular, Hamming, Hanning, windows. IIR design: Analog filter design –Butterworth and Chebyshev approximations digital design using impulse invariant and bilinear Transformation.

UNIT V APPLICATIONS 9

Multirate signal processing-Speech compression-Adaptive filter-Musical sound processing-Image enhancement.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

- Describe the concept of signals and system
- Analyze the discrete time systems using transform techniques
- Compute DFT of short and long sequences using various fast FFT algorithms
- Choose the best filter structure for implementation (IIR/FIR)
- Explain the concept of multi-rate filters and effects of interpolation and decimation

TEXT BOOKS:

1. John G. Proakis, Dimitris G.Manolakis, , ” Digital Signal Processing – Principles, Algorithms & Applications ”, Pearson education / Prentice Hall, Fourth edition, , 2007.
2. Emmanuel C..Ifeachor, Barrie.W.Jervis, , ” Digital Signal Processing ”, Pearson education / Prentice Hall, Second edition, , 2002.

REFERENCE BOOKS:

1. Alan V.Oppenheim, Ronald W. Schafer, Hohn. R.Back ” Discrete Time Signal Processing ”, Pearson education , 2nd edition, , 2005.
2. Andreas Antoniou,” Digital Signal Processing ”, Tata McGraw Hill, 2001.

15UEC975 FUNDAMENTALS OF DIGITAL IMAGE PROCESSING L T P C

3 0 0 3

OBJECTIVES :

- To introduce the image fundamentals and Image transforms.
- To explain the image enhancement techniques.
- To impart knowledge on image segmentation and compression methods.

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Components of an Image processing system ,Elements of visual perception ,Brightness, Contrast, Hue, Saturation, Mach band effect, Color Image Fundamentals -RGB ,HSI models ,Image sensing and acquisition –Image Sampling and Quantization, Basic relationship between pixels.

UNIT II IMAGE TRANSFORMS 9

Two dimensional mathematical preliminaries–2D Transforms- DFT, DCT, Walsh transform , Hadamard Transforms, Hotelling transform, SVD, Sub band coding and Wavelet transform.

UNIT III IMAGE ENHANCEMENT 9

Histogram equalization, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contra harmonic mean filters, Smoothing, sharpening using frequency domain filters, Homomorphic filtering.

UNIT IV IMAGE SEGMENTATION 9

Point detection – line detection – Edge detection –Edge linking and boundary detection - Thresholding – Role of Illumination – Global Thresholding – optimal thresholding – Threshold selection – Region oriented segmentation – Basic formulation – Region growing by pixel aggregation – Region splitting & merging.

UNIT V IMAGE COMPRESSION 9

Need for data compression, Huffman, Run Length Encoding, Arithmetic coding, Vector Quantization, Transform coding, JPEG standards, JPEG compression, MPEG.

TOTAL : 45 Periods

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Describe the fundamentals of an image processing system.
- Apply the image transforms to analyze the images.
- Analyze the effect of different Enhancement on images.
- Apply the various Segmentation techniques on images.
- Compare various image and video compression standards.

TEXT BOOKS:

1. Rafael.C.Gonzalez and Richard.E. Woods, “Digital Image Processing", Pearson Education, 2003.
2. Anil K.Jain, "Fundamentals of Digital Image Processing”, Pearson Education, 2003.

REFERENCE BOOKS:

1. Rafael.C.Gonzalez and Richard.E. Woods,"Digital Image Processing" , Addison Wesley, 1993.
2. Santanu Chaudhury, Shree K Nayar, “Computer Vision, Graphics and Image

Processing- Recent Advances " , Viva Books,1999.
3. Rafael.C.Gonzalez, Richard.E. Woods and Steven L. Eddins, “Digital Image Processing using Matlab" , Pearson Education,2004.
4. Sanjit Kumar Mitra, " Digital Signal Processing: A Computer-based Approach” McGraw-Hill Higher Education, 2001.

MANDATORY COURSE

15UGS331 **VALUE EDUCATION AND HUMAN RIGHTS**

(Common to ALL Branches)

L	T	P	C
2	0	0	P/F

OBJECTIVES:

- To inculcate the values of Humanism, Culture and to have an awareness of Human Rights
- To impart knowledge and develop a sensitivity to the diverse Indian culture

UNIT I **6**

Introduction – Value education - Definition - Why values? - need for inculcation - sources of values- Personal values, Social values, Professional values, Moral values and Behavioral values. Presentation – depicting moral stories or themes and its relevance of life in all its forms.

UNIT II **6**

Values needed for life - love & Compassion, Truth & Tolerance, Fairness & Obedience – Respect Empathy – Protection – Humility & Harmony – Principles of happy living – Stress management **Role Play** – interpreting poems related to nature and humanism.

UNIT III **6**

Social values and personality – Autobiography & biography of National leaders, freedom fighters, Social reformers. **Seminar** on related topics.

UNIT IV **6**

Social values-Five responsibilities: to self family, environment, society and universe- peace within, family & universe; Unethical standards in words and how to correct in deeds, in thought, its deleterious effects in society, deterioration of culture and traditional values- remediation for better understanding of such values and its implications. **Group Discussion, Quiz, Activities (puzzles)**

UNIT V **6**

Human Rights – Universal Declaration of human rights - Human Rights violation - National Integration – Peace and non violence – the role of media in value building - Consumer awareness- **Thematic Discussion.**

TOTAL :30 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the students will be able to:

- Acquire a holistic vision and growth to become an integrated personality.
- Imbibe the essence of spirituality by which they will manifest the noble virtues of a universal brotherhood and benevolence

TEXT BOOKS:

1. S. Ignachimuthu, Values for Life, St.Paul Publications, Mumbai, 1994

REFERENCE BOOKS:

1. Frankena, W.K., “Ethics ”, Prentice Hall of India,, New Delhi, 1990.

2. Meron Theodor, "Human Rights and International Law Legal Policy Issues", Oxford University Press, First Edition, New Delhi, 2000.
3. R.P.Shukla, "Value Education and Human Rights, Sarup and Sons Publishing, New Delhi, 2004.
4. Yogesh Kumar Singh and Reschika Nath. "Value Education". APH Publishing Corporation, New Delhi, 2005.

ONE CREDIT COURSES

15UEC861	PIC EMBEDDED PROGRAMMING	L T P C 1 0 0 1

MODULE I **5**

Introduction To PIC Microcontroller Families-Pin Details-C Programs-I/O Ports-LED Interface-7 Segment Interface-MPlab Complier Configurations- Practical Session for I/O PORT,LED and 7 Segment Interface.

MODULE II **5**

TIMER 0- Configurations- Creating Delay Using Timers - Practical Session for TIMER 0 and Interrupts.

MODULE III **5**

ADC Interface-Multiple 7 Segments.

Total: 15 PERIODS

Course Designer: SUNSHIV Technologies, Chennai

15UEC862	PCB DESIGN	L T P C

1 0 0 1

MODULE I **5**

Introduction to PROTEUS- using tools in PROTEUS - Designing simple circuits in PROTEUS- Using instruments in PROTEUS-simple circuits debugging using instruments, in PROTEUS - Simulating simple mini projects, Clipper circuit, Clamper circuit - Street light controller -Power supply construction for electronics devices - Night security light - Police siren using 555 timer.

MODULE II **5**

Introduction to PCB board-Parts of PCB- Difference between breadboard GCB board and PCB-Multilayer PCB-PCB design software packages-Design Steps-Advantages and Drawbacks of PCB-Software installation.-Overview- Getting started with PROTEUS-Schematics design- Selecting footprints-Placing components- Signal routing- Hole through mount design -Design files- Single layer design - Double layer design -Multilayer design-Hands on training.

MODULE III **5**

SMD packages-Difference between Hole through mount and Surface mount -Surface mount design : Single layer design in SMD packages- Double layer design in SMD packages- Multi layer design in SMD packages- hands on training-Designing PCB for simple circuits in hole through mount as well as SMD packages

Total: 15 PERIODS

Course Designer: RISENGG TECHNOLOGIES, Chennai

15UEC863 **PHYTHON PROGRAMMING** **L T P C**

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MODULE I **5**

Syntax of class, Variable and function - standard data types: Numbers, String, List, Tuple, Dictionary - indentation error – function(Return type, return statement, parameters, arguments and reusability)

MODULE II **5**

OOPs Terminology - class variable access and methods - access of class variable access inside the method - creating an instance or object to the class in python - **"self"** keyword - calling a method by using self and non-self keyword – destructor – Inheritance - multiple inheritance - overloading and overriding method - **"del"** keyword

MODULE III **5**

Creating a file in Python programming-writing on a file-adding content to the existing file

Total: 15 PERIODS

Course Designer: Silicon Software Services, Madurai

15UEC864 **ANDROID PROGRAMMING** **L T P C**

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MODULE I **5**

Fundamental of Android Application-Java for Android-Activities and Intents-User Interface

MODULE II **5**

Services and Broadcast Receivers-SQLite and Content Providers-Location based Services and Sensors-Connectivity and Messaging

MODULE III **5**

Multimedia-Web Application-Testing and Publishing-Intel XDK

Total: 15 PERIODS

Course Designer: ICTACT