SETHU INSTITUTE OF TECHNOLOGY

PULLOOR, KARIAPATTI – 626 115.

(AN AUTONOMOUS INSTITUTION)

REGULATION – 2015

B.E ELECTRONICS AND COMMUNICATION ENGINEERING

CHOICE BASED CREDIT SYSTEM

CURRICULUM & SYLLABUS

CHAIRPERSON

Head Of The Department,
Electronics & Communication
Sethu Institute Of Technology,
Kariapatti-626 115

CHAIRMAN
ACADEMIC COUNCIL

CHAIRMAN
ACADEMIC COUNCIL
Sethu Institute of Technology
Pulloor, Kariapatti - 625 115

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

PROGRAMME OUTCOMES	
(1)	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **(Engineering knowledge)**
(2)	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **(Problem Analysis)**
(3)	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. **(Design and Development of Solutions)**
(4)	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **(Conduct Investigations of Complex Problems)**
(5)	Create, select, and apply appropriate techniques, resources, and modern engineering andIT tools including prediction and modelling to complex engineering activities with an understanding of the limitations. **(Modern Tool Usage)**
(6)	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. **(The Engineer and Society)**
(7)	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. **(Environment and Sustainability)**
(8)	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. **(Ethics)**
(9)	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **(Individual and Team Work)**
(10)	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions. **(Communication)**

(11)	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **(Project Management and Finance)**
(12)	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. **(Life-long learning)**

PROGRAMME EDUCATIONAL OBJECTIVES	
PEO – I	Possess strong technical knowledge in Electronics and CommunicationEngineering to address the real world challenges **(Core Competence)**
PEO – II	Demonstrate continual interest to learn new technologies for successful professional career **(Lifelong Learning)**
PEO – III	Exhibit professional skills and practice ethical principles with social consciousness **(Professionalism)**

PROGRAMME SPECIFIC OUTCOMES	
PSO – I	Design and Develop solution in the field of Signal processing and Communication.
PSO – II	Demonstrate competency in the design and development of Embedded / VLSI systems.

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 functional 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, Essay writing – **Reading** - Prose: My Vision of India-Dr.A.P.J.AbdulKalam

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:

- Apply grammar effectively in writing meaningful sentences and paragraphs.(K3)
- Exhibit reading skills and comprehension to express the ideas in the given text. (K2)
- Develop writing skills to present the ideas in various formal situations. (K6)
- Develop oral fluency to express the ideas in various formal situations. (K6)
- Exhibit writing skills to prepare reports for various purposes. (K6)

TEXT BOOKS:

1. S.M.Rajasangar*Technical English*, Rathna Arts,Sivakasi, 2018.

REFERENCE BOOKS:

1. AsrafRizvi.M, Effective Technical Communication, New Delhi, Tata McGraw-Hill Publishing Company Limited,2007.
2. Lakshminarayanan.K.R,EnglishforTechnicalCommunication,Chennai,ScitechPublications(India)Pvt.Ltd,2004.

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1										3		**3**		
CO.2										3		**3**		
CO.3										3		**3**		
CO.4									2	3		**3**		
CO.5										3		**3**		
CAM (Avg)										3		**3**		
3- Strong 2- Medium 1- Weak														

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 .

UNIT IV MULTIPLE INTEGRALS 8 + 6

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

UNIT V MATRICES 8 + 6

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

SUPPLEMENT TOPIC (for internal evaluation only) 3

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

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 (K4)
- Predict extreme values of the given function on different domains using the lagrange multiplier method (K3)
- Apply the various methods of integration for evaluating definite integrals. (K3)
- Apply the knowledge of multiple integrals to find the area and volume of region bounded by the given curves. (K3)
- Find eigen values and eigen vectors for symmetric and non symmetric matrices (K3)

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, 42ndEdition, (2012).

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",MotilalBanarsidass Publications, New Delhi, 1st Edition, (1965).
5. KREYSZIG. E, "Advanced Engineering Mathematics", John Wiley & Sons, New York, 10th Edition, (2011).
6. P.SIVARAMAKRISHNA DAS,E.RUKMANGADACHARI"Engineering mathematics",volume1, Pearson Edison New Delhi, 2nd Edition, (2013).

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	3		1								1	2	2
CO.2	3			1								1	2	2
CO.3	3			1								1	2	2
CO.4	3			1								1	2	2
CO.5	3			1								1	2	2
CAM (Avg)	**3**	**3**		**1**								**1**	**2**	**2**
3- Strong 2- Medium 1- Weak														

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 CRYSTAL 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- Bridgeman 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 ultrasonic- 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

Introduction to black body- 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 –Different types of moduli of elasticity– 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 - Concept of Entropy.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Apply the concepts of crystal structures and discuss the significance of fundamentals and defects (K3)
- Apply the knowledge of Acoustics and Ultrasonics to find velocity and acoustics parameters for industrial applications (K3)
- Explain the classification of different types of laser and its applications (K2)
- Explain different types of wave equations and functions (K2)
- Apply the concepts of Elasticity and thermal conductivity to solve the problems related to structural and thermal applications (K3)

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& Compa
6. ny Ltd., New Delhi, 2015

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3												2	2
CO.2	3												2	2
CO.3	2												2	2
CO.4	2												2	2
CO.5	3												2	2
CAM (Avg)	3												2	2

3- Strong 2- Medium 1- Weak

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

OBJECTIVES:

- Introduction to the fundamental concepts of chemical bonds.
- Understand the principles and applications of corrosion science.
- Gain knowledge about energy storage devices &Electrochemical sensors.
- Understand the principles and applications of spectroscopy and the concept of green chemistry.
- Acquire knowledge on smart materials.

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 (SP, SP^2 , SP^3)(Homo nuclear& H_2, N_2, O_2) 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 -Types of Polymerisation-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

- Describe the theories of chemical bonding and molecular structure.(K2)
- Analyze the use of electrochemistry and corrosion prevention techniques.(K4)
- Describe the importance of energy storage devices and electrochemical sensor.(K2)
- Explain the principles of instrumentations for Analytical methods and green chemistry.(K2)
- Describe the applications of different polymers and liquid crystals.(K2)

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.

REFERENCES:

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.

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	2												1	1
CO.2	3	3											1	1
CO.3	2												1	1
CO.4	2												1	1
CO.5	2												1	1
CAM (Avg)	2												1	1

3- Strong 2- Medium 1- Weak

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

- Apply the knowledge of problem solving techniques to the solutions of computing problems (Apply)
- Make use of sequential constructs to provide solutions for computing problems . (Apply)
- Select suitable control constructs to provide computing solutions. (Apply)
- Apply the knowledge of modularity to the solutions of computing problems. (Apply)
- Develop solutions to computing problems handling homogeneous and heterogeneous data. (Apply)

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.

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2										2	2
CO.2	3	2	2										2	2
CO.3	3	2	2										2	2
CO.4	3	2	2										2	2
CO.5	3	2	2										2	2
CAM (Avg)	3	2	2										2	2
3- Strong 2- Medium 1- Weak														

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 PLANESURFACES** **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 solidsinclined 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)=75PERIODS

COURSE OUTCOMES:

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

- Apply the knowledge of First angle projection to draw the projection of points, straight lines and planes. (Apply)
- Draw the Projection of different simple solids. (Apply)
- Draw the section of solids and development of lateral surfaces of solids. (Apply)
- Apply the knowledge of Isometric projection to draw the objects like truncated solids and frustum. (Apply)
- Sketch the orthographic views from the given pictorial (isometric) view (Apply)

TEXT BOOKS:

1. Bhatt N.D., "Engineering Drawing", 46th Edition, Charotar Publishing House, (2003).
2. Natarajan K.V., "A Text book of Engineering Graphics", Dhanalakshmi Publishers, (2006).

REFERENCE BOOKS:

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

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3		2						2				2	2
CO.2	3		2						2				2	2
CO.3	3		2						2				2	2
CO.4	3		2						2				2	2
CO.5	3		2						2				2	2
CAM (Avg)	3		2						2				2	2

3- Strong 2- Medium 1- Weak

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 : 30Periods

COURSE OUTCOMES:

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

- Use word processing and spreadsheet software for creating documents. (Apply)
- Develop computer applications using suitable control structures. (Analyze)
- Employ suitable derived data constructs to the solution of computing problems. (Apply)
- Create applications by utilizing structures and unions. (Create)
-

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3								2	2		2	2	2
CO.2	3	3	3						2	2		2	2	2
CO.3	3	2	2						2	2		2	2	2
CO.4	3	3	3						2	2		2	2	2
CAM (Avg)	3		2						2				2	2
3- Strong 2- Medium 1- Weak														

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:

- Apply the basic knowledge of plumbing to make simple house hold pipe line connections.
- Fabricate the given components using carpentry, sheet metal & welding equipment/tools
- Perform the operations like machining, drilling and Tapping
- Apply basic electrical engineering knowledge for house wiring practice
- Apply the knowledge of basic electrical engineering to practice soldering using general purpose PCB

TOTAL: 30 PERIODS

EQUIPMENTREQUIREMENT

ELECTRICAL ENGINEERING

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

ELECTRONICS ENGINEERING

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3								2			2	2	2
CO.2	3								2			2	2	2
CO.3	3								2			2	2	2
CO.4	3								2			2	2	2
CO.5	3								2				2	2
CAM (Avg)	**3.00**								**2.00**			**2.00**	**2.00**	**2.00**
3- Strong 2- Medium 1- Weak														

15UGS112 **BASIC SCIENCES LABORATORY- I** **L T P C**
(COMMON TO ALL BRANCHES) **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:

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

- Apply the principles of Optics, Laser physics and Mechanics to determine the Engineering properties of materials
- Analyze the given liquid sample to determine the viscosity and compressibility of the liquid.
- Apply the principles of spectroscopy to determine the properties using prism
- Prepare solutions on various concentrations. (Apply)

- Analyze the given solution quantitatively using chemical and electro analytical methods.(Analyze)
- Determine the amount and molecular weight of the given substances. (Apply)

A minimum of FIVE experiments shall be offered **TOTAL: 30 Periods**

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3								3				2	2
CO.2	3								3				2	2
CO.3	3								3				2	2
CO.4	3								3				2	2
CO.5	3	3							3				2	2
CAM (Avg)	3								3				2	2
3- Strong 2- Medium 1- Weak														

SEMESTER II

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

- Build business vocabulary to present the ideas in various business scenarios (K6)
- Interpret verbal and non verbal communications to respond to formal situations (K2)
- Develop letter writing skills to present their ideas for various business situations (K6)
- Write Business Proposals and Business Reports for various business purposes. (K6)
- Present the concepts with clarity for various business situations. (K6)

TEXT BOOKS:

1. M.Dhanasekaran: Business English & Presentation Skills, Rathna Arts,Sivakasi, 2018.

REFERENCE BOOKS:

1. B.A.Elankathiravan: Business English & Presentation Skills,Wakeup Publication, Sivakasi,2017
2. Allan Pease, Body Language, New Delhi,Sudha Publications(P) Ltd,2005.
3. Malcolm Goodale, Professional Presentations,New Delhi,CambridgeUniversity Press,2006.
4. Randolph Hudson.H &Bernard Selzler.J.Business Communication,Jaico Publishing House,2006

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1									2	3		**3**		
CO.2									2	3		**3**		
CO.3									2	3		**3**		
CO.4									2	3		**3**		
CO.5									2	3		**3**		
CAM (Avg)									**2.00**	**3.00**		**3.00**		

3- Strong 2- Medium 1- Weak

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 parallelepiped

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 andperiodic 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.

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 (K3)
- Calculate the gradients and directional derivatives for scalar valued and vector valued functions (K3)
- Find the image of a region under conformal mapping and construct analytic functions using its properties (K3)
- Determine the nature and extent of singularities of functions (K3)
- Apply Laplace transform methods to solve initial value problems for constant coefficient linear ordinary differential equations (K3)

TEXT BOOKS:

1. VEERARAJAN.T"Engineering Mathematics"Tata McGraw Hill Publishing Company, New Delhi,vol 15.
2. BALI N. P and MANISH GOYAL, "Text book of Engineering Mathematics", Laxmi Publications (P) Ltd., New Delhi, 3rd Edition, (2008).

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. AGARWAL R.S., "Quantitative Aptitude", S. Chand Publications, New Delhi, 7th Edition, (2008), pp. 341-370, 384-404.

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3			1								2	2	2
CO.2	3			1								2	2	2
CO.3	3			1								2	2	2
CO.4	3			1								2	2	2
CO.5	3			1								2	2	2
CAM (Avg)	**3.00**			**1.00**								**2.00**	**2.00**	**2.00**

3- Strong 2- Medium 1- Weak

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 –Electron and hole concentration (Qualitative)-Intrinsic Carrier Concentration–Expression for electrical conductivity of a semiconductor- Hall effect- Origin of magnetic moment – Bohr magnetron – 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 train.

UNIT – IV OPTOELECTRONICS 9

Introduction -Modulations- Pulse code modulation- Franz keldysh and stark effect – Electroabsorption 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

- Explain the conductivity of materials using classical and quantum free electron theory. (Understand)
- Explain the types of semiconductors and the fundamentals of magnetic materials (Understand)
- Explain the properties and applications of dielectric and superconducting materials (Understand)
- Describe optical modulation and optical switching (Understand)
- Apply the fundamental physics of optical fibers to determine the properties for effective fiber optic communication (Apply)

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
5. , New Delhi, Revised Edition 2015.

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	2												2	2
CO.2	2												2	2
CO.3	2												2	2
CO.4	2												2	2
CO.5	3												2	2
CAM (Avg)	**2.20**												**2.00**	**2.00**
3- Strong 2- Medium 1- Weak														

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 environmental issues in the soceity.
- Awareness about the impact of environment related to human health .

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.

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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 ANDTHE 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:

- Express the concepts of ecosystem and biodiversity. (K2)
- Describe the impact of environmental pollution.(K2)
- Identify alternate energy sources for technological applications.(K2)
- Explain the importance of environmental issues to the society.(K2)
- Analyze the impact of environmental issues related to human health (K4)

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.

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	2					2	3					3	2	2
CO.2	2					2	3					3	2	2
CO.3	2					2	3					3	2	2
CO.4	2					2	3					3	2	2
CO.5	3	3				2	3					3	2	2
CAM (Avg)	3								3				2	2
3- Strong 2- Medium 1- Weak														

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
- Tomake 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 SEMICONDUCTORDEVICES (QUALITATIVE TREATMENTONLY) 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:

- Apply the knowledge of quantitative theory to compute current flow in semiconductor.(K3-Apply)
- Apply the knowledge of semiconductor diode to design rectifiers and regulators.(K3-Apply)
- Analyze the characteristics of BJT for suitable application (K4-Analyze) .
- Apply the knowledge of FET characteristics to identify the different modes of operation (K3-Apply)
- Describe the operation of different special semiconductor devices for various applications (K2-Understand)

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.

Assessment Pattern:

Bloom's Level	Continuous Internal Assessment			End Semester Exam
	PT - 1	PT - 2	PT - 3	
Remember	8	4	5	9
Understand	34	69	93	91
Apply	8	2	2	0
Analyze	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0
Total	50	75	100	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2											2	2
CO.2	3	2	2										2	2
CO.3	3	2											2	2
CO.4	3	2											2	2
CO.5	2												2	2
CAM (Avg)	**2.80**	**2.00**	**2.00**										**2.00**	**2.00**
3- Strong 2- Medium 1- Weak														

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

OBJECTIVES :

- To explain thebasic 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.
.

TOTAL : 45 Periods

COURSE OUTCOMES:

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

- Describe the basic concepts of electronic measurements and various standards. (K2-Understand)
- Interpret the basic principles and characteristics of various measuring instruments. (K3-apply)

- Apply the knowledge of basic electronics to construct various bridge circuits for measurements(K3 Apply)
- Describe the functionality of Cathode ray oscilloscopes/ special oscilloscopes and its sub systems. (K2-understand)
- Illustrate the working principle of signal generators and analyzer (K2 Understand)

TEXT BOOKS

1. AlbertD.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. JosephJ.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

Assessment Pattern:

BLOOM'S LEVEL	Continuous Internal Assessment			END SEMESTER EXAM
	PT - 1	PT - 2	PT - 3	
Remember	8	10	5	25
Understand	32	38	70	25
Apply	10	18	25	25
Analyze	-	9	-	25
Evaluate	-	-	-	
Create	-	-	-	-
TOTAL MARKS	50	75	100	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	1										2	1	
CO.2	3	2	1										1	
CO.3	3	2											2	
CO.4	3	1										2	1	1
CO.5	3	1										2	1	1
CAM (Avg)	3.00	1.40	1.00									2.00	1.20	1.00
3- Strong 2- Medium 1- Weak														

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 of curvature of Planoconvex 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.
- To 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

COURSEOBJECTIVES:

- Apply the theoretical concepts to perform lab experiments.
- To asses the water quality parameters.
- To acquire knowledge on water quality parameters for the analysis of industral effluents

LIST OF EXPERIMENTS

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/
7. bore well) with respect to Hardness, TDS, Chloride and pH.
8. Determination of acidity of industrial effluents.

COURSE OUTCOMES:

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

- Apply the principles of Optics, Laser physics and spectroscopy to determine the Engineeringproperties of materials
- Determine the thermal conductivity of the given material
- Determine the energy gap and specific resistance of the given material.
- Test and analyze the water quality parameters for the given sample

A minimum of FIVE experiments shall be offered

TOTAL: 30Periods

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3								3				2	2
CO.2	3								3				2	2
CO.3	3								3				2	2
CO.4	3	3				3	3		3			2	2	2
CAM (Avg)	3.00	3.00				3.00	3.00		3.00			2.00	2.00	2.00

3- Strong 2- Medium 1- Weak

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:

- Apply the knowledge of diodes and transistors to identify device for various applications(K3-Apply)
- Apply the knowledge of semiconductor diode to construct Rectifiers and regulators(K3-Apply)
- Analyze the characteristics of Power electronic device for switching applications .(K4-Analyze)

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2							3	3		2	2	2
CO.2	3	2							3	3		2	2	2
CO.3	3	2							3	3		2	2	2
CAM (Avg)	3.00	2.00							3.00	3.00		2.00	2.00	2.00
3- Strong 2- Medium 1- Weak														

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

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

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 heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

Suppliment Topic- Application of Fourier series - Gibb's ,Application of Fourier Transform Phenomenon.

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. (K3)

- Apply the knowledge of Fourier transform and its properties to transform signals between time and frequency domain. (K3)
- Apply the knowledge of Z transform and its properties to analyze linear discrete systems. (K3)
- Develop partial differential equation and solve linear first order and second order partial differential equations. (K3)
- Apply Fourier series to solve partial differential equations representing one dimensional and two dimensional heat and wave equations. (K3)

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 GOYALand 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).

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3			1								1	2	2
CO.2	3			1								1	2	2
CO.3	3	3		1								1	2	2
CO.4	3			1								1	2	2
CO.5	3			1								1	2	2
CAM (Avg)	**3.00**	**3.00**		**1.00**								**1.00**	**2.00**	**2.00**

3- Strong 2- Medium 1- Weak

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:

- Apply appropriate simplification methods to simplify Boolean expressions (K3 - Apply)
- Design combinational circuits using appropriate gates (K3 - Apply)
- Apply the Knowledge of sequential circuits to analyze the propagation delay of synchronous and asynchronous circuits (K4 -Analyze)
- Design synchronous and asynchronous circuits for real time applications (K6-Create)
- Apply the Knowledge of programmable logic devices to design combinational circuits (K3 - Apply)

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.

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	8	11	8	08
Understand	1	4	10	22
Apply	41	35	24	54
Analyze			8	16
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	1										2	1	
CO.2	3	2	1										1	
CO.3	3	2											2	
CO.4	3	1										2	1	1
CO.5	3	1										2	1	1
CAM (Avg)	3.00	1.40	1.00									2.00	1.20	1.00
3- Strong 2- Medium 1- Weak														

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:

- Apply the knowledge of Kirchoff's laws to compute voltage and current in AC and DC circuits (Apply)
- Apply the knowledge of network theorems to compute power in AC and DC circuits. (Apply)
- Analyze the characteristics of resonant circuits. (Analyze)
- Analyze the performance of two port networks. (Analyze)
- Apply the knowledge of coupled circuits to characterize three phase circuits . (Apply)

Assessment Pattern:

BLOOM'S LEVEL	Continuous Internal Assessment			END SEMESTER EXAM
	PT - 1	PT - 2	PT - 3	
Remember	8	4	10	10
Understand	10	14	16	24
Apply	24	24	16	50
Analyze	8	8	8	16
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL MARKS	50	50	50	100

TEXT BOOKS:

1. A.Sudhakar, Shyam Mohan S P "Circuits and Networks: Analysis & Synthesis", Tata McGraw - Hill, 5th edition, 2015.
2. William H.Hyte, J.E.Kemmerly, Steven M.Durban "Engineering Circuit Analysis", Tata McGraw – Hill, 8th edition.

REFERENCE BOOKS:

1. Joseph Edminister, "Electric circuits", Schaums Outline Series, McGraw-Hill, 6th edition, 2013.
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. TheodreF.Bogrartjr, "Electric circuits", Macmillan /McGraw-Hill, 2nd edition.

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2									2	2	2
CO.2	3	2	2									2	2	2
CO.3	3	3	2									2	2	
CO.4	3	3	2									2	2	
CO.5	3	2	2									2	2	
CAM (Avg)	**3.00**	**2.40**	**2.00**									**2.00**	**2.00**	**2.00**
3- Strong 2- Medium 1- Weak														

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 ANDTUNEDAMPLIFIERS 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:

- Analyze the various biasing stability configuration to obtain the transfer characteristics of transistor. (Analyze)
- Analyze the small signal model parameters for BJT and FET amplifier in the mid-band region. (Analyze)
- Analyze the frequency response of BJT and FET amplifiers. (Analyze)
- Identify the suitable large signal amplifier for real time applications. (Apply)
- Analyze the different types of feedback topology for amplifier design. (Analyze).

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, 9thEdition, 2012.
4. Nagrath.I.J, "Electronic Devices and Circuits", PHI, 2007.

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	15	9	15	30
Understand	19	21	20	40
Apply	16	20	15	30
Analyze	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	3	2									2	2	2
CO.2	3	3	2									2	2	2
CO.3	3	3	2									2	2	2
CO.4	3	2	2									2	2	2
CO.5	3	3	2									2	2	
CAM (Avg)	3.00	2.80	2.00									2.00	2.00	2.00
3- Strong 2- Medium 1- Weak														

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: 45PERIODS

COURSE OUTCOMES

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

- Apply the knowledge of mathematics to find the spectrum of various amplitude modulation systems (K3-Apply)
- Identify different methods of generating angle modulation and demodulation techniques (K3-Apply)
- Apply the knowledge of random process to compute the characteristics of noise in communication systems (K3-Apply)

- Analyze the impact of Noise in various continuous wave modulation (K4 - Analyze)
- Apply the knowledge of sampling theory to study various pulse modulation techniques. (K3-Apply)

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.

Assessment Pattern:

Bloom's Level	Continuous Internal Assessment			End Semester Exam
	PT - 1	PT - 2	PT - 3	
Remember	03	06	05	10
Understand	44	43	15	40
Apply	03	01	30	50
Analyze	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0
Total	50	50	50	100

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

- Apply knowledge of Object Oriented Programming concepts to solve the real time problems
- Identify and analyze the suitable inheritance & exception handling mechanisms to solve the complex engineering problems
- Design and development of solution to implement an linear data structure for the real time applications
- Apply knowledge of non-linear data structures to solve the real time applications
- Identify and analyze the suitable sorting techniques to solve the real time applications

TEXT BOOKS:

1. E.Balagurusamy,"Object oriented programming with C++", Tata McGrawHill, 6thEdition,2013.
2. Weiss. M.A,"Data Structures and Algorithm Analysis in C++ ", Pearson Education, 4thEdition,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, 4thEdition,2013.
3. Aho.V, Hopcroft.J.E, Ullman.J.D,"Data Structures and Algorithms", Pearson Education, 1stEdition Reprint,2006.
4. Gilberg.R.F, Forouzan.B.A,"DataStructures:APseudocode Approach with C++", Thomson IndiaEducation, 2ndEdition,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++

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3		3									2	2	2
CO.2		3		3								2	2	2
CO.3	3			3								2	2	2
CO.4		3		3								2	2	2
CO.5		3		3								2	2	2
CAM (Avg)	3.00	3.00	3.00	3.00								2.00	2.00	2.00
3- Strong 2- Medium 1- Weak														

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 and Implement Combinational circuits using Logic Gates. (K3 Apply)
- Implement Combinational circuits using MSI Devices. (K3 Apply)
- Design and Construct Sequential circuits using Flip - Flops. (K3 Apply)

HARDWARE AND SOFTWARE REQUIREMENT

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2						3	3	2	2	2	2
CO.2	3	2							3	3	2	2	2	2
CO.3	3	2	2						3	3	2	2		2
CAM (Avg)	3.00	2.00	2.00						3.00	3.00	2.00	2.00	2.00	2.00
3- Strong 2- Medium 1- Weak														

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 Nortonand 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 usingv oltage 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 Boot strapped gate resistance
   - I. Measurement of gain, input resistance and output resistance

8.Designandconstruct 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
   - IIIDetermination of efficiency
   - IV. Comparison with calculated values

10.DesignandconstructSeriesfeedback 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:

- Apply Kirchoff's law and network theorems to simplify the circuits. (Apply)
- Design a small signal amplifier using BJT and FET. (Create)
- Design a power amplifier for real time application. (Create)

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2							3	3	2	2		2
CO.2	3	3	3	2					3	3	2	2	2	2
CO.3	3	3	3	2					3	3	2	2	2	2
CAM (Avg)	3.00	2.67	3.00	2.00					3.00	3.00	2.00	2.00	2.00	2.00
3- Strong 2- Medium 1- Weak														

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 PROBABILITY AND STATISTICAL DISTRIBUTIONS 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 knowledge of standard distributions to solve Probability related problems in Engineering. (K3)
- Find the relationship involving more than one random variable and analyze the functions. (K4)
- Apply the properties of Markov process, Poisson process and Ergodic process to measure the system performances in Engineering processes (K3)
- Determine the Auto-correlation functions and Power spectral density related to

communication and control systems. (K3)

- Apply the fundamental principles in random process to analyse the linear system with random inputs related to signal processing. (K3)

TEXT BOOKS:

1. VEERARAJAN, "Probability and Random Processes", 4th edition, 2015.
2. GROSS D, and HARRIS C.M., "Fundamentals of Queuing Theory", Wiley Students, India, 4rd Edition, (2014).ref

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 McGraw Hill, New Delhi, 1st Edition, (2004).
4. SIMON HAYKIN, "Communication Systems", John Wiley and Sons, New Delhi, 7th Edition, (2007).
5. OLIVER C. IBE, "Fundamentals of Applied probability and Random processes", Elsevier, Lowell, Massachusetts, 1st Indian Reprint, (2007).
6. PEEBLES. P.Z., "Probability, Random Variables and Random Signal Principles", Tata McGraw Hill, New Delhi, 4th Edition

CO/PO/PSO MAPPING														
CO	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**I**	**II**
CO.1	3			1								1	2	2
CO.2	3	3		1								1	2	2
CO.3	3			1								1	2	2
CO.4	3			1								1	2	2
CO.5	3			1								1	2	2
CAM (Avg)	**3.00**	**3.00**		**1.00**								**1.00**	**2.00**	**2.00**

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 multi vibrators
- 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 High frequency and Low frequency oscillators for the desired frequency using BJT(K3)
- Design waveshaping and multivibrator circuit using BJT (K3)
- Apply the knowledge of Linear Integrated Circuits to compute basic mathematical operations (K3)
- Design communication system components using appropriate Integrated Circuits(K3)
- Apply the knowledge of Integrated circuits to design signal generators and voltage regulators (K3)

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. RamakantA.Gayakwad, “OP-AMP and Linear ICs”, Prentice Hall / Pearson Education,4th Edition, 2001.
4. Schilling and Belove, “Electronic Circuits”, TMH, 3rd Edition, 2002.

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	4	3	3	6
Understand	40	40	41	84
Apply	4	4	3	6
Analyze	2	3	3	4
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	2	2
CO.2	3	2										2	2	2
CO.3	3	2										2	2	2
CO.4	3	2	2									2	2	2
CO.5	3	2	2									2	2	2
CAM (Avg)	3.00	2.00	2.00									2.00	2.00	2.00
3- Strong 2- Medium 1- Weak														

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 compute electric field intensity for different co-ordinate systems. (K3 - Apply)
- Apply appropriate laws to compute the intensity and flux density of magnetic field. (K3 - Apply)
- Analyze current and charge distribution for different boundary conditions.(K4 -Analyze)
- Formulate Maxwell equation for static and time varying fields. (K2 - Understand)
- Analyze the EM wave propagation parameters in different mediums. (K4 -Analyze)

TEXTBOOKS:

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 .

. **Assessment Pattern:**

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	15	9	15	30
Understand	19	21	20	40
Apply	16	20	15	30
Analyze	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	2	3
CO.2	3	2										2	2	3
CO.3	3	3										2	2	3
CO.4	2											2	2	2
CO.5	3	3										2	2	3
CAM (Avg)	2.80	2.50										2.00	2.00	2.80
3- Strong 2- Medium 1- Weak														

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)=75PERIODS

COURSE OUTCOMES:

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

- Apply engineering knowledge to classify the CT/DT signals/systems according to their properties (K3)
- Apply the knowledge of Fourier series and Fourier Transform to analyze the characteristic of CT signals and systems (K4)
- Analyze Continuous time signals and systems using Laplace transform (K4)
- Identify the required sampling rate for CT to DT signal conversion and represent the DT signals/systems using DTFT (K3)
- Apply the knowledge of Z Transform to analyze the characteristic of DT signals and Systems (K4)

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.

Assessment Pattern:

BLOOM'S LEVEL	Continuous Internal Assessment			END SEMESTER EXAM
	PT - 1	PT - 2	PT - 3	
Remember	10	8	8	8
Understand	24	10	10	28
Apply	16	16	32	48
Analyze	-	16	-	16
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2									2	3	
CO.2	3	3	2	2								2	3	
CO.3	3	3	2	2								2	3	
CO.4	3	2	2									2	3	
CO.5	3	3	2	2								2	3	
CAM (Avg)	**3.00**	**2.60**	**2.00**	**2.00**								**2.00**	**3.00**	
3- Strong 2- Medium 1- Weak														

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: 45PERIODS

COURSE OUTCOMES:

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

- Apply the knowledge of information theory to design an efficient source coding techniques(Apply)
- Analyze the performance of various error control coding schemes.(Analyze)
- Apply the knowledge of line coding techniques to identify efficient baseband signalling techniques in digital communication.(Analyze)
- Analyze the error performance of various digital modulation techniques.(Analyze)
- Apply the knowledge of spread spectrum techniques to improve the performance of digital communication system in fading environment.(Apply)

BLOOM'S LEVEL	Continuous Internal Assessment			END SEMESTER EXAM
	PT - 1	PT - 2	PT - 3	
Remember	6	6	6	10
Understand	12	28	44	58
Apply	32	16	-	32
Analyze	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL MARKS	50	50	50	100

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 , 2010.
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.

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	3	
CO.2	3	2	2									2	3	
CO.3	3	2										2	3	
CO.4	3	2	2									2	3	
CO.5	3	2										2	3	
CAM (Avg)	3.00	2.00	2.00									2.00	3.00	
3- Strong 2- Medium 1- Weak														

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

- Analyze the performance characteristics of DC machines to select suitable DC machine for various applications. (Analyze)
- Analyze the performance of transformers by conducting various tests for determining the efficiency. [Analyze]
- Examine the starting methods and parameters of three phase induction motor for various applications. (Understand)
- Examine the starting methods and parameters of synchronous machines for various

applications. (Understand)

- Illustrate the working of single phase induction motor and special machines. (Understand)

TEXT BOOKS:

1. Nagrath I.J., and Kothari D.P., " Electrical Machines", Tata McGraw - Hill, 1997.
2. Fitzgerald A.E., Kingsley C., UmansS. and Umans S.D., "Electric Machinery", McGraw- Hill, Singapore, 2000.

REFERENCE BOOKS:

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

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3		3									2	2	2
CO.2		3		3								2	2	2
CO.3	3			3								2	2	2
CO.4		3		3								2	2	2
CO.5		3		3								2	2	2
CAM (Avg)	3.00	3.00	3.00	3.00								2.00	2.00	2.00

3- Strong 2- Medium 1- Weak

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

- Select suitable mathematical problem solving techniques and solve the quantitative problems within the stipulated time (Apply)
- Exhibit Verbal and Non Verbal Reasoning skills to solve the problems based on logical and analytical reasoning (Apply)

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”, UpkarsPrakashan Publications, Agra, Revised Edition, (2013).

CO/PO/PSO MAPPING													
POs												**PSOs**	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**I**	**II**
3	2		2									2	2
3	3		2							2		2	2
3.00	**2.50**		**2.00**							**2.00**		**2.00**	**2.00**
3- Strong 2- Medium 1- Weak													

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. Astablemultivibrator

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. Monostablemultivibrator 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 various oscillator and wave shaping circuits using BJT and Op-Amp (K3 - Apply)
- Develop the ability to implement various Op-Amp applications. (K3 - Apply)
- Develop design knowledge on how to Simulate analog circuits using PSPICE (K3 - Apply)

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2						3	3	2	2	2	2
CO.2	3	2	2						3	3	2	2	2	2
CO.3	3	2	2						3	3	2	2	2	2
CAM (Avg)	3.00	2.00	2.00						3.00	3.00	2.00	2.00	2.00	2.00
3- Strong 2- Medium 1- Weak														

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:

- Analyze various analog modulation and demodulation techniques. (K4-Analyze)
- Design and simulate digital modulation techniques. (K4-Analyze)
- Design and construct various Pulse modulation Techniques. (K4-Analyze)
- Analyze the error performance of various digital Modulation techniques. (K4-Analyze)

SOFTWARE AND HARDWARE REQUIREMENT

1. PC -15
2. Simulation software with Signal Processing Tool Box-10 Users license
3. AMTransceiverKit-2
4. FMTransceiverKit- 2
5. PAM, PPM, PWMTrainerKits-2
6. CRO - 6
7. Power supply – 6
8. Function Generator – 6

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	3	2		3	2			3	3		3	3	
CO.2	3	3	2		3	2			3	3		3	3	
CO.3	3	3	2						3	3		2	3	
CO.4	3	3	2		3				3	3		2	3	
CAM (Avg)	3.00	3.00	3.00	2.00		3.00	2.00			3.00	3.00		2.50	3.00
3- Strong 2- Medium 1- Weak														

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

Apply the concepts of array in various applications (K3 - Apply)

Apply the knowledge of modular programming to solve problems. (K3 - Apply)

Apply structure concepts to handle complex data (K3 - Apply)

Implement the file handling mechanism to access data in a disc (K3 - Apply).

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

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2			2				2	2		2	3	3
CO.2	3	2			2				2	2		2	3	3
CO.3	3	2			2				2	2		2	3	3
CO.4	3				2				2	2		2	3	3
CAM (Avg)	3.00	2.00			2.00				2.00	2.00		2.00	3.00	3.00

3- Strong 2- Medium 1- Weak

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 ppoint 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:

- Analyze the efficient computation of DFT using various FFT algorithms. (K4-Analyze)
- Analyze the performance of digital IIR filters using transformation techniques.(K4-Analyze)
- Analyze the performance of FIR filters using different window functions.(K4-Analyze)
- Analyze the finite wordlength effects in digital filter.(K4-Analyze)

- Develop programs for real time applications using DSP Processor. (K6-Create)

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

Assessment Pattern:

BLOOM'S LEVEL	Continuous Internal Assessment			END SEMESTER EXAM
	PT - 1	PT - 2	PT - 3	
Remember	6	6	10	10
Understand	5	12	24	20
Apply	39	32	16	60
Analyze	-	-	-	10
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL MARKS	50	50	50	100

CO/PO/PSO MAPPING														
	POs												PSOs	
CO	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	3										2	3	
CO.2	3	3	2									2	3	
CO.3	3	3	2									2	3	
CO.4	3	3										2	3	
CO.5	3	3	3	3	3				3	2	3	2	3	
CAM (Avg)	3.00	3.00	2.33	3.00	3.00				3.00	2.00	3.00	2.00	3.00	
3- Strong 2- Medium 1- Weak														

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

PREREQUISITE: ELECTROMAGNETIC FIELDSOBJECTIVES:

- 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:

- Apply the knowledge of Symmetrical Networks to design constant K-filter and M-derived filter(Apply,K3
- Apply the knowledge of differential equations to determine various transmission line

parameters (Apply,K3).

- Apply the knowledge of a dissipation less transmission line to determine impedance matching networks for unmatched lines (Apply,K3)
- Analyze the characteristics of TE,TM and TEM wave propagation in Parallel planes(Analyze,K4)
- Analyze the wave propagation characteristics in different modes for different types of waveguides. (Analyze K4)

TEXTBOOKS:

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.

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	8	10	10	10
Understand	32	24	34	60
Apply	10	16	6	30
Analyze				
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2									2	2	
CO.2	3	2										2	2	
CO.3	3	2										2	2	
CO.4	3	3										2	3	
CO.5	3	3										2	3	
CAM (Avg)	3.00	2.40	2.00									2.00	2.40	
3- Strong 2- Medium 1- Weak														

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:

- Apply the knowledge of 8086 processor to design and develop code for appropriate applications. (K3)
- Analyze the various interfacing techniques to develop real time applications. (K4)
- Apply the knowledge of 8051 microcontroller to design and develop code for appropriate applications. (K3)
- Design and develop code for Microcontroller based real time Application (K6)
- Develop code for real time control applications using Advanced Virtual RISC Microcontroller (K3)

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 GillispieMazidi,"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

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	2	7	4	5
Understand	44	43	42	75
Apply	4		4	20
Analyze				
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2									2		2
CO.2	3	3	2	2	2	2			2	2		2		2
CO.3	3	2	2									2		2
CO.4	3	3	3	2		2			2	2	2	2		3
CO.5	3	2	2			2			2	2	2	2		2
CAM (Avg)	**3.00**	**2.40**	**2.20**	**2.00**	**2.00**	**2.00**			**2.00**	**2.00**	**2.00**	**2.00**		**2.20**
3- Strong 2- Medium 1- Weak														

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–IPV4, IPV6, 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 :

- Apply the knowledge of OSI Reference Model and TCP/IP Protocol Suite to construct interconnection of networks (Apply)

- Analyze the performance of MAC layer protocols for LAN and WAN (Analyze)
- Apply the knowledge of network layer to identify suitable internet protocols. (Apply)
- Analyze the performance of transport layer protocols. (Analyze)
- Apply the knowledge of cryptography to develop secured protocol for internet applications. (Evaluate)

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.

Assessment Pattern:

Bloom's Level	Continuous Internal Assessment			End Semester Exam
	PT - 1	PT - 2	PT - 3	
Remember	05	5	5	20
Understand	45	40	30	60
Apply	0	5	10	20
Analyze	0	0	5	0
Evaluate	0	0	0	0
Create	50	50	50	100

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	2	
CO.2	3	2										2	2	
CO.3	3	2										2	2	
CO.4	3	2	2									2	2	
CO.5	3	3	2	2	2							2	3	
CAM (Avg)	3.00	2.20	2.00	2.00	2.00							2.00	2.20	

3- Strong 2- Medium 1- Weak

15UEC507	DIGITALSIGNAL 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 code for various signal processing techniques using simulation software. (K3, Apply)
- Analyze the frequency response of digital filters using simulation software. (K4, Analyze)
- Implement various signal processing techniques using DSP Processor. (K3, Apply)

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2			3				3	3		2	2	
CO.2	3	3	2		3				3	3		2	2	
CO.3	3	2			3				3	3		2	2	
CAM (Avg)														
3- Strong 2- Medium 1- Weak														

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 data manipulation using 8086 and 8051 (K3, Apply)
- Develop assembly language program to set delay using 8253. (K3, Apply)
- Develop assembly language program to interface peripherals with 8086 (K3, Apply)
- Develop code for microprocessor/ microcontroller based applications (K3, Apply)

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3								3	3	2	2		2
CO.2	3	2							3	3	2	2		2
CO.3	3	2	2						3	3	2	2		2
CO.4	3	2	2			2			3	3	2	2		2
CAM (Avg)	3.00	2.00	2.00			2.00			3.00	3.00	2.00	2.00		2.00
3- Strong 2- Medium 1- Weak														

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 **6**

Communication – Types of communication – Communication network – Communication Techniques- Barriers of Communication.

UNIT II **6**

Listening – Types of listening – Listening & Note Talking – Listening strategies – Barriers of Listening – Conversation & Oral skills – Improving fluency &self expression- Good Pronunciation.
.

UNIT III **6**

Reading comprehension – Enriching Vocabulary (restricted to 1000 words) – Error analysis – Visual perception – Transcoding – Formal and Informal letters – Resume writing – Report writing.

UNIT IV **6**

Attitude – Self Confidence – Leadership Qualities – Effective Time Management – Surviving stress (Emotional Intelligence) – Overcoming failure- Professional Ethics – Interpersonal Skills.

UNIT V **6**

Body Language – Types of Interview: Online interview, Mock Interview, Telephonic interview – GD - Presentation.

TOTAL:30 PERIODS

COURSE OUTCOMES:

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

- Present ideas and in a flexible manner and differentiate & eliminate the ambiguity
- Write well-structured and easily readable reports, e-mails and articles on complex topics in an appropriate style
- Comprehend any address in English face to face and through different media like telephone and public announcement

REFERENCE BOOKS:

1. Allan Pease, Body Language, New Delhi, Sudha Publications (P) Ltd, 2005
2. Dr.Rathan Reddy, Team Development & Leadership, Mumbai, Jaico Publishing House, 2006
3. Chand.S, Soft Skills, New Delhi, S.Chand& Company Ltd, 2011
4. Career Press Editors, 101 Great Resumes, Mumbai, Jaico Publishing House, 2006

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, $\pi/4$-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:

- Apply the knowledge of cellular concept to compute the parameters of cellular services.(K3-Apply)
- Apply the knowledge of channel propogation characteristics to compute the parameters of multipath channels. (K3- Apply)
- Analyze the error performance of the signaling schemes for fading channels . (K4-Analyze)
- Apply the knowledge of digital filter to design Equalizers for the given specifications. (K3 - Apply)

- Compare the architectures of Second, Third, Fourth and Fifth generation wireless systems .(K2- Understand)

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 PramodViswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
3. UpenaDalal, “ Wireless Communication”, Oxford University Press, 2009.
4. Jonathan Rodriguez, “Fundamentals of 5G Mobile Networks” Wiley Publications, 2015.

Assessment Pattern:

Bloom's Level	Continuous Internal Assessment			End Semester Exam
	PT - 1	PT - 2	PT - 3	
Remember	10	5	5	10
Understand	20	15	5	20
Apply	20	30	30	60
Analyze	0	0	10	10
Evaluate	0	0	0	0
Create	0	0	0	0
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2				2				2		2	3	
CO.2	3					2						2	3	
CO.3	3	3	2		2							2	3	
CO.4	3					2						2	3	
CO.5	3	2										2	3	
CAM (Avg)	**3.00**	**2.33**	**2.00**		**2.00**	**2.00**				**2.00**		**2.00**	**3.00**	
3- Strong 2- Medium 1- Weak														

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**

Antennacharacteristics:Radiationpattern,Beamsolidangle, Directivity,Gain, Input impedance,Polarization, Bandwidth,Reciprocity,EquivalenceofRadiationpatterns,Equivalenceof Impedances, Effective aperture, Vectoreffective length, Antennatemperature.

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

Review of electromagnetic theory: Vector potential, Retarded case. Wire antennas:Hertziandipole,Halfwave Dipole,Monopole -Radiation resistance and Directivity,Small loopantennas.Antenna Arrays:LinearArray andPatternMultiplication,Two-elementArray,Uniform Array,Arraywith non-uniform Excitation-Binomial Array

UNIT III APERTURE ANTENNAS **9**

MagneticCurrent and itsfields,Uniquenesstheorem, Field equivalence principle, Slotantenna,Horn Antenna,Pyramidal Horn Antenna, ReflectorAntenna-Flat reflector,CornerReflector,Commoncurved reflectorshapes, Lens Antenna.

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

Special Antennas:Longwire,V and RhombicAntenna,Yagi-UdaAntenna, Turnstile Antenna,Helical Antenna-Axialmodehelix,Normal modehelix,LogperiodicDipoleArray,Spiral Antenna, Microstrip Patch Antennas, Wearable antennas, Mobilephone antennas.
Antenna Measurements:RadiationPatternmeasurement, GainandDirectivityMeasurements, AnechoicChambermeasurement

UNIT V RADIO WAVE PROPAGATION **9**

Ground WavePropagation, Free-space Propagation, Ground Reflection, Surface waves, Diffraction, Wave propagation in complex Environments,TroposphericPropagation,TroposphericScatter. Ionospheric propagation: Structureofionosphere,Skywaves,skipdistance,Virtualheight,Critical frequency,MUF,Electrical properties ofionosphere, Effectsofearth'smagneticfields, Faradayrotation,Whistlers.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Apply the knowledge of the antenna arameters to calculate radiated power (K3)
- Apply the knowledge of dipole antenna arrays to obtain the radiation pattern of Antenna arrays (K3)

- Design the suitable aperture antenna for various applications (K6)
- Design the travelling wave antennas for various applications (K3)
- Apply the knowledge of Antenna radiation to identify the Nature of wave propagation. (K3)

TEXTBOOKS:

1. K.D Prasad, "Antennas and Wave Propagation",SathyaPrakasanPublications, 3rdEdition,2005.
2. E.C.Jordan andBalmain, "Electromagneticwavesand RadiatingSystems",PearsonEducation,2006.

REFERENCE BOOKS:

1. JohnD.Kraus,RonaldJMarhefkaandAhmadSKhan,"AntennasforallApplications",TataMcGraw-Hill BookCompany,3rdEdition,2007.
2. G.S.N.Raju, "AntennaWave Propagation", PearsonEducation, 2004.
3. ConstantineA.Balanis, "AntennaTheory Analysisand Desin, JohnWiley",3rdEdition,2009.
4. A.R.Harish, M.Sachidanada, "Antennas and Wave propagation",OxfordUniversity Press2007.
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

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	10	8	8	10
Understand	30	34	36	70
Apply	10	8	6	20
Analyze				
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	2	
CO.2	3	2										2	2	
CO.3	3	3	3	2	2	2	2					2	3	
CO.4	3	2	2			2	2					2	2	
CO.5	3	2										2	2	
CAM (Avg)	**3.00**	**2.20**	**2.50**	**2.00**	**2.00**	**2.00**	**2.00**					**2.00**	**2.20**	
3- Strong 2- Medium 1- Weak														

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 –Design of adders and multiplexers- 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: 45PERIODS

COURSE OUTCOMES

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

- Apply the knowledge of Verilog Hardware Description Language to design digital circuits (K6,Create)
- Apply the knowledge of MOS Technology to design layout (K3, Apply)
- Apply the knowledge of circuit characterization to compute power dissipation and delay in CMOS circuits. (K3,Apply)
- Analyze power dissipation in various CMOS logic circuits. (K4, Analyze)
- Apply the knowledge of testing to identify faults in VLSI circuits (K2, Understand)

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..

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	2	6	8	10
Understand	29	22	23	50
Apply	19	-	16	30
Analyze	-	22	3	10
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	3	3	3	2						2	2	2	3
CO.2	3										2	2		3
CO.3	3	2									2	2		3
CO.4	3	3	2								2	2		3
CO.5	2										2	2		3
CAM (Avg)	2.80	2.67	2.50	3.00	2.00						2.00	2.00	2.00	3.00
3- Strong 2- Medium 1- Weak														

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: 30Periods

COURSE OUTCOMES:

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

- Analyze the various parameters of wired and wireless protocols using different topologies.(K4)
- Analyse the performance of flow control and Routing protocols.(K4)
- Apply different encryption and decryption algorithms for data security.(K3)

HARDWARE AND SOFTWARE REQUIREMENT

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	3			3				3	3		2	2	
CO.2	3	3			3				3	3		2	2	
CO.3	3	2			3				3	3		2	2	
CAM (Avg)	3.00	2.67			3.00				3.00	3.00		2.00	2.00	
3- Strong 2- Medium 1- Weak														

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: 30PERIODS

COURSE OUTCOMES:

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

- Implement combinational and sequential circuits using FPGA. (K3 Apply)
- Develop verilog code for real time applications. (K6 Create)
- Analyze area, power dissipation of the CMOS logic circuits using EDA Tool (K4 Analyze)

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

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2		3				3	3	2	2		2
CO.2	3	3	3	3	3				3	3	2	2		3
CO.3	3	3	2		3				3	3	2	2		2
CAM (Avg)	3.00	2.67	2.33	3.00	3.00				3.00	3.00	2.00	2.00		2.33
3- Strong 2- Medium 1- Weak														

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:

- Identify and formulate a technical problem to reach substantiated conclusion using basic technical knowledge (K4-Analyze)
- Design/Develop proto type / model for societal needs applying the basic engineering knowledge.(K3-Apply)
- Evaluate the performance of the developed solution using appropriate techniques and tools (K5-Evaluate)
- Apply management principles to function as a team (Affective Domain)
- Commun
- icate the technical information effectively (Affective Domain)

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	3											3	3
CO.2			3			3							3	3
CO.3					3								3	3
CO.4										3	3			
CO.5									3					
CAM (Avg)	3.00	3.00	3.00		3.00	3.00			3.00	3.00	3.00		3.00	3.00
3- Strong 2- Medium 1- Weak														

SEMESTER VII

15UME701	**PROJECT MANAGEMENT AND FINANCE**	**L**	**T**	**P**	**C**
	(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, TQM in projects - Project Performance Measurement and Control - Monitor and assess project performance, schedule, and cost.Earned Value Management, performance measurement methods to monitor, evaluate and control planned cost and schedule performance - 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:

- Analyze different types of projects and identify the suitable project for the given constraints. (Analyze)

- Analyze and identify Critical Path using PERT/CPM for the given project . (Analyze)
- Analyze Theory of Constraints, Multi project scheduling and heuristic methods for allocating resources to a project. (Analyze)
- Apply the knowledge of Quality Management and TQM Concepts to different stages of project and design a suitable Quality Management System. (Apply)
- Investigate the financial data such as balance sheet, income expenditure statement, cash flow statement and budget to interpret, synthesize to provide valid solution for a variety of business problems. (Analyze)

TEXT BOOKS:

1. Prasanna Chandra, "'Fundamentals of Financial Management' ", Tata Mcgraw-Hill Publishing Ltd, 2005.
2. Jack Meredith, Samuel J.Mantel, "Project Management- A Managerial Approach", John Wiley and Sons.

REFERENCE BOOKS:

1. Clifford F Gray, Erik W Larson, "Project Management-The Managerial Process ", Tata Mcgraw-Hill Publishing Co Ltd.
2. John M Nicholas, "Project Management For Business And Technology", Prentice Hall of India Pvt Ltd.
3. Paresh Shah, "Basic Financial Accounting for Management", Oxford University Press, 2007.

15UEC702	OPTICAL COMMUNICATIONAND NETWORKS	L	T	P	C
		3	0	0	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 impart knowledge on optical networks

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

UNITII TRANSMISSIONCHARACTERISTICS OF OPTICAL FIBERS **9**

Attenuation–Materialabsorptionlossesinsilicaglassfibers–LinearandNonlinearScattering losses-Fiber Bend losses–Intra and inter Modal Dispersion – Over all Fiber Dispersion – Polarization- non linear Phenomena. Optical fiber connectors **,**Fiber alignment and Joint Losses–Fiber Splices–Fiber connectors–Expanded Beam Connectors –Fiber Couplers.

UNIT III SOURCESAND DETECTORS **10**

Opticalsources:LightEmittingDiodes-LEDstructures-surfaceandedgeemitters, internal-quantum efficiency ,injection laser diode structures-comparison of LED and ILD

Optical Detectors: PIN Photo detectors ,Avalanche photodiodes, construction, characteristics and properties, Comparison of performance, Photodetector noise– Noise sources ,Signal to Noise ratio, Detector response time.

UNIT IV FIBER OPTIC RECEIVERAND MEASUREMENTS **10**

Fundamental receiver operation, Preamplifiers, Error sources–Receiver Configuration–Probability of Error–Quantum limit.

Fiber Attenuation measurements-Dispersion measurements–Fiber Refractive index profile measurements – Fiber cut- off Wave length Measurements – Fiber Numerical Aperture Measurements–Fiber diameter measurements.

UNITV OPTICAL NETWORKS **9**

Basic Networks–SONET/SDH–Broadcast–and–select WDM Networks– Wavelength Routed Networks–Nonlinear effects on Network performance–Performance of WDM +EDFA system– Solitons–Optical CDMA–Ultra High Capacity Networks

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Apply the knowledge of Ray theory and Mode theory to compute the fiber parameters. (K3-Apply)

- Apply the knowledge of transmission characteristics of light signal to compute various losses in optical fibers(K3-Apply)
- Apply the knowledge of optical sources and detectors to find their suitability for different applications. (K3-Apply)
- Apply the knowledge of error sources in the optical receiver to compute the probability of error.(K3 - Apply)
- Compare the architectures of diiferent optical networks.(K2-Understand)

TEXTBOOKS:

1. John M.Senior, "Optical Fiber Communication",PearsonEducation,2nd Edition,2007.
2. Gerd Keiser, "Optical Fiber Communication", McGrawHill–ThirdEdition, 2000.

REFERENCE BOOKS:

1. J.Gower, "Optical Communication System", Prentice Hall ofIndia, 2001.
2. Rajiv Ramaswami,"Optical Networks",Elsevier, 2nd Edition, 2004.
3. GovindP.Agrawal,"Fiber-optic communication systems", JohnWiley& 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/

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	8	12	10	20
Understand	38	38	34	70
Apply	4		6	10
Analyze				
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	2	
CO.2	3	2										2	2	
CO.3	3	2										2	2	
CO.4	3	2										2	2	
CO.5	2											2	2	
CAM (Avg)	**2.80**	**2.00**										**2.00**	**2.00**	
3- Strong 2- Medium 1- Weak														

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

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,DifferentialNegativeResistance, 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, IMPATT Diodes, TRAPATT Diodes, BARITT Diodes –Physical Structures, Principles of Operation, Power Output and Efficiency.

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 ,Multi cavity Klystron Amplifiers, Reflex klystron-Velocity Modulation Process, Bunching process .Helix Traveling-Wave Tubes (TWTs)- Slow- Wave structures, Amplification Process, Convection Current

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

UNIT IV MONOLITHIC MICROWAVE INTEGRATED CIRCUITS **9**

Monolithic Microwave Integrated Circuits**:** Introduction, Materials-Substrate Materials, Conductor Materials, DielectricMaterials,ResistiveMaterials,MonolithicMicrowaveIntegratedCircuitGrowth, MMIC Fabrication Techniques, Fabrication Example

UNIT V MICROWAVE MEASUREMENTS **9**

Slotted line VSWR measurement, VSWR through return loss measurement, Power measurement, Impedance measurement,Insertionlossandattenuationlossmeasurements-Measurementof scattering parameters- Measurementof1dB, dielectric constant measurement of a solid using waveguide

TOTAL: 45PERIODS

COURSE OUTCOMES:

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

- Apply the knowledge of Transmission lines to determine the S-matrix of microwave components (K3)
- Analyze the characteristics of microwave solid state devices for various microwave applications (K4)
- Apply the knowledge of amplifiers and oscillators to implement microwave communication link (K3)
- Explain different fabrication techniques used to construct microwave integrated circuits (K2)
- Analyze various microwave parameters using suitable measurement techniques (K4)

TEXT BOOKS:

1. Samuel Y.Liao," "Microwave Devices and Circuits" , " Prentice Hall of India,, 3rd Edition, , 2003. .
2. Annapurna Das, SisirK.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

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	8	8	10	20
Understand	34	34	40	70
Apply	8	8		10
Analyze				
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	2	
CO.2	3	3	2									2	3	
CO.3	3	2										2	2	
CO.4	2											2	2	2
CO.5	3	3	2									2	3	
CAM (Avg)	2.80	2.50	2.00									2.00	2.40	2.00
3- Strong 2- Medium 1- Weak														

15UEC706 OPTICALAND MICROWAVE COMMUNICATION LABORATORY

L	T	P	C
0	0	2	1

OBJECTIVES:

- To train the students about fiber optic components used in optical communication.
- To demonstrate the characteristics of microwave sources.
- To demonstrate the working of microwave components.

LIST OF EXPERIMENTS

MICROWAVEEXPERIMENTS:

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-PlaneT, H-Plane T and MagicT.
8. Radiation Pattern of Antennas.
9. Antenna Gain Measurement

OPTICAL EXPERIMENTS:

1. DC characteristics of LED 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: 30PERIODS

COURSE OUTCOMES:

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

- Analyze the characteristics of microwave generators(K4-Analyze)
- Analyze microwave components and circuits in terms of scattering parameters(K4-Analyze)
- Analyze the characteristics of optical fibers, LED and Photodiode(K4-Ananlyze)
- Analyze various losses in fiber optic communication systems (K4-Analyze)

HARDWAREAND SOFTWARE REQUIREMENT

1.Klystronpowersupply-3
2.Klystrontube- 3
3. Gunn power supply -3
5. PINmodulator -3
6. Isolator -5
7.Attenuator -5
8.Frequencymeter -5
9. Slottedsection- 5
10. Detector mount -5
11. Termination -10
12.Movable short-5
13.Slidescrewtuner -4
14.Hornantenna-2
15.Fixedattenuator -3
16.MagicTEE- 2
17.E-PlaneTEE-2
18.H-PlaneTEE-2
19.Directional coupler- 2
20.VSWRmeter-5
21.CRO -5
22.Powermeter -2
23.Radiationtable-1
24.UniversalWaveguidestand-25
25. Optical powersource -4
26.Fiber OpticPower meter-4
27.Fiber optic trainerKit-5
28.Multiplexer/DemultiplexerKit-2
29.Laser TrainerKit -2
30.PINDiode-3
31. LEDmountedsource at wavelength870nm-3

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2			2			3	2		2	2	
CO.2	3	2	2			2			3	2		2	2	
CO.3	3	2	2			2			3	2		2	2	
CAM (Avg)	3	2	2			2			3	2		2	2	
3- Strong 2- Medium 1- Weak														

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. Assessment of safety and risk – Risk Benefit analysis – Professional Rights – Employee rights – Intellectual Property Rights

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:

- Illustrate the basic perception of profession, professional ethics and various m issues.(Understand)
- Describe the code of ethics and role of professional ethics in engineering field. (Understand)
- Apply ethical principles to resolve global and cross cultural issues that arise in professional career.(Apply)

TEXT BOOKS:

1. Subramanian. R , "Professional Ethics", Oxford University press India, New Delhi First edition, 2013.
2. DhineshBabu.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", OxfordUniversity Press, 2001.
4. David Ermann, Michele S Shauf "Computers, Ethics and Society", OxfordUniversity Press,2003.

15UEC804	PROJECT WORK	L	T	P	C
		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:

- Design/Develop sustainable solutions for societal issues with environmental considerations applying the basic engineering knowledge. (K6-Create)
- Analyze and review research literature to synthesize research methods including design of experiments to provide valid conclusion. (K4-analyze)
- Utilize the new tools, algorithms, techniques to provide valid conclusion following the norms of engineering practice. (K3-Apply)
- Test and Evaluate the performance of the developed solution using appropriate techniques and tools. (Evaluate)
- Apply management principles to function effectively in the project team for project execution. (Affective Domain)
- Engage in learning for effective project implementation in the broadest context of technological change with consideration for public health, safety, cultural and societal needs. (Affective Domain)
- Write effective reports and make clear presentation to the engineering community and society (Psychomotor Domain)

LIST OF PROFESSIONAL ELECTIVES

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

OBJECTIVES:

- To introduce the architectureof different types of microcontrollers.
- To impart knowledge of Raspberry Pi and Arduino microcontroller programming

UNITI MIXED SIGNAL MICROCONTROLLER430g

Features- Architecture Pin Details Instruction Set – Interrupt Vector Addresses – Special Function Register- Memory Organization – universal Serial Interface.

UNIT II RASPBERRY PI MICROCONTROLLER

Basics- Network Configuration -ARM vs. x86- Pin Details – Programming with Raspberry Pi – Partition Management.USB and memory card interface.

UNIT III R8C 16 BIT MICROCONTROLLER

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 ARDUINO CONTROLLER

Arduino hardware fundamentals – functions in Arduino sketches– Structure data using arrays and strings - Standard Arduino Library- Program LCD displays.

UNIT V CYPRESS'S PSOC

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: 45Periods

COURSE OUTCOMES:

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

- Describe the architecture of mixed signal microcontroller.
- Develop programs using Raspberry Pi microcontroller.
- Develop programs using R8C microcontroller.
- Develop code for real time applications using ARDUINO Processor.
- Describe the architecture of PSoC.

TEXT BOOKS:

1. Simon Monk, " Programming Arduino" 2nd Edition Tata McGraw Hill.
2. Mohamed Rafiquzzaman,, "Microprocessors and Microcomputer Based System Design", CRC Press,2nd Edition,2007.

REFERENCE BOOKS:

1. Julio Sanchez Maria P.Canton, "Microcontroller Programming: The microchip PIC", CRC Press, Taylor & Francis Group,2007.
2. Lyla B.Das,"Embedded systems an integrated approach" , Pearson, 2013
3. Eben Upton and Gareth Halfacree" Raspberry Pi® User Guide",Wiley,2013
4. www.ti.com/lit/ds/symlink/msp430g2231-ep.pdf

15UEC902 MOBILE AD-HOC NETWORK

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. FekriM.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. 82004.
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	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 ARCHITECTURE AND ASSEMBLY LANGUAGE PROGRAMMING 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 PROCESSORS 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

ARM LABORATORY

LISTOF 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.

COURSE OUTCOMES

After the successful completion the students will be able to

- Discuss the ARM assembly language programming.
- Describe the ARM instruction set.
- Identify the application of ARM processor.
- Write programs in ARM for a specific Application.
- Analyze the performance of interrupt.
- Write programmes for interfacing keyboard, display, motor and sensor.

TEXT BOOKS:

1. Steve Furber,“ARM System - on - Chip Architecture", 2nd Edition, 2009.
2. 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 GillispieMazidi,“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.

15UEC904	LINEAR CONTROL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the concept of open loop and closed loop (feedback) systems
- To provideknowledgeoftimedomainandfrequencydomainanalysisofcontrolsystems required for stability analysis
- To present the compensation technique that can be used to stabilize control systems

UNITI CONTROL SYSTEMMODELING 9

Basic Elements of Control System – Open loop and Closed loop systems - Differential equation - Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems -Block diagram reduction Techniques- Signal flow graph

UNITII TIME RESPONSEANALYSIS 9

Time response analysis - First Order Systems - Impulse and Step Response analysis of second order systems - Steady state errors – P, PI, PD and PID Compensation, Analysis using MATLAB

UNITIII FREQUENCY RESPONSEANALYSIS 9

Frequency Response - Bode Plot, Polar Plot, Nyquist Plot - Frequency Domain specifications from the plots - Series, Parallel, series-parallel Compensators -Lead,Lag,and Lead Lag Compensators, Analysis using MATLAB

UNITIV STABILITYANALYSIS 9

Stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Stability, Dominant Poles, Application of Root Locus Diagram - Nyquist Stability Criterion -Relative Stability,Analysis using MATLAB

UNITV STATE VARIABLEANALYSIS 9

State space representation of Continuous Time systems – State equations – Transfer function from State Variable Representation – Solutions of the state equations - Concepts of Controllability and Observability – State space representation for Discrete time systems.

COURSE OUTCOMES:

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

- Develop mathematical models for Electrical and Mechanical systems.(K3).
  - Analyze the time response of first and Second order system(K4)
  - Analyze the LTI systems through various frequency response plots.(K4)
  - Analyze stability of systems using analytical and graphical methods.(K4)
  - Analyze the MIMO systems using state space model.(K4)

TEXTBOOKS:

1. I. J.Nagrath,M.Gopal"Control Systems:Engineering ", Anshan Publishers, 5th Edition,2008.
2. M.Gopal,"Control Systems:Principles and Design", Tata McGrawHill,4th Edition,2012.

REFERENCE BOOKS:

1. M.Gopal, "Digital Control and State Variable Methods",TMH,2nd Edition, 2007.
2. Schaum"s Outline Series,"Feedback and Control Systems", Tata McGraw-Hill, 2007.
3. Richard C.Dorf,Robert H. Bishop,"Modern Control Systems",Addidon–Wesley,9th Edition,2010.
4. Benjamin.C.Kuo, " Automatic control systems", Prentice Hall ofIndia,6th Edition ,2013.
5. John J.D'azzo ,Constantine H.Houpis, " Linear control system analysis and design ", Tata McGrow-Hill,1995.

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Assessment Pattern:

in BLOOM'S LEVEL	Continuous Internal Assessment			END SEMESTER EXAM
	PT - 1	PT - 2	PT - 3	
Remember	12	4	6	8
Understand	6	24	8	28
Apply	32	22	20	48
Analyze	-	-	16	16
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL	50	50	50	100

CO/PO/PSO MAPPING														
	POs												PSOs	
CO	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2									2		2
CO.2	3	3	2		2							2	2	
CO.3	3	3	2		2							2		2
CO.4	3	3	2		2							2	2	2
CO.5	3	3	2									2	2	2
CAM (Avg)	3.00	2.80	2.00		2.00							2.00	2.00	2.00
3- Strong 2- Medium 1- Weak														

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	ADVANCED DIGITAL SYSTEM DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce methods to analyze and design synchronous and asynchronous sequential circuits
- To introduce the architectures of programmable devices
- To introduce design and implementation of digital circuits using programming tools

UNIT I SEQUENTIAL CIRCUIT DESIGN 9

Analysis of clocked synchronous sequential circuits and modeling- State diagram, state table, state table assignment and reduction-Design of synchronous sequential circuits design of iterative circuits-ASM chart and realization using ASM

UNIT II ASYNCHRONOUS SEQUENTIAL CIRCUIT DESIGN 9

Analysis of asynchronous sequential circuit – flow table reduction-races-state assignment-transition table and problems in transition table- design of asynchronous sequential circuit-Static, dynamic and essential hazards – data synchronizers – mixed operating mode asynchronous circuits – designing vending machine controller

UNIT III FAULT DIAGNOSIS AND TESTABILITY ALGORITHMS 9

Fault table method-path sensitization method – Boolean difference method-D algorithm - Tolerance techniques – The compact algorithm – Fault in PLA – Test generation-DFT schemes – Built in self test

UNIT IV SYNCHRONOUS DESIGN USING PROGRAMMABLE DEVICES 9

Programming logic device families – Designing a synchronous sequential circuit using PLA/PAL – Realization of finite state machine using PLD – FPGA – Xilinx FPGA-Xilinx 4000

UNIT V VHDL PROGRAMMING 9

RTL Design – Detructured level Design -combinational logic – Types – Operators – Packages – Sequential circuit – Sub programs – Test benches. (Examples: address, counters, flipflops, FSM,Multiplexers / Demltiplexers).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Construct sequential circuit using appropriate flip-flops
- Analyze the synchronous and asynchronous circuits using sequential circuits
- Discuss the importance of testing and its types in VLSI circuits
- Explain the Concept of PLD
- Construct any digital circuit using VHDL

.

TEXT BOOKS

1. Charles H.Roth Jr “Fundamentals of Logic Design” Thomson Learning 2004
2. Nripendra N Biswas “Logic Design Theory” Prentice Hall of India,2001
3. Parag K.Lala “Fault Tolerant and Fault Testable Hardware Design” B S Publications,2002
4. ZainalatsedinNavabi, ‘VHDL Analysis and Modelling of Digital Systems’, 2n Edition, Tata McGraw Hill, 1998.
5. Douglas Perry, ‘VHDL Programming By Example’, Tata McGraw Hill, 3rdEdition.2007.

REFERENCES

1. D.A.Pucknell, K.Eshraghian, ‘Basic VLSI Design’, 3rd Edition, Prentice Hall of India, New Delhi, 2003.
2. Eugene D.Fabricius, ‘Introduction to VLSI Design’, Tata McGraw Hill, 1990.
3. N.H.Weste, ‘Principles of CMOS VLSI Design’, Pearson Education, India, 2002.
4. Charles H.Roth, ‘Fundamentals of Logic Design’, Jaico Publishing House, 1992.
5. Parag K.Lala “Digital system Design using PLD” B S Publications,2003

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:

- Outline the basics of computer networks to implement the Asynchronous Transfer Mode and frame relay. (K2,understand)
- Analyze the performance of various queuing system for f high speed networks. (K4 - ANALYZE)

- Apply the knowledge of congestion and traffic mechanism cto study the performance of ATM and frame relay. (K3,Apply)
- Apply the knowledge of differentiated and integrated service architectureto construct the high speed networks (K3,Apply)
- Discuss the various QOS supporting protocols for hifgh speed networks. (K2,understand)

TEXT BOOKS:

1. William Stallings, “High Speed Networks And Internet” , Pearson Education,2nd Edition, 2003.
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. IrvanPepelnjk, 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.

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	2												2	
CO.2	3		2										2	
CO.3	3	2											2	
CO.4	3	2											2	
CO.5	2	2											2	
CAM (Avg)	**2.60**	**2.00**	**2.00**										**2.00**	

3- Strong 2- Medium 1- Weak

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

OBJECTIVES:

- To familiarize with soft computing concepts.
- To introduce the ideas of Neural networks, fuzzy logic and use of heuristics based on human experience.
- To introduce the concepts of Genetic algorithm and its applications to soft computing using some applications.

UNIT I ARTIFICIAL NEURAL NETWORK -I **9**

Introduction – Fundamental concept – Evolution of Neural Networks – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network.Supervised Learning Network: Perceptron Networks – Adaline – Multiple Adaptive Linear Neurons – Back-Propagation Network – Radial Basis Function Network.

UNIT II ARTIFICIAL NEURAL NETWORK -II **9**

Associative Memory Networks: Training Algorithms for Pattern Association – Auto associative Memory Network – Hetero associative Memory Network – Bidirectional Associative Memory – Hopfield Networks – Iterative Auto associative Memory Networks – Temporal Associative Memory Network. Unsupervised Learning Networks: Fixed weight Competitive Nets – Kohonen Self- Organizing Feature Maps – Learning Vector Quantization – Counter propagation Networks – Adaptive Resonance Theory Networks – Special Networks.

UNIT III FUZZY SET THEORY I **9**

Introduction to Classical Sets and Fuzzy sets – Classical Relations and Fuzzy Relations – Tolerance and Equivalence Relations – Noninteractive Fuzzy sets – Membership Functions: Fuzzification – Methods of Membership Value Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods.

.UNIT IV FUZZY SET THEORY II 9

Fuzzy Arithmetic and Fuzzy Measures: Fuzzy Rule Base and Approximate Reasoning: Truth values and Tables in Fuzzy logic – Fuzzy Propositions – Formation of Rules – Decomposition and Aggregation of rules – Fuzzy Reasoning – Fuzzy Inference Systems (FIS) – Fuzzy Decision Making – Fuzzy Logic Control Systems.

.

UNIT V GENETIC ALGORITHM **9**

Introduction – Basic Operators and Terminologies in GAs – Traditional Algorithm vs. Genetic Algorithm – Simple GA – General Genetic Algorithm – The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems – Genetic Programming. Applications of Soft Computing: A Fusion Approach of Multispectral Images with SAR Image for Flood Area Analysis – Optimization of Travelling Salesman Problem using Genetic Algorithm Approach – Genetic Algorithm

based Internet Search Technique – Soft Computing based Hybrid Fuzzy Controllers – Soft Computing based Rocket Engine – Control.

.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Analyze and appreciate the applications which can use fuzzy logic.
- Design the inference systems.
- Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).
- Understand the importance of optimizations and its use in computer engineering fields and other domains.
- understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network ,genetic algorithm and its various applications.

TEXT BOOK:

1. S.N. Sivanandan and S.N. Deepa, Principles of Soft Computing, Wiley India, 2007.ISBN: 10: 81-265-1075-7.

REFERENCE BOOKS:

1. TimothyJ.Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill, 1997.

2. J.S.R.Jang, C.T.S.un and E.Mizutani, Neuro-Fuzzy and Soft Computing, PHI, 2004, Pearson Education.
3. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI 2010.

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. Introduction to Discrete Wavelet Transform-DWT for ImageCompression.

UNIT II IMAGE ENHANCEMENT AND IMAGE RESTORATION 10

Histogram processing – Arithmetic and logic operations– Smoothing, sharpening spatial filters– Smoothing, sharpening using frequency domain filters – Homomorphic filtering, Color Image Enhancement. Model of image degradation –noise models –Spatial filtering: Mean, order statistics, adaptive filters Estimating degradation-Constrained least square filtering- Geometric mean filter - Geometric transformations

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 filtering using convolutional masks.(Mean filter)
6. Non Linear filtering using convolutional masks.(Median filter)
7. Geometric transformations. (image rotation, scaling, and translation)
8. Binary Image Processing(Thresholding, logic operations)
9. Edge detection.(Sobel,Prewitt,Robert mask)
10. Morphological operations.(erosion, dilation, opening, closing, open-close, close-open)
11. Color Image Processing.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

- Apply the fundamental concepts of images and 2D transforms for image Processing.(K3-Apply)
- Develop a mathematical model of various image enhancement and restoration techniques and analyze their performance. (K4-Analyze)
- Analyze the different methodologies for image segmentation (K4-Analyze)
- Develop and simulate various techniques used for improving the quality of image in spatial domain. (K3-Apply)
- Develop and simulate various Image segmentation techniques. (K3-Apply)
- Develop and simulate various Morphological techniques. (K3-Apply)

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. SantanuChaudhury,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.

Assessment Pattern:

BLOOM'S LEVEL	Continuous Internal Assessment			END SEMESTER EXAM
	PT - 1	PT - 2	PT - 3	
Remember	6	6	6	5
Understand	44	9	28	60
Apply	-	35	16	35
Analyze	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL MARKS	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2									2	2	
CO.2	3	3	2									2	3	
CO.3	3	3	2									2	3	
CO.4	3	2	2		3				3	1	2	2	2	
CO.5	3	2	2		3				3	1	2	2	2	
CAM (Avg)	3	2	2		3				3	1	2	2	2	
3- Strong 2- Medium 1- Weak														

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 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 III 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 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.
- Compare the efficiency of various compression techniques in terms of storage and compression ratio.
- Analyze the performance of various predictive coding techniques in audio and video.
- 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 GradeVoice 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.

TELEVISION AND VIDEO ENGINEERING **L T P C**

15UEC911 **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 MODERNVIDEO 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,Touchsystems,SmartTV,Curved TV

TOTAL: 45PERIODS

COURSE OUTCOMES:

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

- Outline the fundamentals of television. (K2)
- Apply the knowledge of the circuits and television standards for effective transmission of TV signals (K3)
- Apply the knowledge of satellite communication for efficient broadcasting of signals (K3)
- Identify the various redistribution mechanisms of satellite signals (K2)
- Apply the knowledge of television basics to study latest and revolutionary ideas in HDTV, Digital TV (K3)

TEXT BOOKS:

1. R.G.Gupta,"Television Engineering and Video Systems", TataMcGraw-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.

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	6	6	6	10
Understand	44	44	35	80
Apply			9	10
Analyze				
Evaluate				
Create				
Total	50	50	50	100

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.

TEXTBOOKS:

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 NETWORKS AND STANDARDS	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:

- Apply the knowledge of MAC Layer to identify multiple access protocols for data and voice oriented networks (K3-Apply)
- Apply the knowledge of cellular communication to compare various wireless system standards (K3-Apply)
- Apply the knowledge of data communication to study different types of Wireless LAN Standards and their applications (K3-Apply)
- Apply the knowledge of infrastructure less network to demonstrate MAC and routing protocols developed for Adhoc and wireless sensor networks.(K3-Apply)
- Compare the architectures of PAN, MAN and CAN (K2 - Understand)

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. KavethPahlavan, 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.

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	2	
CO.2	3	2				2						2	2	
CO.3	3	2										2	2	
CO.4	3	2										2	2	
CO.5	2					2						2	2	
CAM (Avg)	**2.80**	**2.00**				**2.00**						**2.00**	**2.00**	

3- Strong 2- Medium 1- Weak

15UEC914	FPGA-BASEDSYSTEMDESIGN	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 TOASICS,CMOSLOGICANDASIC LIBRARY DESIGN** **9**

Types of ASICs –Design flow-CMOS transistors CMOS Design rules-Combinational LogicCell–Sequentiallogiccell-TransistorsasResistors–TransistorParasiticCapacitance-Logical effort

UNIT II **PROGRAMMABLEASICS,PROGRAMMABLE ASIC LOGIC CELLSAND PROGRAMMABLEASIC I/OCELLS** **9**

Antifuse-static RAM-EPROM and EEPROM technology-PREP benchmarks-Actel ACT- Xilinx LCA–AlteraFLEX-AlteraMAX-DC&ACinputsandoutputs-Clock&Powerinputs- XilinxI/O blocks.

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

ActelACT-XilinxLCA-XilinxEPLD-AlteraMAX5000and7000-AlteraMAX9000–Altera FLEX–Design systems- Logic Synthesis- Half gate ASIC.

UNIT IV **SIMULATION,TESTINGANDASIC CONSTRUCTION** **9**

Typesofsimulation-boundaryscantest–faults-faultsimulation-Systempartition–FPGA partitioning-partitioning methods.

UNIT V **FLOORPLANNING,PLACEMENTAND ROUTING** **9**

Floorplanning-placement-physicaldesignflow–globalrouting-detailedrouting-special routing-circuit extraction-DRC.

Total: 45 PERIODS

COURSE OUTCOMES:

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

- 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 PrenticeHall,2004.

REFERENCE BOOKS:

1. Farzad Nekoogar ,Farzad Nekoogar,"From ASICs to SOCs:A Practical Approach", Prentice Hall, IstEdition , 2003.
2. Rochit Rajsuman," System-on-a-Chip Design and Test ", Santa Clara,CA: ArtechHousePublishers,2000.
3. Farzad Nekoogar," TimingVerificationofApplication-SpecificIntegratedCircuits(ASICs)", Prentice Hall ,Ist Edition , 1999.
4. Himanshu Bhatnagar," Advanced ASIC Chip Synthesis ", kluwe racademic publishers,2ndEdition,2001.

15UEC915 INTERNET OF THINGS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand about Internet of Things .
- To get basic knowledge of RFID Technology, Sensor Technology.
- To make students aware of resource management and security issues in Internet of Things.

UNITI INTRODUCTION 8

Internet of Things: History of IoT, About IoT, Overview and Motivations,Examples of Applications, Internet of Things Definitions and Frameworks: IoT Definitions, IoT Architecture ,General Observations ,ITU-T Views ,Working Definition, IoT Frameworks, Basic Nodal Capabilities

UNITII FUNDAMENTAL IoT MECHANISMS AND KEY TECHNOLOGIES 9

Identification of IoT Objects and Services, Structural Aspects of the IoT, Environment Characteristics, Traffic Characteristics, Scalability ,Interoperability, Security and Privacy, Open Architecture, Key IoT Technologies ,Device Intelligence, Communication Capabilities ,Mobility Support ,Device Power, Sensor Technology, RFID Technology, Satellite Technology

UNITIII RADIO FRQUENCY IDENTICATION TECHNOLOGY 10

RFID: Introduction, Principle of RFID, Components of an RFID system, Issues EPC Global Architecture Framework: EPCIS &ONS, Design issues, Technological challenges, Security challenges, IP for IoT, Web of Things. Wireless Sensor Networks :WSN Architecture, the node, Connecting nodes, Networking Nodes,WSN specific IoT applications ,Challenges: Security, QoS, Configuration, Various integration approaches

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UNITIV INTERNETOFTHINGSPRIVACY,SECURITY AND GOVERNANCE 9

Vulnerabilities of IoT, Security requirements, Threat analysis, Use cases and misuse cases, IoT security tomography and layered attacker model, Identity establishment, Access control, Message integrity, Non-repudiation and availability, Security model for IoT.

UNITV BUSINESS MODELS FOR INTERNET OF THINGS 9

Business Models and Business Model Innovation, Value Creation in the Internet of Things, Business Model Scenarios for the Internet of Things.

Internet of Things Application :Smart Metering Advanced Metering Infrastructure ,e-Health Body Area Networks ,City Automation, Automotive Applications, Home Automation, Smart Cards

TOTAL PERIODS: 45 HOURS

COURSEOUTCOMES:

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

- Apply the knowledge of data communication to Classify Machine to Machine communication and IoT Technology. [Apply]
- Analyze the characteristics of various IoT technologies. [Analyze]
- Analyze the challenges in developing RFID based industrial applications. [Analyze]
- Analyze the various security issues related to IoT.[Analyze]
- Design and develop IoT technologies for real world scenario.[Create]

TEXT BOOKS:

1. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6:TheEvolvingWorldof M2M Communications”, ISBN:978-1-118-47347-4, Willy Publications
2. Bernd Scholz-Reiter, Florian Michahelles,“Architecting the Internet of Things”, ISBN978-3-642-19156-5 e-ISBN978-3-642-19157-2, Springer
3. Parikshit N. Mahalle & Poonam N.Railkar,“Identity Managemen tfor Internet of Things”, River Publishers, ISBN: 978-87-93102-90-3 (HardCopy),978-87-93102-91-0(ebook).

REFERENCEBOOKS:

1. Hakima Chaouchi,“The Internet of Things Connecting Objects to the Web”ISBN:978-1-84821-140-7,WillyPublications
2. Olivier Hersent, David Boswarthick,Omar Elloumi, The Internet ofThings: Key Applications and Protocols,ISBN:978-1-119-99435-0,2nd Edition, Willy Publications
3. Daniel Kellmereit, Daniel Obodovski, “The Silent Intelligence: The Internet of Things”,. Publisher: LightningSourceInc;1edition(15April2014). ISBN-10:0989973700,ISBN-13:978-0989973700.
4. Fang Zhaho, Leonidas Guibas, “Wireless Sensor Network: An information processing approach”,Elsevier,ISBN:978-81-8147-642-5.

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Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	5	3	3	5
Understand	45	47	40	88
Apply			4	5
Analyze			3	2
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2				2						3	2	2
CO.2	3	2	2			2						3	2	2
CO.3	3	2	2			2						3	2	2
CO.4	3	2	2			2						3	2	2
CO.5	3	3	3	3	3	2			2			3	3	3
CAM (Avg)	3.00	2.20	2.25	3.00	3.00	2.00			2.00			3.00	2.20	2.20

3- Strong 2- Medium 1- Weak

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:

- Apply the knowledge of kepler's law to ascertain the various parameters of satellite

orbits.(K3-Apply)

- Analyze the parameters of satellite link budget estimation to improve the uplink and downlink performance.(K3-Apply)
- Apply the knowledge of communication engineering to choose an appropriate multiple access schemes for a given satellite communication link.(K3-Apply)
- Apply the knowledge of satellite link design to effective redistribution of satellite signal. (K3-Apply)
- Apply the knowledge of satellite communication principles to categorize various real world satellite applications. (K3-Apply)

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:

1N.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.

Assessment pattern:

BLOOM'S LEVEL	Continuous Internal Assessment			END SEMESTER EXAM
	PT - 1	PT - 2	PT - 3	
Remember	6	6	10	10
Understand	5	12	24	20
Apply	39	32	16	60
Analyze	-	-	-	10
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL MARKS	50	50	50	100

15UEC917	SPEECH AND AUDIO 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 MECHANICS OF AUDIO 9

Introduction - Review Of Signal Processing Theory-Speech production mechanism –Nature of Speech signal – Discrete time modeling of Speech production – Classification of Speech sounds – Phones – Phonemes – Phonetic and Phonemic alphabets –Articulatory features. Absolute Threshold of Hearing - Critical Bands- Simultaneous Masking, Masking-Asymmetry, and the Spread of Masking- Non simultaneous Masking -Perceptual Entropy - Basic measuring philosophy -Subjective versus objective perceptual testing - The perceptual audio quality measure (PAQM) - Cognitive effects in judging audio quality.

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. Speech & audio coding standards.- G.726, LPC-10, DTW, HMM, speech enhancement techniques for periodic, wide band and interfering speech.

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. ShailaApte- “Speech and audio processing”, Wiley India Publication, 2013.

REFERENCE BOOKS:

1. Deller J. R. Proakis J. G. and Hanson J.H., “Discrete Time Processing of Speech Signal”, Macmillian..
2. L.R Rabinar and B.H. Juang and Yegnanarayana, “Fundamentals of SpeechRecognition”, Pearson Publishers.
3. Saeed V. Vaseghi “ Advanced digital signal processing and noise reduction” Willey, 4th edition
4. Thomas F. Quateri 1ed, “Discrete Time Speech Signal Processing: Principles and Practice”.
5. 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, Re classification, Overlaying, Buffering – Data Output – Printers and Plotters

UNIT V APPLICATIONS 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- Water resources – Urban Analysis – Watershed Management – Resources Information Systems. Introduction to Global positioning system.

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 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 Mischael Hord, 1986

15UEC919 **NANOELECTRONICS**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the concept of nano electronics, nano devices 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 Nano particles – Optical Properties –Methods of Synthesis – RF Plasma – Chemical Methods. Carbon Nano tubes – Fabrication – Structure – Electrical Properties – Vibrational Properties – Mechanical Properties, Application of Carbon Nano tubes – Field Emission and Shielding – Computers

UNIT III NANO ORGANIC FETS AND SENSORS **9**

Nano Crystals in nano electronics 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:

- Analyze properties of nano materials by using different characterization techniques (K4-Analyze)
- Apply different synthesis method to growth of carbon nano tubes (CNT) and study the impact of CNT in electronic devices (K3-Apply)
- Identify suitable nano structure for advanced sensor and application (K3-Apply)
- Apply the knowledge of product design and development process to design nano films (K3-Apply)
- Identify table nano structure for advanced sensor and application (K3-Apply)

TEXT BOOKS:

1. Charles P. Poole, Jr. and Frank J. Owens, “Introduction to Nano Technology” , JohnWiley & Sons, 2006.
2. Raguse, “Nanotechnology: Basic Science and Emerging Technologies” Chapam & Hall / CRC, 2007.
3. MichealF.Ashby, Paulo J.Ferreira and Daniel L.Schodek, “ Nano materials, Nanotechnologies and Design” Butterworth-Heinemann, Elsevier Ltd, Burlington, USA, Jordan Hill, Oxford, UK, 2009.

REFERENCE BOOKS:

1. Rainer Waser (Ed.), “Nano electronics and Information Technology: Advanced Electronic
   Materials and Novel Devices””, Wiley-VCH, 2003.
2. T.Pradeep, “NANO: The Essentials-Understanding Nano science and Nanotechnology” ,Tata McGraw Hill, 2007.
3. George W. Hanson, “ Fundamentals of Nano electronics” , 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.

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	10	12	12	20
Understand	40	38	34	70
Apply			4	10
Analyze				
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	2	
CO.2	3	2										2	2	
CO.3	3	2										2	2	2
CO.4	3	2										2		2
CO.5	3	2	2									2	2	2
CAM (Avg)	3.00	2.00	2.00									2.00	2.00	2.00
3- Strong 2- Medium 1- Weak														

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:

- Describe the need for green communication technology (Understand).
- Analyze the performance of software defined radio networks and cognitive radio networks (Analyze).
- Acquire the knowledge of importance of cooperative communication networks (Apply).
- Apply the concept of wireless technologies to Design a wireless module for health care applications (Design).

TEXT BOOKS:

1. Markus Dillinger, KambizMadani,NancyAlonistioti, “Software Defined Radio:Architectures, Systems and Functons”.(Wiley series in software Radio),2003.
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, MaziarNekovee, Thomas Hou, “Coginitive Radio communication and Ne
3. tworks: Principles and Practice”,2009.

CO/PO/PSO MAPPING

CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2	2									2	2	
CO.2	3	3	2									2	3	
CO.3	3	3	2									2	3	
CO.4	3	2	2		3				3	1	2	2	2	
CO.5	3	2	2		3				3	1	2	2	2	
CAM (Avg)	3	2	2		3				3	1	2	2	2	

3- Strong 2- Medium 1- Weak

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:

- Apply the knowledge of ARM 7 architecture to configure its peripherals.(K2,understand)
- Apply the knowledge of embedded C to develop embedded application programs.(K3,Apply)
- Apply the knowledge of ARM programming to interface peripheral devices. (K3,Apply)
- Apply the knowledge of RTOS programming to develop embedded programs. (K3, Apply)
- Design embedded system for real time applications (K6 create)

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; bio potential 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, ultra sonography

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 :

- Apply the knowledge of bio electrodes to record various bio potential .(K3-Apply)
- Apply appropriate methods to perform bio-medical parameter measurement. (K3-Apply)
- Apply the knowledge of assist devices and bio-telemetry in medical applications. (K3-Apply)
- Apply the knowledge of image processing to compare the different medical images. (K3 - Apply)
- Compare the function of various diagnostic equipments medical applications (K2-Understand).

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.SFarhang-Boroujeny, " Handbook of Biomedical Instrumentation ",TATA McGraw-HillNew Delhi, 2003.
2. Joseph J.Carr and John M.Brown " Introduction to Biomedical equipment Technology ", John Wiley and Sons, New York,, 2004.

Assessment Pattern:

Cognitive Level	Periodical Test – I (as marks)	Periodical Test – II (as marks)	Periodical Test – III (as marks)	End Semester Examination (as marks)
Remember	9	12	12	20
Understand	37	34	34	70
Apply	4	4	4	10
Analyze				
Evaluate				
Create				
Total	50	50	50	100

CO/PO/PSO MAPPING														
CO	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	I	II
CO.1	3	2										2	2	
CO.2	3	2										2	2	
CO.3	3	2										2	2	
CO.4	3	2										2	2	
CO.5	3					2	2					2	2	
CAM (Avg)	**3.00**	**2.00**				**2.00**	**2.00**					**2.00**	**2.00**	
3- Strong 2- Medium 1- Weak														

15UEC923	ADVANCED WIRELESS TECHNOLOGIES	L	T	P	C
		3	0	0	3

OBJECTIVES :

- To give an idea about various generations of wireless and cellular networks
- To familiarize students about fundamentals of 3G Services, its protocols and applications
- To give knowledge in evolution of 4G Networks, its architecture and applications

UNIT I INTRODUCTION 9

Introduction: History of mobile cellular systems, First Generation, Second Generation, Generation 2.5,Overview of 3G& 4G,3GPP and 3GPP2 standards

UNIT II 4G LTE NETWORKS 9

4G Vision, 4G features and challenges, Applications of 4G, 4G Technologies – Multi carrier modulation, Smart Antenna Techniques, OFDM-MIMO Systems, Adaptive Modulation and Coding with Time-Slot Scheduler, Bell Labs Layered Space Time (BLAST) System, Software-Defined Radio, Cognitive Radio

UNIT III WiMAX NETWORKS 9

WiMax: Introduction – IEEE 802.16, OFDM, MIMO, IEEE 802.20

UNIT IV SPECTRUM & PERFORMANCE 9

Spectrum for LTE-Flexibility-Carrier Aggregation-Multi standard Radio base stations-RF requirements for LTE-Power level requirements-Emission requirements-Sensitivity and Dynamic range-Receiver susceptibility. Performance Assessment-Performance Evaluation

UNIT V 5G MOBILE TECHNOLOGY 9

Introduction – 5G Time scales – Requirements – waveforms – Modulation schemes – Multiple access schemes – Millimeter wave links – Full duplex.

TOTAL:45Periods

COURSE OUTCOMES:

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

- Outline the fundamental concepts of 4G Technologies
- Interpret the various protocols and standards in various layers in Wireless networks.
- Analyze the performance of 4G networks
- Explain Spectrum characteristics & Performance evaluation
- Illustrate with the latest 5G technologies for mobile networks.

REFERENCE BOOKS:

1. Introduction to 3G Mobile Communication, JuhaKorhonen, Artech House,(www.artechhouse.com), Jan 2003, ISBN-10: 1580535070
2. 4G LTE/LTE – Advanced for Mobile Broadband, Erik Dahlman, Stefan Parkvall, Johan Skold,Academic Press 2011.
3. 3G Evolution HSPA and LTE for Mobile Broadband, Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, Academic Press, Oct 2008, ISBN-10: 0123745381
4. UMTS Mobile Communication for the Future, Flavio Muratore, John Wiley & Sons Ltd, Jan 2001, ISBN-10: 0471498297
5. SavoG.Glisic, “Advanced Wireless Networks- 4GTechnologies”, Wiley, 2006
6. Magnus Olsson, Catherine Mulligan, “EPC and 4G packet network”, Elsevier 2012
7. Vijay Garg, “Wireless Communications and Networking”, Elsevier, Morgan kufmann publisher 2007.
8. *www.radio-electronics.com/info/cellulartelecomms*

15UEC924 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING L T P C

3 0 0 3

OBJECTIVES:

- To impart the characteristics of AI that make it useful to real-world problems
- To learn the strengths and limitations of various state-space search algorithms, and choose the appropriate algorithm for a problem.

UNIT I FUNDAMENTALS 8

Intelligent agents − Agents and environments − Good behavior − The nature of environments – Structure of agents − Problem solving − Problem solving agents − Example problems − Searching for solutions − Uniformed search strategies − Avoiding repeated states − Searching with partial information.

UNITII SEARCHING TECHNIQUES10

Informed search and exploration − Informed search strategies − Heuristic function − Local search algorithms and optimistic problems − Local search in continuous spaces − Online search agents and unknown environments − Constraint Satisfaction Problems(CSP) − Backtracking Search and Local Search for CSP − Structure of problems − Adversarial search – Games − Optimal decisions in games − Alpha-Beta pruning − Imperfect real-time decision − Games that include an element of chance.

UNIT III KNOWLEDGE REPRESENTATION 10

First order logic − Representation revisited − Syntax and semantics for first order logic − Using first order logic − Knowledge engineering in first order logic − Inference in first order logic − Propositional versus first order logic − Unification and lifting − Forward chaining − Backward chaining − Resolution − Knowledge representation − Ontological engineering − Categories and objects − Actions − Simulation and events − Mental events and mental objects.

UNIT IV LEARNING 9

Learning from observations − Forms of learning − Inductive learning − Learning decision trees – Ensemble learning − Knowledge in learning − Logical formulation of learning − Explanation based learning − Learning using relevant information − Inductive logic programming − Statistical Learning Methods − Learning with Complete Data − Learning with Hidden Variable – EM Algorithm − Instance Based Learning − Neural Networks − Reinforcement Learning − Passive Reinforcement Learning − Active reinforcement learning − Generalization in reinforcementlearning.

UNIT V APPLICATIONS 8

Communication − Communication as action − Formal grammar for a fragment of english − Syntactic analysis − Augmented grammars − Semantic interpretation − Ambiguity and disambiguation − Discourse understanding − Grammar Induction − Probabilistic language processing − Probabilistic language models − Information Retrieval − Information extraction − Machine translation.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

- Understand the fundamentals of Artificial Intelligence and Machine learning concepts (Understand)
- Apply the basic concept of AI methods to solve a given problem. (Apply)
- Acquire the information of real world knowledge representation. (Apply)
- Analyze the performance of different decision making and learning methods. (Analyze)
- Apply the knowledge of machine Learning technique to design AI machine for the application of real world problems.

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, “Artificial Intelligence−A Modern Approach”, 3rd Edition, Pearson Education / Prentice Hall of India, 2009.
2. Nilsson, N.J., “Artificial Intelligence: A new Synthesis”, Elsevier, 2007.

REFERENCE BOOKS:

1. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 3rd Edition, Tata McGraw-Hill, 2008.
2. Luger, G.F., “Artificial Intelligence-Structures and Strategies for Complex Problem Solving”, Pearson Education / PHI, 2011.

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).

INTERDISCIPLINARY ELECTIVE

15UGM953 EMBEDDED PROGRAMMING

L T P C

(Common to CES and ECE) **3 0 0 3**

OBJECTIVES:

- To learn the architecture and programming of ARM processors.
- To give an idea of embedded systems and its relation with microprocessors.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS AND ARM PROCESSORS 10

Introduction: Embedded Systems – evaluation of ARM processors-ARM 7 processor architecture and organization-TDMI (ARM7 CPU features)-ARM peripherals: General purpose I/O-Timers and counters-PWM modulator-RTC- watchdog timer-UART-I2C Interface-SPI Interface-A/D converter-D/A Converter-Interrupt Registers-3 stage pipeline.

UNIT II EMBEDDED PROGRAMMING 8

Difference between C and Embedded C –structure of embedded C program and examples.-ARM registers for programming-data types in embedded C for ARM 7-IF, IF-else, else if ladder statements- while, for loop –break and continue statements.

UNIT III ARM 7 INTERFACING 9

GPIO programming- I/O Direction setting – PIN function control- Interfacing of LEDs, Interfacing of Switches with interrupt mechanism-Interfacing of Relays, LCD,7 segment display-stepper motor and DC motors(PWM control)- timer interfacing

UNIT IV ARM 9 AND PORTING RTOS TO ARM CORTEX MICROCONTROLLERS 9

Interfacing of ADC configuring ADC registers -Interfacing DAC and configuring DAC registers Interfacing RTC and configuring RTC registers –Interfacing of GSM-serial communication-sensor interfacing, Building root file system, Kernel Compilation for ARM, Porting of OS to ARM. Overview of open source RTOS (Chibi-OS / Free RTOS / MicroC-OSetc.),

UNIT V CASE STUDY 9

Microwave oven-Anti-lock Breaking system(ABS)-Intruder alarm system-power saving system in Air-conditioners-water level monitoring and controlling system.

TOTAL:45PERIODS

COURSE OUTCOMES

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

- Apply the knowledge of ARM 7 architecture to configure its peripherals.(K2,understand)
- Apply the knowledge of embedded C to develop embedded application programs.(K3,Apply)
- Apply the knowledge of ARM programming to interface peripheral devices. (K3,Apply)
- Apply the knowledge of RTOS programming to develop embedded programs. (K3, Apply)
- Design embedded system for real time applications (K6 create)

TEXT BOOKS:

1. Muhammad Ali Mazidi , “ARM Peripherals Programming and Interfacing: Using C Language for ARM Cortex (ARM books Book 2)”, pearson education, 2nd edition, 2011.
2. Jonathan W. Valvano, “ Embedded Systems: Introduction to Arm® CortexTM-M Microcontrollers, Fifth Edition (Volume 1)”, CreateSpace Independent Publishing Platform; 5th edition (May 26, 2012).
3. David Seal, “ ARM architecture Reference Manual”, Addison Wesley, 2000.
4. The Definitive Guide to the ARM Cortex M3, Joseph Yiu, Newnes

REFERENCE BOOKS:

1. Marilyn Wolf, “Computers as Components – Principles of Embedded Computing System Design”, Third Edition “Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.
2. Yury Magda, " ARM programming for beginners with interactive simulation“, Amazon Digital
   Services LLC, 2011.
3. Steve Ferber, “ ARM system on-chip architecture”, Addison Wesley, 2nd Edition 2011.
4. Assembly language Programming ARM Cortex-M3, Vincent Mahout, Wiley

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 loud speaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones

UNIT II TELEVISION SYSTEMS 9

Color 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, Cellular 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 ageInternational 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,InfraRed(IR),NearIR,MiddleIR,ThermalIRandMicrowave–Black Body Radiation-Planck"s law–Stefan-Boltzman law.

UNIT II EMR INTERACTIONWITH ATMOSPHERE AND EARTH MATERIALS **9**

Atmospheric characteristics– Scattering of EMR– Rayleigh, 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 OPTICALAND 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 ", NarosaPublishingHouse,2001.
2. AnjiReddy, "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 GillispieMazidi, Rolin D. McKinlay " The 8051 Microcontroller and Embedded Systems ", Pearson Education, Second edition, 2007.
3. Raj Kammaal," Embedded Systems ", McGraw Hill,1st Edition2003.
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, Secondedition, , 2002.

REFERENCE BOOKS:

1. Alan V.Oppenheim, Ronald W. Schafer,Hohn. R.Back ” Discrete Time SignalProcessing ”, 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. SantanuChaudhury, 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.

15UEC976 SENSORS AND ACTUATORS L T P C

3 0 0 3

OBJECTIVES:

- To outline the concepts of all transducer types and to analyze their characteristics based on the industrial process requirements.
- To explain the working principle of Resistive, Inductive, Capacitive and miscellaneous transducers

UNIT I INTRODUCTION AND DISPLACEMENT MEASUREMENT 9

Sensors - Basic requirements of a sensors- Classification of sensors- Static and Dynamic characteristics of sensors, Displacement Sensors- Linear and Rotary displacement sensors- Potentiometer, Capacitive and Inductive type displacement sensor- position sensors- Optical encoder, Photoelectric sensor, Hall Effect Sensor.

UNIT II MEASUREMENT OF PROXIMITY, FORCE AND PRESSURE 9

Eddy current proximity sensor- Inductive Proximity sensor- Capacitive Proximity sensor - Pneumatic Proximity sensors Proximity Switches- Contact and Noncontact type – Strain Gauge – Diaphragm Pressure Sensor- Capsule Pressure sensors- Bellows Pressure Sensor- Bourdon tube pressure sensor- Piezoelectric Sensor- Tactile sensor.

UNIT IIIMEASUREMENT OF VELOCITY, FLOW AND LEVEL 9

Tacho generator - Pyroelectric sensors - Ultrasonic sensor – Resistive sensor- Pitot tube – Orificeplate - flow nozzle Venturi tubes – Rotameter- Electromagnetic flow meter. Float level sensor- Pressure level sensor- Variable capacitance sensor.

UNIT IV MEASUREMENT OF TEMPERATURE, MOTION AND LIGHT SENSORS 9

Thermocouples- Thermistors -Thermodiodes - Thermotransistors- Bimetallic Strip- Resistance Temperature Detector Infrared Thermography. Vibrometer and accelerometer- seismic accelerometer. Photo resistors -Photodiodes - Phototransistors- Photo conductors.

UNIT V MICRO SENSORS AND ACTUATORS 9

Micro Sensors: Principles and examples, Force and pressure micro sensors, position and speed micro sensors, acceleration micro sensors, chemical sensors, biosensors, temperature micro sensors and flow micro sensors. Micro Actuators: Actuation principle, shape memory effects- one way, two way and pseudo elasticity. Types of micro actuators- Electrostatic, Magnetic, Fluidic, Inverse piezo effect, other principles.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Explain the concept of transducer and its classification
- Select a suitable transducer for instruments based on its characteristics
- Infer the working principle of Resistive transducers

- Infer the working principle of Inductive and Capacitive transducers
- Illustrate the working principle of other miscellaneous transducers

TEXT BOOKS:

1. Sensors and Actuators: Control System Instrumentation, Clarence W. de Silva CRC Press , 2nd Edition,2015.
2. D. Johnson, “Process Control Instrumentation Technology”, John Wiley and Sons,8th Edition,2014.
3. Doebelin. E.A, “Measurement Systems – Applications and Design”, Tata McGraw Hill, New York, 2007.

REFERENCE BOOKS:

1. Andrzej M. Pawlak Sensors and Actuators in Mechatronics Design and Applications, 2006
2. D.Patranabis, “Sensors and Transducers”, TMH,2nd edition 2004.
3. Ian Sinclair, Sensors and Transducers, Elsevier, 3rd Edition, 2011.
4. Ramon PallásAreny, John G. Webster, “Sensors and Signal Conditioning”, 2nd edition, John Wiley and Sons,2000.

VALUE EDUCATION AND HUMAN RIGHTS

15UGS331 **L T P C**

(Common to ALL Branches)

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.

UNIT II **6**

Values needed for life - love & Compassion, Truth & Tolerance, Fairness & Obedience – Respect Empathy – Protection – Humility & Harmony – Principles of happy living – Stress

UNIT III **6**

Social values and personality – Role models – National leaders – freedom fighters, Social reformers & Value based anecdotes

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.

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- **Case Study.**

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:Cadd Academy,Madurai.

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:Cadd Academy,Madurai.

15UEC863	PYTHON PROGRAMMING	L T P C 1 0 0 1

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
		1 0 0 1

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

15UEC865	PROGRAMMING IN R	L	T	P	C
		1	0	0	1

Module I: **5**

Evolution of R, Features of R-Basic syntax, Data types, Variables, Operators

Module II: **5**

Control Structures and Functions ,Loop Functions ,Data Manipulation , String Operations ,Packaging, Debugging and Object Oriented Programming

Module III: **5**

Data import/export and data frames.Graphical procedures.Installing, starting and stopping R-file operations and file formats-writing code and text editors.

TOTAL:15 PERIODS

Course Designer:Cadd Academy,Madurai.