GOVERNMENT COLLEGE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University)

Coimbatore - 641 013

Regulations, Curriculum And Syllabi For

B.E. (ELECTRONICS AND COMMUNICATION ENGINEERING)

(Full Time)

2012

Regulations

OFFICE OF THE CONTROLLER OF EXAMINATIONS
GOVERNMENT COLLEGE OF TECHNOLOGY
THADAGAM ROAD, COIMBATORE - 641 013

PHONE 0422 - 2433355 FAX : +91 0422 - 2433355
email : coegct@gmail.com

VISION AND MISSION OF THE INSTITUTION

Vision

To emerge as a center of excellence and eminence by imparting futuristic technical education in keeping with global standards, making our students technologically competent and ethically strong so that they can readily contribute to the rapid advancement of society and mankind

Mission

1. To achieve Academic excellence through innovative teaching and learning practices
2. To enhance employability and entrepreneurship
3. To improve the research competence to address Societal needs
4. To inculcate a culture that supports and reinforces ethical, professional behaviours for a harmonious and prosperous society

VISION AND MISSION OF THE DEPARTMENT

Vision

The vision of ECE department is to become pioneer in higher learning and research and to produce creative solution to societal needs.

Mission

1. To provide excellence in education, research and public service.
2. To provide quality education and to make the students entrepreneur and employable.
3. Continuous upgradation of techniques for reaching heights of excellence in a global perspective.

PROGRAMME EDUCATIONAL OBJECTIVES

The Programme Educational Objectives of UG in Electronics and Communication Engineering are

1. Graduates apply their knowledge of mathematics and science to identify, analyze and solve problems in the field of Electronics and develop sophisticated communication systems.
2. Graduates exhibit their innovative ideas and management skills to meet the day to day technical challenges.
3. Graduates embody a commitment to professional ethics, diversity and social awareness in their professional career.
4. Graduates exhibit a desire for life-long learning through technical training and professional activities

PROGRAMME OUTCOMES

The Programme Outcomes of UG in Electronics and Communication Engineering are:

1. An ability to apply knowledge of mathematics, science and engineering fundamental concepts appropriate to the discipline of Electronics and Communication Engineering
2. An ability to analyze the complex Engineering problems, identify and formulate the solutions appropriate to it.
3. An ability to design, implement and evaluate electronics and communication systems for public health and safety, cultural, societal and environmental considerations
4. An ability to design electronic circuits and conduct investigations, as well as to analyze and interprete data
5. An ability to use current techniques, skills, and modern tools necessary for practice.
6. An ability to apply the professional engineering practice to the local and global issues in the society
7. An ability to apply the knowledge of professional engineering solutions for the sustainable development in changing environments
8. An ability to apply the knowledge of learnt professional ethics to social issues and responsibilities
9. An ability to function effectively as an individual and as a team leader in diverse and multidisciplinary settings to accomplish a common goal
10. An ability to communicate effectively through presentations and clear instructions with the engineering community and society
11. An ability to apply the engineering and management principles to manage project as an employee and as an employer
12. An ability to develop life-long learning for the changing technological environment

Curriculum

LLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLL

B.E ELECTRONICS AND COMMUNICATION ENGINEERING [FULL TIME]
CURRICULUM FOR CANDIDATES
ADMITTED DURING 2012-2013 AND ONWARDS

FIRST SEMESTER

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
		THEORY							
1	12L1Z1	COMMUNICATION SKILLS IN ENGLISH I	25	75	100	3	1	0	4
2	12L1Z2	ENGINEERING MATHEMATICS I	25	75	100	3	1	0	4
3	12L103	FUNDAMENTALS OF CIVIL AND MECHANICAL ENGINEERING	25	75	100	4	0	0	4
4	12L104	MATERIALS SCIENCE	25	75	100	3	0	0	3
5	12L105	APPLIED CHEMISTRY	25	75	100	3	0	0	3
6	12L106	PROGRAMMING IN C	25	75	100	3	1	0	4
		PRACTICAL							
7	12L107	WORKSHOP	25	75	100	0	0	3	2
8	12L108	CHEMISTRY LABORATORY	25	75	100	0	0	3	2
9	12L109	C PROGRAMMING LABORATORY	25	75	100	0	0	3	2
		TOTAL			**900**				**28**

SECOND SEMESTER

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
		THEORY							
1	12L2Z1	COMMUNICATION SKILLS IN ENGLISH II	25	75	100	3	1	0	4
2	12L2Z2	ENGINEERING MATHEMATICS II	25	75	100	3	1	0	4
3	12L203	ENGINEERING PHYSICS	25	75	100	3	0	0	3
4	12L204	OBJECT ORIENTED PROGRAMMING USING C++	25	75	100	3	0	0	3
5	12L205	ELECTRICAL ENGINEERING	25	75	100	3	0	0	3
6	12L206	SEMICONDUCTOR DEVICES	25	75	100	3	0	0	3
		PRACTICAL							
7	12L207	PHYSICS LABORATORY	25	75	100	0	0	3	2
8	12L208	ENGINEERING GRAPHICS	25	75	100	2	0	3	4
9	12L209	ELECTRICAL ENGINEERING LABORATORY	25	75	100	0	0	3	2
		TOTAL			**900**				**28**

THIRD SEMESTER

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
		THEORY							
1	12L3Z1	ENGINEERING MATHEMATICS III	25	75	100	3	1	0	4
2	12L302	CIRCUIT THEORY	25	75	100	3	1	0	4
3	12L303	ELECTRONIC CIRCUIT DESIGN	25	75	100	3	1	0	4
4	12L304	DATA STRUCTURES AND ALGORITHMS	25	75	100	3	0	0	3
5	12L305	SIGNALS AND SYSTEMS	25	75	100	3	1	0	4
6	12L306	ELECTROMAGNETIC WAVES AND WAVE GUIDES	25	75	100	3	1	0	4
		PRACTICAL							
7	12L307	ELECTRON DEVICES AND CIRCUITS LABORATORY	25	75	100	0	0	3	2
8	12L308	DATA STRUCTURES LABORATORY	25	75	100	0	0	3	2
		TOTAL			**800**				**27**

FOURTH SEMESTER

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
		THEORY							
1	12L401	RANDOM PROCESS AND QUEUING THEORY	25	75	100	3	1	0	4
2	12L402	ENVIRONMENTAL SCIENCE AND ENGINEERING	25	75	100	3	0	0	3
3	12L403	ANALOG INTEGRATED CIRCUITS	25	75	100	3	0	0	3
4	12L404	ANALOG COMMUNICATION	25	75	100	3	0	0	3
5	12L405	DIGITAL LOGIC WITH HDL	25	75	100	3	1	0	4
6	12L406	NETWORKS AND TRANSMISSION LINES	25	75	100	3	0	0	3
		PRACTICAL							
7	12L407	INTEGRATED CIRCUITS LABORATORY	25	75	100	0	0	3	2
8	12L408	ANALOG COMMUNICATION LABORATORY	25	75	100	0	0	3	2
		TOTAL			**800**				**24**

FIFTH SEMESTER

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
		THEORY							
1	12L501	DIGITAL SIGNAL PROCESSING	25	75	100	3	1	0	4
2	12L502	MICROPROCESSORS AND MICROCONTROLLERS	25	75	100	3	0	2	4
3	12L503	DIGITAL COMMUNICATION	25	75	100	3	0	0	3
4	12L504	COMPUTER ARCHITECTURE AND ORGANIZATION	25	75	100	3	0	0	3
5	12L505	CMOS VLSI SYSTEMS	25	75	100	3	0	0	3
6	12L506	CONTROL SYSTEMS	25	75	100	3	1	0	4
		PRACTICAL							
7	12L507	DIGITAL COMMUNICATION SYSTEMS LABORATORY	25	75	100	0	0	3	2
8	12L508	VLSI LABORATORY	25	75	100	0	0	3	2
		TOTAL			**800**				**25**

SIXTH SEMESTER

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
		THEORY							
1	12L601	MANAGEMENT THEORY AND PRACTICE	25	75	100	3	0	0	3
2	12L602	MIXED SIGNAL CIRCUITS AND INTERFACING	25	75	100	3	0	0	3
3	12L603	ANTENNAS AND WAVE PROPAGATION	25	75	100	3	0	0	3
4	12L604	EMBEDDED SYSTEMS	25	75	100	3	0	0	3
5	12L605	COMPUTER COMMUNICATION	25	75	100	3	0	0	3
6		ELECTIVE I	25	75	100	3	0	0	3
		PRACTICAL							
7	12L607	EMBEDDED SYSTEMS LABORATORY	25	75	100	0	0	3	2
8	12L608	NETWORKING LABORATORY	25	75	100	0	0	3	2
		TOTAL			**800**				**22**

SEVENTH SEMESTER

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
		THEORY							
1	12L701	MICROWAVE AND RF SYSTEMS	25	75	100	3	0	0	3
2	12L702	LOW POWER VLSI DESIGN	25	75	100	3	0	0	3
3	12L703	WIRELESS COMMUNICATION	25	75	100	3	0	0	3
4	12L704	FIBER OPTIC COMMUNICATION	25	75	100	3	0	0	3
5		ELECTIVE II	25	75	100	3	0	0	3
6		ELECTIVE III	25	75	100	3	0	0	3
		PRACTICAL							
7	12L707	MICROWAVE AND RF LABORATORY	25	75	100	0	0	3	2
8	12L708	ELECTIVE LABORATORY	25	75	100	0	0	3	2
		TOTAL			**800**				**22**

EIGHTH SEMESTER

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
		THEORY							
1		Elective IV	25	75	100	3	0	0	3
2		Elective V	25	75	100	3	0	0	3
		PRACTICAL							
3	12L801	PROJECT WORK & VIVA VOCE	50	150	200	0	0	12	6
		TOTAL			**400**				**12**

LIST OF ELECTIVES FOR B.E. ELECTRONICS AND COMMUNICATION ENGINEERING (SIXTH SEMESTER)

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
1	12L6E0	AUTOMOTIVE ELECTRONIC SYSTEMS	25	75	100	3	0	0	3
2	12L6E1	RELATIONAL DATABASE MANAGEMENT SYSTEMS	25	75	100	3	0	0	3
3	12L6E2	OPERATING SYSTEMS	25	75	100	3	0	0	3
4	12L6E3	MEASUREMENTS AND INSTRUMENTATION	25	75	100	3	0	0	3
5	12L6E4	TV AND VIDEO ENGINEERING	25	75	100	3	0	0	3
6	12L6E5	STATISTICAL THEORY OF COMMUNICATION	25	75	100	3	0	0	3

(SEVENTH SEMESTER)

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
1	12L7E0	SPREAD SPECTRUM TECHNIQUES	25	75	100	3	0	0	3
2	12L7E1	ADVANCED DIGITAL SIGNAL PROCESSING	25	75	100	3	0	0	3
3	12L7E2	VLSI SIGNAL PROCESSING	25	75	100	3	0	0	3
4	12L7E3	SOFTWARE ENGINEERING	25	75	100	3	0	0	3
5	12L7E4	NEURAL NETWORKS	25	75	100	3	0	0	3
6	12L7E5	RADAR SYSTEMS	25	75	100	3	0	0	3
7	12L7E6	IMAGE PROCESSING	25	75	100	3	0	0	3
8	12L7E7	MULTIMEDIA COMPRESSION TECHNIQUES	25	75	100	3	0	0	3
9	12L7E8	MEMS	25	75	100	3	0	0	3
10	12L7E9	AVIONICS	25	75	100	3	0	0	3
11	12L7EA	REAL TIME CONTROLLERS	25	75	100	2	0	2	3

(EIGHTH SEMESTER)

S. No.	Subject Code	Course Title	Sessional marks	Final Exam marks	Total marks	Credits			
						L	T	P	C
1	12L8E0	PROFESSIONAL ETHICS	25	75	100	3	0	0	3
2	12L8E1	DSP SYSTEM DESIGN	25	75	100	3	0	0	3
3	12L8E2	NANO ELECTRONICS	25	75	100	3	0	0	3
4	12L8E3	SOFT COMPUTING	25	75	100	3	0	0	3
5	12L8E4	TOTAL QUALITY MANAGEMENT	25	75	100	3	0	0	3
6	12L8E5	BIO MEDICAL INSTRUMENTATION	25	75	100	3	0	0	3
7	12L8E6	POWER ELECTRONICS	25	75	100	3	0	0	3
8	12L8E7	VLSI TESTING	25	75	100	3	0	0	3
9	12L8E8	SATTELITE COMMUNICATION	25	75	100	3	0	0	3
10	12L8E9	NETWORK SECURITY	25	75	100	3	0	0	3

12L1Z1-COMMUNICATION SKILLS IN ENGLISH-I

COURSE OBJECTIVES:

- *To increase reading ability of students*
- *To create ability to write effectively for a variety of professional and technical settings*
- *To gain knowledge about the formal elements of language*
- *To improve technical writing skills*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO1: An increased reading ability of students
CO2: An ability to write effectively for a variety of professional and technical settings
CO3:An ability to apply the formal elements of language
CO4: An improvement in technical writing skills

L	T	P	C
3	1	0	4

UNIT-I **(9)**

Tenses - Word formation- Vocabulary (Synonyms & Antonyms)- Listening and transfer of information- Pronunciation Practice- Word Stress-Sentence Stress-Intonation-Introducing oneself-Role play activities based on real life situations- Non-Verbal Communication -Reading Comprehension (Skimming and Scanning)- An introduction to Letter Writing – E-Tender Notices

UNIT-II **(9)**

Technical Vocabulary-Abbreviations and Acronyms- Commonly Confused Words- Active Voice to Passive Voice- Impersonal Passive- Listening at Specific Contexts such as Airport, Railway Station, Bus Stand, Sea Port/Shipboard etc-Debates on Chosen Topics - Reading For Identifying Stylistic Features- Recommendations- Letter to the Editor of a News Paper

UNIT-III **(9)**

Subject-Verb Agreement (Concord) - Preposition-Listening to News in English- Mini Oral Presentation on the assumption of a historian, celebrity, famous Personality etc.- Reading and Note-making- Notice -Agenda- Memo- Advertisement and Slogan Writing.

UNIT-IV **(9)**

Common Errors in English-Conditional Statements -Use of Modal Auxiliaries- Definition-Listening to a Discussion at a Business Meeting- Group Discussion on chosen topics-Reading for interpreting tables, charts etc. - Writing E-mails-Graphic Description

UNIT-V **(9)**

Extensive Reading- APJ Abdul Kalam's "Wings of Fire"- An Abridged Special Edition for students.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *Meenakshi Raman, Sangeetha Sharma, "**Technical Communication: English Skills for Engineers**" Oxford University Press: New Delhi, 2008*

REFERENCE BOOKS:

1. *Meenakshi Raman, Sangeetha Sharma, "**Technical Communication: English Skills for Engineers**" Oxford University Press: New Delhi, 2008*
2. *Rizvi Ashrav.M, "**Effective Technical Communication**" Tata McGraw Hill, New Delhi, 2005*
3. *Herbert, A.J, "**Structure of Technical English**": the English Language Society.*
4. *Authentic NET Resources*

12L1Z2-ENGINEERING MATHEMATICS – I

COURSE OBJECTIVES:

- *The wider applications in engineering problems using matrix theory and its properties.*
- *The area of hyperbolic functions and solid geometry leads to solve sphere, cone and cylinder problems.*
- *The applications of differential equations and integral complex leads to bending of beams, electric circuits and transmission lines.*
- *Functions of two variables including extremum problems Leibnitz rule of integration.*
- *Performing double and triple integration.*

COURSE OUTCOMES:

At the end of the course the students should be able to

CO1: Find eigen values and eigen vectors of real Matrix, Reduce quadratic form to canonical form (Usage)
CO2: Identify and solve problems using hyperbolic functions and apply solid geometry for solving problems (Usage)
CO3: Apply differential calculus to solve problems and curvature, evolute and envelopes (Usage)
CO4: Apply Taylor's theorem, Lagrangian multiplier method, Jacobians- differentiation under integral sign for two independent variables (Usage)
CO5: Calculate the area using double integral and volume using triple integral (Usage)

L	T	P	C
3	1	0	4

UNIT I MATRICES (9)

Characteristic equation– Eigen values and Eigen vectors of a real matrix – Properties of Eigen values- Cayley-Hamilton Theorem (statement only) and applications-Diagonalisation by similarity transformation- Reduction of quadratic form to canonical form.

UNIT II HYPERBOLIC FUNCTIONS AND SOLID GEOMETRY (9)

Hyperbolic functions and Inverse Hyperbolic functions- Identities- Real and imaginary parts-solving problems using hyperbolic functions.Sphere– tangent plane– Orthogonal spheres- Cone-right circular cone– Cylinder– right circular cylinder.

UNIT III APPLICATIONS OF DIFFERENTIAL CALCULUS (9)

Curvature- Cartesianand polar coordinates– centre and radius of curvature- circle of curvature-Evolutes-Envelopes- Evolutes as envelope of normal.

UNIT IV FUNCTION OF SEVERAL VARIABLES (9)

Function of two variables- Taylor's theorem (statement only) and expansions- maxima and minima-constrained maxima and minima by Lagrangian multiplier method- Jacobians-differentiation under integral sign.

UNIT V INTEGRAL CALCULUS (9)

Gamma and Beta functions- Double integration- Cartesian and Polar Coordinates– change of order of integration- Area as double integral– Triple integration– Volume as a triple integral-Transformation to Cylindrical and Spherical co-ordinates.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *Veerarajan.T.,"**Engineering Mathematics**" for Semesters I and II, Tata McGraw Hill Publishing Co., New Delhi., 2010.*

2. *Dr.Kandasamy.P.,Dr.Thilagavathy.K and Dr.Gunavathy.K., "**Engineering Mathematics**" for First Year B.E/ B.Tech, S.Chand &Co., Ram Nagar, New Delhi, 2010.*

REFERENCE BOOKS:

1. *N.P.Bali., Dr. Manish Goyal., "**A text book of Engineering Mathematics**" vol.I, University science Press, New Delhi, 2010.*

2. *H.C.Taneja., "**Advanced Engineering Mathematics**" vol.I,I. K. International Pub. House Pvt. Ltd., New Delhi,2007.*

3. *Baburam.,"**EngineeringMathematics**"vol.I,Pearson,NewDelhi,2010.*

4. *B.V.Ramana., "**Higher Engineering Mathematics**" Tata McGraw Hill Publishing Co., New Delhi, 2007.*

5. *Grewal B.S., "**Higher Engineering Mathematics**" (40th Edition) Khanna Publishers, New Delhi., 2007.*

12L103 FUNDAMENTALS OF CIVIL AND MECHANICAL ENGINEERING

COURSE OBJECTIVES:

- *To learn the methods and materials used in construction*
- *To gain knowledge about principles of engines and steam generators*
- *To acquire fundamental knowledge on manufacturing and metal cutting process*
- *To motivate students to participate in cross disciplinary groups*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Knowledge about methods and materials used in construction
CO 2: An ability to explain the working principles of engines and steam generators
CO 3: A fundamental knowledge on manufacturing and metal cutting process
CO 4: Motivation for students to participate in cross disciplinary groups

L	T	P	C
4	0	0	4

SECTIONA
CIVIL ENGINEERING

MATERIALS IN CONSTRUCTION **(15)**

Stone- Types- Qualities- Qualities of good building stone

Bricks- Manufacturing- Qualities- Uses

Cement- Different types- Manufacturing- Qualities- Uses

Steel- Qualities- Uses.

CONSTRUCTION **(15)**

Masonry- Brick masonry-Types of bonds- Stone masonry-Types-Methods of construction

Concrete-Materials used- Preparation- Qualities- Uses

Flooring-Types-Methods of construction

Roofing- Types- Construction of tiled roof, Asbestos roof and Concrete roof.

TOTAL: 30 HOURS

TEXT BOOKS:

1. *Ramesh Babu V. "**Basics of Civil Engineering**", Anuradha Publishers, 2000.*
2. *Natarajan K.V. **"Basics of Civil Engineering**", N. Dhanalakshmi Publishers, 2000*

REFERENCE BOOKS:

1. *Rangawala S.C. "**Engineering materials**", Charotor Publishing Houses, 2001.*
2. *Punmia B.C. "**Building construction**", Lakshmi publications, 2002.*

SECTION B
MECHANICAL ENGINEERING

ENERGY ENGINEERING **(6)**

Working principles of impulse and reaction turbines - Working principles of IC Engines (CI and SI Engines)

STEAM GENERATORS **(5)**

Classifications- working of Cochran, Lamont and Benson boilers (separate study of boiler mountings and accessories are beyond the scope of this syllabus).

MANUFACTURING PROCESS **(8)**

Basic principles of moulding- Melting of metals and casting-Crucible furnace and Cupola. Basic principles of hand forging- mechanical power hammers- hot and cold forging process-roll forging. Basic principle of welding- arc welding- brazing and soldering– Micro machining Techniques–electron beam lithography for manufacturing of electron devices: computer memories, IC and cathodes– Materials used in electronic industries– Beryllium, Germanium, Zirconium–IC packaging materials– silicon, gallium arsenide- semi conducting materials–IC packaging techniques– die bonding– wire bonding.

METAL CUTTING PROCESS **(6)**

Lathe: Main components and their functions Basic operations of turning, facing, taper turning and thread cutting- Drilling machine**:** Types of drilling machines- bench, upright-main parts and their functions- Reaming operations.

TOTAL: 25HOURS

TEXT BOOKS:

1. *Venugopal K. "**Basic Mechanical Engineering**",Anuradha Publishers, 2003.*

2. *Ramesh Babu "**Basic Mechanical Engineering**",VRBPublishers Pvt. Ltd, 2007.*

REFERENCE BOOKS:

1. *Nagrath G.R. "**Power Plant Engineering**", Khanna Publishers,New Delhi,1986.*
2. *Jain R.K. "**Production Technology**", Khanna Publishers,New Delhi,1981.*
3. *Shanmugam.G "**Basic Mechanical Engineering**", Tata McGraw Hill, New Delhi.*
4. *William D Calliste. "**Materials Science and Engineering**", John Wiley & Sons Inc.1997.*
5. *R.S.Parmar, "**Manufacturing Processes and Automation**", Khanna Publishers, 2009.*

12L104-MATERIALS SCIENCE

COURSE OBJECTIVES:

- *To explain the theory behind conducting materials and their characteristics*
- *To gain knowledge on the behavior of semiconducting materials and dielectrics*
- *To exploit magnetic and superconducting materials*
- *To update with the modern engineering materials and their applications*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: An ability to explain theory behind conducting materials and their characteristics
CO 2: Knowledge on the behavior of semiconducting materials and dielectrics
CO 3: Exploitation of magnetic and superconducting materials
CO 4: An ability to update with the modern engineering materials and their applications

L	T	P	C
3	0	0	3

UNIT I CONDUCTING MATERIALS (9)

Introduction to Conductors– classical free electron theory of metals– Draw backs of classical theory– quantum theory- Electrical and Thermal conductivity of Metals–Derivation for Wiedemann–Franz law–Lorentz number—Fermi distribution function - effect of temperature – density of energy states– calculation of Fermi energy-carrier concentration in metals

UNIT II SEMICONDUCTING MATERIALS AND DEVICES (9)

Introduction–Properties–elemental and compound semiconductors Intrinsic and extrinsic semiconductors–properties- Carrier concentration in intrinsic Semiconductor-variation of Fermi level with temperature and carrier concentration- Electrical Conductivity– band gap determination- extrinsic semiconductors- Carrier concentration in P- type and N-type semiconductors– variation of Fermi level with temperature and impurity concentration– Hall effect- Determination of Hall Co-efficient in N type and P type Semiconductor-Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS (9)

Introduction- Origin of magnetic moment- Bohr magnetron- Dia, Para, and Ferro magnetic materials- Domain theory of ferro magnetism- Hysteresis- Hard and Soft magnetic materials. Ferrites- structure and applications-Magneto optical recording and readout– Superconductivity-Types of super conductors- BCS theory of super conductivity (qualitative)- properties-High T_C superconductors, Applications of superconductors- SQUID, Cryotron, Magnetic elevitation.

UNIT IV DIELECTRICS **(9)**

Introduction to dielectric materials– Electric polarization and Dipole moment-Electrical susceptibility– dielectric constant– Various polarization mechanisms in dielectrics-electronic, ionic, orientational and space charge polarization–frequency and temperature dependent of polarization– internal field– Claussius– Mosotti relation (derivation)– dielectric loss– dielectric breakdown– $BaTiO_3$ - Applications of dielectric materials.

UNIT V MODERN ENGINEERING MATERIALS **(9)**

Metallic glasses- preparation of metallic glasses- properties– applications of the metallic glasses-Shape Memory Alloys (SMA)- Characteristics, properties of NiTi alloy-applications of the Shape memory alloys-advantages and disadvantages of SMA- Nano materials- synthesis–chemical vapour deposition– SolGels– ball Milling–properties of nano particles and applications of nano particles– Carbon Nano tubes (CNT)– structure–properties– applications of the CNTs.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

*Ganesan S. Iyandurai N, **"Engineering Physics II"**, Gems Publishers, Coimbatore 2009.*

REFERENCEBOOKS:

1. *Jayakumar S, "**Materials Science**", RK Publishers, Coimbatore, 2004*
2. *William D Callister Jr, "**Materials Science and Engineering – An Introduction**", John Wiley and Sons Inc.,6th Edition, New York, 2003*
3. *James F Shackelford, S "**Introduction to materials Science for Engineers**",6th Macmillan Publishing Company, New York, 2004*

12L105- APPLIED CHEMISTRY

COURSE OBJECTIVES:

- *To enrich knowledge on basic electrochemistry*
- *To compare the performances of various batteries*
- *To explain the types of corrosion and protection methods*
- *To gain knowledge about planar technology and concept of polymers*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Knowledge on basic electrochemistry
CO 2: An ability to compare the performances of various batteries
CO 3: An ability to explain the types of corrosion and protection methods
CO 4: Knowledge about planar technology and concept of polymers

L	T	P	C
3	0	0	3

UNIT I BASIC ELECTROCHEMISTRY (9)

EMF and thermodynamic principles of electrochemical systems- Nernst equation, problems- applications of emf measurement – potentiometric titrations- acid alkali, redox reactions - pH measurements using glass electrode- ion selective electrode- fluoride analysis, solubility of sparingly soluble salts - concentration cells - electrode/electrolyte - simple examples - Polarisation- concentration - over voltage.

UNIT II BATTERIES (9)

Batteries - components - Characteristics - voltage , current , capacity, electrical storage density, energy density, discharge rate – types of batteries (primary and secondary)- primary- Zn- MnO_2 , Zn- AgO , Zn- HgO , Li- SO_2 Cl - cells- construction and working- Comparison of performance of primary cells–Secondary- Lead acid, Ni-Cd, Ni-Fe-Lithium ion batteries – Components – Characteristics- functioning-comparison of performances.

UNIT III CORROSION (9)

Corrosion-spontaneity –chemical- oxidation corrosion- nature of oxides- Pilling and Bedworth rule - electrochemical corrosion– general mechanism- differential aeration- Pitting, Galvanic & stress corrosion. Prevention of corrosion-Proper design of structures, cathodic protection (sacrificial anode and impressed current cathodic), Inhibitors – Protective coatings- Paints, electro plating (plating of chromium and nickel only), electroforming and electropolishing - applications.

UNIT IV PLANAR TECHNOLOGY (9)

Silicon-polycrystalline and single crystalline - crystal growth techniques-Czochralski process and float zone process-wafer preparation-PN junction formation by solid fusion-open type diffusion system, Ion implantation and molecular beam epitaxy–Deposition of dielectrical layers by crystal vapor deposition and sputtering techniques – Fabrication silicon devices -Masking and photolithography- Etching techniques wet and electrochemical – metal deposition techniques.

UNIT V POLYMERS **(9)**

Monomers-functionality, Degree of polymerization-Coordination polymerization Zeigler-Natta catalyst, Polymers, structure, properties and their end uses of Polycarbonate, PVC, Polyamide, PET, Polyester, Teflon, Epoxy resin, Polyurethane, PMMA. Compounding of plastics- ingredients and functions, Fabrication-compression molding-Injection moulding-blow moulding and Extrusion moulding -Conducting polymers, poly acetylene, mechanism of conduction-natural rubber-vulcanization of rubberBiodegradable polymers - polylactide, cellulose and starch.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Vairam S. And Ramadevi A., **"Engineering Chemistry"**, 1st Edn,Gem publishers, Coimbatore(2011).*

2. *JainP.C &Jain.M,, **"Engineering Chemistry"**, 17th Edn Dhanpat Rai publications(p) Ltd, New Delhi.(2008)*

REFERENCE BOOKS:

1. *Puri Br, Sharma, Lr, Pathania M.S. **"Principles of Physical Chemistry"**, Vishal Publications Co (2008).*
2. *Thiyagi .M. S. **"Introduction to Semiconductor Materials and devices"**, John Wiley & sons, Singapore(2000)*
3. *Pletcher D , Walsh, **"Industrial Electrochemistry"**, 2nd Edn. Kluwer, the language of Science, (2008)*
4. *Linden, **Hand book of batteries and fuel cells**, vol.1, 1 st Edn, Mc Graw Hill (1984).*
5. *Engineering Chemistry, **A text book of Chemistry for Engineers**, Wiley India Pvt . Ltd, (2011).*

12L106 – PROGRAMMING IN C

COURSE OBJECTIVES:

- *To get basic knowledge on the fundamental concepts of digital computer and information technology*
- *To exploit the appropriate decision statements for the given program*
- *To inscribe C programs by applying the concepts of arrays, pointers and functions*
- *To implement user defined data types like structures and unions in a C program*
- *To gain basic knowledge on file operation and graphics in C*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Knowledge on the fundamental concepts of digital computer and information technology
CO 2: An ability to exploit the appropriate decision statements for the given program
CO 3: An ability to inscribe C programs by applying the concepts of arrays, pointers and functions
CO 4: An ability to implement user defined data types like structures and unions in a C program
CO 5: Basic knowledge on file operation and graphics in C

L	T	P	C
3	1	0	4

UNIT I BASICS OF COMPUTER, PROGRAMMING AND INFORMATION TECHNOLOGY (9)

Digital Computer Fundamentals- Block diagram of a computer- Components of a Computer system-Applications of Computers- Hardware and Software definitions- Categories of Software- Booting-Installing and Uninstalling Software- Software privacy- Software terminologies-Information Technology Basics- History of Internet- Internet Tools. Problem solving Techniques- Program-Program development cycle- Algorithm- Flow Chart- Pseudo Code- Program control structures-Types and generation of programming languages-Development of algorithms for simple problems.

UNIT II BASIC ELEMENTS OF C (9)

Introduction to C- C Declaration- Operators and Expressions- Input and output Functions-Decision statements: If- If else- Nested If else- If else If ladder- break- continue- goto- switch-nested switch case-Switch case and nested ifs- Loop control: for, nested for, while, do-while-do while statement with while loop-Arrays: initialization, characteristics, types and operations.

UNIT III POINTERS AND FUNCTIONS (9)

Strings and Standard functions: Declaration and Initialization, formats, standard, conversion and memory functions, applications; Pointers- pointers and address- declaration- void, wild, constant pointers–arithmetic operations with pointers- pointers and arrays- pointers to pointers-pointers and strings; Functions- return

statement- types- call by value and reference-returning more values, function as an argument, function with operators, decision statements, loop statements, arrays and pointers, recursion- Tower of Hanoi.

UNIT IV STORAGE CLASSES, STRUCTURE AND UNION (9)

Storage classes: auto- extern- static-register; Preprocessor directives; Structures: Declaration and initialization, structure within structure- Array Of Structures- pointer to structure-structure and functions- typedef- bitfields- enumerated data types; union: calling BIOS and DOS services- union of structures.

UNIT V FILES, GRAPHICS AND DYNAMIC MEMORY ALLOCATION (9)

Files: streams and file types- operations- FileI/O- read and write- other–creating, processing and updating files- simple file handling programs- low level programming- command line arguments-Environment variables; Graphics: initialization- functions- library functions- text- patterns and styles-mouse programming- drawing non common figures; Dynamic memory allocation

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *ITL Education solutions Limited, **"Introduction to Information Technology"**, Pearson Education(India), 2005. (Unit I) (Chapter:1,7,9,10,15,16)*

2. *Ashok N. Kamthane, **"Programming in C"**, Pearson Education, 2nd Edition, 2012.*

REFERENCE BOOKS:

1. *Byron Gottfried, **"Programming With C"**, II Edition, (Indian Adapted Edition), TMH publications, 2006.*

2. *Brain W. Kernighanand Dennis M. Ritchie, **"The C Programming Language"**, Pearson Education Inc.(2005).*

3. *E.Balagurusamy,**"Programming in ANSIC"**,5th Edition,TataMcGraw-HillEducation,2011.*

12L107 - WORKSHOP

COURSE OBJECTIVES:

- *To model various types of joints in carpentry and welding*
- *To create ability for sand mould preparation*
- *To develop skill for metal fabrication of simple parts*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO1: An ability to model various joints in carpentry and welding
CO2: An ability to prepare sand moulds for cube, bush, pipes, etc.
CO3: An ability to fabricate the various parts in metal sheet

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Introduction to use of tools and equipments in Carpentry, Welding, Foundry and Sheet metal.
2. Safety aspects in Welding, Carpentry and Foundry.
3. Half lap Joint and Dovetail Joint in Carpentry
4. Welding of Lap joint, Butt joint and T-joint
5. Preparation of Sand mould for cube, conical bush, pipes and V pulley.
6. Fabrication of parts like tray, frustum of cone and square box in sheet metal.

TOTAL: 45HOURS

12L108-CHEMISTRY LABORATORY

COURSE OBJECTIVES:

- *To perform analytical experiments in the field of chemistry*
- *To estimate various chemical elements in the given substance*
- *To create exposure to practical knowledge of various chemical phenomena by demonstration of experiments*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: An ability to perform analytical experiments in the field of chemistry
CO 2: An ability to estimate various chemical elements in the given substance
CO 3: Exposure to practical knowledge of various chemical phenomena by demonstration of experiments

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Estimation of hardness by EDTA method
2. Estimation of chloride by argentometric method
3. Determination Dissolved oxygen by Winkler's method
4. Estimation of available chlorine in bleaching powder
5. Estimation of copper and zinc in brass sample
6. Estimation of manganese in steel sample.
7. Surface area of activated carbon by adsorption technique using acetic acid
8. Estimation of calcium and magnesium in magnesite ore
9. Estimation of manganese in pyrolusite ore
10. Conduct metric titration of mixture of strong and weak acids using strong base
11. Potentiometric titration (Ferrous iron versus potassium dichromate)
12. Estimation of sodium or potassium using flame photometer
13. Estimation nickel using spectrophotometer
14. Estimation of iron by spectrophotometer.

(Any twelve experiments only)

REFERENCE BOOKS:

1. *A.O.Thomas,**"Practical Chemistry"**,6th Edn,Scientific book centre, Kannanore (1995)*

2. *Arthur I. Vogel, **Quantitative Inorganic Analysis**, 3rd Edn, ELBS (1970)*

12L109-C PROGRAMMING LABORATORY

COURSE OBJECTIVES:

- *To illustrate flowchart and algorithm for a given problem*
- *To exploit operators, decision making and looping in C programs*
- *To develop an efficient C program using appropriate C elements*
- *To identify, analyze and formulate C programs for the real time applications*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: An ability to illustrate flowchart and algorithm for a given problem
CO 2: An ability to exploit operators, decision making and looping in C programs
CO 3: An ability to develop an efficient C program using appropriate C elements
CO 4: An ability to identify, analyze and formulate C programs for the real time applications

L	T	P	C
0	0	3	2

Exercises illustrating the following concepts:

1. Operators , Expressions and IO formatting
2. Decision Making and Looping
3. Arrays and Strings
4. Functions and Recursion
5. Pointers
6. Dynamic Memory Allocation
7. Structures
8. Unions
9. Files
10. Command line arguments
11. Graphics.
12. Mini Project

TOTAL : 45 HOURS

12L2Z1-COMMUNICATION SKILLS IN ENGLISH-II

PREREQUISITE: COMMUNICATION SKILLS IN ENGLISH-I

COURSE OBJECTIVES:

- *To improve the grammatical knowledge of the students*
- *To acquire knowledge on both American & British English listening skills*
- *To develop skill to address the gathering on an occasion*
- *To gain basic knowledge to prepare an industrial report*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Improvement in the grammatical knowledge of the students
CO 2: An ability to improve listening skills on both American & British English
CO 3: An ability to address the gathering on an occasion
CO 4: Development of a basic knowledge to prepare an industrial report

L	T	P	C
3	1	0	4

UNIT I **(15)**

Use of Relative Clauses-Noun Phrases- Listening to Conversations- Telephonic Conversational Skills Paralinguistic Communication (Articulation, Stress and Pause) – Cloze Reading-Reading to practice stress, pause etc. –Process Description- Transcoding

UNIT II **(15)**

Cause and Effect Expressions-Time and Contracted Time Statements- Listening to Narration/Speech – Extemporaneous -Instructions with Imperatives- Reading for inferring meaning: Lexical and Contextual - Understanding the organization of the Texts -Writing Articles (Technical & General)

UNIT III **(15)**

Phrasal Verbs -American and British Vocabulary- Video Listening: Listening to Authentic Clippings in English (Movie/Play)-Making Speeches (Introducing a Chief Guest, Delivering Welcome Address, Proposing Vote of Thanks)-Reading for understanding discourse cohesion-Logical Connectives - Minutes of the Meeting

UNIT IV **(15)**

Idiomatic Expressions -Numerical Expressions- Listening to authentic songs in English-Mock Interviews-Reading for identifying the topic sentence in each paragraph-An Introduction to Different kinds of Report-Report on an Industrial Visit-Report on an accident

UNIT V **(15)**

Abstract – foot notes-bibliography-plagiarism- Technical Style- Presentation of a Mini Project Report of 25 to 30 pages on one of the topics from the First Year B.E Syllabus or similar topics.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

REFERENCE BOOKS:

1. *Meenakshi Raman, Sangeetha Sharma, "**Technical Communication: English Skills for Engineers**", OxfordUniversity Press: New Delhi, 2008*
2. *Rizvi Ashrav.M, "**Effective Technical Communication**" Tata McGraw Hill: New Delhi, 2005*
3. *Herbert, A.J, "**Structure of Technical English**": the English Language Society*
4. *Authentic NET Resources*

12L2Z2-ENGINEERING MATHEMATICS – II

PREREQUISITE: ENGINEERING MATHEMATICS-I

COURSE OBJECTIVES:

- *Understand vector calculus operations and identities to solve physical problems*
- *Develop the ability of mathematical modeling of systems using differential equations*
- *Understand the concept of Complex differentiation leads to analytic functions, conformal mapping and bilinear mapping*
- *Gain the knowledge on Complex Integration around unit circle and semi circle*
- *Understand the concepts of Laplace Transforms including applications*

COURSE OUTCOMES:

At the end of the course the students should be able to

CO 1: Apply Green's, Gauss divergence and Stoke's theorems to verify applications (Usage)
CO 2: Apply first, second and higher order differential equations to solve real world applications (Usage)
CO 3: Obtain the images corresponding to conformal and bilinear mapping (Usage)
CO 4: Evaluate contour integration using Cauchy-Residue theorem (Usage)
CO 5: Perform Laplace transformations to solve linear and second order differential equations with constant coefficients (Usage)

L	T	P	C
3	1	0	4

UNITI-VECTOR CALCULUS (9)

Gradient,Divergence,Curl-Directional derivative–Irrotational and Solenoidal fields-Vector identities-Line, Surface and Volume Integrals–Green's Theorem in a Plane, Gauss Divergence and Stoke's Theorems (Statements only)- Verifications and Applications.

UNITII-ORDINARY DIFFERENTIAL EQUATIONS (9)

Linear equations of Second and Higher order with constant coefficients-Simultaneous first order Linear equations with constant coefficients-Linear equations of Second and Higher order with variable coefficients-Legendre type Method of variation of parameters-method of reduction of order.

UNIT III- COMPLEX DIFFERENTIATION (9)

Linear equations of Second and Higher order with constant coefficients-Simultaneous first order Linear equations with constant coefficients-Linear equations of Second and Higher order with variable coefficients-Legendre type Method of variation of parameters-method of reduction of order.

UNIT IV-COMPLEX DIFFERENTIATION (9)

Cauchy's integral theorem, Cauchy's integral formula-Taylor's and Laurent's theorems (Statements only)and expansions–Poles and Residues–Cauchy's Residue theorem–Contour integration–Circular and semicircular contours.

UNIT V-LAPLACE TRANSFORMATIONS (9)

Laplace transforms – Properties and standard transforms-Transforms of unit step, unit impulse and error functions–Transforms of periodic functions-Inverse Laplace transforms-Initial and Final –Convolution theorem (statement only) and applications-Applications to Solution of Lineary differential equations of second order with constant coefficients.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *Veerarajan.T., "**Engineering Mathematics" for Semesters I and II** , Tata McGraw Hill Publishing Co.,New Delhi., 2010.*
2. *Dr.Kandasamy.P., Dr.Thilagavathy.K and Dr.Gunavathy.K., "Engineering Mathematics" for First Year B.E/B.Tech, S. Chand & Co., Ram Nagar, New Delhi, 2010.*

REFERENCE BOOKS:

1. *N.P.Bali., Dr. Manish Goyal., "**A text book of Engineering Mathematics**" vol. II , University science Press,New Delhi, 2010.*
2. *H.C.Taneja., "**Advanced Engineering Mathematics**" vol.II, I.K.International Pub. House Pvt.Ltd., New Delhi,2007.*
3. *Baburam., "**Engineering Mathematics**", Pearson, New Delhi, 2010.*
4. *B.V.Ramana., "**Higher Engineering Mathematics**" Tata McGraw Hill Publishing Co., New Delhi, 2007.*
5. *Grewal B.S., "**Higher Engineering Mathematics**"(40th Edition) Khanna Publishers, New Delhi., 2007.*

12L203-ENGINEERING PHYSICS

PREREQUISITE: MATERIALS SCIENCE

COURSE OBJECTIVES:

- *To gain a basic knowledge on Lasers and its applications*
- *To study basic optical fibers that are useful for communication systems*
- *To gain knowledge on quantum and crystal physics*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Basic knowledge on Lasers and its applications.
CO 2: Knowledge on working principles of optical fibers and their applications
CO 3: Exposure to quantum and crystal physics

L	T	P	C
3	0	0	3

UNIT I-LASERS (9)

Introduction-Principle of laser action-characteristics of laser-Spontaneous emission and Stimulated emission–Einstein's coefficients-population inversion–methods of achieving population inversion-Types of pumping–Optical Resonator- Types of Lasers–Principle, construction and working of different types of laser-CO_2, Nd-YAG, Semiconductor laser and Dyelaser-applications of laser-Lasers in microelectronics, welding, heat treatment, cutting–holography–construction and Reconstruction of a hologram–applications of holography.

UNIT II-FIBER OPTICS AND APPLICATIONS (9)

Introduction–Basics Principles involved in fiber optics-Total internal reflection–Structure of optical fiber–Propagation of light through optical fiber–Derivation for Numerical Aperture and acceptance angle-fractional index change-Preparation of optical fiber-Crucible and Crucible technique-Classification of optical fiber based on materials, refractive index profile and Modes-Splicing-fusion and multiple splices-Light sources for fiber optics.-LED-Detectors-Principle of photo detection-PIN Photo diode,-Fiber optical communication links-Fiber optic sensors-Temperature, displacement.

UNIT III-QUANTUM PHYSICS AND APPLICATIONS (9)

Limitations of classical Physics-Introduction to Quantum theory-Dual nature of matter and radiation-de-Broglie wavelength interms of voltage, energy, and temperature–Heisenberg's Uncertainty principle– verification-Schrödinger's Time independent and Time dependent wave equations–physical significance of a wave function-Particle in a one dimensional deep potential well–microscope–basic definitions of microscope –Electron microscope-Scanning Electron Microscope(SEM)-Transmission Electron Microscope(TEM).

UNIT-IV ULTRASONICS **(9)**

Introduction–properties of ultrasonic waves–production of ultrasonic waves Magneto striction effect-Magneto striction generator-Piezoelectric crystals-Piezoelectric effect-Piezoelectric generator-Detection of ultrasonic wave–kundt's tube method–sensitive flame method–thermal detector method–piezo electric detector method-cavitation -industrial applications-ultrasonic drilling-ultrasonic welding- ultrasonics oldering and ultrasonic cleaning-Non-destructive Testing- Pulse echo system, through transmission and resonance system.

UNIT-V CRYSTAL PHYSICS **(9)**

Introduction–Crystalline and Non-crystalline materials–Lattice–Unit Cell–Crystal system-Bravais lattices–Millerindices–dspacing in cubic lattice–Calculation of number of atoms per unit cell–Atomic radius–Coordination number– Packing factor for SC, BCC, FCC, and HCP structures–NaCl–Polymorphism and allotropy–Crystal defects–Point, line and surfaced effects.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Ganesan S. Iyandurai N, "**Engineering Physics I**", Gems Publishers, Coimbatore,201044*

REFERENCE BOOKS:

1. *Gaur R K and Gupta S L-"**Engineering Physics**", Dhanpat Raj and sons, 2002*
2. *Avadhanulu M N and Kshirsagar P G,"**A textbook of Engineering Physics**"S.Chand and Company Ltd,NewDelhi,2005*
3. *Arumugam M- "**Engineering Physics**", Anuadha Publishers, 2002*
4. *Jayakumar S, "**Engineering Physics**", RK Publishers, Coimbatore, 2003*

12L204-OBJECT ORIENTED PROGRAMMING USING C++

PREREQUISITE: PROGRAMMING IN C

COURSE OBJECTIVES:

- *To acquire a basic knowledge on object oriented programming concepts and methods*
- *To develop a skill to write a C++ program*
- *To learn the concepts of classes and data abstraction*
- *To develop and increase the confidence level of the students in the programming part and encourage them in the automation side*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Basic knowledge on object oriented programming concepts and methods
CO 2: Development of a skill to write a C++ program
CO 3: Knowledge on the concepts of classes and data abstraction
CO 4: Improvement in the confidence level of the students in the programming part and Encouraging them in the automation side

L	T	P	C
3	0	0	3

UNIT-I CONCEPTS (9)

Complexity: Inherent Complexity-Structure-bringing Order to Chaos-On Designing Complex Systems; Object Model: Evalution-Elements-Applying Object Model; Classes and Objects-Nature of an Object-Relationships-Nature of a Class-Relationship among Classes-Interplay of classes and objects-On building Quality classes and objects; Classification-importance-identifying classes and objects-key abstraction and mechanisms.

UNIT-II METHODS (9)

Notation: Elements-class diagram-state transition, object, Interaction, Module, Process diagram-Applying the Notation; Process: Principles-micro, macro development process; Pragmatics: Management and Planning-staffing-Release management-Reuse-Quality Assurance -Documentation-tools-Benefits and Risks

UNIT-III OVERVIEW OF C++ (9)

Introduction-Variables and basic types- library types-Arrays- Pointers-Expressions-Statements- Functions-I/O library

UNIT-IV CLASSES AND DATAABSTRACTION (9)

Classes: definitions and Declarations –this pointer-scope constructors-friend, static class members; Copy control; Overloading operations and conversions; Definitions, Input, output operators, arithmetic, relational, assignment,

subscript, member access, increment and decrement, call operators, function objects, conversions and class types.

UNIT-V OBJECT ORIENTED AND GENERIC PROGRAMMING (9)

Object Oriented Programming: Inheritance, virtual functions; Templates-Template compilation models-class template members-generich and leclass-template specialization-overloading and function templates-exception handling

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Grady Booch, "**Object Oriented Analysis and Design**", Second Edition, Pearson Education,2008.*
2. *Stanley B.Lippman Josee Lajoie,Barbara E.Moo,"**C++ Primer**",4th Edition, Pearson Education,2008.*

REFERENCE BOOKS:

1. *Ali Bahrami,"**Object oriented systems Development**",TMH,second reprint 2008.*
2. *Herbert Schildt,"**The Complete Reference C++**",Tata Mc Graw-Hill Pub.Co.Ltd.,4th edition,2003.*
3. *Ira Pohl,"**Object oriented programming Using C++**",second Edition,Pearson Education ,2008.*
4. *VenuGopal K.r.,Rajkumar,Ravishankar.T,"**Mastering C++**", Tata Mc Graw-Hill Pub.Co.Ltd.,1999.*

12L205- ELECTRICAL ENGINEERING

COURSE OBJECTIVES:

- *To get a basic knowledge on motors and transformers*
- *To learn the principles of stepper motors used in microprocessor applications*
- *To gain a basic knowledge on special machines*
- *To know the various types of motors ,its application and operation,which helps students to identify the range of motors in home and industrial applications*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: A basic knowledge on motors and transformers
CO 2: Knowledge on the principles of stepper motors used in microprocessor applications
CO 3: A basic knowledge on special machines
CO 4: Exposure to various types of motors ,its application and operation

L	T	P	C
3	0	0	3

UNIT I DC MACHINES (9)

DC Generator-Construction-Working principle-Armature reaction-Commutation-EMF equation-Electrical characteristics- Applications- DC Motors-Back emf-Torque equation-Performance characteristics-Starters-tests-Speed control-Applications.

UNIT II TRANSFORMERS (9)

Single phase-Working principle-emf equation-Types-Phasor diagram-Equivalent circuit-Auto transformers-All day efficiency- Three phase-Construction-Star and Delta connections.

UNIT III SYNCHRONOUS MACHINES (9)

Alternators-Construction-Principle of operation-emf equation-Phasor diagram-Regulation-Synchronous motor-Power relation- Effect of excitation-phasor diagram- V and inverted V curves- Hunting-Starting methods-Applications.

UNIT IV INDUCTION MACHINES (9)

Three phase-Construction-Working principle-Speed-torque curve-Starting-Speed control-Single phase-Principle of operation- Types-Applications.

UNIT V SPECIAL MACHINES (9)

Stepper motor-DC and AC servomotors-AC series motor-Universal motor-Printed circuit(Disc) DC motor-Reluctance motor- Hysteresis motor-Linear induction motor.

LECTURE:45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *J.B.Guptha,**" Theory and Performance of Electrical machines",**S.K.Kataria & Sons, NewDelhi 2009.*
2. *B.L.Theraja,**"A TextBook of Electrical Technology",** VolumeII, (AC & DC Machines),S.Chand & Company Ltd,NewDelhi,2004.*

REFERENCE BOOKS:

1. *Alexander Langsdorf,**" Theory of DC Machinery",**PHI,1975.*
2. *Alexander S.Langsdorf,**"Theory of Alternating - Current Machinery",**PHI,1985.*
3. *I.J.Nagrath, D.P.Kothari,**"Electric Machines",**TMH,2003.*
4. *B.R.Sharma,**"Electrical Machines"**, Satya Prakashan Publication,2000.*

12L206- SEMICONDUCTOR DEVICES

COURSE OBJECTIVES:

- *To gain a basic knowledge on Active and passive components*
- *To learn the principles of diodes and transistors suitable for various applications*
- *To gain a basic knowledge on optoelectronic devices*
- *To learn the concepts of analog devices*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Knowledge on theory of basic semiconductor devices
CO 2: Ability to design biasing circuits for basic semiconductor devices
CO 3: Basic knowledge on optoelectronic devices and special diodes
CO 4: Knowledge on principles and applications of display devices

L	T	P	C
3	0	0	3

UNIT 1-PN JUNCTION AND SEMICONDUCTOR DIODES (9)

Energy band structure of conductors, semiconductors and Insulators-Classification of semiconductors-conductivity of semiconductors-Drift and diffusion currents-Continuity Equation-Energy band structure of PN junction diode- Diode current equation-Transitionor space charge capacitance-Diffusion capacitance-Effect of temperature on PN junction diodes-Diode switching characteristics-PN diode and Zener diode applications.

UNIT II-BIPOLAR JUNCTION TRANSISTORS (9)

Transistor current components-Ebermoll's model of transistor-Transistor as an amplifier-CE,CB and CC configurations: Analysis of cut-off and saturation regions- Transistor switching times-maximum voltage rating.

UNIT III-FIELD EFFECT TRANSISTORS (9)

Operation and Characteristics of JFET,FET as a Voltage variable resistor, Metal oxide semiconductor field effect transistor(MOSFET)-Enhancement and Depletion mode MOSFET-Characteristics of n-MOS and p-MOS- CMOS characteristics-Inverted TFET-Operation and Characteristics.

UNIT IV-BIASING OF BJT AND FET (9)

DC operating point and Load line-Q point-Bias Stability, Transistor biasing methods: Fixed bias-Collector to basebias-Self biasing, Bias compensation methods, Thermistor and sensistor compensation techniques, thermalrunaway ,thermal stability, FET biasing methods: Self bias-Source bias-Voltage divider bias-Biasing enhancement and depletion MOSFET.

UNIT V DISPLAY DEVICES AND SPECIAL DIODES **(9)**

Photo emissitivity and photo-conductivity-Construction and characteristics of LCD, LED, Photoconductive cell, photo voltaic cell, photo diode, solar cell, photo transistors, plasma display ,numeric displays, opto couplers and LASER diodes-Theory and Characteristics of Schottky diode, Tunnel diode and Varactor diode, SCR,TRIAC,LDR.

LECTURE: 45 TUTORIAL:0 TOTAL: 45

TEXT BOOKS:

1. *Jacob Millman, Christos Halkias & Satyabrata Jit, Millman's"**Electronic Devices and Circuits**", 2nd Edition, McGraw Hill, 2008.*

2. *Robert L.Boylestad, Louis Nashelsky, "**Electronic Devices and Circuit Theory**", Pearson education, 9th Edition,2006.*

REFERENCE BOOKS:

1. *S.Salivahanan, N.Sureshkumar and A.Vallavaraj, "**Electronic Devices and Circuits**", 2nd Edition, Tata McGraw Hill, 2008.*

2. *Allen Mottershead "**Electronic Devices and Circuits**", Prentice Hall of India, 2008.*

3. *Douglas.A.Pucknell, Kamran Eshraghian, "**Basic VLSI Design, Principles and Application**", PHI 2009.*

12L207-PHYSICS LABORATORY

COURSE OBJECTIVES:

- *To get practical knowledge on electromagnetism and optics*
- *To apply knowledge about electrical and electronic devices*
- *To work in a team to achieve goals*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Practical knowledge on electromagnetism and optics
CO 2: An ability to apply knowledge about electrical and electronic devices
CO 3: An ability to work in a team to achieve goals

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Spectrometer - diffraction grating Normal incidence method
2. Air wedge
3. Youngs modulus – cantilever bending Koening's method
4. Particle size determination
5. Thermal conductivity of the bad conductor Lee's disc method
6. Ammeter and voltmeter calibration – low range
7. Resistance of the given coil of wire – carey Foster's bridge
8. Torsional pendulum
9. Young's modulus - non uniform bending
10. Transistor characteristics

(Any Eight experiments only)

TOTAL: 45 HOURS

12L208-ENGINEERING GRAPHICS

COURSE OBJECTIVES:

- *To gain a basic knowledge in representing various curves & conics*
- *To learn geomentrical constructions and orthographic projections*
- *To convert pictorial view to orthographic projections*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Basic knowledge in representing various curves & conics
CO 2: Ability to learn geometrical constructions and orthographic projections
CO 3: Ability to convert pictorial view to orthographic projections

L	T	P	C
2	0	3	4

UNIT I GEOMETRICAL CONSTRUCTIONS (15)

Dimensioning- Lettering-Types of Lines-Scaling conversions- Dividing a given straight line in to any number of equal parts-Bisecting a give angle-Drawing a rectangular polygon given one side-Special methods of constructing a pentagon and hexagon-Construction of curves like ellipse, parabola, cycloid and involute using one method.

UNIT II ORTHOGRAPHIC PROJECTIONS (25)

Introduction to Orthographic Projection-Projection of points-Projection of straight lines with traces-Projection of planes-Conversion of pictorial views to orthographic views-Projection of solids-Auxiliary projections

UNIT III SECTION OF SOLIDS AND DEVELOPMENT (15)

Section of solids-Development of surfaces

UNIT IV INTERPETRATION OF SOLIDS (10)

Cylinder and cylinder, cone and cylinder only

UNIT V PICTORIAL VIEWS (10)

Isometric projections-Conversion of orthographic views to pictorial views (simple objects).

LECTURE: 30 PRACTICAL: 45 TOTAL: 75

REFERENCE BOOKS:

1. *K. Venugopal, "**Engineering Graphics**", New Age International (P) Limited, 2007*
2. *Dhananjay.A.Jolhe, "**Engineering Drawing**" Tata McGraw Hill Publishing Co., 2007*
3. *K.V.Nataraajan, "**A Text Book of Engineering Graphics**", Dhanalakshmi Publishers, Chennai, 2006*
4. *M.B.Shah and B.C.Rana, "**Engineering Drawing**", Pearson Education, 2005*
5. *Luzadder and Duff, "**Fundamentals of Engineering Drawing**", Prentice Hall of India Pvt Ltd, XI Edition,2001*

12L209- ELECTRICAL ENGINEERING LABORATORY

COURSE OBJECTIVES:

- *To implement the theoretical concepts of motors and generators*
- *To perform various load tests on motors and generators*
- *To apply practical knowledge on DC motors and transformers*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO 1: Implementation of the theoretical concepts of motors and generators
CO 2: An ability to perform various load tests on motors and generators
CO 3: An ability to apply practical knowledge on DC motors and transformers

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Speed control of DC shunt motor.
2. Swinburne's Test.
3. DC series motor load test.
4. Magnetization characteristics of separately excited generator.
5. Load and Magnetization characteristics of self excited generator.
6. Load test on DC compound generator.
7. Load test on DC Shunt Motor.
8. Load test on DC Compound Motor.
9. OC and SC tests on single phase transformers.
10. Regulation of Alternator.
11. Equivalent circuit of three phase Induction motor.
12. Load test on three phase Induction motor.
13. V and inverted V curves on Synchronous motor.
14. Load test on single phase Induction motor.
15. Study of Starters: for AC motors and DC motors.

TOTAL: 45HOURS

REFERENCE BOOKS:

1. *B.L.Theraja, **"A Text book of Electrical Technology",** Volume II, (AC & DC Machines), S.Chand & Company Ltd, New Delhi, 2004.*

12L3Z1-ENGINEERING MATHEMATICS – III

PREREQUISITE: ENGINEERING MATHEMATICS-II

COURSE OBJECTIVES:

- *Understand the partial differential equation concepts.*
- *Form the Fourier series and perform Harmonics Analysis.*
- *Understand the concepts of finite and infinite Fourier transformations.*
- *Understand the method of separating variables and introduce Fourier series analysis to solve the boundary value problems.*
- *Gain the knowledge to find solutions for difference equation using z-transformation*

COURSE OUTCOMES: At the end of the course, students will be able to

CO1: Form and solve first& higher order partial differential equation, Lagrange's equations (Usage)
CO2: Determine the behavior of the Fourier series at points of discontinuity using Dirichlet's boundary Condition, Use half range sine and cosine series, Parseval's Identity and perform Harmonic Analysis of a discrete function. (Familiarity)
CO3: Solve problems using Fourier integral theorem and convolution theorem. (Usage)
CO4: Solve one dimensional wave and heat equation using separation of variables method and Fourier series. (Usage)
CO5: Develop Z-transform techniques for discrete time systems. (Assessment)

L	T	P	C
3	1	0	4

UNIT I PARTIAL DIFFERENTIAL EQUATIONS (9)

Formation of PDE by elimination arbitrary constants and functions – Solutions of standard first order partial differential equations – Lagrange's equation – Linear partial differential equations of second and higher order with constant coefficients-homogeneous and non homogeneous types.

UNIT II FOURIER SERIES (9)

Dirichlet's Conditions – General Fourier Series –Odd and even functions- Half range Sine and Cosine series – Parseval's Identity – Harmonic Analysis.

UNIT III FOURIER TRANSFORMS (9)

Statement of Fourier integral Theorem – Fourier transform pair– Fourier Sine and Cosine Transforms – Properties – Transforms of Simple functions- Convolution Theorem – Parseval's Identity-Finite Fourier transforms

UNIT IV BOUNDARY VALUE PROBLEMS (9)

Method of separation of variables – One dimensional wave equation – One dimensional heat equation – Unsteady and Steady state conditions –Fourier series solution.

UNIT V Z-TRANSFORMS (9)

Z-transforms - Elementary properties-Inverse Z-transform - Initial and Final value theorems - Convolution theorem - Formation of difference equations - Solution to difference equations of second order with constant coefficients using Z - transform.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *Veerarajan.T., "Transforms and Partial Differential Equations", Tata McGraw Hill Publishing Co., New Delhi. 2010.*

REFERENCE BOOKS:

1. *N.P. Bali., Dr. Manish Goyal., "Transforms and Partial Differential Equations", University science Press, New Delhi, 2010.*
2. *Dr.Kandasamy.P., Dr.Thilagavathy.K and Dr.Gunavathy.K., "Engineering Mathematics" for Third Semester B.E/B.Tech, S. Chand & Co., Ram Nagar, New Delhi, 2010.*
3. *B.V.Ramana., "Higher Engineering Mathematics" Tata McGraw Hill Publishing Co., New Delhi, 2007.*
4. *Grewal B.S., "Higher Engineering Mathematics" (40th Edition) Khanna Publishers, New Delhi.,2007.*
5. *Glyn James, "Advanced Modern Engineering Mathematics" (8th Edition) Wiley India , New Delhi., 2007.*

12L302- CIRCUIT THEORY

COURSE OBJECTIVES:

- *To Acquire a thorough knowledge of the Circuit components, parameters and theorems related to AC and DC circuit analysis*
- *To apply the concepts of resonance, transients and coupled circuits and develop, design and problem solving skills in allied circuits*
- *To gain knowledge about various concepts of graph theory, its terminology and its application in circuit analysis*

COURSE OUTCOMES:

Upon completion of this course the students will have:

CO1: A thorough knowledge of the Circuit components, parameters and theorems related to AC and DC circuit analysis
CO2: Ability to apply the concepts of resonance, transients and coupled circuits to design, develop, and analyze the electric circuits, thus improving the problem solving skills
CO3: Knowledge on various concepts of graph theory, its terminology and its application in circuit Analysis

L	T	P	C
3	1	0	4

UNIT I DC AND AC CIRCUITS (9)

DC circuits-Circuit elements - Current and voltage sources - Ohm's and Kirchhoff's laws - Resistive circuits - Series and parallel reduction method and analysis- Voltage and current division-Source transformation-Star delta transformation. AC circuits-Introduction to alternating quantities- Average and RMS values-Circuits elements, series and parallel combination of circuit elements - Use of complex notation- Phasor representation of variables - Steady state solution using phasor algebra - Analysis of series, parallel and series, parallel circuits - Active and reactive power.

UNIT II NETWORK ANALYSIS AND THEOREMS (9)

Mesh and nodal analysis-Matrix method of solving network equations-Superposition theorem -Thevenin's and Norton's theorem- Maximum power transfer theorem - Millman's theorem - Compensation theorem - Reciprocity theorem - Tellegen's theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS (9)

Series and parallel resonance - Variation of impedance with frequency- Bandwidth of RLC circuit - Q factor - Impedance of RLC circuit near resonance - Selectivity - Effect of variation in circuit reactive elements on selectivity-Self inductance- Coefficient of coupling-Dot convention analysis of coupled circuits-Ideal transformer-Analysis of single tuned and double tuned circuits

UNIT IV NETWORK TRANSIENTS (9)

Transient concepts-Transient response of simple RL and RC series, RL and RC parallel circuits-Transient response of RLC series and parallel circuits –solution of RL,RC and RLC series and parallel circuits for step input and sinusoidal input using Laplace transform method.

UNIT V GRAPH THEORY (9)

Linear graph of a network - Trees- Tie-set and Cut-set schedules - Incidence matrix - Reduction-solution of resistive networks using tie-set and cut-set schedules-Principle of duality-Dual networks.

LECTURE:45 TUTORIAL:15 TOTAL:60 HOURS

TEXT BOOKS:

1. *William Hart Hayt, Jack Ellsworth Kemmerly, "**Engineering Circuit Analysis**", Tata McGraw- Hill, New Delhi, 7th Edition, 2007.*
2. *Boylestad R.L, "**Introductory Circuit Analysis**", Prentice Hall, 10th Edition, 2003.*
3. *Decarlo R.A,Pen-MinLin, "**Linear Circuit Analysis**", Oxford University press, 2001.*

REFERENCES BOOKS:

1. *Umesh Sinha, "**Network Analysis and Synthesis**", Satya Prakashan,New Delhi, Reprint edition, 1997.*
2. *Charles Alexander, Mathew Sadiku, "**Fundamentals of Electric Circuits**", Tata Mc Graw Hill, New Delhi,2009.*
3. *Sudhahar.A, Shyammohan S.P, "**Circuits and Networks**: **Analysis and Synthesis"**, Tata Mc Graw Hill, New Delhi,3rd Edition, 2007.*
4. *D.R.Cunningham, J.A Stuller, "**Basic Circuit Analysis**", Jaico Publishing House, Mumbai, 2000.*

12L303- ELECTRONIC CIRCUIT DESIGN

PREREQUISITE: SEMICONDUCTOR DEVICES

COURSE OBJECTIVES:

- *To gain knowledge about the basic electronic circuits*
- *To acquire an in-depth knowledge of low frequency and high frequency analysis of BJT and FET amplifiers*
- *To design feedback amplifiers and oscillators*
- *To design the wave shaping circuits*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Knowledge of the basic electronic circuits
CO2: In-depth knowledge of low frequency and high frequency analysis of BJT and FET amplifiers
CO3: Ability to design feedback amplifiers and oscillators
CO4: Ability to design the wave shaping circuits

L	T	P	C
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UNIT I RECTIFIERS AND POWER SUPPLIES (9)

Classification of power supplies, Rectifiers - Half-wave, full-wave and bridge rectifiers -Rectifiers with filters- C, L, LC and CLC filter- Voltage regulators - Zener diode as a voltage regulator - Over voltage protection, Switched mode power supply-Power control using SCR-Uninterrupted Power supplies.

UNIT II LOW FREQUENCY AND HIGH FREQUENCY ANALYSIS OF AMPLIFIERS (9)

Frequency response of amplifiers - BJT AC Analysis- Hybrid and π equivalent models -Low frequency analysis of BJT & FET - High frequency analysis of BJT and FET -Miller's theorem -Midband analysis of amplifiers-Multistage frequency effects.

UNIT III FEEDBACK AMPLIFIERS AND OSCILLATORS (9)

Types of feedback amplifiers-Analysis of voltage and current feedback amplifiers-Oscillators- Barkhausen criterion-Design of Oscillators - Colpitts oscillator, Hartley oscillator, RC Phase Shift Oscillator, Wein Bridge oscillator and Crystal Oscillators.

UNIT IV LARGE SIGNAL AND TUNED AMPLIFIERS (9)

Classification of large signal amplifiers-Class A, B, C, D and AB amplifiers operation -efficiency - Class A amplifier with load- Class B push-pull amplifier - Distortion in amplifiers - MOSFET power amplifier-Tuned Amplifiers-Single, Double Tuned and Stagger Tuned Amplifiers.

UNIT V MULTIVIBRATORS **(9)**

Design of Monostable, bistable and astable multivibrators-Schmitt trigger-Monostable and astable blocking oscillators using emitter based timing-UJT Saw tooth generator.

LECTURE:45 TUTORIAL:15 TOTAL:60 HOURS

TEXT BOOKS:

1. *Robert L. Boylestad and Louis Nashelsky, "**Electronic Devices and Circuit Theory**", 9th Edition, Pearson Education PHI, 2007.*
2. *Millman.J and Halkias .C, "**Integrated Electronics**", TMH, 2007.*

REFERENCE BOOKS

1. *David A. Bell, "Electronic Devices and Circuits", 4th Edition, PHI, 2007*
2. *Floyd, " Electronic Devices", 6th Edition, Pearson Education, 2002.*
3. *I.J. Nagrath," Electronic Devices and Circuits", PHI, 2007.*
4. *S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, "Electronic Devices and Circuits", 2nd Edition, TMH, 2007.*
5. *Jacob Millman &Taub, "Pulse, Digital and Switching Waveforms",2nd Edition, 2007*

12L304- DATA STRUCTURES AND ALGORITHMS

PREREQUISITE: OBJECT ORIENTED PROGRAMMING USING C++

COURSE OBJECTIVES:

- *To Acquire basic knowledge of linear and non-linear data structures*
- *To apply the knowledge of linear and non-linear data structures to Engineering problems*
- *To formulate algorithms for sorting and searching problems*
- *To apply the knowledge of Algorithmic design techniques for optimization problems*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Basic knowledge of linear and non-linear data structures
CO2: Ability to apply the knowledge of linear and non-linear data structures to Engineering problems
CO3: Ability to formulate algorithms for sorting and searching problems
CO4: Ability to apply the knowledge of Algorithmic design techniques for optimization problems

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UNIT I ALGORITHM ANALYSIS (9)

Algorithm analysis - Mathematical background - Run time calculations - Logarithms in running time – List ADT - Link lists– Single, Double, Circular – Operations.

UNIT II STACK AND QUEUES (9)

Stack - Primitive operation – Application – Queues ADT – Array implementation of queues and Applications – Priority Queues – Applications – Binomial queue structure - Binomial queue operations.

UNIT III TREES (9)

Binary trees - Basic operations and representations - Binary tree transversal - Representation of lists as binary trees – Application - Balanced Trees - AVL trees - B trees - Various types of hashing.

UNIT IV SORTING AND SEARCHING (9)

Sorting - Exchange sorts: Bubble sort - Quick sort - Selection and Tree sorting: Straight selection sort - Binary tree sorts – Heap sort - Insertion sorts - Merge sorts - Radix sorts - Efficiency analysis. Searching - Basic search techniques - Sequential searching - Indexed sequential search - Binary search - Tree searching.

UNIT V GRAPHS AND ALGORITHM DESIGN TECHNIQUES (9)

Graphs - Definitions and properties – Representation - Graph search methods - Applications of Depth-First search - Shortest path algorithm (Dijkstra) - Minimum spanning tree (Prim's and Kruskal's algorithms). Algorithm Design Techniques: Greedy Algorithm – Divide and Conquer – Dynamic Programming – Backtracking.

LECTURE:45 TUTORIAL:0 TOTAL:45 HOURS

TEXT BOOKS:

1. *Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 2nd Edition, Pearson Education, 2009.*
2. *Yedidyah Langsam Aaron, Moshe.J.Augenstein, M.Tenenbaum, "Data Structures using C and C++", 2nd Edition, PHI Learning Pvt.Ltd, 2011.*

REFERENCE BOOKS:

1. *Jean Paul Tremblay, Paul G. Sorenson, "An Introduction to Data structures With Applications", Tata McGraw Hill Publishing Company Ltd, 2008.*
2. *T.H.Cormen, C.E. Leiserson, R.L. Rivest, C.Stein, "Introduction to Algorithms", 3rd Edition,PHILearningPvt.Ltd, 2009.*
3. *Alfred V. Aho, John E. Hoporoft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, 03.*

12L305- SIGNALS AND SYSTEMS

COURSE OBJECTIVES:

- *To analyze the Continuous Time and Discrete Time signals and systems*
- *To gain knowledge of Fourier and Laplace Transforms and its application in the analysis of Continuous Time Systems*
- *To gain knowledge of Discrete Time Fourier Transforms and Z-Transforms and its application in the analysis of Discrete Time Systems*
- *To analyze state variable equations of linear time invariant Continuous and Discrete Time Systems and its matrix representation*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Knowledge of Continuous Time and Discrete Time signals and systems
CO2: Ability to apply Fourier and Laplace Transforms for the analysis of Continuous Time Systems
CO3: Ability to apply Discrete Time Fourier Transforms and Z-Transforms for the analysis of Discrete Time Systems
CO4: Ability to analyze state variable equations of linear time invariant Continuous and Discrete Time Systems and its matrix representation

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UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS (9)

Continuous Time (CT) signals - Discrete Time (DT) signals - Step, Ramp, Pulse, Impulse, Exponential, classification of CT and DT signals –periodic and aperiodic signals, random signals, Energy and Power signals - CT systems and DT systems, Classification of systems.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS (9)

Fourier series analysis- spectrum of Continuous Time signals- Fourier and Laplace Transforms in signal Analysis.

UNIT III LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS (9)

Differential Equation-Block diagram representation-impulse response, convolution integrals-Fourier and Laplace transforms in Analysis- State variable equations and matrix representation of systems.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS (9)

Baseband Sampling of CT signals - Aliasing - DTFT and properties - Z transform and properties.

UNIT V LINEAR TIME INVARIANT DISCRETE TIME SYSTEMS (9)

Difference Equations-Block diagram representation-Impulse response-Convolution sum- DTFT and Z Transform analysis of Recursive and Non-Recursive systems- State variable equations and matrix representation of systems.

LECTURE:45 TUTORIAL:15 TOTAL:60 HOURS

TEXT BOOKS:

1. *Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, Indian Reprint, 2007.*
2. *Simon Haykins and Barry Van Veen, "Signals and Systems", John Wiley & sons, 2004.*

REFERENCE BOOKS:

1. *H P Hsu, Rakesh Ranjan, "Signals and Systems", Tata McGraw Hill, 7th Reprint, 2010*
2. *Edward W. Kamen, Bonnie S. Heck, "Fundamentals of Signals and Systems Using the Web and MATLAB", Pearson Prentice Hall, 2007.*
3. *John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2008*
4. *M.J.Roberts,"Signals and Systems, Analysis Using Transform Methods and MATLAB", Tata McGraw Hill (India),2nd Edition, 2011.*
5. *Robert A. Gabel and Richard A.Roberts, "Signals and Linear Systems", John Wiley, 3rd Edition, 2009*

12L306-ELECTROMAGNETIC WAVES AND WAVE GUIDES

COURSE OBJECTIVES:

- *To Gain basic knowledge of static electric and magnetic field principles and related laws governing them*
- *To derive wave equations for Electromagnetic wave propagation in free space and media*
- *To analyze the characteristics of wave propagation in parallel plate, rectangular and circular waveguides*
- *To gain knowledge about cavity resonators and waveguide components*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Basic knowledge of static electric and magnetic field principles and related laws governing them
CO2: Abillity to derive wave equations for electromagnetic wave propagation in free space and media
CO3: Ability to analyze the characteristics of wave propagation in parallel plate, rectangular and circular waveguides
CO4: Knowledge on cavity resonators and waveguide components

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UNIT I ELECTROSTATIC FIELDS (9)

Vector analysis- Orthogonal co-ordinate systems-Coulomb's Law-Electric field intensity-Field due to continuous Volume charge distribution-Field due to line charge-Field due to sheet of charge-Electric flux-Gauss law-Application of Gauss law- Divergence theorem-Electric scalar potential-Equipotential surface-Poisson's and Laplace equations-Capacitance of parallel plate-Capacitance of Coaxial cable-Parallel wire capacitance-Boundary conditions-Energy stored in electric field-Energy density.

UNIT II STEADY MAGNETIC FIELDS (9)

Biot-Savat's Law-Ampere's circuital law-Magnetic flux and flux density-Scalar and Vector potential-Force on a moving charge and differential current element-Magnetic Boundary conditions-Magnetic circuit-Faraday's law of electromagnetic inductance-Inductance and Mutual inductance-Inductance of transmission line-Energy stored in magnetic field-Energy density.

UNIT III ELECTROMAGNETIC WAVES (9)

Displacement current-Maxwell's equation-Equation of continuity-Inconsistency of Ampere's law-Wave motion in free space- Uniform plane waves-Sinusoidal time variations-Conductors and Dielectrics-Propagation in good conductors and Good dielectrics-Skin effect-Polarization-Reflection and Refraction of plane waves-Reflection by a conductor –Normal and Oblique incidence-Reflection by a Dielectric-Reflection at the surface of a conducting medium-Surface impedance-Poynting Theorem- power loss in a plane conductor.

UNIT IV GUIDED WAVES AND RECTANGULAR WAVEGUIDES (9)

General solutions for TE and TM waves-Waves between parallel planes of perfect conductors-Velocities of wave propagation- Attenuation in parallel plate waveguide-Wave impedance of TE and TM waves in a parallel plate waveguide-Types of waveguides-Mode theory of a Rectangular waveguide(TE and TM waves)-Characteristics of TE and TM waves-Impossibility of TEM waves in rectangular waveguides-Dominant mode - Wave impedances of TE and TM waves - Characteristic impedance of a waveguide-Attenuation factor -Excitation of various modes-Quality Factor.

UNIT V CIRCULAR WAVEGUIDES, CAVITY RESONATORS AND WAVEGUIDE COMPONENTS (9)

Bessel functions-TE and TM modes in circular Waveguides-Wave impedances-Dominant mode-Field configuration- Comparison of Circular and Rectangular waveguides-Excitation of modes-Microwave cavity resonators-Rectangular and Circular cavity resonators-Q factor of a cavity resonator for the TE_{101} mode-Cavity excitation and tuning-Applications- TEM wave in co-axial lines-Waveguide components.

LECTURE : 45 TUTORIAL : 15 TOTAL:60 HOURS

TEXT BOOKS:

1. *William H.Hayt,"Engineering Electrmagnetics", Tata McGraw-Hill,2011.*
2. *Edward.C.Jordan&Keith.G.Balmai,, "Electromagnetic Waves and Radiating Systems", Prentice Hall of India,1995*

REFERENCE BOOKS:

1. *S.Baskaran, "Transmission Lines and Waveguides", Scitech Publications(India) PVT.LTD,Chennai,2011*
2. *David K.Cheng , "Field and Wave Electromagnetics"', Pearson Edition ,1999.*
3. *Umesh Shinha,"Electromagnetic Theory and its Applications",Satya Prakashan,1996.*
4. *Gangadhar.K.A,"Field Theory"Khanna Publishers,2002.*

12L307- ELECTRON DEVICES AND CIRCUITS LABORATORY

COURSE OBJECTIVES:

- *To learn the characteristics of the basic devices and determine their parameters*
- *To design various transistor amplifiers and oscillators*
- *To design rectifiers, wave shaping circuits and resonant circuits*
- *To design and model electronic circuits using circuit simulation tool*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Ability to learn the characteristics of the basic devices and determine their parameters
CO2: Ability to design various transistor amplifiers and oscillators
CO3: Ability to design rectifiers, wave shaping circuits and resonant circuits
CO4: Ability to design and model electronic circuits using circuit simulation tool

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

(Both Discrete and P-spice Simulation)

1. Characteristics and applications of diodes.
2. Computation of h parameters for BJT.
3. Characteristics of MOSFET.
4. Characteristics of SCR/TRIAC.
5. Characteristics of Opto electronic Devices.
6. Design of Rectifiers with filters.
7. Design of AF amplifiers.
8. Design of Power amplifiers.
9. Design of feedback amplifiers.
10. Design of RF amplifiers.
11. Design of Oscillators.
12. Design of Wave shaping Circuits.

13. Design of series and parallel resonance circuits.

TOTAL: 45 HOURS

REFERENCE BOOKS:

1. *Jacob Millman,Christos Halkias & Satyabrata Jit,Millman's,"**Electronic Devices and Circuits**", 2nd Edition, McGraw Hill,2008.*
2. *S.Salivahanan,N.Sureshkumar and A.Vallavaraj, "**Electronic Devices and Circuits**", 2nd Edition,Tata McGrawHill,2008.*
3. *Robert L. Boylestad and Louis Nashelsky,"**Electronic Devices and Circuit Theory**",9thEdition, Pearson Education / PHI, 2007*

12L308 DATA STRUCTURES LABORATORY

PREREQUISITE: C PROGRAMMING LABORATORY

COURSE OBJECTIVES:

- *To develop programming skills in C++*
- *To implement various linear and non-linear data structures, sorting and searching algorithms in C++*
- *To identify suitable data structures and algorithms for a given contextual problem*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Development of programming skills in C++
CO2: Ability to implement various linear and non-linear data structures, sorting and searching algorithms in C++
CO3: Ability to identify suitable data structures and algorithms for a given contextual problem

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

Implementation of the following using C++

1. Arrays
2. Linked list
3. Stacks
4. Queues
5. Trees
6. Sorting and Searching
7. Graphs

TOTAL:45 HOURS

REFERENCE BOOKS:

1. *Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 2nd Edition, PearsoSEducation, 2009.*
2. *Yedidyah Langsam Aaron, Moshe.J.Augenstein, M.Tenenbaum,"Data Structures using C and C++", 2nd Edition, PHI Learning Pvt.Ltd, 2011.*

12L401 - RANDOM PROCESSES AND QUEUEING THEORY

COURSE OBJECTIVES:

- *Gain knowledge on basis of random variables and understand the various standard distributions and their properties*
- *Understand the basic concepts of various processes and Markov chains*
- *Acquire knowledge on various types of spectral densities and their properties*
- *Gain the knowledge about linear systems with random inputs*
- *Understand the various types of Markovian models and Birth and death models in queuing theory.*

COURSE OUTCOMES:

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

CO1: Characterize probability models using probability mass functions & cumulative distribution functions and have a well-founded knowledge of standard distributions which can describe real life phenomenon (Assessment)
CO2: Gain adequate knowledge about basics of various processes and Markov chains including transition probabilities and limiting distributions (Usage)
CO3: Describe a random process in terms of its correlation functions and spectral densities (Usage)
CO4: Solve the problems of autocorrelation and cross correlation functions of input and output- white noise (Usage)
CO5: Formulate concrete problems using queuing theoretical approaches through Birth and Death process-single and multiple server queuing models.

L	T	P	C
3	1	0	4

UNIT I RANDOM VARIABLES (9)

Discrete and continuous random variables - Moments - Moment Generating Functions and their properties. Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions - Function of Random variables.

UNIT II CLASSIFICATION OF RANDOM PROCESS (9)

Definition and examples - first order, second order, strictly stationary, wide - sense stationary and ergodic processes - Markov process – Binomial, Poisson and Normal processes – Sine wave process – Random telegraph process.

UNIT III CORRELATION AND SPECTRAL DENSITIES (9)

Autocorrelation - Cross correlation - properties - Power spectral density - Cross spectral density - properties - Wiener- Khintchine relation - Relation between cross power spectrum and cross correlation function.

UNIT IV LINEAR SYSTEMS WITH RANDOM INPUTS (9)

Linear time invariant system - System transfer function - Linear systems with random inputs - Auto correlation

and cross correlation functions of input and output - white noise.

UNIT V QUEUING THEORY **(9)**

Markovian models - Birth and Death Queuing models - Steady state results - Single and multiple server queuing models - Little's formula - M/G/1 queue.

LECTURE:45 TUTORIAL:15 TOTAL:60 HOURS

TEXT BOOKS:

1. *T. Veerarajan, "Probability, Statistics and Random Process" , Tata McGraw Hill Publishing Company Ltd., NewDelhi – 2007*

REFERENCE BOOKS:

1. *Peebles Jr. P.Z., "Probability, Random Variables and Random Signal Principles", Tata McGraw Hill, 4th edition, New Delhi, 2002.*
2. *K. S. Trivedi , "Probability and Statistics with Reliability , Queuing and Computer Science Applications" , Prentice Hall of India Ltd., New Delhi.*
3. *P. Kandasamy, ,K.Thilagavathy, K.Gunavathy, "Probability and Random Process", S.Chand & Co. Ltd., New Delhi- 2003.*
4. *D. Gross and C.M. Harris, "Fundamentals of Queuing Theory", Sultan Chand & Sons, New Delhi, 2009.*
5. *A.O.Allen, "Probability and Statistics and Queueing Theory with Computer Applications", Elsevier*

12L402 ENVIRONMENTAL SCIENCE AND ENGINEERING

COURSE OBJECTIVES:

- *To gain basic knowledge about various resources of environment*
- *To create an exposure to the basic concepts of ecosystems and biodiversity*
- *To gain knowledge about engineering solutions for solving issues of pollution and hazards of solid Waste*
- *To acquire knowledge on environmental threats and social issues.*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Basic knowledge about various resources of environment
CO 2: Exposure to the basic concepts of ecosystems and biodiversity
CO 3: Knowledge about engineering solutions for solving issues of pollution and hazards of solid Waste
CO 4: Knowledge on environmental threats and social issues.

L	T	P	C
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UNIT I ENVIRONMENTAL RESOURCES (9)

Earth structure- Internal and external earth processes- plate tectonics- erosion- weathering- deforestation- anomalous properties of water- hydrological cycle- effect of modern agriculture- fertilizers- pesticides- eutrophication- biomagnifications- land degradation- minerals- rocks- rock cycle- mining- types of mining- desertification- soil erosion- methods of conservation of soil erosion- renewable energy resources- wind- solar- geothermal- tidal- OTEC.

UNIT II ECO SYSTEM AND BIODIVERSITY (9)

Weather and climate- ocean current- upwelling- EL Nino- Ecology- ecosystem- biomes- physical and chemical components of ecosystem- biological components of ecosystem- forest ecosystem- desert ecosystem and pond ecosystem- Energy flow in ecosystem- nitrogen cycle- carbon dioxide cycle- phosphorous cycle- food pyramid- Ecological succession- types- biodiversity- need for biodiversity- values of biodiversity- hot spots of biodiversity- endangered and endemic species- conservation of biodiversity insitu-exitu conservation.

UNIT III ENVIRONMENTAL POLLUTION (9)

Air pollution, classification of air pollutants gaseous particulars, sources effects and control of gaseous pollutants SO2, NO2, H2S, CO, CO2 and particulates, control methods, cyclone separator, electrostatic precipitator, catalytic combustion water pollution-classification of water pollutants, inorganic pollutants, sources, effects and control of heavy metals, organic pollutants, oxygen demanding wastes, aerobic and anaerobic decomposition, soil pollution, Noise pollution, sources, effects, decibel scale.

UNIT IV ENVIRONMENTAL THREATS (9)

Acid rain- green house effect- global warming- disaster management- flood- drought- earthquake- tsunami- threats to biodiversity- destruction of habitat- habit fragmentation- hunting- over exploitation – man- wildlife conflicts- The IUCN red list categories- status of threatened species.

UNIT V SOCIAL ISSUES AND ENVIRONMENT (9)

Sustainable development- sustainable technologies- need for energy and water conservation- rain water harvesting- water shed management- waste land reclamation- Air act- Wild life protection act- forest conservation act- population growth- exponential and logistic growth- variation in population among nations- population policy- women and child welfare programs- Role of information technology in human and health- HIV/AIDS- effects and preventive measures.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45HOURS

TEXT BOOKS:

1. *Sharma J.P.**, 'Environmental Studies'**, 3rd Edition, University Science Press, New Delhi 2009*
2. *Anubha Kaushik and C.P.Kaushik, **'Environmental Science and Engineering'**, 3rd Edition New age International Publishers, New Delhi 2008*

REFERENCE BOOKS:

1. *R.K.Trivedi, **'Hand book of Environmental Laws, Rules, Guidelines, Compliances and Standards'**, Vol.I &II, Environ Media.2006*
2. *G.Tyler Miller,JR, **'Environmental Science'**, 10th Edition, Thomson BROOKS/COLE 2004*
3. *Gilbert M.Masters, **'Introduction to Environmental Engineering and Science'**, 2nd Edition Pearson Education 2004.*

12L403- ANALOG INTEGRATED CIRCUITS

PREREQUISITE: ELECTRONIC CIRCUIT DESIGN

COURSE OBJECTIVES:

- *To gain knowledge of IC fabrication*
- *To design analog integrated circuits using opamp in linear and nonlinear domain*
- *To gain knowledge on Analog multipliers, PLL and Data Converters*
- *To acquire knowledge on special function ICs*

COURSE OUTCOMES:

Upon completion of this course the student will have :

CO1: Knowledge of IC fabrication,
CO2: Ability to design analog integrated circuits using opamp in linear and nonlinear domain
CO3: Knowledge on Analog multipliers, PLL and Data Converters
CO4: Knowledge on special function ICs

L	T	P	C
3	0	0	3

UNIT I IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR ICS (9)

Advantages of ICs over discrete components – Fabrication of monolithic ICs – Current mirror and current sources- Current sources as active loads- BJT Differential amplifier with active loads- General operational amplifier stages and internal circuit diagram of IC 741- DC and AC performance characteristics- slew rate- Open and closed loop configurations.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS (9)

Sign Changer- Scale Changer- Voltage Follower- V-to-I and I-to-V converters- adder- subtractor- Instrumentation amplifier- Integrator- Differentiator- Logarithmic amplifier- Antilogarithmic amplifier- Comparators- Schmitt trigger- Precision rectifier- peak detector- clipper and clamper- Low-pass- high-pass and band-pass Butterworth filters.

UNIT III ANALOG MULTIPLIER AND PLL (9)

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell - Variable transconductance technique- analog multiplier ICs and their applications- Operation of the basic PLL- Closed loop analysis- Voltage controlled oscillator- Monolithic PLL IC 565- application of PLL for AM detection- FM detection and Frequency synthesizing.

UNIT IV DATA CONVERTERS (9)

Analog and Digital Conversions- D/A converter – specifications - weighted resistor type- R-2R Ladder type- Inverted R-2R Ladder type - switches for D/A converters- A/D Converters – specifications - Flash type -

counter type-Successive Approximation type -charge balancing type and Dual Slope type.

UNIT V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICs (9)

Sine-wave generators- Multivibrators and Triangular wave generator- Saw-tooth wave generator- Timer IC 555- IC Voltage regulators - Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator- Switched capacitor filter IC MF10- Frequency to Voltage and Voltage to Frequency converters- Audio Power amplifier and Video Amplifier

LECTURE: 45 TUTORIAL: 0 TOTAL: 45HOURS

TEXT BOOKS:

1. *D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.*
2. *Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", 3rd Edition, Tata McGraw- Hill, 2007.*

REFERENCE BOOKS:

1. *B.S.Sonde, "System design using Integrated Circuits" , New Age Pub, 2nd Edition, 2001*
2. *Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley International, 2005.*
3. *Ramakant A.Gayakwad, "OP-AMP and Linear ICs", Prentice Hall / Pearson Education, 4th Edition, 2001.*
4. *J.Michael Jacob, "Applications and Design with Analog Integrated Circuits", Prentice Hall of India, 1996.*
5. *William D.Stanley, "Operational Amplifiers with Linear Integrated Circuits", Pearson Education, 2004.*

12L404- ANALOG COMMUNICATION

PREREQUISITE: SIGNALS AND SYSTEMS, RANDOM PROCESS

COURSE OBJECTIVES:

- *To understand the concepts of analog modulation and demodulation techniques*
- *To understand the sources of noise and its effects in Communication systems*
- *To analyze the performance of receiver in the presence of noise*
- *To gain the basic concepts of satellite communication*

COURSE OUTCOMES:

Upon completion of this course the student have:

CO1: Knowledge on analog modulation and demodulation techniques
CO2: Exposure to the sources of noise and its effects in Communication systems
CO3: Ability to analyze the performance of receiver in the presence of noise
CO4: Basic knowledge on satellite communication

L	T	P	C
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UNIT I AMPLITUDE MODULATION (9)

Spectral characteristics of periodic and non periodic signals - Generation and demodulation of AM, DSBSC, SSB and VSB signals - Comparison of amplitude modulation systems.

UNIT II ANGLE MODULATION AND PULSE MODULATION (9)

Phase and Frequency modulation - Single tone, narrow band and wideband FM - Transmission bandwidth - Generation and demodulation of FM signal, Phase Modulation - Pulse Amplitude Modulation - Pulse Time Modulation.

UNIT III NOISE THEORY (9)

Review of probability - Random variables and random process - Gaussian process - Noise - Shot noise - Thermal noise - White noise - Narrow band noise - Noise temperature - Noise figure.

UNIT IV PERFORMANCE OF CW MODULATION SYSTEMS (9)

Super heterodyne radio receiver and its characteristics - SNR - Noise in DSBSC systems using coherent detection - Noise in AM system using envelope detection - Noise in FM system – FM threshold effect - Pre emphasis and De emphasis in FM - Comparison of performances.

UNIT V SATELLITE COMMUNICATIONS (9)

Satellite communication - Orbit dynamics - Kepler's law - Orbitary parameters - Orbital perturbations - Station keeping - Geostationary - Frequency allocation - Units of visibility -Launching vehicles and propulsion.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45HOURS

TEXT BOOKS:

1. *Simon Haykin, "Communication Systems", John Wiley & sons, NY, 4th Edition, 2001.*
2. *Wayne Tomasi, "Electronic Communications Systems: Fundamentals Through Advanced Telecommunications Series", Edition5, Pearson/Prentice Hall, 2004*

REFERENCE BOOKS:

1. *Dennis Roddy & John Coolen , " Electronic Communication", 4th Edition, Prentice Hall of India, 2008.*
2. *Herbert Taub & Donald L Schilling – "Principles of Communication Systems" 3rd Edition – Tata McGraw Hill, 2008.*
3. *B.P.Lathi, " Modern Digital and Analog Communication Systems", 3rd Edition, Oxford Press,2007.*
4. *John G. Proakis, Masoud Salehi, "Fundamentals of Communication Systems", Pearson Education, 2006.*
5. *George Kennedy, "Electronic Communication Systems", Tata McGraw Hill, 4th Edition,1999*

12L405- DIGITAL LOGIC WITH HDL

COURSE OBJECTIVES:

- *To Acquire knowledge on number systems and Boolean algebra*
- *To implement Combinational and Sequential logic circuits*
- *To design Synchronous and Asynchronous digital circuits*
- *To realize combinational and sequential logic circuits using Verilog HDL*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Indepth knowledge on number systems and Boolean algebra
CO2: Ability to implement Combinational and Sequential logic circuits
CO3: Ability to design Synchronous and Asynchronous digital circuits
CO4: Ability to realize combinational and sequential logic circuits using Verilog HDL

L	T	P	C
3	1	0	4

UNIT I NUMBER SYSTEMS (9)

Number Systems - Number base conversions - Complements - Signed Binary Numbers - Binary codes -Boolean Algebra - Boolean functions - Canonical and Standard Forms - Minimization of Boolean expressions - Karnaugh map minimization- Don't care conditions - Tabulation Method - Implementation of logic functions using gates - NAND and NOR implementation.

UNIT II COMBINATIONAL LOGIC CIRCUITS (9)

Binary Adder - Binary Subtractor - BCD adder - Binary Multiplier - Magnitude comparator - Multiplexers/Demultiplexers - Decoders/Encoders - Code converters - Implementation of combinational logic using MUX - Introduction to Verilog - Verilog code for full adder, mux/demux and code converters.

UNIT IIISEQUENTIAL LOGIC CIRCUITS (9)

Latches - Flip flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Design of Asynchronous counters - Design of Synchronous counters - Modulo_n counter - Shift registers - Universal Shift Register– Ring counter – Johnson counter - Verilog code for Flip Flops, Registers and Counters.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS (9)

Block Diagram - Modes of Operation - Analysis of Sequential Circuits - Circuits with Latches - Design Procedure - Reduction of State and Flow Tables - Races - Hazards.

UNIT V MEMORY AND PROGRAMMING LOGIC **(9)**

Classification of memories - RAM organization - Memory decoding - Memory expansion - Static RAM cell - Dynamic RAM cell - ROM organization - Types of ROM - Programmable Logic Array - Programmable Array Logic - Field Programmable Gate Arrays.

LECTURE:45 TUTORIAL:15 TOTAL:60 HOURS

TEXT BOOKS:

1. *M. Morris Mano, "Digital Design", 4th Edition, Pearson Education, 2011.*

REFERENCE BOOKS:

1. *Stephen Brown, Zvonko Vranesic, "Fundamentals of Digital Logic with Verilog Design", 2nd Edition, Tata McGraw Hill Education Pvt.Ltd., 2010.*
2. *A.Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, PHI Learning Pvt.Ltd, New Delhi, 2011.*
3. *Charles H.Roth, Jr, "Fundamentals of Logic Design", 4th Edition, Jaico Publishing House, 2006.*
4. *Samir Palnitkar, "Verilog HDL", Pearson Education, 2009.*
5. *Donald D.Givone," Digital Principles and Design", Tata Mc-Graw-Hill Publishing Company Ltd., New Delhi,2003.*

12L406-NETWORKS AND TRANSMISSION LINES

PREREQUISITE: CIRCUIT THEORY

COURSE OBJECTIVES:

- *To understand the symmetrical and asymmetrical two port networks and passive networks*
- *To gain knowledge in the design of matched networks for loaded transmission lines*
- *To synthesize the Foster and Cauer forms of RC and LC networks*
- *To analyze the distortionless line and the effects of loading*
- *To compute various parameters for loaded transmission lines using Smith chart and acquire knowledge of stub matching in Transmission Lines*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Knowledge on symmetrical and asymmetrical two port networks and passive networks
CO2: In-depth knowledge in the design of matched networks for loaded transmission lines
CO3: Ability to synthesize the Foster and Cauer forms of RC and LC networks
CO4: Ability to analyze distortion less line and the effects of loading
CO5: Ability to compute various parameters for loaded transmission lines using Smith chart and acquire knowledge of stub matching in Transmission Lines

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3	0	0	3

UNIT I SYMMETRICAL AND ASYMMETICAL TWO PORT NETWORKS

Two port networks- Characterization in terms of impedance, Admittance, Hybrid and Transmission parameters - Inter relationships among parameter sets - Interconnection of two port networks - Series, parallel and cascade. Lattice Networks- Symmetrical two port networks: T and ð Equivalent of a two port network - Image impedance - Characteristic impedance and propagation constant of a symmetrical two port network.

UNIT II PASSIVE NETWORKS (9)

Constant K filters-m derived filters-Composite filters-Design procedures-Series and shunt equalizer-Symmetrical and asymmetrical attenuators - T and ð sections.

UNIT III PASSIVE NETWORK SYNTHESIS (9)

Synthesis: Positive real functions - Driving point functions - Brune's positive real functions - Properties of positive real functions. Testing driving point functions - Application of maximum modulus theorem - Properties of Hurwitz polynomials - Even and odd functions - Strum's theorem - Driving point synthesis - RC elementary synthesis operations - LC network synthesis - Properties of RC network functions - Foster and Cauer forms of RC and RL networks.

UNIT IV TRANSMISSION LINE THEORY (9)

Line parameters and transmission constants-Transmission line equation-Physical significance of the equation-

Infinite line- Input and transfer impedance-Waveform distortion- Distortionless line- Loading-Reflection phenomena-Reflection loss and insertion loss-Skin and proximity effect-T and ð equivalent of transmission lines.

UNIT V LINE AT RADIO FREQUENCIES (9)

Parameters of open wire line and co-axial line at high frequencies-Standing waves-Standing wave ratio-Input impedance of open and short circuited lines-Relation between VSWR and reflection co-efficient-Quarter wave transformer-Single and double stub matching-Smith chart and its applications.

LECTURE:45 TUTORIAL:0 TOTAL:45 HOURS

TEXT BOOKS:

1. *John.D.Ryder "Networks Lines and Fields", Prentice hall of India Pvt.Ltd,2nd Edition, 1997.*
2. *Sudhahar.A, Shyammohan S.P, "Circuits and Networks:Analysis and Synthesis", Tata Mc Graw Hill, New Delhi,3rd Edition, 2007.*

REFERENCE BOOKS:

1. *Umesh Sinha "Network Analysis And Synthesis", Sathya Prakashan Publishers, 1997.*
2. *Van Valkenburg "Introduction to Modern Synthesis", Wiley Eastern Publication, 2007.*
3. *B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2nd Edition, 2009.*
4. *D.Roy Choudhary, "Network and Systems", New Academic Science, 2nd Edition, 2009.*

12L407- INTEGRATED CIRCUITS LABORATORY

PREREQUISITE: ELECTRON DEVICES AND CIRCUITS LABORATORY

COURSE OBJECTIVES:

- *To design and implement realize combinational and sequential logic circuits*
- *To design and realize various applications of Op-Amp and IC 555 timer.*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Ability to design and implement combinational and sequential logic circuits
CO2: Ability to design and realize various applications of Op-Amp and IC 555 timer

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Implementation of Simple Boolean expression using Universal gates..
2. Half Adder and Full adder
3. Multiplexer and Demultiplexers
4. Flip-flops
5. Synchronous and Asynchronous Counters
6. Data transfer using shift register.
7. Applications of op-amp.
8. Schmitt trigger using op-amp
9. Active filters using op-amp.
10. Multivibrators using 555 timer

TOTAL:45 HOURS

REFERENCE BOOKS:

1. *D.Roy Choudhury and Shail Jain, "Linear Integrated Circuits" New Age international (P) Ltd. 1998.*
2. *M. Morris Mano, "Digital Design", 3rd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2003.*

12L408- ANALOG COMMUNICATION LABORATORY

COURSE OBJECTIVES:

- *To create exposure to the practical aspects of modulation and demodulation techniques*
- *To Visualize the characteristic features of radio receivers*
- *To realize the principles of TDM and noise spectrum measurement using spectrum analyzer*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO1: Exposure to the practical aspects of modulation and demodulation techniques
CO2: Ability to visualize the characteristic features of radio receivers
CO3: Ability to realize the principles of TDM and noise spectrum measurement using spectrum analyzer

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1.Cross over network

2.Tone control circuits

3.Amplitude modulation and demodulation

4.AM- DSBSC generation

5.Characteristics of AM receiver

6.Frequency modulation and demodulation

7.Pre emphasis and de emphasis in FM

8.Pulse modulation – PAM/PWM/PPM

9.Transistor mixer

10.IF tuned Oscillator

11.IF tuned Amplifier

12.Time division multiplexing

13.Noise spectrum measurements using spectrum analyzer.

TOTAL: 45 HOURS

REFERENCE BOOKS:

1. *George S.Kennedy, "Electronic Communication Systems", Mc Graw-Hill, 35th Reprint, 2008.*
2. *Simon Haykin, "Communication Systems", John Wiley & Sons, 3rd Edition, 2008*

12L501- DIGITAL SIGNAL PROCESSING

PREREQUISITE: SIGNALS AND SYSTEM

COURSE OBJECTIVES:

- *To understand the principle of discrete time signals and systems*
- *To design and realize IIR and FIR filters*
- *To gain knowledge about DSP architecture and programming*
- *To apply the concepts of Multirate signal processing in real time applications*

COURSE OUTCOMES:

Upon completion of this course the student will have

CO 1: An in-depth knowledge on the principles of discrete time signals and systems
CO 2: An ability to design and realize IIR and FIR filters
CO 3: Knowledge on DSP architecture and programming
CO 4: An ability to apply the concepts of Multirate signal processing in real time applications

L	T	P	C
3	1	0	4

UNIT I DISCRETE – TIME SIGNALS AND SYSTEMS (9)

Review of discrete-time signals and systems - DFT and its properties, FFT algorithms and its application to convolution, Overlap-add and overlap-save methods.

UNIT II DESIGN OF INFINITE IMPULSE RESPONSE FILTERS (9)

Analog filters - Butter worth and Chebyshev Type I .Analog Transformation of prototype LPF to BPF /BSF/ HPF. Transformation of analog filters into equivalent digital filters using Impulse invariant method and Bilinear transform method- Realization structures for IIR filters – direct, cascade, parallel forms.

UNIT III DESIGN OF FINITE IMPULSE RESPONSE FILTERS (9)

Linear phase response of FIR-FIR design using window method- Rectangular, Hamming, Hanning and Blackmann Windows- Frequency sampling method - Realization structures for FIR filters - Transversal and Linear phase structures- Comparison of FIR and IIR filters.

UNIT IV QUANTIZATION EFFECTS AND DSP ARCHITECTURE (9)

Representation of numbers-ADC Quantization noise-Coefficient Quantization error-Product Quantization error-truncation & rounding errors -Limit cycle due to product round-off error-Round- off noise power-limit cycle oscillation due to overflow in digital filters- Principle of scaling- Introduction to PDSP - special features- TMS320C54x DSP processor architecture and addressing schemes.

UNIT V MULTIRATE SIGNALPROCESSING (9)

Introduction to Multirate signal processing-Decimation-Interpolation (by an integer and rational factor)-Poly phase Decomposition of FIR filter-Multistage implementation of sampling rate conversion- Applications

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *A.V.Oppenheim, R.W. Schafer and J.R. Buck, "**Discrete-Time Signal Processing**", Prentice Hall, 3rd Edition, 2010.*
2. *John G Proakis and Manolakis, "**Digital Signal Processing Principles, Algorithms and Applications**", Pearson Education, 4th Edition, 2009.*

REFERENCE BOOKS:

1. *Emmanuel C. Ifeacher, Barry W. Jervis, "**Digital Signal Processing: A Practical Approach**" 2nd Edition, Pearson Education, 2004.*
2. *Lonnie C. Ludeman, "**Fundamentals of Digital Signal Processing**" John Wiley& Sons, 1986.*
3. *S.K. Mitra, "**Digital Signal Processing, A Computer Based approach**", McGraw-Hill, 4th Edition, 2010.*
4. *P.Ramesh Babu, "**Digital Signal Processing**", Scitech Publications, 4th edition, 2011.*
5. *V.Udayashankara, "**Real Time Digital Signal Processing**", PHI learning, 2010.*

12L502- MICROPROCESSORS AND MICROCONTROLLERS

PREREQUISITE: DIGITAL LOGICWITH HDL

COURSE OBJECTIVES:

- *To gain knowledge about architecture and programming concepts of 8086 Microprocessor,8051 and PIC Microcontrollers*
- *To acquire Knowledge on peripheral interfacing concepts*
- *To design microprocessor and Microcontrollers based systems*

COURSE OUTCOMES:
Upon completion of this course the student will have

CO 1: Knowledge on architecture and programming concepts of 8086 Microprocessor, 8051 and PIC Microcontrollers
CO 2: Knowledge on peripheral interfacing concepts
CO 3: An ability to design microprocessor and Microcontrollers based systems

L	T	P	C
3	1	0	4

UNIT I 8086 ARCHITECTURE (9)

8086 Microprocessor Architecture – Pin Description – Minimum/Maximum mode system configuration - Memory and I/O interfacing - Bus cycles - Timing diagram - Interrupts.

UNIT II 8086 PROGRAMMING AND INTERFACING (9)

8086 Instruction set, Addressing Modes- Procedures, Macros, Assembler Directives - Assembly language programming - Peripheral Interfacing using 8255 PPI - 8279 Keyboard/Display controller - 8251 USART.

UNIT III 8051 MICROCONTROLLER (9)

8051 Microcontroller Architecture - Signals - Memory organization - SFRs - Interrupts - Timer/Counter- Port operation - Serial communication.

UNIT IV 8051 PROGRAMMING AND INTERFACING (9)

8051 Instruction Set - Programming 8051Timers - Serial Port Programming - Interrupts Programming. LCD and Keyboard Interfacing- ADC, DAC and Sensor Interfacing, External Memory Interface - RTC Interfacing - Motor Control.

UNIT V PIC MICROCONTROLLER (9)

16C7X PIC Microcontroller Architecture - Signals - Memory organization - SFRs - Interrupts - Timer/Counter- I/O Expansion - I^2C bus - EEPROM - A/D Converter -PWM module - MSSP module - USART - Instruction set - Addressing modes.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *Krishna Kant,* ***"Microprocessor and Microcontroller Architecture, Programming and System Design using 8085,8086, 8051 and 8096",*** *PHI, 2011.*
2. *Ajay Deshmukh, "* ***Microcontrollers : Theory and Applications****", Tata McGraw Hill, 2010.*

REFERENCE BOOKS:

1. *Douglas V.Hall,* ***"Microprocessor and Interfacing, Programming and Hardware",*** *Revised 2nd Edition, Tata McGraw Hill, Indian edition 2007.*
2. *Kenneth J.Ayala.,* ***"The 8051 Microcontroller",*** *3rd Edition, Thompson Delmar Learning, 2007, New Delhi.*
3. *Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay,* ***"The 8051 Microcontroller and Embedded Systems",*** *2nd Edition, Pearson Education 2008.*
4. *A.K. Ray, K.M.Bhurchandi,* ***"Advanced Microprocessor and Peripherals",*** *2nd edition, Tata McGraw-Hill, 2007.*

12L503- DIGITAL COMMUNICATION

PREREQUISITE: ANALOG COMMUNICATION

COURSE OBJECTIVES:

- *To understand the principle of Pulse modulation techniques and digital modulation techniques*
- *To analyze Base band pulse transmission*
- *To apply the concepts of Error control coding*
- *To understand the principles of spread spectrum and its applications*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Knowledge on the principle of Pulse modulation techniques and digital modulation techniques
CO 2: An ability to analyze Base band pulse transmission
CO 3: An ability to apply the concepts of Error control coding
CO 4: Knowledge on the principle of spread spectrum and its applications

L	T	P	C
3	0	0	3

UNIT I PULSE MODULATION (9)

Sampling process -PAM- Other forms of pulse modulation-Bandwidth -Noise tradeoff-Quantization-PCM-Noise considerations in PCM Systems-TDM- Digital multiplexers-Limitation and modification of PCM-Delta modulation-Linear prediction- differential pulse code modulation-Adaptive Delta Modulation - Source coders based on probability -Shannon Fano coding, Shannon binary coding, Huffman coding.

UNIT II ERROR CONTROL CODING (9)

Discrete memoryless channels - Linear block codes - Cyclic codes - Convolutional codes -Maximum likelihood decoding of convolutional codes-Viterbi Algorithm-Trellis coded Modulation-Turbo codes -Applications.

UNIT III BASEBAND PULSE TRANSMISSION (9)

Line coding - Intersymbol Interference- Nyquist's criterion for Distortion less Base band Binary Transmission-Correlative level coding-Baseband M-ary PAM transmission-Adaptive Equalization -Eye patterns.

UNIT IV DIGITAL MODULATION TECHNIQUES (9)

Generation of ASK,PSK,FSK - Signal space diagram - matched filter-detection - bit error probability and Power spectra of BPSK, QPSK, FSK -Differential phase shift keying - Comparison of Digital modulation systems - Carrier and symbol synchronization.

UNIT V SPREAD SPECTRUM MODULATION **(9)**

Pseudo- noise sequences-A notion of spread spectrum -Direct sequence spread spectrum with coherent binary phase shift keying - Signal space dimensionality and processing gain -Probability of error - Frequency -Hop spread spectrum -Code Division Multiplexing.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Simon Haykins, "**Communication Systems**" John Wiley, 2009.*
2. *Amitabha Battacharya, "**Digital Communications**", Tata McGraw Hill, 2006.*

REFERENCE BOOKS:

1. *Sam K.Shanmugam, "**Digital & Analog Communication Systems**", John Wiley, 2008.*
2. *John G.Proakis, Masoud Salehi, "**Digital Communications**", McGraw Hill, 4th Edition, 2008.*
3. *Taub & Schilling , "**Principles of Communication Systems**", Tata McGraw-Hill, 3rd Edition,2008.*
4. *B.P.Lathi, "**Modern Digital and Analog Communication Systems**", 3rd Edition, Oxford Press,2007*

12L504- COMPUTER ARCHITECTURE AND ORGANIZATION

PREREQUISITE: MICROPROCESSORS AND MICROCONTROLLERS

COURSE OBJECTIVES:

- *To understand the basic concepts of computer system design*
- *To apply the principle of micro programming to design the major components like ALU, Controller etc*
- *To know the concepts of advanced computer architectures and multiprocessing*

COURSE OUTCOMES:

Upon completion of this course the student will have

CO 1: Knowledge on the basic concepts of computer system design
CO 2: An ability to apply the principle of micro programming to design the major components like ALU, Controller etc
CO 3: Knowledge on the concepts of advanced computer architectures and multiprocessing

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3	0	0	3

UNIT I BASICS OF COMPUTER SYSTEM DESIGN (9)

Machine computation - Evolution: First, Second, Third and Fourth generation of computer systems - Recent developments - Different layers of Computer systems - Complexity of computing - Computer system Design Layers - RTL structure of computer system.

UNIT II CENTRAL PROCESSING UNIT (9)

Data path and Control path support – Micro operations and Control signals on Data path: Memory, Bus and Inter register transfer and Arithmetic and Logic micro operations - Machine language instructions - Execution of instructions - ALU - Bit sliced ALU.

UNIT III CONTROLLER DESIGN (9)

Controller functions - Control transfer: Instruction control and Program control transfers - Hardwired Control : Sequence counter method - Delay element method - State table method - Microprogrammed Control : Encoding of control signals - Next address generation - Microprogram sequencer - Microinstruction execution - Control memory optimization.

UNIT IV MEMORY SUBSYSTEM (9)

CPU – Memory interaction - Performance measures - Memory array organization : 2D, 3D and 2.5D memory organization - Memory Hierarchy - Cache memory - address mapping techniques - Associate memory : Principle of CAM - Associative memory block diagram - Applications of Associative memory - Virtual memory : organization - Address translation schemes.

UNIT V ADVANCED COMPUTER ARCHITECTURES (9)

RISC architecture - Instruction pipelining - R2000/R3000 functional block diagram and Instruction pipeline - Parallel architectures : models of computation - classification - dataflow architecture - reduction machine - Control driven machines- Multiprocessing architecture - MIMD model - Key issues of Multiprocessing.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *P.Pal Chaudhuri, **" Computer Organization and Design",** Prentice Hall of India, New Delhi, 3rd Edition, 2010.*

REFERENCE BOOKS:

1. *Hayes J.P., **" Computer Architecture and Organization",** McGraw Hill, New Delhi, 3rd Edition, 2002.*
2. *Harry F. Jordan and Gita Alaghband, **"Fundamentals of Parallel Processing",** Prentice Hall of India, New Delhi, 2002.*
3. *Kai Hwang and F.A. Briggs, **" Computer Architecture and Parallel Processing",** McGraw Hill, 1999.*

12L505- CMOS VLSI SYSTEMS

PREREQUISITE: DIGITAL LOGIC WITH HDL

COURSE OBJECTIVES:

- *To gain knowledge about basic concepts of CMOS and CMOS Logic Design*
- *To design static CMOS and dynamic clocked CMOS circuits*
- *To apply knowledge on High-Level Digital Functional Block*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic concepts of CMOS and CMOS Logic Design
CO 2: An ability to design static CMOS and dynamic clocked CMOS circuits
CO 3: An Ability to apply knowledge on High-Level Digital Functional Block

L	T	P	C
3	0	0	3

UNIT I OVERVIEW OF VLSI (9)

Complexity and Design - MOSFETs as switches - Basic Logic Gates in CMOS - Complex Logic Gates in CMOS – Transmission Gate circuits - CMOS Layers - Designing FET Arrays.

UNIT II MOS PHYSICS (9)

nFET Current-Voltage Equations - The FET RC Model - pFET Characteristics - DC characteristics of CMOS Inverter - Inverter Switching Characteristics - Power Dissipation - Transmission Gates and Pass Transistors.

UNIT III CMOS CIRCUITS (9)

Pseudo-NMOS - Tri-State Circuits - Clocked CMOS - Dynamic CMOS - Logic circuits - Interconnect Delay Modeling - Crosstalk - Floor planning and Routing - Input and Output circuits - Power distribution and consumption - Low Power Design Considerations.

UNIT IV CLOCKING AND TESTING (9)

CMOS clocking styles - Pipelined systems - System Design Considerations - Reliability and Testing of VLSI circuits - General Concepts - CMOS testing - Test Generation Methods.

UNIT V VLSI SYSTEMS SPECIFICATIONS AND COMPONENTS (9)

Systems Specifications - Structural Gate Level Modeling - Switch Level Modeling - Design Hierarchy - Behavioral

and RTL Modeling - Multiplexer -Binary Decoders - priority Encoders - Latches - Flip Flops and Registers - Arithmetic Circuits in CMOS VLSI: Adders and Multipliers.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *John P.Uyemura, " **Introduction to VLSI Circuits and systems",** JohnWiley&Sons,2003.*
2. *Keng, Lable Bick, **"CMOS Digital Integrated Circuits",** TataMcGrawHill,1999.*

REFERENCE BOOKS:

1. *Neel H.E.Weste Eshraghian,**"Principles of CMOS VLSI Design",** AddisonWesley,1999*
2. *SjohoemS. & LindhL.,**"VHDL for Designers",** Prentice Hall,1997.*
3. *Smith,**"Application Specific Integrated Circuits",** Addison Wesley,1997.*
4. *Mukherjee, **"Introduction NMOS and CMOS VLSI System Design",** PH1986.*
5. *Douglas A.Pucknell & K.Eshranghian,**"Basic VLSI Design",** PHI 3rdEdition 1994.*

12L506- CONTROL SYSTEMS

PREREQUISITE: SIGNALS AND SYSTEMS

COURSE OBJECTIVES:

- *To compute differential equation and tranfer function of a given control system*
- *To gain knowledge on the concepts of time response and frequency response analysis*
- *To analyze the stability and state variable of a control system*

COURSE OUTCOMES:

Upon completion of this course the student will have

CO 1: An ability to compute differential equation and tranfer function of a given control system
CO 2: Knowledge on the concepts of time response and frequency response analysis
CO 3: An ability to analyze the stability and state variable of a control system

L	T	P	C
3	1	0	4

UNIT I CONTROL SYSTEM MODELING (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.

UNIT II TIME RESPONSE ANALYSIS (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.

UNIT III FREQUENCY RESPONSE ANALYSIS (9)

Frequency Response - Bode Plot, Polar Plot, Nyquist Plot - Frequency Domain specifications from the plots - Constant M and N Circles - Nichol's Chart - Use of Nichol's Chart in Control System Analysis-Series, Parallel, series-parallel Compensators - Lead, Lag, and Lead Lag Compensators.

UNIT IV STABILITY ANALYSIS (9)

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

UNIT V STATE VARIABLE ANALYSIS (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- Sampled Data control systems- Sampling Theorem- Sampler and Hold - Open loop and Closed loop sampled data systems.

Case study: Any two examples of control systems.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *J.Nagrath and M.Gopal, "**Control System Engineering**", NewAge International Publishers, 5th Edition, 2007.*

REFERENCE BOOKS:

1. *Benjamin.C.Kuo, "**Automatic Control Systems**", Prentice Hall of India, 7th Edition,1995.*
2. *M.Gopal, "**Control System – Principles and Design**", Tata McGraw Hill, 2nd Edition,2002.*
3. *Schaum's Outline Series,"**Feedback and Control Systems**", Tata McGraw-Hill,2007.*
4. *John J.D'azzo,Constantine H.Houpis, "**Linear Control System analysis and Design**", TataMcGraw Hill,Inc.,1995.*
5. *Richard C. Dorf, Robert H. Bishop,"**Modern Control Systems**",Addison–Wesley,1999.*

12L507- DIGITAL COMMUNICATION SYSTEMS LABORATORY

PREREQUISITE: ANALOG COMMUNICATION LABORATORY

COURSE OBJECTIVES:

- *To implement FFT algorithms, Linear/Circular convolution using MATLAB*
- *To design IIR, FIR and Multirate filters*
- *To implement the DSP algorithms using TMS320C5X*
- *To implement digital modulation techniques using SIMULINK*

COURSE OUTCOMES:

Upon completion of this course the student will be familiar with:

CO 1: An ability to implement FFT algorithms, Linear/Circular convolution using MATLAB
CO 2: An ability to design IIR, FIR and Multirate filters
CO 3: An ability to implement the DSP algorithms using TMS320C5X
CO 4: An ability to implement digital modulation techniques using SIMULINK

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

DIGITAL SIGNAL PROCESSING (IMPLEMENTATION USING MATLAB/ TMS320C5X)

1. Fast Fourier Transform algorithms, Linear convolution/ circular convolution.
2. IIR filter Design- Impulse invariant and Bilinear transformation methods.
3. FIR Filter Design - Window-based method.
4. Multi rate filters, Decimation by poly phase decomposition.
5. Study of various addressing modes of DSP using simple programming examples.

DIGITAL COMMUNICATION (IMPLEMENTATION USING SIMULINK/ HARDWARE)

6. Signal sampling and reconstruction.
7. Pulse Code Modulation/ Delta Modulation.
8. Convolutional coder.
9. Generation and study of eye patterns.
10. ASK, FSK, PSK schemes.
11. Code Division Multiplexing.

TOTAL: 45

REFERENCE BOOKS

1. *John G Proakis and Manolakis, "**Digital Signal Processing Principles, Algorithms and Applications**", Pearson Education, 4th Edition, 2009.*
2. *S.K. Mitra, "**Digital Signal Processing, A Computer Based approach**", McGraw-Hill, 4th Edition, 2010.*
3. *The Manuals of the Digital Signal Processors manufactured by Texas Instruments (Available online on the web pages of Texas Instruments)*
4. *Amitabha Battacharya, "**Digital Communications**", Tata McGraw Hill, 2006.*
5. *Taub & Schilling , "**Principles of Communication Systems**", Tata McGraw-Hill, 3rd Edition,2008.*

12L508- VLSI LABORATORY

PREREQUISITE: INTEGRATEDCIRCUITSLABORATORY

COURSE OBJECTIVES:

- *To apply the HDL programming knowledge for modeling and synthesis of digital circuits*
- *To learn FPGA tools and devices*
- *To implement digital circuits/systems on FPGA devices*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Ability to apply the HDL programming knowledge for modeling and synthesis of digital circuits
CO 2: Knowledge of FPGA tool and devices
CO 3: An ability to implement digital circuits/systems on FPGA devices

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

DESIGN AND SIMULATION USING HDL

1. Combinational Logic circuits
2. Synchronous Sequential Logic circuits
3. Asynchronous Sequential Logic circuits
4. Architecture level :
   a. Memory devices
   b. ALU
   c. RISC CPU (3 bit opcode, 5 bit address)
5. Implementation of Traffic light controller
6. Study of Synthesis tools
7. Layout Design of Logic gates and Combinational circuits
8. Study of development tool for FPGAs for schematic entry and Verilog

TOOLS:

Xilinx Tools, Cadence Tools, Model SIM, Mentor Graphics Tools, T-SPICE

TOTAL: 45

REFERENCE BOOKS:

1. *Cyril,**"Fundamentals of HDL Design",**Pearson Education,2009.*
2. *Samir Palnitkar, **"Verilog HDL",**Pearson Education,2003*

12L601- MANAGEMENT THEORY AND PRACTICE

COURSE OBJECTIVES:

- *To gain a basic knowledge of business and management*
- *To plan for effective organization*
- *To communicate effectively and control*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge of business and management
CO 2: Ability to plan for effective organization
CO 3: Ability to communicate effectively and control

L	T	P	C
3	1	0	4

UNIT I BASICS OF MANAGEMENT THOUGHT (9)

Evolution of Management, definition, Levels, Principles, Differences with administration. Roles of Managers, Social Responsibility of Business, External environment of business, management Ethics

UNIT II PLANNING (9)

Nature, Purpose, Types, Steps, Management by Objectives, Strategic planning process, Decision-making- Types of decisions, Approaches to decision-making under uncertainty.

UNIT III ORGANIZING (9)

Formal, Informal organization- Span of Management- Departmentation – Line, Staff authority, Decentralization and Delegation of authority- Effective organization and organization culture.

UNIT IV STAFFING AND LEADING (9)

Systems Approach to staffing- Performance appraisal process and career strategy formulation, Leadership theories, Theories of motivation, Communication – Process, Barriers, Guidelines for effective communication – Electronic media in communication.

UNIT V CONTROLLING (9)

Process, Feedback loop of Management control, Requirements for effective control- control techniques- Operations research for controlling, Overall and Preventive control.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *Harold Koontz, Weihrich,"**Essentials of Management**",Tata McGrawHill,NewDelhi,2010*
2. *Tripathy,P.C And Reddy,P.N.,"**Principles of Management**",Tata McGrawHill,2010*

REFERENCE BOOKS:

1. *Joseph Massie,"**Essentials of Management**",Prentice Hall of India,NewDelhi,2007.*
2. *Prasad, L.M., "**Principles and Practice of Management**", Sultan Chand and Sons, New Delhi, 2010*

12L602- MIXED SIGNAL CIRCUITS AND INTERFACING

PREREQUISITE: ANALOG INTEGRATED CIRCUITS, ECD

COURSE OBJECTIVES:

- *To gain a basic knowledge of sampling circuits and Sample & Hold architectures*
- *To acquire in-depth knowledge in digital to analog and analog to digital architectures*
- *To analyze MOSFET based power amplifiers*

COURSE OUTCOMES:
Upon completion of this course the student will have:

CO 1: Basic knowledge of sampling circuits and Sample & Hold architectures
CO 2: In-depth knowledge of digital to analog and analog to digital architectures
CO 3: Ability to analyze MOSFET based power amplifiers

L	T	P	C
3	1	0	4

UNIT I BASIC SAMPLING CIRCUITS (9)

Introduction to data conversion and processing - Analog switches - High and low level analog multiplexers - analog multiplexer IC - Sample and hold circuits - MOS - Comparison of diode and MOS switches - Improvements in MOS switch performance.

UNIT II SAMPLE AND HOLD ARCHITECTURES (9)

Open loop architecture - closed loop architecture - multiplexed input architecture - switched capacitor architecture - current mode architecture..

UNIT III DIGITAL TO ANALOG CONVERTER ARCHITECTURE (9)

Basic principles of digital to analog conversion - general considerations - performance metrics - reference multiplication and division - switching functions in resistor ladder DACs, current steering DACs, capacitor DACs, Binary- thermometer code conversion

UNIT IV ANALOG TO DIGITAL CONVERTER ARCHITECTURE (9)

General considerations - performance metrics - Successive approximation ADC, Pipelined ADC, Flash Converters, Sigma delta ADC.

UNIT V CMOS POWER AMPLIFIERS (9)

MOSFET based Class A, B, AB, C and D Power Amplifiers –characteristics analysis.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *Behzad Razavi, "**Principles of Data Conversion System Design**", John Wiley & Sons, 2011.*
2. *Sundaram Natarajan, "**Microelectronics Analysis & design"**, McGraw Hill 2006.*

REFERENCE BOOKS:

1. *R. J Baker, "**CMOS Mixed Signal Circuit Design**", Wiley Interscience, 2nd Edition, 2009.*
2. *B.Razavi, "**Design of Analog CMOS Integrated Circuits**", McGraw Hill, 2005.*
3. *David A. Johns and Ken Martin, "**Analog Integrated Circuit Design**", Wiley India, 2008.*

12L603- ANTENNAS AND WAVE PROPAGATION

PREREQUISITE: ELECTROMAGNETIC WAVES AND WAVEGUIDES

COURSE OBJECTIVES:

- *To understand the Antenna fundamentals and parameters*
- *To learn the concepts of wire antennas and antenna arrays*
- *To design various types of antennas*
- *To get thorough knowledge about wave propagation and characteristics*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge of Antenna fundamentals and parameters
CO 2: Knowledge on wire antennas and antenna arrays
CO 3: An ability to design various types of antennas
CO 4: A thorough knowledge about wave propagation and characteristics

L	T	P	C
3	0	0	3

UNIT I ANTENNA FUNDAMENTALS AND PARAMETERS (9)

Introduction -Types of antennas-Radiation mechanism current distribution-Radiation pattern-power density-radiation intensity- directivity-gain-antenna efficiency beam width-bandwidth-polarization radiation efficiency-effective aperture-Friss equation and radar range equation-antenna temperature-Far field radiation-duality theorem.

UNIT II LINEAR WIRE AND LOOP ANTENNAS (9)

Linear wire antenna- Infinitesimal dipole-small dipole-finite length dipole- Half wavelength dipole, Loop antenna- Circular loop antenna of constant current-ferrite loop.

UNIT III ARRAYS (9)

Two-element array(with equal and unequal magnitude and spacing)-N element linear array (with uniform spacing and Magnitude), Broad side array, End fire array, Phased array, Multifunction of patterns, Binomial array, Tcheshctt array, Planar array, Circular array.

UNIT IV TRAVELING WAVE AND BROADBAND ANTENNAS (9)

Folded dipole, V antenna, Rhombic antenna, Helical antenna, Yagi-uda array of linear elements- Spiral antenna-Log periodic antenna, Patch antenna. Concept of Horn antenna-Parabolic reflector, Antenna measurement-radiation pattern, far and near field measurement- Anechoic chamber.

UNIT V WAVE PROPAGATION **(9)**

Fundamental equation for free space propagation—modes of propagation structure of atmosphere and characteristics-sky wave propagation-effects of Earth's magnetic field- Application of Bartree magnetic ionic formula-Hartree formula-effective dielectric constant and conductivity of the ionosphere and collision frequency –lowest Usable frequency-Skip distance- Optimum working frequency-ionospheric Abnormalities – Multi hop propagations - space wave propagation –Duct propagation.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *Constantine A,Balanis "**Antenna Theory: Analysis and Design**", John Wiley Publishers, 2003.*
2. *K.D.Prasad "**Antenna and Wave Propagation**", Satya prakashan, 1996.*

REFERENCE BOOKS:

1. *John D.Kraus "**Antennas**", Tata Mc Graw Hill, 2002.*
2. *H.Griffiths, J.Encianas, A.Papiernik & Serge Drabowitch "**Modern Antennas**", Chapman & Hall, 2005.*

12L604- EMBEDDED SYSTEMS

PREREQUISITE: MICROPROCESSORS AND MICROCONTROLLERS

COURSE OBJECTIVES:

- *To gain basic knowledge about design and analysis of embedded systems*
- *To learn the concepts of real time operating systems*
- *To apply embedded concepts to real time applications*

COURSE OUTCOMES:
Upon completion of this course the student will have:

CO 1: Basic knowledge about design and analysis of embedded systems
CO 2: Knowledge on real time operating systems
CO 3: Ability to apply embedded concepts to real time applications

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3	0	0	3

UNIT I INTRODUCTION TO EMBEDDED COMPUTING (9)

Complex systems and microprocessors - Embedded system design process - Formalism for system design - Instruction sets Preliminaries - ARM Processor - CPU: Programming input and output – Supervisor mode, exception and traps - Coprocessor - Memory system mechanism - CPU performance – CPU power consumption.

UNIT II COMPUTING PLATFORM AND DESIGN ANALYSIS (9)

CPU buses - Memory devices - I/O devices - Component interfacing - Design with microprocessors - Development and Debugging - Program design - Model of programs - Assembly and Linking - Basic compilation techniques - Analysis and optimization of execution time, power, energy, program size - Program validation and testing.

UNIT III PROCESS AND OPERATING SYSTEMS (9)

Multiple tasks and multi processes – Processes - Context Switching – Operating Systems Scheduling policies - Multiprocessor- Inter Process Communication mechanisms – Evaluating operating system performance - Power optimization strategies for processes.

UNIT IV HARDWARE/SOFTWARE INTEGRATION (9)

Compiler - Cross compiler - Emulator, Simulators - Host and target machines - Linkers/locators for embedded software - Getting embedded software into the target system and testing on host machine.

UNIT V EMBEDDED SYSTEM APPLICATIONS (9)

Applications of Embedded systems - Recent trends in Embedded systems - Case study of Embedded systems like Digital camera, Smart card, Flight simulation and control.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Wayne Wolf, "**Computers as Components - Principles of Embedded Computer System Design**", Morgan Kaufmann Publisher, 2006.*

2. *Rajkamal, "**Embedded Systems Architecture, Programming and Design**", TATA McGraw-Hill, First Reprint, 2003.*

REFERENCE BOOKS:

1. *Steve Heath, "**Embedded Systems Design**", 2nd Edition, Elsevier Publications, 2006.*
2. *David E-Simon, "**An Embedded Software Primer**", Pearson Education, 2007.*
3. *Frank Vahid and Tony Gwasrgie, "**Embedded system Design**", John Wiley and Sons, 2002.*

12L605- COMPUTER COMMUNICATION

PREREQUISITE: DIGITAL COMMUNICATION

COURSE OBJECTIVES:

- *To learn about data communication and protocols*
- *To acquire knowledge of LAN, MAN, WAN.*
- *To know about upper OSI layers and cloud computing*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Knowledge on data communication and protocols
CO 2: In-depth knowledge of LAN, MAN, WAN.
CO 3: Knowledge about upper OSI layers and cloud computing

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UNIT I DATA COMMUNICATION (9)

OSI reference model, Open system standard, Transmission of Digital Data - Electrical Interface, MODEMS, Line configuration, Encoding and Decoding, Multiplexing, Error Detection and Correction .

UNIT II DATA LINK CONTROL AND PROTOCOLS (9)

Flow control and error control, stop and wait, Sliding windows, Automatic Repeat (ARQ), Asynchronous Protocols, - X MODEM, Y MODEM, Synchronous protocols - Character Oriented and Bit oriented protocols (HDLC).

UNIT III LOCAL AREA NETWORKS AND METROPOLITAN NETWORKS (9)

IEEE 802 standards, LLC, MAC layer protocols - CSMA/CD Ethernet, Token Bus, Token Ring, FDDI, Distributed Queue Dual Bus, Switched Multimega Bit Data Service.

UNIT IV WIDE AREA NETWORKS (9)

Circuit Switch packet Switch, Message Switching, X .25 Protocols- Architecture and Layers of Protocol, Frame Delay, ISDN and ATM Protocol, Internetworking Device- Repeater, Bridge, Routes and Gateways, Routing Algorithms.

UNIT V UPPER OSI LAYERS AND INTRODUCTION TO CLOUD COMPUTING (9)

Session layer protocols, Presentation layer - Data Security, Encryption/Decryption, Authentication, Data Composition, Application layer protocols - MHS, File transfer, Virtual terminal, CMIP.

Cloud Computing - History of Cloud Computing - Cloud Architecture – Cloud Storage –Advantages and disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services- Developing Cloud Services

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Behrouz A. Forouzan, **"Data Communications and Networks",** 4th Edition, Tata McGraw Hill Publication, 2006.*

2. *Michael Miller, "**Cloud Computing: Web-Based Applications that Change the Way You Work and Collaborate Online**, Que Publishing, August 2008.*

REFERENCE BOOKS:

1. *William Stallings **,"Data and Computer Communications",** 6th Edition, Pearson Education Asia, 2002.*
2. *Andrew. S. Tanenbaum**, "Computer Networks",** 4th edition, Pearson Education, 2002.*
3. *Larry L. Peterson and Bruce S. Davie **," Computer Networks: A systems approach"** , 3rd Edition, Morgan Kaufmann Publishers, 2003.*

12L607- EMBEDDED SYSTEMS LABORATORY

PREREQUISITE: MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

COURSE OBJECTIVES:

- *To apply the programming skills for embedded system design*
- *To design real time system using the concepts of peripheral interfacing with PIC microcontroller*
- *To communicate effectively the concepts, principles and techniques learnt on embedded systems*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: An ability to apply the programming skills for embedded system design
CO 2: An ability to work in teams to design real time system using the concepts of peripheral interfacing with PIC microcontroller
CO 3: An ability to communicate effectively the concepts, principles and techniques learnt on embedded systems

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0	0	3	2

LIST OF EXPERIMENTS

PIC Microcontroller Programming

1. BCD to Seven Segment Display
2. Timer/Counter Programming
3. Serial Communication
4. Pulse Width Modulation
5. DC Motor Control

Embedded Experiments using Proteus & Keil software

6. Clock using timer interrupt
7. Square wave generation
8. BCD to Seven segment display
9. Frequency Adder/Multiplier
10. Serial Transmission and Reception
11. Experiments based on Embedded Application Development Systems

TOTAL: 45

REFERENCE BOOKS:

1. *Ajay Deshmukh, "**Microcontrollers : Theory and Applications**", Tata McGraw Hill, 2010.*
2. *Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay "**The 8051 Microcontroller and Embedded Systems"**, 2nd Edition, Pearson Education 2008.*
3. *Proteus Professional user Manual.*
4. *Embedded Application Development System – User Manual*

12L608- NETWORKING LABORATORY

PREREQUISITE: COMPUTER COMMUNICATION

COURSE OBJECTIVES:

- *To implement and analyze network protocols*
- *To apply the knowledge of data packet scheduling*
- *To get practical knowledge about network management, network security and WiFi*
- *To communicate effectively the concepts, principles and techniques learnt on network protocols*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: An ability to implement and analyze network protocols
CO 2: An ability to apply the knowledge of data packet scheduling
CO 3: Practical knowledge about network management, network security and WiFi
CO 4: An ability to communicate effectively the concepts, principles and techniques learnt on network protocols

1. L T P C
0 0 3 2

LIST OF EXPERIMENTS

NETWORK PROGRAMMING

1. Analysis of logical link control layer protocols – Stop and wait, Sliding window
2. Analysis of MAC protocols – ALOHA, SLOTTED ALOHA, CSMA, CSMA/CD, TOKEN BUS and TOKEN RING.
3. Client / Server communication using TCP / UDP Socket programming
4. Data packet scheduling, Congestion control, transmission flow control, Error Detection and Control algorithms

NETWORKMANAGEMENT

5. Switches / Routers

   Interface PC's using connectivity devices

   Configure a router to connect two different

   Networks(WAN).

   Create Access Control Lists in a router and filter network traffic
6. Wi-Fi Physical Layer
7. Wi-Fi MAC Layer
8. Cryptography (Network Security)

TOTAL: 45

REFERENCE BOOKS:

1. *Behrouz A. Forouzan, **"Data Communications and Networks",** 4th Edition, Tata McGraw Hill Publication, 2006.*
2. *William Stallings **,"Data & Computer Communications",** 6th Edition, Pearson Education Asia, 2002.*
3. *Andrew. S. Tanenbaum**, "Computer Networks",** 4th edition, Pearson Education, 2002.*
4. *Larry L. Peterson and Bruce S. Davie **," Computer Networks: A systems approach"** , 3rd Edition, Morgan Kaufmann Publishers, 2003.*

12L701- MICROWAVE AND RF SYSTEMS

PREREQUISITE: NETWORKS AND TRANSMISSION LINE, ELECTROMAGNETIC WAVES AND WAVEGUIDES

COURSE OBJECTIVES:

- *To acquire the basic knowledge of planar transmission lines and parameters*
- *To realize the significance of impedance matching in transceiver*
- *To apply the concepts of microwave sources and circuits*
- *To gain knowledge about RF circuits and systems*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge on planar transmission lines and parameters
CO 2: An ability to realize the significance of impedance matching in transceiver
CO 3: An ability to apply the concepts of microwave sources and circuits
CO 4: An in-depth knowledge of RF circuits and systems

L	T	P	C
3	1	0	4

UNIT I Z, Y AND S PARAMETERS AND PLANAR TRANSMISSION LINES (9)

Impedance and Admittance matrices-reciprocal networks-Lossless networks-Scattering matrices-Generalized scattering matrix - Transmission matrix - Relation between impedance, admittance, scattering and transmission matrices. Planar transmission lines - Microstrip- Formula for effective dielectric constant, characteristic impedance and attenuation.

UNIT II IMPEDANCE MATCHING (9)

Matching with lumped elements-Single stub and Double Stub matching - Analytic and Smith Chart solutions, Quarter wave Transformer-Tapered lines-Exponential taper-Triangular taper. Passive Microwaves circuits**:** Dividers and couplers- Three port networks- T Junction - Lossless divider – Resistive divider- branch line coupler-hybrid coupler-maximally flat low pass filter – stepped impedance filter.

UNIT III ACTIVE MICROWAVE CIRCUITS (9)

Ferrite devices-Phase shifters-Isolator-circulator-Low noise amplifier-Mixers-Single ended mixers- Single Balanced mixers- Single pole switch-PIN diode switches-One port negative resistance oscillator. High power sources- Klystron-Magnetron- TWT-Low power source-GUNN, IMPATT, TRAPATT

UNIT IV WIRELESS RF SYSTEMS (9)

Introduction to wireless systems – Design and performance issue –Wireless Antennas – Propagation and Fading – Power Amplifier – Diode Mixer – SAW Filters –Frequency Synthesizer – PLL Analysis – Oscillator Phase Noise – Receiver Architecture – Dynamic Range– Digital Cellular Receiver.

UNIT V RF CIRCUITS **(9)**

Linearity & Distortion in RF Circuits –Intercept Points – Review of Technology - Bipolar transistors – current dependence – High frequency effects– Bipolar transistor design considerations – CMOS transistors – NMOS – CMOS small signal models –Square Law Equations . Block Diagram of RFID – Readers – Tags – middleware – RFID Applications - Merits and Demerits.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *David M. Pozar, "**Microwave Engineering**",JohnWiley&Sons,2001*
2. *Annapurna Das & Sisir K. Das," **Microwave Engineering**",TataMcGrawHill,2000.*
3. *John Rogers & Calvin Plett, "**Radio Frequency Integrated Circuits**", Artech House,2003.*

REFERENCE BOOKS:

1. *R.E.Collin, "**Foundations of Microwave Engineering**", McGraw Hill, 2007.*
2. *www.trenster.com, www.activewaveinc.com, www.chipcon.com,*
3. *www.ti.com, www.microcircuits.com*

12L702- LOW POWER VLSI DESIGN

PREREQUISITE: CMOS VLSI SYSTEMS

COURSE OBJECTIVES:

- *To learn the sources of power dissipation and principles of low power VLSI design*
- *To design and analyze low power CMOS circuits*
- *To gain knowledge in power estimation and optimization techniques*
- *To synthesis low power circuits*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Knowledge on the sources of power dissipation and principles of low power VLSI design
CO 2: Ability to design and analyze low power CMOS circuits
CO 3: An in-depth knowledge of power estimation and optimization techniques
CO 4: An ability to synthesis low power circuits

L	T	P	C
3	1	0	4

UNIT I POWER DISSIPATION IN CMOS (9)

Hierarchy of limits of power - Sources of power consumption - Physics of power dissipation in CMOS FET devices- Basic principle of low power design.

UNIT II POWER OPTIMIZATION (9)

Logical level power optimization - Circuit level low power design - Circuit techniques for reducing power consumption in adders and multipliers.

UNIT III DESIGN OF LOW POWER CMOS CIRCUITS (9)

Computer Arithmetic techniques for low power systems - Reducing power consumption in memories - Low power clock, Interconnect and layout design - Advanced techniques - Special techniques.

UNIT IV POWER ESTIMATION (9)

Power estimation techniques - Logic level power estimation - Simulation power analysis - Probabilistic power analysis.

UNIT V SYNTHESISANDSOFTWAREDESIGNFORLOWPOWER (9)

Synthesis for Low power - Behavioural level transforms- Software design for low power.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *K.Roy and S.C. Prasad , **"Low Power CMOS VLSI Circuit Design",** Wiley,2000.*
2. *Dimitrios Soudris, Chirstian Pignet, Costas Goutis, **"Designing CMOS Circuits for Low Power",** Kluwer,2002.*

REFERENCE BOOKS:

1. *J.B. Kuo and J.H Lou, **"Low voltage CMOS VLSI Circuits",** Wiley 1999.*
2. *A.P.Chandrakasan and R.W. Broadersen, **"Low power digital CMOS design",** Kluwer Academic Publishers,2002.*
3. *Gary Yeap, **"Practical low power digital VLSI design",** Kluwer,1998.*
4. *Abdellatif Bellaouar,Mohamed.I. Elmasry, **"Low power digital VLSI design",** Kluwer, 1995.*
5. *James B. Kuo, Shin - chia Lin, **"Low voltage SOI CMOS VLSI Devices and Circuits",** John Wiley and sons,2001.*

12L703- WIRELESS COMMUNICATION

PREREQUISITE: DIGITAL COMMUNICATION, RF SYSTEMS

COURSE OBJECTIVES:

- *To acquire knowledge of Wireless channels and parameters*
- *To learn mobile communication and cellular system architecture*
- *To create exposure to multipath mitigation techniques and wireless standards*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge on Wireless channels and parameters
CO 2: Knowledge on mobile communication and cellular system architecture
CO 3: Exposure to the concepts of multipath mitigation techniques and wireless standards

L	T	P	C
3	0	0	3

UNIT I WIRELESS CHANNELS (9)

Large scale path loss - Path loss models -Link Budget design - small scale fading- Fading due to Multipath time delay spread - flat fading - frequency selective fading - Fading due to Doppler spread - fast fading - slow fading - Parameters of mobile multipath channels - Time dispersion parameters-coherence bandwidth - Doppler spread and Coherence time.

UNIT II CELLULAR ARCHITECTURE (9)

Evolution of Mobile Communication- trends in Cellular radio and personal communications- Cellular concept- Frequency reuse - channel assignment- hand off interference and system capacity- trunking and grade of service.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS (9)

Structure of a wireless communication link, Modulation and demodulation - Quadrature Phase Shift Keying, $\pi / 4$- Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels, OFDM principle – Transceiver implementation, Cyclic prefix, PAPR, Intercarrier interference.

UNIT IV MULTIPATH MITIGATION TECHNIQUES (9)

Diversity - Micro - and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver, MIMO systems - Spatial Multiplexing, System Model, Channel state information, Capacity in fading and non-fading channels.

UNIT V WIRELESS STANDARDS **(9)**

Principles of Spread Spectrum Techniques, FDMA, TDMA and CDMA - Capacity Calculations - GSM and GPRS, CDMA in IS-95 / CDMA 2000, Wi-Fi, WiMax

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Andreas.F. Molisch, **"Wireless Communications",** John Wiley , 2nd Edition- India, 2006.*
2. *Rappaport,T.S., **"Wireless Communications",** Pearson Education, 2nd Edition 2009.*

REFERENCE BOOKS:

1. *David Tse and Pramod Viswanath, **"Fundamentals of Wireless Communication",** Cambridge University Press, 2005.*
2. *Gordon L. Stuber, **"Principles of Mobile Communication",** Springer International Ltd.,3rd Edition , 2011.*
3. *Simon Haykins & Michael Moher, **"Modern Wireless Communications",** Pearson Education, 3rd Edition,2007.*
4. *Vijay. K. Garg, **"Wireless Communication and Networking"**, Morgan Kaufmann Publishers, 2007, http://books.elsevier.com/9780123735805.*
5. *Van Nee, R. and Ramji Prasad, **"OFDM for wireless multimedia communications"**, Artech House, 2000.*

12L704- FIBER OPTIC COMMUNICATION

PREREQUISITE: SEMICONDUCTOR DEVICES, DIGITAL COMMUNICATION

COURSE OBJECTIVES:

- *To acquire knowledge of optical fibers and optical communication systems*
- *To learn the principles of optical modulation techniques*
- *To apply the fiber optic concepts for various communication systems*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Indepth knowledge on optical fibers and optical communication systems
CO 2: Knowledge on the working principles of optical modulation techniques
CO 3: Ability to apply the fiber optic concepts for various communication systems

L	T	P	C
3	0	0	3

UNIT I INTRODUCTION TO OPTICAL FIBERS (9)

Review of Electrical communication systems - Need for optical communication. Electrical and Optical communication - Advantages and applications - EM spectrum - system model description - Selection of system components - choice of operating wave length - System performance .Mode theory of Circular Wave guides - Overview of Modes - Key Modal concepts - Linearly Polarized Modes - Single Mode Fibers - Graded Index fiber structure.

UNIT II FIBER OPTICAL SOURCES & PHOTO DETECTORS (9)

Characteristics and requirements - Spontaneous and stimulated emission - Source classifications: Ruby, He-Ne lasers, Homo & Hetero structures, Laser Diodes and LED's characteristics, Comparison and applications - Physical principles of Photodiodes, Photo detector Noise, Detector response time - Avalanche multiplication Noise - Comparisons of photo detectors.

UNIT III MODULATION TECHNIQUES (9)

Classifications, Direct/Internal modulation: Analog and Digital modulation formats-External modulators: Electro-optic and Acousto – optic modulators.

UNIT IV TRANSMISSION MEDIA & OPTICAL RECEIVERS (9)

Fiber-optics Vs Coaxial cables - Optical fiber modes and configurations - Fiber transmission properties-Choice of wave length for fiber-optic transmission - Cable configurations - Splices, connectors and couplers - Requirements - Methods of detection process - Comparison - Basic principles of photo detection - Photo diode - Avalanche photo multiplier - Receiver configurations - Pre amplifiers for detectors.

UNIT V SYSTEM CONFIGURATIONS AND FIBER OPTIC APPLICATIONS (9)

Laser radar system - Fiber optic link for computers - Multichannel audio/video communication systems- Repeater/Regenerator for fiber-optic systems -Power Budget and Rise-time Budget- Basic networks - SONET/SDH - WDM concepts and components - Optical CDMA - generation of optical fiber link - Introduction to Ultra High Capacity Networks - optical networking technology in enterprise.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Keiser G, "**Optical Fiber Communications**", McGraw Hill, New Delhi, 3rd edition, 2001.*
2. *Hohn M. Senior, "**Optical Fiber Communications Principles and Practice**", PHI, New Delhi, 3rd edition, 2008.*
3. *Gower, J "**Optical Communication Systems**", PHI, New Delhi, 2nd edition, Fifth reprint, 1995.*

REFERENCE BOOKS:

1. *Franz J.H. Jain V.K, "**Optical Communication, Components and systems**", Narosa publications, New Delhi, 2000.*
2. *K. Mynbaev and Lowell L Scheiner, "**Fiber Optic Communication Technology**", Pearson Education Asia, New Delhi, 2001.*

12L707- MICROWAVE AND RF LABORATORY

PREREQUISITE: NETWORKS AND TRANSMISSION LINE

COURSE OBJECTIVES:

- *To measure various parameters using microwave bench setup*
- *To analyze the radiation pattern of various Antennas and RF circuits*
- *To measure various parameters of RF circuits using network analyzer and spectrum analyzer*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: An ability to measure various parameters using microwave bench setup
CO 2: An ability to analyze the radiation pattern of various Antennas and RF circuits
CO 3: An ability to measure various parameters of RF circuits using network analyzer and spectrum analyzer

L	T	P	C
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LIST OF EXPERIMENTS

1. Measurement of VSWR for various load impedance and reflection coefficient.
2. Study of mode characteristics of Klystron tube.
3. Study of isolator, circulator, directional coupler and magic tee.
4. Study of GUNN oscillator characteristics.
5. Design of RF low pass, high pass and Band pass filters.
6. Study of IF and RF amplifiers.
7. Study of mixer.
8. Measurement of Bandwidth, Numerical aperture and optical losses in a fiber optic cable.
9. Characterization of filters using network analyzer.
10. Spectral analysis of RF circuits using spectrum analyzer.
11. Study of Antenna parameters.

REFERENCE BOOKS:

1. *David M..Pozar, "**Microwave &RF Design of Wireless System**", John Wiley & Sons, 1998.*
2. *R.E.Collin, "**Foundations of Microwave Engineering**", McGraw Hill, 2007.*

3. *www.agilent.com*

12L708 ELECTIVE LABORATORIES

PREREQUISITE: EMBEDDED SYSTEMS, DIGITAL IMAGE PROCESSING

COURSE OBJECTIVES:

- *To implement image processing and neural network training algorithms using MATLAB*
- *To learn ARM based real time applications*
- *To design wireless data modem and DSP based system*
- *To design and simulate PCB layout and ASIC layout using cadence tool*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Ability to implement image processing and neural network training algorithms using MATLAB
CO 2: Knowledge on ARM based real time applications
CO 3: Ability to design wireless data modem and DSP based system
CO 4: Ability to design and simulate PCB layout and ASIC layout using cadence tool

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Implementation of Image Processing Algorithm Using Matlab
2. Implementation of Neural Networks Using Matlab
3. Real Time Embedded Applications using ARM.
4. DC power supply design using buck-boost converters.
5. Design of AC/DC voltage regulator.
6. Design of process control timer.
7. Design of Wireless data modem.
8. PCB layout design.
9. DSP based system design.
10. CADENCE Tool Experiments.

REFERENCE BOOKS:

1. *Rafael C Gonzalez, Richard E Woods and Steven Eddins.L 2nd Edition,* ***"Digital Image Processing using Matlab"****-2nd Edition, Pearson Education 2003.*

2. *Jane W.S.Liu, " **Real Time Systems",** 1st Edition ,Pearson Education 2000*

3. *Glaf P.Feiffer, Andrew Ayre and Christian Keyold **,"Embedded Networking with CAN and CAN open",** Embedded System Academy 2005*

4. *Shibu K V, **"Introduction to Embedded Systems"**, 2nd Edition, TataMcGraw-Hill 2009*

5. *http://www.roma3.infn.it/rictec/Microelettronica/tutorial/Cadence_manual.pdf*

6. *John D.Kraus and Ronalatory Marhefka, **"Antennas For All Applications"**, 3rd edition, Tata McGraw-Hill Book Company, 2003.*

7. *Avathar Singh, S.Srinivasan, "**Digital Signal Processing**", Thomson Learning, 2004.*

12L6E0 – AUTOMOTIVE ELECTRONIC SYSTEMS

PREREQUISITE: EMBEDDED SYSTEMS, CONTROL SYSTEMS

COURSE OBJECTIVES:

- *To acquire the knowledge of basic electrical and electronic components used in an automotive systems*
- *To formulate and solve the problems of an embedded system in automotive electronic systems*
- *To learn the various vehicle communication protocols*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: An in-depth knowledge of the basic electrical and electronic components used in an automotive systems
CO 2: An ability to apply knowledge of an embedded system in automotive electronic systems
CO 3: Knowledge on various vehicle communication protocols

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3	0	0	3

UNIT I ELECTRONICS IN AUTOMOTIVE SYSTEMS (9)

Overview of Automotive Mechanical systems - Need for Automotive Electronics System - Performance (Speed, Power and Torque) - Control (Emission, Fuel Economy, Drivability and Safety) and Legislation (Environmental legislation for pollution and safety norms) - Overview of vehicle electronic systems - Basic electrical components and their operation in an automobile- Power train subsystem(Starting systems, Charging systems, Ignition systems, Electronic fuel control) - Chassis subsystem(ABS,TCS and ESP) - Comfort and safety subsystems (Night vision, airbags, Seatbelt Tensioners, Cruise Control- Lane-departure-warning, Parking)

UNIT II EMBEDDED HARDWARE AND SOFTWARE (9)

Hardware module - Introduction to an embedded board -components - Software Module: IDE - Getting started: Creating new project, creating new files, adding files to project, compile, build, debug and simulation of a project.

UNIT III EMBEDDED SYSTEM PROGRAMMING AND DEBUGGING (9)

Embedded System Programming - Up-loaders- ISP - ROM Emulators - In-Circuit Emulators - Debug Interfaces: BDM and JTAG.

UNIT IV EMBEDDED SYSTEM IN AUTOMOTIVE APPLICATIONS (9)

Engine management systems - Gasoline/ Diesel systems, various sensors used in system - Electronic transmission control - Vehicle safety system - Electronic control of braking and traction - Body electronics - Infotainment systems - Navigation systems - System level tests - Software calibration using engine and vehicle

dynamometers - Environmental tests for Electronic Control Unit - Application Control Unit - Application of Control elements and control methodology in Automotive System.

UNIT V EMBEDDED SYSTEM COMMUNICATION PROTOCOLS (9)

Introduction to control networking - Communication protocols in embedded systems - SPI, I^2C, USB - Vehicle communication protocols - Introduction to CAN, LIN, FLEXRAY, MOST, KWP2000.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Denton.T,* "***Automobile Electrical and Electronic Systems***", *Edward Arnold Publishers, 4th Edition 2012.*
2. *Nicholas Navit,* "***Automotive Embedded System Handbook***", *CRC press,2009 .*

REFERENCES BOOKS:

1. *Robert Bosch GmbH, "**Automotive Handbook**", John Wiley & Sons, 6th Edition, 2004.*
2. *Knowles.D, "**Automotive Electronic and Computer Controlled Ignition Systems**", Prentice Hall,1998.*
3. *William B. Ribbens, "**Learning Automotive Electronics**", Newnes Publishing, 6th Edition 2003.*
4. *Joerg Schaeuffele, Thomas Zurawka - "**Automotive Software Engineering - Principles, Processes, Methods and Tools**", SAE Publications,2005*

12L6E1- RELATIONAL DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES:

- *To learn the basics of the structure of database system and various data models*
- *To acquire the knowledge on the concepts of data storage, query processing and transaction management*
- *To know about the latest techniques in current databases*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge on the structure of the database system and various data models
CO 2: An ability to gain knowledge about data storage, query processing and transaction management
CO 3: An awareness about the latest techniques in current databases

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UNIT I INTRODUCTION AND CONCEPTUAL MODELING (9)

Introduction to File and Database systems- Database system structure - Data Models - Introduction to Network and Hierarchical Models - ER model - Relational Model - Relational Algebra and Calculus.

UNIT II RELATIONAL MODEL (9)

SQL - Data definition- Queries in SQL- Updates- Views - Integrity and Security - Relational Database design - Functional dependences and Normalization for Relational Databases (up to BCNF).

UNIT III DATA STORAGE AND QUERY PROCESSING (9)

Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files - Different types of Indexes- B-Tree - B+Tree - Query Processing.

UNIT IV TRANSACTION MANAGEMENT (9)

Transaction Processing - Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules - Concurrency Control - Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control - Recovery Techniques - Concepts- Immediate Update- Deferred Update - Shadow Paging.

UNIT V CURRENT TRENDS **(9)**

Object Oriented Databases - Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage - XML - Structure of XML- Data- XML Document- Schema- Querying and Transformation. - Data Mining and Data Warehousing.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Abraham Silberschatz, Henry F. Korth and S. Sudarshan- **"Database System Concepts",** Sixth Edition, McGraw- Hill, 2010.*

REFERENCES BOOKS:

1. *Ramez Elmasri and Shamkant B. Navathe, **"Fundamental Database Systems",** 6th Edition, Pearson Education,2010.*
2. *Raghu Ramakrishnan**, "Database Management System",** Third Edition, Tata McGraw-Hill Publishing Company,2003.*
3. *Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- **"Database System Implentation"**- 2nd Edition Pearson Education- 2009.*
4. *Peter Rob and Corlos Coronel- **"Database System, Design, Implementation and Management",** Thompson Learning Course Technology- 5th edition, 2003.*

12L6E2 - OPERATING SYSTEMS

COURSE OBJECTIVES:

- *To learn the concepts of various operating systems*
- *To acquire the knowledge of Process, memory and I/O management techniques*
- *To know the basics of Unix and Windows operating systems*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: An in-depth knowledge on the concepts of various operating systems
CO 2: Knowledge on Process, memory and I/O management techniques
CO 3: An exposure to Unix and Windows operating systems

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UNIT I OPERATING SYSTEM CONCEPTS (9)

Introduction - Multitasking - Multiprogramming - Multi user - Multithreading - Types of Operating Systems - Batch operating system - Time sharing systems - Distributed OS - Network OS - Real Time OS - Operating system services - Architectures- System programs and calls.

UNIT II PROCESS MANAGEMENT AND PROCESS SYNCHRONIZATION (9)

Process concept - Process scheduling - Scheduling criteria - Scheduling algorithms - First Come First Serve - Shortest Job First - Priority Scheduling - Round Robin - Multilevel Queue Scheduling. Process synchronization and Deadlock - Critical Section Problems - Semaphores - Methods for handling Deadlocks - Deadlock prevention, avoidance and detection - Deadlock recovery.

UNIT III MEMORY MANAGEMENT (9)

Logical and Physical address Space - Swapping - Contiguous memory allocation - Non-contiguous memory allocation - Virtual memory management - Paging and Segmentation techniques - Segmentation with paging - Demand Paging – Page replacement Algorithms.

UNIT IV FILE SYSTEM AND I/O SYSTEMS (9)

Different types of files - Access methods - Directory structures - Allocation methods - Disk scheduling and management and its associated algorithms - Distributed file system. I/O Hardware - application I/O Interface - Kernel - Transforming I/O requests - Performance Issues.

UNIT V OVERVIEW OF UNIX SYSTEM AND WINDOWS (9)

UNIX system call for processes and file system management - Windows architecture overview - Windows file system – Case studies: Linux System - Windows XP - Mach system.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, **"Operating System Concepts"**, John Wiley & Sons, 7nd Edition, 2005.*
2. *Dhamdhere D.M., **"Operating Systems – A Concept-Based Approach "**,3rd Edition, Tata McGraw Hill, New Delhi, 2012.*

REFERENCE BOOKS:

1. *William Stallings, **"Operating Systems"**, Prentice Hall, New Delhi, 6th Edition, 2005.*
2. *Harvey M. Deitel, Paul J. Deitel, David R. Choffnes, **"Operating Systems"**, Prentice Hall, New Delhi, 3rd Edition 2004.*
3. *Jean Bacon, Tim Harris, **"Operating Systems",** Addison Wesley, New Delhi, 1st Edition, 2003.*

12L6E3 - MEASUREMENTS AND INSTRUMENTATION

PREREQUISITE: CIRCUIT THEORY, LINEAR INTEGRATED CIRCUITS

COURSE OBJECTIVES:

- *To understand the basics of measurement, different types of sensors and transducers*
- *To acquire an in-depth knowledge on ac and dc bridges for measurement*
- *To learn the concepts of signal analyzers, digital instruments, data display and recording systems*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Knowledge on the basics of measurement, different types of sensors and transducers
CO 2: An in-depth knowledge on ac and dc bridges for measurement
CO 3: Basic knowledge on the working principles of signal analyzers, digital instruments, data display and recording Systems

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UNIT I BASICS OF MEASUREMENT (9)

Measurement System -Instrumentation - Characteristics of measurement systems -Static and Dynamic - Errors in Measurements - Calibration and Standards.

UNIT II TRANSDUCERS (9)

Classification of Transducers-Variable Resistive transducers-Strain gauges, Thermistor, RTD- Variable Inductive transducers- LVDT, RVDT,- Variable Capacitive Transducers -Capacitor microphone- Photo electric transducers Piezoelectric transducers- Thermocouple-IC sensors-Fibre optic sensors-Smart/intelligent sensors.

UNIT III SIGNAL CONDITIONING AND SIGNAL ANALYZERS (9)

DC and AC bridges - Wheatstone, Kelvin, Maxwell, Hay and Schering.Pre- amplifier - Isolation amplifier - Filters -Data acquisition systems. Spectrum Analyzers -Wave analyzers-Frequency selective wave analysers, Heterodyne wave analyser, Total harmonic distortion-Harmonic distortion analysers-Logic analyzers.

UNIT IV DIGITAL INSTRUMENTS (9)

Digital instruments-Classification of Digital instruments-Digital methods of measuring frequency, period, phase difference, pulse width, time interaval, AC and DC Voltage and current-Digital Voltmeters-automation in Voltmeter -Accuracy and Resolution in DVM-Guarding techniques -Frequency counter-DMM,DPM and Digital Q- meter.

UNIT V DATA DISPLAY AND RECORDING SYSTEMS (9)

Dual trace CRO -Digital storage and Analog storage oscilloscope. Analog and Digital Recorders and printers. Virtual Instrumentation - Block diagram and architecture - Applications in various fields. Measurement systems applied to Micro and Nanotechnology.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Albert D.Helfrick and William D. Cooper, "**Modern Electronic Instrumentation and Measurement Techniques**", Prentice Hall of India, 2007.*
2. *A.K Sawhney, "**Course In Electrical And Electronic Measurement And Instrumentation**", Dhanpat Rai Publisher,2000.*

REFERENCE BOOKS:

1. *John P. Bentley, "**Principles of Measurement Systems**", 4th edition, pearson Education Limited, 2005.*
2. *Ernest .o .Doebelin and Dhanesh. N. manik, "**Measurement systems**" ,5th edition, McGraw-Hill, 2007.*
3. *Bouwens,A.J, "**Digital Instrumentation**", Tata Mc-Graw Hill, 1986.*
4. *David A.Bell, "**Electronic Instrumentation and Measurements**", 2nd edition, PHI, 2007.*
5. *Kalsi.H.S,"**Electronics Instrumentation**".Tata Mc Graw Hill,4 th edition,2004.*

12L6E4 - TV AND VIDEO ENGINEERING

PREREQUISITE: DIGITAL COMMUNICATION

COURSE OBJECTIVES:

- *To gain the basic knowledge on the fundamentals of monochrome and color television*
- *To understand the principles of monochrome and color television transmitter and receiver systems*
- *To acquire the knowledge on advanced television systems*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge on the fundamentals of monochrome and color television
CO 2: Description about the principles of monochrome and color television transmitter and receiver systems
CO 3: Exposure to advanced television systems

L	T	P	C
3	0	0	3

UNIT I FUNDAMENTALS OF TELEVISION (9)

Aspect ratio-image continuity- number of scanning lines-interlaced scanning- picture resolution- camera tubes-image orthicon- vidicon- plumbicon- silicon diode array vidicon- solid state image scanners- monochrome picture tubes- composite video signal- video signal dimension- horizontal sync. Composition- vertical sync. Details-functions of vertical pulse train- scanning sequence details. Picture signal transmission- positive and negative modulation- VSB transmission- sound signal transmission- standard channel bandwidth.

UNIT II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER (9)

TV transmitter-TV signal propagation- interference- TV Transmission antennas- monochrome TV receiver-RF tuner- UHF - VHF tuner- digital tuning techniques- aft- IF subsystems- AGC noise cancellation- video amplifier circuits- sync operation- typical sync processing circuits - deflection oscillators- frame deflection circuits- requirements- line deflection circuits- EHT generation- receiver antennas.

UNIT III ESSENTIALS OF COLOUR TELEVISION (9)

Compatibility- colour perception- three colour television cameras- values of luminance and colour difference signals- colour television display tubes- delta- gun precision-in-line and Trinitron colour picture tubes- purity and convergence- purity and static and dynamic convergence adjustments- pincushion-correction techniques-automatic degaussing circuits- gray scale tracking- colour signal transmission- bandwidth- modulation of colour difference signals- weighting factors- formation of chrominance signal.

UNIT IV COLOUR TELEVISION SYSTEMS (9)

NTSC colour TV systems- SECAM system- PAL colour TV systems- cancellation of phase errors- PAL-D colour system- PAL coder- PAL- decoder receiver- chromo signal amplifier- separation of U and V signals- colour burst separation- burst phase discriminator- acc amplifier- reference oscillator- ident and colour killer circuits- U and V demodulators- colour signal matrixing. Sound in TV

UNIT V ADVANCED TELEVISION SYSTEMS (9)

Satellite TV technology- geo stationary satellites- satellite electronics- domestic broadcast system- cable TV – cable signal sources- cable signal processing, distribution and scrambling- video recording- VCR electronics- video home formats- video disc recording and playback- DVD players- tele text signal coding and broadcast receiver- digital television- transmission and reception- projection- flat panel display TV receivers- LCD and plasma screen receivers- 3DTV- EDTV

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *R.R.Gulati," **Monochrome Television Practice, Principles, Technology And Servicing**" 3rd Edition 2006, New Age International (P) Publishers.*
2. *R.R.Gulati, "**Monochrome & colour Television**", New Age International (P) Publishers, 2003.*

REFERENCE BOOKS:

1. *A.M Dhake, **"Television and video Engineering"**, 2nd Edition., TMH,2003*

12L6E5- STATISTICAL THEORY OF COMMUNICATION

PREREQUISITE: RANDOM PROCESS, DIGITAL COMMUNICATION, DSP

COURSE OBJECTIVES:

- *To know the concepts of information theory and coding*
- *To acquire the basic knowledge on hypothesis testing and estimation theory*
- *To understand the coherent detection of signals and optimum linear filters*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: An exposure to the concepts of information theory and coding
CO 2: Basic knowledge on hypothesis testing and estimation theory
CO 3: Knowledge on the coherent detection of signals and optimum linear filters

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UNIT I INFORMATION MEASURE AND NOISELESS CODING (9)

Discrete entropy - Joint and conditional entropies - Uniquely decipherable and instantaneous codes - Kraft-Mcmillan inequality - Noiseless coding theorem - Construction of optimal codes.

UNIT II DISCRETE MEMORYLESS CHANNEL (9)

Mutual information and channel capacity - Shannon's fundamental theorem- Entropy in the continuous case- Shannon-Hartley law.

UNIT III HYPOTHESIS TESTING AND ESTIMATION THEORY (9)

Baye's, minimax and Neyman-Pearson tests - Random parameter estimation-Minimum Mean Square Error(MMSE), Minimum Mean Absolute Error (MMAE) and MAP estimates - Nonrandom parameters - Maximum Likelihood estimation.

UNIT IV DETECTION OF SIGNALS IN NOISE (9)

Coherent signal detection in the presence of additive white and non-white Gaussian noise- Matched filter.

UNIT V DISCRETE OPTIMUM LINEAR FILTERING (9)

Orthogonality principle- Spectral factorization- FIR and IIR Wiener filters.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Robert B. Ash, "**Information Theory**", Courier Dover Publications, 1990*
2. *M.D.Srinath, P.K.Rajasekaran, "**Statistical Signal Processing with Applications**", Wiley,1996*

REFERENCE BOOKS:

1. *Reza F.M. "**An Introduction to Information Theory**", McGraw Hill, New Delhi, 2002.*

12L7E0 SPREAD SPECTRUM TECHNIQUES

PREREQUISITE: DIGITAL COMMUNICATION

COURSE OBJECTIVES:

- *To understand the principles of spread spectrum techniques.*
- *To create exposure to the fundamental concepts of cryptosystems.*
- *To apply the concepts of spread spectrum techniques to mobile communication.*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Indepth knowledge on the principles of spread spectrum techniques.
CO 2: Exposure to the fundamental concepts of cryptosystems.
CO 3: An ability to apply the spread spectrum techniques to mobile communication.

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UNIT I INTRODUCTION TO SPREAD SPECTRUM (9)

Introduction-Application and advantages of Spread Spectrum (SS) – Classification of SS Pseudo Noise Sequences-Direct Sequence SS – Frequency Hopping – Chirp – Hybrid Spectrum Methods.

UNIT II SPREAD SPECTRUM TECHNIQUES (9)

Frequency hop SS signals, performance of FHSS – Fast hopping and Slow hopping-DS and FH, CDMA system based on FH SS signals – types of SS signals-time hoping SS systems.

UNIT III SPREAD SPECTRUM ANALYSIS (9)

Synchronization of SS System - Acquisition, Tracking, Jamming Considerations – Broad Band- Partial – Multiple Tone – Pulse – Repeat Band Jamming Blade Systems.

UNIT IV CRYPTOGRAPHY (9)

Fundamental concepts of cryptosystems - authentication, digital signature, key schedule-encipherment, decipherment, stream cipher system, public key- cryptosystem- public key distribution system- RSA cryptosystem and authentication scheme- protocols, internetworking security mechanisms-private and public key encryption.

UNIT V APPLICATIONS (9)

Commercial application of SS - CDMA-multipath channels – FCC part 15 rules- direct sequence CDMA- IS-95 CDMA digital cellular systems, SS applications in cellular – PCS and mobile communication.

LECTURE: 45 TUTORIAL: 15 TOTAL: 60

TEXT BOOKS:

1. *Bernard sklar, "**Digital communication-fundamentals and Application**", Pearson Edition, 2001.*
2. *M.K.Simon, J.K.Scholtz and B.K.Levitt,"**Spread Spectrum Communications Vol-1, Vol-2, Vol-3**", computer science press Inc, 2002.*

REFERENCE BOOKS:

1. *John G. Proakias,"**Digital Communications**", McGraw Hill Inc, 2001.*
2. *Feher.K.,"**Wireless Digital Communications**", Pearson education,1995.*
3. *John.G.Proakias,"**Digital Communications**", Tata McGraw Hill Publishing Company Ltd, 4th Edition, 2006.*

12L7E1 ADVANCED DIGITAL SIGNAL PROCESSING

PREREQUISITE: DIGITAL SIGNAL PROCESSING

COURSE OBJECTIVES:

- *To analyze the discrete random process*
- *To know about non-parametric and parametric power spectrum estimation and prediction*
- *To understand the concepts of adaptive filters and multi-rate digital signal processing*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: An ability to analyze discrete random process
CO 2: An exposure to non-parametric and parametric power spectrum estimation and prediction
CO 3: Knowledge about the concepts of adaptive filters and multi-rate digital signal processing

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3	0	0	3

UNIT I DISCRETE RANDOM SIGNAL PROCESSING (9)

Discrete Random Processes-Ensemble Averages-Stationary processes-Bias and Estimation-Autocovariance-Autocorrelation-Parseval's theorem-Wiener-Khintchine relation-White noise-Power Spectral Density-Spectral Factorization-Filtering Random Processes-Special types of Random Processes-ARMA, AR, MA-Yule-Walker equations.

UNIT II SPECTRAL ESTIMATION (9)

Estimation of spectra from finite duration signals-Nonparametric methods-Periodogram-Modified periodogram-Bartlett- Welch and Blackman-Tukey methods-Parametric methods–ARMA-AR and MA model based spectral estimation-Solution using Levinson-Durbin algorithm.

UNIT III LINEAR ESTIMATION AND PREDICTION (9)

Linear prediction –Forward and Backward prediction-Solution of Prony's normal equations-Least mean-squared error criterion-Wiener filter for filtering and prediction-FIR and IIR Wiener filters-Discrete Kalman filter.

UNIT IV ADAPTIVE FILTERS (9)

FIR adaptive filters-adaptive filter based on steepest descent method-Widrow-Hopf LMS algorithm, Normalized LMS algorithm, Adaptive channel equalization, Adaptive echo cancellation, Adaptive noise cancellation, RLS adaptive algorithm.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING (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-Time invariant structures-Multistage implementation of multirate system, Application to subband coding-Wavelet transform.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Monson H. Hayes, "**Statistical Digital Signal Processing and Modeling**", John Wiley and Sons, Inc, Singapore,2008.*

REFERENCE BOOKS:

1. *John J. Proakis, Dimitris G. Manolakis, "**Digital Signal Processing**", Pearson Education,4th Edition, 2009.*
2. *Rafael C. Gonzalez, Richard E. Woods, "**Digital Image Processing**", Pearson Education Inc.,3rd Edition, 2008.*

12L7E2 VLSI SIGNAL PROCESSING

PREREQUISITE: DIGITAL SIGNAL PROCESSING, LOW POWER VLSI DESIGN,DIGITAL LOGIC WITH HDL, COMPUTER ARCHITECTURE

COURSE OBJECTIVES:

- *To realize the concepts of DSP algorithms using pipelining and parallel processing*
- *To design filters using systolic and parallel architectures*
- *To know about bit level arithmetic architectures and numerical strength reduction*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Ability to realize DSP algorithms using pipelining and parallel processing
CO 2: An ability to realize filters using systolic and parallel architectures
CO 3: Exposure to bit level arithmetic architectures and numerical strength reduction

L	T	P	C
3	0	0	3

UNIT I ITERATION BOUND (9)

Introduction to DSP Systems-Typical DSP algorithms. Iteration Bound–data flow graph representations-loop bound and iteration bound-Longest Path Matrix algorithm-Pipelining and parallel processing–Pipelining in FIR digital filters-parallel processing-pipelining and parallel processing for low power-Retiming-definitions and properties-Solving systems of Inequalities Techniques.

UNIT II UNFOLDING (9)

Unfolding–Algorithm-Properties and Applications of Unfolding-Unfolding for retiming-1D & 2D systolic architecture design -selection of scheduling vectors-Algorithmic strength reduction in filters– 2-parallel FIR filter- 2-parallel fast FIR filters-DCT algorithm architecture transformation-parallel architectures for rank-order filters-Odd-Even-Merge Sort architectures-parallel rank-order filters.

UNIT III FAST CONVOLUTION (9)

Fast convolution–Cook-Toom algorithm- modified Cook-Took algorithm-Pipelined and parallel recursive and adaptive filters–inefficient/efficient single channel interleaving-Look-Ahead pipelining in first-order IIR filters-Look-Ahead pipelining with power-of-two decomposition-Clustered Look-Ahead pipelining-parallel processing of IIR filters-combined pipelining and parallel processing of IIR filters-pipelined adaptive digital filters-relaxed look-ahead-pipelined LMS adaptive filter.

UNIT IV BIT LEVEL ARITHMETIC ARCHITECTURES (9)

Bit-Level Arithmetic Architectures Scaling and roundoff noise-scaling operation-roundoff noise-state variable description of digital filters-scaling and roundoff noise computation-roundoff noise in pipelined first-order filters-Bit-Level Arithmetic Architectures-parallel multipliers with sign extension-parallel carry-ripple array multipliers-parallel carry-save multiplier-4x4 bit Baugh-Wooley carry-save multiplication tabular form and

implementation-bit-serial FIR filter-CSD representation- CSD multiplication using Horner's rule for precision improvement.

UNIT V NUMERICAL STRENGTH REDUCTION (9)

Numerical Strength Reduction – sub expression elimination- multiple constant multiplications- iterative matching. Linear transformations-Synchronous-Wave and asynchronous pipelining-synchronous pipelining and clocking styles-clock skew in edge-triggered single-phase clocking-two-phase clocking-wave pipelining-asynchronous pipelining bundled data versus dual rail protocol.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Keshab K.Parhi, "**VLSI Digital Signal Processing systems- Design and implementation**", Wiley, Inter Science, 2007.*

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REFERENCE BOOKS:

1. *Mohammed Isamail and Terri Fiez, "**Analog VLSI Signal and Information Processing**", Mc Graw-Hill- 1994.*
2. *S.Y. Kung- H.J. White House, T. Kailath- "**VLSI and Modern Signal Processing**", Prentice Hall- 1985.*
3. *Jose E. France, Yannis Tsividis, "**Design of Analog - Digital VLSI Circuits for Telecommunication and Signal Processing**"- Prentice Hall- 1994.*

12L7E3 SOFTWARE ENGINEERING

COURSE OBJECTIVES:

- *To gain knowledge on the software process and requirements*
- *To gain knowledge about software architectural design*
- *To exploit software testing and project management*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: An in-depth knowledge on the software process and requirements
CO 2: Knowledge about the concepts of software architectural design
CO 3: An ability to exploit software testing and project management

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UNIT I SOFTWARE PROCESS (9)

Introduction-S/W Engineering Paradigm–life cycle models (waterfall, incremental, spiral, WIN WIN spiral, evolutionary, prototyping, object oriented)-system engineering-computer based system-verification-validation-life cycle process- development process-system engineering hierarchy.

UNIT II SOFTWARE REQUIREMENTS (9)

Functional and non-functional-user-system-requirement engineering process-feasibility studies-requirements-elicitation-validation and management - software prototyping - prototyping in the software process - rapid prototyping techniques – user interface prototyping-S/W document. Analysis and modeling-data, functional and behavioral models-structured analysis and data dictionary.

UNIT III DESIGN CONCEPTS AND PRINCIPLES (9)

Design process and concepts-modular design-design heuristic-design model and document. Architectural design- software architecture-data design-architectural design-transform and transaction mapping-user interface design-user interface design principles. Real time systems-Real times of tware design-system design-real time executives-data acquisition system-monitoring and control system. SCM – Need for SCM-Version control-Introduction to SCM process-Software configuration items.

UNIT IV TESTING (9)

Taxonomy of software testing - levels - test activities - types of s/w test - black box testing - testing boundary conditions – structural testing-test coverage criteria based on dataflow mechanisms-regression testing-testing in the large. S/W testing strategies-strategic approach and issues-unit testing-integration testing-validation testing-system testing and debugging.

UNIT V SOFTWARE PROJECT MANAGEMENT (9)

Measures and measurements-S/W complexity and science measure-size measure-data and logic structure

measure– information flow measure. Software cost estimation-function point models- COCOMO model-Delphi method.-Defining a Task Network-Scheduling-Earned Value Analysis-Error Tracking-Software changes-program evolution dynamics– software maintenance-Architectural evolution. Taxonomy of CASE tools.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Roger S.Pressman, "**Software Engineering- A Practitioner's Approach"**, McGraw-Hill International Edition, 6th Edition, 2006.*

REFERENCE BOOKS:

1. *Ian Sommerville, **"Software Engineering",** Pearson education Asia, 8th Edition, 2007.*
2. *Pankaj Jalote- **An Integrated Approach to Software Engineering**, Springer Verlag, 1997.*
3. *James F Peters and Witold Pedryez, **"Software Engineering - An Engineering Approach"**, John Wiley and Sons, New Delhi, 2000.*
4. *Ali Behforooz and Frederick J Hudson, **"Software Engineering Fundamentals",** Oxford University Press, New Delhi,1996.*

12L7E4- NEURAL NETWORKS

COURSE OBJECTIVES:

- *To understand the basic concepts of Artificial Neural Networks*
- *To solve problems using Feed forward and Feedback Neural networks*
- *To understand the concepts of simulated annealing and adaptive resonance theory*
- *To apply the concepts of Neural networks to Pattern recognition*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Exposure to basics of Artificial Neural Network
CO 2: Ability to solve problems using Feed forward and Feedback Neural networks
CO 3: Knowledge about the concepts of simulated annealing and adaptive resonance theory
CO4: Ability to apply the concepts of Neural networks to Pattern recognition

L	T	P	C
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UNIT I INTRODUCTION (9)

Artificial neural networks- History-Structure and function of single neuron-Weights, activation functions and bias-Fundamental neuron models and learning-Neural net architectures-Learning algorithms, supervised and unsupervised-Use of neural networks- Perceptron-linear separability.

UNIT II FEEDFORWARD AND FEEDBACK NETWORKS (9)

Back propagation network-Architecture -Delta rule-Weight updation for output and hidden layer-Local and global minima-practical considerations-Merits, demerits and applications-Pattern association-Associative memories-BAM-Energy theorem-Architecture and processing-Hopfield memory-Discrete and continuous-Optimization using Hopfield networks.

UNIT III SIMULATED ANNEALING AND COMPETITIVE NETWORKS (9)

Annealing-Boltzman machine architecture, learning and processing-Practical considerations-Neural networks based on competition-Counter propagation network-Forward mapping CPN and complete CPN-Building blocks-Architecture, Training and data processing-Practical considerations and applications.

UNIT IV SOMAND ADAPTIVE RESONANCE THEORY (9)

Topologically organized network-Feature map classifier-Applications-Learning vector quantization-Adaptive resonance theory-Fundamentals-Basic architecture and operation-Pattern matching-ART1 network-Architecture and processing summary.

UNIT V HANDWRITTEN CHARACTER AND SPEECH RECOGNITION (9)

Neocognetron -Architecture-Data processing and performance-Spatio-temporal pattern classification-STN-Architecture- Speech recognition-SCAF-Training-Time dilation effect.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *James A.Freeman, David M.Skapura, "**Neural Networks Algorithms, Applications, and Programming Techniques**", Pearson Education (Singapore) Private Limited, Delhi, 2003.*

REFERENCE BOOKS:

1. *Satish Kumar,"**Neural Networks:A Classroom Approach**",Tata McGraw-Hill Publishing Company Limited, New Delhi,2004.*
2. *Simon Haykin, "**Neural Networks: A Comprehensive Foundation**", 2nd edition, Addison Wesley Longman (Singapore) Private Limited, Delhi, 2001.*
3. *Laurence Fausett, "**Fundamentals of Neural Networks, Architectures, Algorithms and Applications**", Pearson education Private Limited, Delhi, 2004.*
4. *Sivanandam.S.N, Sumathi.S, Deepa.S.N, "**Introduction to Neural networks using MATLAB6.0**", Tata Mc-Graw-Hill Publishing Company Limited, NewDelhi, 2006.*

12L7E5- RADAR SYSTEMS

PREREQUISITE: MICROWAVE AND RF SYSTEMS

COURSE OBJECTIVES:

- *To understand the basic concepts of radar signals and systems*
- *To gain knowledge about radar transmitter and receiver*
- *To understand the concepts of radar detection, tracking and measurement*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge on radar signals and systems
CO 2: An exposure to radar transmitter and receiver
CO 3: Knowledge on the concepts of radar detection, tracking and measurement

L	T	P	C
3	0	0	3

UNIT I INTRODUCTION TO RADAR (9)

Fundamentals of Radar-Elements-Functions-System considerations- Radar Targets-Basic Principle. Radar equation. Radar cross section. Cross section of small targets. Target scattering matrices. Area and volume targets.

UNIT II RADAR SIGNALS (9)

Real, Complex, Analytic Radar signals-Duration, Frequency, Bandwidth of radar signals. Ambiguity function and its properties. Uncertainty principle. Pulse compression-linear FM pulse-Pulse compression by Costas FM and binary phase coding.

UNIT III RADAR TRANSMITTER AND RECEIVER (9)

Radar Transmitters- Introduction-Linear Beam Power Tubes-Solid State RF Power Sources-Magnetron-Crossed Field Amplifiers-Other RF Power Sources-Other aspects of Radar Transmitter. Radar Receivers-The Radar Receiver-Receiver noise Figure-Superheterodyne Receiver-Duplexers and Receiver Protectors-Radar Displays.

UNIT IV RADAR DETECTION (9)

Radar detection. Optimum Bayesian decision rules. Detection criteria for different target models.

UNIT V MEASUREMENT AND TRACKING (9)

Range and Doppler measurements and tracking. Range and Doppler frequency resolutions. Optimum receivers. Optimum filters for Doppler measurements. Coherent and non coherent implementations. Angle measurement and tracking. Angle measurement and tracking by conical scan and mono pulse. Optimum mono pulse systems.

LECTURE: 45 TUTORIAL:15 TOTAL: 60

TEXT BOOKS:

1. *PeytonZ.Peebles,"**Radar Principles**",Johnwiley,2004.*
2. *Merrill I. Skolnik ,"**Introduction to Radar Systems**",Tata McGraw-Hill(3rdEdition)2003*

REFERENCE BOOKS:

1. *J.CToomay,"**Principles of Radar**", 2nd Edition –PHI, 2004*

12L7E6 - IMAGE PROCESSING

PREREQUISITE: SIGNALS AND SYSTEMS, DIGITAL SIGNAL PROCESSING

COURSE OBJECTIVES:

- *To understand the basics of digital imaging and image transforms*
- *To gain knowledge about various image processing techniques*
- *To apply knowledge of different image processing schemes for real time applications*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Knowledge on the basics of digital imaging and image transforms
CO 2: Exposure to various image processing techniques
CO 3: An ability to apply knowledge of different image processing schemes for real time applications

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UNIT I DIGITAL IMAGE FUNDAMENTALS (9)

Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, MachBand effect, Image sampling, Quantization, Dither, Two-dimensional mathematical preliminaries.

UNIT II IMAGE TRANSFORMS (9)

1D DFT, 2D transforms-DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Wavelet transform.

UNIT III IMAGE ENHANCEMENT AND RESTORATION (9)

Histogram modification-Noise distributions-Spatial averaging-Directional Smoothing-Median-Geometric mean-Harmonic mean-Contra harmonic and Yp mean filters. Design of 2D FIR filters. Image restoration-degradation model- Unconstrained and Constrained restoration-Inverse filtering- removal of blur caused by uniform linear motion- Wiener filtering-Geometric transformations- spatial transformations-Gray-Level interpolation.

UNIT IV IMAGE SEGMENTATION AND RECOGNITION (9)

Image segmentation-Edge detection-Edge linking and boundary detection-Region growing, Region splitting and Merging- Image Recognition-Patterns and pattern classes, Matching by minimum distance classifier, Matching by correlation. Neural networks-Back propagation network and training, Neural network to recognize shapes.

UNIT V IMAGE COMPRESSION (9)

Need for data compression-Huffman-Run Length Encoding-Shift codes-Arithmetic coding-Vector

Quantization-Block Truncation Coding- Transform coding- JPEG standard-JPEG 2000-EZW-SPIHT-MPEG.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Rafael C.Gonzalez, Richard E.Woods,"**Digital Image Processing**",Pearson Education,Inc., 2nd Edition, 2004*

2. *Anil K.Jain, "**Fundamentals of Digital Image Processing**", Prentice Hall of India, 2002.*

REFERENCE BOOKS:

1. *Rafael C.Gonzalez, Richard E.Woods, Steven Eddins,"**Digital Image Processing usingMATLAB**", Pearson Education, Inc.,2004.*

2. *Milan Sonkaetal,"**Image Processing, Analysis and Machine Vision**", Brookes/Cole, Vikas Publishing House, 2nd Edition, 1999;*

3. *Jayaraman S,Esakkirajan S and Veerakumar J, "**Digital Image Processing**", Tata McGraw Hill Education pvt ltd, 2010.*

12L7E7-MULTIMEDIA COMPRESSION TECHNIQUES

PREREQUISITE: DIGITAL COMMUNICATION, SIGNALS AND SYSTEMS

COURSE OBJECTIVES:

- *To gain knowledge about Multimedia components and characteristics*
- *To understand various text and image compression algorithms*
- *To know about audio and video compression techniques and standards*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Knowledge about Multimedia components and characteristics
CO 2: Exposure to various text and image compression algorithms
CO 3: Exposure to audio and video compression techniques and standards

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UNIT I MULTIMEDIA COMPONENTS (9)

Introduction-Multimedia skills-Multimedia components and their characteristics-Text, Sound, images, Graphics, Animation, Video, Hardware.

UNIT II TEXT COMPRESSION (9)

Compression principles-source encoders and destination encoders-Lossless and Lossy compression-entropy encoding- source encoding-text compression-static Huffman coding dynamic coding-arithmetic coding-LZW Compression- Entropy and Quality measures.

UNIT III IMAGE COMPRESSION (9)

Approaches to image compression- Predictive Techniques- PCM, DPCM, DM- Progressive based compression-Vector quantization-Binary Tree Predictive-Quad trees-DCT coding-Wavelet methods-Filter banks-EZW, SPIHT- Compression standards.

UNIT IV AUDIO COMPRESSION (9)

Audio compression-Companding laws-frequency domain filtering-Basic subband coding-application to speech coding- G.722-Application to Audio coding-MPEG Audio-Progressive encoding for Audio-Silence compression-Speech compression techniques-CELP Vocoders-LPC.

UNIT V VIDEO COMPRESSION (9)

Video compression techniques-Standards-MPEG1, 2, 4, 7 Video coding-Motion estimation and compensation techniques-H.261-H.263.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Fred Halshall, **"Multimedia Communication- Applications, Networks, Protocols and Standards",** Pearson education, 2007.*
2. *Khalid Sayood, "**Introduction to Data Compression**", 3rd Edition, Morgan Kaufmann Series in Multimedia Information and Systems, 2006.*

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,1st Edition, 1995.*
3. *Ranjan Parekh, **"Principles of Multimedia",** TMH, 2006.*
4. *Tay Vaughan, **"Multideai- making it work",** 7/e, TMH, 2007.*

12L7E8 -MEMS

COURSE OBJECTIVES:

- *To understand the basics of MEMS and mechanics for MEMS Design*
- *To get knowledge about the concepts of optical and RF MEMS*
- *To apply the basic knowledge of MEMS in different fields*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Knowledge on the basics of MEMS and mechanics for MEMS Design
CO 2: Exposure to concepts of optical and RF MEMS
CO 3: Ability to apply the basic knowledge of MEMS in different fields

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UNIT I INTRODUCTION TO MEMS (9)

MEMS and Microsystems-Miniaturization-Typical products-Micro sensors-Micro actuation-MEMS with micro actuators-Micro accelerometers and Micro fluidics-MEMS materials-Micro fabrication.

UNIT II MECHANICS FOR MEMS DESIGN (9)

Elasticity-Stress-strain and material properties-Bending of thin plates-Spring configurations-torsional deflection-Mechanical vibration-Resonance-Thermomechanics-actuators-force and response time-Fracture and thin film mechanics.

UNIT III ELECTROSTATIC DESIGN AND SYSTEM ISSUES (9)

Electrostatics: basic theory-electrostatic instability. Surface tension-gap and finger pullup-Electrostatic actuators-Comb generators- gap closers- rotary motors- inch worms- Electromagnetic actuators. bistable actuators. Electronic Interfaces-Feedback systems-Noise-Circuit and system issues.

UNIT IV MEMS APPLICATION (9)

Case studies-Capacitive accelerometer-Piezo electric pressure sensor-Micro fluidics application-Modeling of MEMS systems-CAD for MEMS.

UNIT V INTRODUCTION TO OPTICAL AND RF MEMS (9)

Optical MEMS—System design basics-Gaussian optics-matrix operations-resolution. Case studies-MEMS scanners and retinal scanning display-Digital Micro mirror devices.RF Mems-design basics-case study-Capacitive RF MEMS switch-performance issues.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *StephenSanteria,“* ***Microsystems Design****”,Kluwe rpublishers,2000.*
2. *N.P.Mahalik ,“****MEMS****”, Tata McGrawhill,2007*

REFERENCE BOOKS:

1. *Vijay. K.Varadan, K.J.Vinoy, K.A.Jose, “****RF MEMS And Applications****”, John Wiley&Sons,2003.*
2. *Nadim Maluf, ”****An Introduction to Micro Electro Mechanical System Design****”, Artech House, 2000.*
3. *Mohamed Gad-el-Hak, editor, ”****The MEMS Handbook****”,CRC press Baco Raton,2000.*
4. *TaiRanHsu, ”****MEMS & Microsystems Design and Manufacture****” Tata McGrawHill, NewDelhi, 2002.*
5. *Liu,”****MEMS****”,Pearson education,2007.*

12L7E9-AVIONICS

COURSE OBJECTIVES:

- *To understand the basics of Avionics and navigation systems*
- *To get knowledge on Radio and satellite navigation systems*
- *To acquire knowledge on air data systems and aircraft display technology*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge about Avionics and navigation systems
CO 2: Exposure to Radio and satellite navigation systems
CO 3: Knowledge of air data systems and aircraft display technology

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UNIT I INTRODUCTION (9)

Introduction to aircraft- Axes system-Parts, importance and role of Avionics-systems which interface directly with pilot –Aircraft state sensor systems- Navigation systems- External world sensor systems-task automation systems. Avionics architecture evolution. Avionics Data buses - MILSTD 1553,ARINC 429,ARINC629.

UNIT II RADIO NAVIGATION (9)

Types of Radio Navigation- ADF, DME, VOR, LORAN, DECCA, OMEGA. ILS, MLS

UNIT III INERTIAL AND SATELLITE NAVIGATION SYSTEMS (9)

Inertial sensors -Gyroscopes, Accelerometers, Inertial navigation systems –Block diagram, Platform and strap down INS. Satellite Navigation-GPS

UNIT IV AIR DATA SYSTEMS AND AUTOPILOT (9)

Air data quantities -Altitude, Airspeed, Mach no., Vertical speed, Total Air temperature, Stall warning, Altitude warning. Autopilot-basic principles-longitudinal and lateral autopilot.

UNIT V AIRCRAFT DISPLAYS (9)

Display technologies-LED, LCD, CRT, Flat Panel Display. Primary Flight parameter displays-Head Up Display, Helmet Mounted Display, Night vision goggles, Head Down Display, MFD, MFK, Virtual cockpit.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Albert Helfrick.D, "**Principles of Avionics**", Avionics communications Inc.,2004*
2. *Collinson,R.P.G, "**Introduction to Avionics**",Chapman and Hall,1996.*

REFERENCE BOOKS:

1. *Middleton,D.H, "**Avionics Systems**", Longman Scientific and Technical, Longman Group UK Ltd, England, 1989.*
2. *Spitzer, C.R. "**Digital Avionics Systems**", Prentice Hall, Englewood Cliffs, N.J.,USA 1993.*
3. *Spitzer, C.R, "**The Avionics Handbook**", CR CPress,2000.*
4. *Pallet, E.H.J, "**Aircraft Instruments and Integrated Systems**", Longman Scientific*

12L8E0 -PROFESSIONAL ETHICS

COURSE OBJECTIVES:

- *To gain knowledge of Engineering Ethics and their responsibility in society*
- *To know about safety & risk assessment and benefit analysis*
- *To know the employee responsibilities and rights*
- *To follow the ethics of Engineers in global issues*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Awareness of Engineering Ethics and their responsibility in society
CO 2: Knowledge on safety & risk assessment and benefit analysis
CO 3: Awareness of employee responsibilities and rights
CO 4: Ability to follow the ethics of Engineers in global issues

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UNIT I ENGINEERING ETHICS (9)

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

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION (9)

Engineering as experimentation-engineers as responsible experimenters-codes of ethics- a balanced outlook on law-the challenger case study

UNIT III SAFETY (9)

Safety and risk-assessment of safety and risk-risk benefit analysis and reducing risk-the three mile island and Chernobyl case studies.

UNIT IV RESPONSIBILITIES AND RIGHTS (9)

Collegiality and loyalty-respect for authority-collective bargaining-confidentiality-conflicts of interest-occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT V GLOBAL ISSUES (9)

Multinational corporations-Environmental ethics-computer ethics-weapons development-engineers as managers- consulting engineers-engineers as expert witnesses and advisors-moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers(India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE), India

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Mike Martin and Roland Schinzinger, "**Ethics in Engineering**", McGraw-Hill,NewYork 1996.*
2. *Govindarajan M, Natarajan S, Senthil Kumar V.S, "**Engineering Ethics**", Prentice Hall of India, New Delhi, 2004.*

REFERENCE BOOKS:

1. *Charles D.Fleddermann,"**Engineering Ethics**",Pearson Education/Prentice Hall, New Jersey, 2004 (Indian Reprint)*
2. *Charles E Harris, Michael S.Protchard and Michael J Rabins, "**Engineering Ethics–Concepts and Cases**", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)*
3. *John R Boatright, "**Ethics and the Conduct of Business**", Pearson Education, New Delhi, 2003.*
4. *Edmund G Seebauer and Robert L Barry,"**Fundamentals of Ethics for Scientists and Engineers**", Oxford University Press, Oxford,2001.*

12L8E1-DSP SYSTEM DESIGN

PREREQUISITE: DIGITAL SIGNAL PROCESSING, MICROPROCESSOR AND MICROCONTROLLERS

COURSE OBJECTIVES:

- *To gain knowledge about architecture, instruction set and programming concepts of TMS320C6X, ADSP 21XX processors*
- *To design different types of filters*
- *To know about code optimization techniques*
- *To understand the concepts of frame processing ,Real Time Analysis and scheduling*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Knowledge of architecture, instruction set and programming concepts of TMS 320C6X, ADSP 21XX processors
CO 2: Ability to implement FFT algorithms and design digital filters
CO 3: Knowledge in the code optimization techniques
CO 4: Awareness about the concepts of frame processing ,Real Time Analysis and scheduling

L	T	P	C
3	0	0	3

UNIT I ADSP21XX ARCHITECTURE AND PROGRAMMING (9)

Introduction to ADSP-2100 family of processors-Assembly language overview-Development systems-Single precision fixed point division-Multi precision fixed point addition-subtraction-multiplication and division-Fixed point to floating point conversion and vice versa - Floating point addition-subtraction-multiplication and division-Sine-arc tangent-square root and logarithm approximation-Uniform random number generation.

UNIT II FFT AND FILTER IMPLEMENTATION USING ADSP21XX (9)

Implementation of FFT: Radix-2 fast Fourier transforms-Block floating point scaling-Optimized radix-2 DIT FFT- Leakage-Implementation of digital filters: single and double precision FIR Filters-IIR Filters-Multirate filters.

UNIT III TMS320C6X ARCHITECTURE (9)

CPU Operation-Pipelined CPU-VelociTI-C64x DSP-Software tools: EVM-DSK Target C6x board Assembly file- Memory management-Compiler utility-Code initialization-Code composer studio-Interrupt data processing.

UNIT IV CODE OPTIMIZATION (9)

Word-wide optimization-Mixing C and assembly-software pipelining-C64x improvements-Real time filtering–Circular buffering-Adaptive filtering.

UNIT V FRAME PROCESSING, REAL TIME ANALYSIS AND SCHEDULING (9)

Frame processing: DMADSP Host Communication-DFT and FFT Implementation-Real time FFT-Real time analysis-Real time scheduling-real time data exchange-DSP/BIOS-Data synchronization and communication.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *"**Digital Signal Processing Applications using the ADSP–2100 Family**", Volume1 Analog devices, DSP Division PrenticeHall,1992.*
2. *Nasser Kehtarnavazand Mansour Keramat, "**DSP System design using the TMS320C600**",Prentice hall, 2001*

REFERENCE BOOKS:

1. *Sophocles J.Orfanidis, "**Introduction to Signal Processing**",PrenticeHall,1998.*
2. *Sen M.Kuo, Bob H.Lee,"**Real–Time Digital Signal Processing- Implementations, Applications and Experiments with the TMS320C55x**",John Wiley and Sons ,2001.*
3. *John G Proakis and Manolakis, "**Digital Signal Processing Principles, Algorithms and Applications**", Pearson Education, 4th Edition, 2009.*

12L8E2 -NANO ELECTRONICS

COURSE OBJECTIVES:

- *To Understand the fundamentals of Nanotechnology and Nanoelectronics*
- *To Acquire Knowledge on Silicon MOSFETS & quantum Transport devices*
- *To get Exposed to carbon Nanotubes and molecular electronics*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge on the fundamentals of Nanotechnology and Nanoelectronics
CO 2: Knowledge on Silicon MOSFETS & quantum Transport devices
CO 3: Exposure to carbon Nanotubes and molecular electronics

L	T	P	C
3	0	0	3

UNIT I INTRODUCTION TO NANO TECHNOLOGY (9)

Background to nanotechnology: Types of nanotechnology and nanomachines-periodic table-atomic structure-molecules and phases-energy-molecular and atomic size-surface and dimensional space - top down and bottom up; Molecular Nanotechnology: Electron microscope- scanning electron microscope-atomic force microscope-scanning tunneling microscope-nanomanipulator-nanotweezers-atom manipulation–nanodots – self assembly - dippen nano lithography. Nanomaterials: preparation-plasma arcing-chemical vapor deposition-sol-gels-electro deposition-ball milling-applications of nanomaterials;

UNIT II FUNDAMENTALS OF NANOELECTRONICS (9)

Fundamentals of logic devices:-Requirements-dynamic properties- threshold gates; physical limits to computations; concepts of logic devices: -classifications-two terminal devices-field effect devices-coulomb blockade devices-spintronics-quantum cellular automata-quantum computing-DNA computer; performance of information processing systems; -basic binary operations, measure of performance processing capability of biological neurons-performance estimation for the human brain. Ultimate computation:-power dissipation limit – dissipation in reversible computation-the ultimate computer.

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES (9)

Silicon MOSFETS –Novel materials and alternate concepts:- fundamentals of MOSFET Devices-scaling rules-silicon-dioxide based gate dielectrics-metal gates-junctions & contacts-advanced MOSFET concepts. Quantum transport devices based on resonant tunneling-Electron tunneling- resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices-applications of single electron devices to logic circuits.

UNIT IV CARBON NANOTUBES (9)

Carbon Nanotube: Fullerenes – types of nanotubes – formation of nanotubes -assemblies –purification of carbon nanotubes –electronic propertics –synthesis of carbon nanotubes-carbon nanotube interconnects- carbon nanotube FETs-Nanotube for memory applications-prospects of an all carbon nanotube nanoelectronics.

UNIT V MOLECULARELECTRONICS (9)

Electrodes & contacts- functions-molecular electronic devices- first test systems-simulation and circuit design-fabrication; Future applications: MEMS-robots-random access memory-mass storage devices.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard Raguse , "**Nanotechnology: Basic Science and Emerging Technologies**", Chapman Hall/ CRC, 2002*

REFERENCE BOOKS:

1. *T.Pradeep, "**NANO: The Essentials–Understanding Nanoscience and Nanotechnology**", TMH 2007*
2. *Rainer Waser(Ed.), "**Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices**", Wiley-VCH ,2003*

12L8E3- SOFT COMPUTING

COURSE OBJECTIVES:

- *To Understand the concepts of Fuzzy set theory, optimization and Neuro-Fuzzy modeling*
- *To get Exposed to artificial intelligence and search techniques*
- *Able to apply soft computing techniques in real time applications*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Awareness about the concepts of Fuzzy set theory, optimization and Neuro-Fuzzy modeling
CO 2: Exposure to artificial intelligence and search techniques
CO 3: An ability to apply soft computing techniques in real time applications

L	T	P	C
3	0	0	3

UNIT I FUZZY SET THEORY (9)

Introduction to NeuroFuzzy and Soft Computing-Fuzzy Sets-Basic Definition and Terminology-Set-theoretic Operations-Member Function Formulation and Parameterization-Fuzzy Rules and Fuzzy Reasoning-Extension Principle and Fuzzy Relations-Fuzzy If-Then Rules-Fuzzy Reasoning-Fuzzy Inference Systems- Mamdani Fuzzy Models-Sugeno Fuzzy Models-Tsukamoto Fuzzy Models-Input Space Partitioning and FuzzyModeling.

UNIT II OPTIMIZATION (9)

Derivative-based Optimization-Descent Methods-The Method of Steepest Descent-Classical Newton's Method-Step Size Determination-Derivative free Optimization-Simulated Annealing-Random Search Down hill Simplex Search-Genetic Algorithms.

UNIT III ARTIFICIAL INTELLIGENCE (9)

Introduction-Knowledge Representation-Reasoning- Issues and Acquisition: Prepositional and Predicate Calculus Rule Based knowledge Representation-Symbolic Reasoning-Under Uncertainty- Basic knowledge Representation Issues-Knowledge acquisition-Heuristic Search: Techniques for Heuristic search-Heuristic Classification-State Space Search: Strategies Implementation of Graph Search-Search based on Recursion Patent-directed Search Production System and Learning.

UNIT IV NEURO FUZZY MODELING (9)

Adaptive Neuro-Fuzzy Inference Systems-Architecture-Hybrid Learning Algorithm-Learning Methods that Cross-fertilize ANFIS and RBFN-Coactive Neuro Fuzzy Modeling -Framework Neuron Functions for Adaptive Networks Neuro Fuzzy Spectrum.

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE (9)

Printed Character Recognition-Inverse Kinematics Problems-Automobile Fuel Efficiency Prediction-Soft Computing for Color Recipe Prediction.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

*1.J.S.R.Jang, C.T.Sun and E.Mizutani,"**Neuro-Fuzzy and Soft Computing**",PHI,2004,Pearson Education2004.*

*2.N.P.Padhy,"**Artificial Intelligence and Intelligent Systems**",Oxford University Press,2006.*

REFERENCE BOOKS:

1. *Elaine Rich &Kevin Knight,"**Artificial Intelligence**", Second Edition,Tata Mcgraw Hill Publishing Comp.,2006, New Delhi.*

2. *Timothy J.Ross, "**Fuzzy Logic with Engineering Applications**",McGraw-Hill,1997.*

3. *Davis E.Goldberg, "**Genetic Algorithms:Search,Optimization and Machine Learning**", Addison Wesley, N.Y.,1989.*

4. *S.Rajasekaran and G.A.V.Pai,"**Neural Networks, Fuzzy Logic and Genetic Algorithms**",PHI,2003.*

12L8E4- TOTAL QUALITY MANAGEMENT

COURSE OBJECTIVES:

- *To Understand the basics concepts and principles of TQM*
- *To get Exposed to TQM tools and Techniques*
- *To gain knowledge of different quality standards in manufacturing and service sectors*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic Knowledge about the concepts and principles of TQM
CO 2: Exposure to TQM tools and Techniques
CO 3: Knowledge of different quality standards in manufacturing and service sectors

L	T	P	C
3	0	0	3

UNIT I INTRODUCTION (9)

Introduction-Need for quality-Evolution of quality-Definition of quality-Dimensions of manufacturing and service quality - Basic concepts of TQM-Definition of TQM- TQM Framework-Contributions of Deming, Juran and Crosby - Barriers to TQM.

UNIT II PRINCIPLES OF TQM (9)

Leadership- Strategic quality planning, Quality statements-Customer focus-Customer orientation, Customer satisfaction, complaints, and retention-Employee involvement-Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Appraisal of Performance

UNIT III TQM TOOLS &TECHNIQUES (9)

The seven traditional tools of quality-New management tools-Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT-Benchmarking-process-FMEA-Stages,Types.

UNIT IV TQM TOOLS &TECHNIQUES II (9)

Quality circles-5s, Kaizen, Quality Function Deployment (QFD)-Taguchi Quality loss function-TPM-Concepts, improvement needs-Cost of Quality-Performance measures.

UNIT V QUALITY SYSTEMS **(9)**

Need for ISO 9000-ISO 9000-2000 Quality System-Elements, Documentation, Quality auditing-QS9000-ISO14000- Concepts, Requirements and Benefits-Case studies of TQM implementation in manufacturing and service sectors including IT.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *DaleH. Besterfiled, etat.,"**Total Quality Management**",Pearson Education Asia,3rd Edition, Indian Reprint 2009.*

2. *Suganthi, L and Anand Samuel,"**Total Quality Management**",Prentice Hall (India) Pvt. Ltd.,2006.*

3. *Janakiraman,B and Gopal,R.K,"**Total Quality Management–Text and Cases**", Prentice Hall (India)Pvt. Ltd.,2006.*

REFERENCE BOOKS:

1. *James R.Evans and William M.Lindsay,"**The Management and Control of Quality**",6th Edition,South-Western (Thomson Learning), 2005.*

2. *Oakland, J.S. "**TQM–Text with Cases**", Butterworth – Heinemann Ltd., Oxford, 3rd Edition,2003.*

12L8E5- BIO MEDICAL INSTRUMENTATION

PREREQUISITE: MEASUREMENTS AND INSTRUMENTATION

COURSE OBJECTIVES:

- *To Understand the Human physiology and components of biomedical system*
- *To get exposed to electro and non-electro physiological parameter measurements*
- *To know about medical imaging and biotelemetry systems*
- *To Understand the principle of operation of Therapeutic equipments*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knowledge on Human physiology and components of biomedical system
CO 2: Exposure to electro and non-electro physiological parameter measurements
CO 3: Knowledge of medical imaging and biotelemetry systems
CO 4: Description on the principles of operation of Therapeutic equipments

L	T	P	C
3	0	0	3

UNIT I PHYSIOLOGY AND TRANSDUCERS (9)

Cell and its structure - Resting and Action Potential - Nervous system: Functional organization of the nervous system - Structure of nervous system, neurons - synapse - transmitters and neural communication - Cardiovascular system - respiratory system , Basic components of a biomedical system .Transducers - selection criteria – Piezo electric, ultrasonic transducers ,Temperature measurements , Fibre optic temperature sensors.

UNIT II ELECTRO – PHYSIOLOGICAL MEASUREMENTS (9)

Electrodes - Limb electrodes-floating electrodes - pregelled disposable electrodes - micro- needle and surface electrodes - Amplifiers: Preamplifiers- differential amplifiers- chopper amplifiers -Isolation amplifier. Physiological measurements-ECG, EEG, EMG, ERG - Lead systems and recording methods-Typical waveforms. Electrical safety in medical environment: shock hazards-leakage current.

UNIT III NON-ELECTRICAL PARAMETER MEASUREMENTS (9)

Measurement of blood pressure -Cardiac output -Heart rate-Heart sounds-Pulmonary function measurements – spirometer -Photo Plethysmography- Body Plethysmography-Blood Gas analysers - pH of blood -measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements.

UNIT IV MEDICAL IMAGING AND BIOTELEMETRY (9)

Radio graphic and fluoroscopic techniques -Computer tomography-Magnetic Resonance Imaging - Ultrasonography-A mode,B mode ,M mode- Endoscopy-Thermography-Different types of biotelemetry systems and patient monitoring-Wireless telemetry,single channel,multi channel,multi patient and implantable telemetry systems.

UNIT V ASSISTING AND THERAPEUTIC EQUIPMENTS (9)

Pacemakers-External and internal pacemakers-Defibrillators-DC defibrillator, implantable defibrillators-Ventilators -Nerve and muscle stimulators -TENS-Surgical diathermy machine, safety aspects in Electro surgical units- Heart Lung machine- Audiometers-Dialysers-Lithotripsy.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *R.S.Khandpur, "**Hand Book of Bio-Medical instrumentation**", Tata McGraw Hill Publishing Co Ltd., 2004.*
2. *Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, "**Bio-Medical Instrumentation and Measurements**", 2nd edition, Pearson Education, 2002 .*

REFERENCE BOOKS:

1. M.Arumugam, "***Bio-Medical Instrumentation***", Anuradha Agencies, 2003.
2. L.A. Geddes and L.E.Baker, "***Principles of Applied Bio-Medical Instrumentation***", John Wiley & Sons, 1975.
3. *J.Webster, "**Medical Instrumentation**", John Wiley & Sons, 1995.*

12L8E6- POWER ELECTRONICS

PREREQUISITE: ELECTRONIC DEVICES

COURSE OBJECTIVES:

- *To learn about power semiconductor devices and their characteristics*
- *To acquire the knowledge of Power supplies and inverters*
- *To be aware of the applications of power electronics*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Knowledge of power semiconductor devices and their characteristics
CO 2: Description about the working principles of Power supplies and inverters
CO 3: Exposure to the applications of power electronics

L	T	P	C
3	0	0	3

UNIT I POWER SEMICONDUCTOR DEVICES (9)

Power transistors-Fast recovery diodes-Thyristors-Power TRIAC-MOSFET-IGBT-GTO-characteristics -rating, Protection circuits, Driver Circuits.

UNIT II CONTROLLED RECTIFIERS AND AC VOLTAGE CONTROLLERS (9)

Single Phase and Three Phase Controlled rectifiers- Design of Trigger circuits- Dual Converters-AC Voltage controllers

UNIT III POWER SUPPLIES (9)

DC-DC Converters-Gating requirements-Switching mode regulators-Boost, Buck, Buck-Boost and Cuk regulators, DC and AC Power supplies- Switched mode- Resonant and Bidirectional Power supplies.

UNIT IV INVERTERS (9)

Voltage and current source inverters-Resonant-Series inverter-PWM inverter.

UNIT V APPLICATIONS (9)

DC motor drives-Induction and Synchronous motor drives-Switched reluctance and brushless motor drives-Solid state relays-Microelectronic relays

LECTURE: 45 TUTORIAL: 0 TOTAL:

TEXT BOOKS:

1. *Muhammad H.Rashid,"**Power Electronics-Circuits, Devices and Applications**", 3rd Edition, Prentice Hall of India,2004.*

REFERENCE BOOKS:

1. *M.D.Singh, K.B. Khanchandani, "**Power Electronics**",Tata McGraw-Hill,1998.*
2. *Ned Mohan,Tore M.Undeland, William P.Robbins,"**Power Electronics, Converters, Applications and Design**", John Wiley & Sons,1994.*
3. *B.K.Bose,"**Modern Power Electronics**",Jaico Publishing House,1999.*
4. *Sen,"**Power Electronics**",Tata McGraw-Hill,1987.*

12L8E7- VLSI TESTING

PREREQUISITE: DIGITAL LOGIC WITH HDL

COURSE OBJECTIVES:

- *To learn about the faults and fault models in digital circuits*
- *To be aware of test pattern generation methods and learn the concepts of design for testability*
- *To Acquire knowledge of fault diagnosis at various logic and system levels*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Baisc knowldge on the faults and fault models in digital circuits
CO 2: Exposure to test pattern generation methods and concepts of design for testability
CO 3: Indepth knowledge on fault diagnosis at various logic and system levels

L	T	P	C
3	0	0	3

UNIT-I FAULT SIMULATION **(9)**

Introduction to Testing - Faults in digital circuits - Modelling of faults - Logical Fault Models - Fault detection - Fault location - Fault dominance - Logic Simulation - Types of simulation - Delay models - Gate level Event-driven simulation.

UNIT-II TEST GENERATION **(9)**

Test generation for combinational logic circuits - Testable combinational logic circuit design –Test generation for sequential circuits-design of testable sequential circuits.

UNIT-III TESTABLE DESIGN **(9)**

Design for Testability-Ad-hoc design-Generic scan based design-Classical scan based design-System level DFT approaches.

UNIT-IV BUILT IN SELF TEST **(9)**

Built-In Self Test-Test pattern generation for BIST-Circular BIST-BIST Architectures-Testable Memory Design –Test algorithms-Test generation for Embedded RAMs

UNIT-V FAULT DIAGNOSIS **(9)**

Logic Level Diagnosis - Diagnosis by UUT reduction - Fault Diagnosis for Combinational Circuits - Self-checking design - System Level Diagnosis.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Abramovici .M,Breuer M.A and Friedman A.D,* ***"Digital Systems and Testable Design"*** *Jaico Publishing House, 2002.*
2. *Bushnell M.L and Agrawal V.D,* ***"Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits"****, Kluwer Academic Publishers, 2002.*

REFERENCE BOOKS:

1. *Lala P.K,****"Digital Circuit Testing and Testability"****, Academic Press, 2002.*
2. *Crouch.A.L,****"Design for Test for Digital IC's and Embedded Core Systems",*** *PrenticeHall International,2002.*

12L8E8- SATELLITE COMMUNICATION

PREREQUISITE: DIGITAL COMMUNICATION

COURSE OBJECTIVES:

- *To realize the importance of Keplar's law of satellite orbits and to know about different satellite subsystems*
- *To learn about satellite link design and multiple access Techniques*
- *To be aware of various satellite communication applications*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: An ability to realize the importance of Keplar's law of satellite orbits and to know about different satellite subsystems
CO 2: Exposure to satellite link design and access Techniques
CO 3: Exposure to various satellite services

L	T	P	C
3	0	0	3

UNIT I SATELLITE ORBITS AND TRAJECTORIES (9)

Orbital Mechanics-Orbit Equations, Kepler's Laws, Orbital Period, Orbits and their types, look angle calculation;Satellite Launch.

UNIT II SATELLITE SUBSYSTEM (9)

Satellite Subsystems- AOCS-TTC and M-Power-Transponders-Antennas-earth control-Effects of earth-Perturbation, sun transit-moon transit-satellite power design-MTBF. Basic Equations-System Noise and G/T ratio-Uplink, Downlink and Design for a specified C/N ratio- with GEO and LEO examples-Atmospheric and Rain effects on link performance.

UNIT III LINK DESIGN, MODULATION AND ERROR CONTROL (9)

Single link design-double link design aspects-PAM, baseband processing-Digital Modulation for satellite links-BPSK, QPSK and QAM-TDM standards for satellite systems-Error control requirements for satellite link-ARQ, Concatenated Codes, Interleaving, Turbo codes.

UNIT IV MULTIPLE ACCESS FOR SATELLITE COMMUNICATIONS (9)

FDM-FM-FDMA-TDMA-structure and system design-Onboard Processing systems-DAMA and PAMA-CDMA-system design and capacity.

UNIT V APPLICATIONS (9)

Remote sensing, navigation, scientific and military application, VSAT-Network architecture, Access Control

protocols and techniques, VSAT Earth stations; Satellite Mobile Telephony-Global star, DBS/DTH Television, GPS, Weather satellites.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *T.Pratt, C. Bostian and J.Allnut,; "**Satellite Communications**", John Wiley and Sons, 2nd Edition,2006.*
2. *D.Rody, "**Satellite Communications**",McGraw-Hill,2006.*
3. *M. Richharia, "**Satellite communication systems**", John Wiley &Sons, 2nd Edition,2011.*

REFERENCE BOOKS:

1. *W.L.Pritchard,HG Suyderhoud and RAN elson,"**Satellite Communication System Engineering**",2nd Edition, Prentice Hall, 1993.*
2. *Tri. T. Ha, "**Digital Satellite Communications**",Tata McGraw Hill, Indian reprint,2009.*
3. *B.N.Agarwal,"**Design of Geosynchronous Spacecraft**", Prentice Hall,2007.*

12L8E9- NETWORK SECURITY

PREREQUISITE: COMPUTER COMMUNICATION

COURSE OBJECTIVES:

- *To learn the concepts of classical encryption techniques and message authentication codes*
- *To apply the knowledge about public key cryptography and authentication.*
- *To illustrate network and system level security.*

COURSE OUTCOMES:

Upon completion of this course the student will have:

CO 1: Basic knolwedge on the concepts of classical encryption techniques and message authentication codes
CO 2: An ability to apply the knowledge of public key cryptography and authentication
CO 3: Illustration of network and system level security

L	T	P	C
3	0	0	3

UNIT-I INTRODUCTION (9)

OSI Security Architecture-Classical Encryption techniques-Cipher Principles-Data Encryption Standard-Block Cipher Design Principles and Modes of Operation-Evaluation criteria for AES-AES Cipher-Triple DES-Placement of Encryption Function-Traffic Confidentiality

UNIT-II PUBLIC KEY CRYPTOGRAPHY (9)

Key Management-Diffie-Hellman key Exchange-Elliptic Curve Architecture and Cryptography-Introduction to Number Theory-Confidentiality using Symmetric Encryption-Public Key Cryptography and RSA.

UNIT-III AUTHENTICATION AND HASH FUNCTION (9)

Authentication requirements- Authentication functions-Message Authentication Codes-Hash Functions-Security of Hash Functions and MACs-MD5 message Digest algorithm-Secure Hash Algorithm-RIPEMD-HMAC Digital Signatures-Authentication Protocols-Digital Signature Standard

UNIT-IV NETWORK SECURITY (9)

Authentication Applications: Kerberos-X.509 Authentication Service-Electronic Mail Security-PGP-S/MIME-IP Security-Web Security.

UNIT-V SYSTEM LEVEL SECURITY (9)

Intrusion detection - password management - Viruses and related Threats - Virus Counter measures - Firewall Design Principles – Trusted Systems.

LECTURE: 45 TUTORIAL: 0 TOTAL: 45

TEXT BOOKS:

1. *Behrouz A Forouzan, **"Cryptography and Network Security",** Tata McGraw Hill Education Pvt. Ltd., New Delhi,2007.*

REFERENCE BOOKS:

1. *Atul Kahate ,**"Cryptography and Network Security",** 2nd Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009.*
2. *William Stallings, **"Cryptography and Network Security**, 4th edition, Prentice Hall ,New Delhi, 2006*
3. *Bruce Schneier, **"Applied Cryptography",**2nd edition, John Wiley & Sons, New York 1996.*
4. *Chris Brenton, **"Mastering Network Security"**, BPB Publication, New Delhi, 2002.*
5. *Steven L Shaffer, Alan R Simon, **"Network Security",** AP Professional, NewYork,2001.*