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

Curriculum

LLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLLL

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	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	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

(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

(Common to all branches)

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 HOURS

References 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

(Common to all branches)

L T P C

3 1 0 4

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.

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**.**

APPLICATIONS OF DIFFERENTIAL CALCULUS (9)

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

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.

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 HOURS

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.*

References 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., "**Engineering Mathematics**" vol. I, 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*

12L103 FUNDAMENTALS OF CIVIL AND MECHANICAL ENGINEERING

L T P C
4 0 0 4

SECTION A
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*

References Books

*1. Rangawala S.C. "**Engineering materials**", Charotor Publishing Houses, 2001.*

*2. Punmia B.C. "**Building construction**", Lakshmi publications, 2002.*

<div align="center">

SECTION B

MECHANICAL ENGINEERING

</div>

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 – Micromachining 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.

<div align="right">

TOTAL: 25 HOURS

</div>

Text Books

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

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

References 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

(Common to EEE, EIE, CSE & IT)

L T P C
3 0 0 3

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

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.

MAGNETIC AND SUPER CONDUCTING MATERIALS (9)

Introduction - Origin of magnetic moment - Bohr magnetron - Dia, Para, and Ferro magnetic materials - Domain theory of ferromagnetism - Hysteresis - Hard and Soft magnetic materials. Ferrites - structure and applications. - Magneto optical recording and readout – Superconductivity - Types of superconductors - BCS theory of superconductivity (qualitative) - properties- High T_c superconductors, Applications of superconductors- SQUID, Cryotron, Magnetic levitation.

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.

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 - Nanomaterials-synthesis –chemical vapour deposition – Sol Gels – ball Milling – properties of nanoparticles and applications of nanoparticles – Carbon Nanotubes (CNT) – structure – properties – applications of the CNTs.

TOTAL: 45 HOURS

Text Book

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

References Books

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

(Common to EEE,EIE,CSE & IT)

L T P C
3 0 0 3

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.

BATTERIES (9)

Batteries - components - Characteristics - voltage , current , capacity, electrical storage density, energy density, discharge rate – types of batteries (primary and secondary)- primary- $Zn-MnO_2$, $Zn-AgO$, $Zn-HgO$, $Li-SO_2Cl$ - 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.

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.

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.

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.

TOTAL : 45 HOURS

Text Books

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

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

References 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

(Common to CIVIL, EEE,EIE, CSE, IT & IBT)

L T P C

3 1 0 4

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.

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.

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.

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-bit fields- enumerated data types; union: calling BIOS and DOS services-union of structures.

FILES, GRAPHICS AND DYNAMIC MEMORY ALLOCATION (9)

Files: streams and file types-operations-File I/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 HOURS

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.*

References Books

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

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

3. *E. Balagurusamy, **"Programming in ANSI C"**, 5th Edition, Tata McGraw-Hill Education, 2011.*

12L107 WORKSHOP

(Common to all branches)

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: 45 HOURS

12L108 CHEMISTRY LABORATORY

(Common to all branches)

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)

TOTAL : 45 HOURS

References 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

(Common to Civil, EEE, EIE,CSE, IT & IBT)

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

(Common to all branches)

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 organisation 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 HOURS

References 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

12L2Z2 ENGINEERING MATHEMATICS II

(Common to all branches)

L T P C
3 1 0 4

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.

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.

COMPLEX DIFFERENTIATION (9)

Functions of a Complex variable-Analytic functions- Cauchy Riemann equations and sufficient conditions(excluding proof)– Harmonic and orthogonal properties of analytic functions –Construction of analytic functions-Conformal mappings : $w = z + a$, az , $1/z$, z^2, e^z, $\cos z$, $\sin z$ and Bilinear Transformation.

COMPLEX INTEGRATION (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.

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 value theorems –Convolution theorem(statement only) and applications- Applications to Solution of Linear y differential equations of second order with   constant coefficients.

LECTURE:45 TUTORIAL:15 TOTAL:60 HOURS

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.*

References 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
[Common to EEE, EIE, CSE & IT]

L T P C
3 0 0 3

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 Dye laser- applications of laser -Lasers in microelectronics, welding, heat treatment, cutting – holography – construction and reconstruction of a hologram – applications of holography.

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 Photodiode, - Fiber optical communication links-Fiber optic sensors-Temperature, displacement.

QUANTUM PHYSICS AND APPLICATIONS (9)

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

ULTRASONICS (9)

Introduction – properties of ultrasonic waves – production of ultrasonic waves Magnetostriction effect- Magnetostriction 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- ultrasonic soldering and ultrasonic cleaning-Non- destructive Testing-Pulse echo system, through transmission and resonance system.

CRYSTAL PHYSICS (9)

Introduction – Crystalline and Non-crystalline materials –Lattice – Unit Cell –Crystal system - Bravais lattices – Miller indices – d spacing 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 surface defects.

TOTAL: 45 HOURS

Text book

1.   *Ganesan S. Iyandurai N, "Engineering Physics I", Gems Publishers, Coimbatore,2010*

References 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++

[Common to EEE,EIE, CSE & IT]

L T P C
3 0 0 3

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.

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 and Metrics-Documentation-tools-Benefits and Risks

OVERVIEW OF C++ (9)

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

CLASSES AND DATA ABSTRACTION (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.

OBJECT ORIENTED AND GENERIC PROGRAMMING (9)

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

TOTAL:45 HOURS

Text Books

1. *Grady Booch,"**Object Oriented Analysis and Design**",2ⁿᵈ Edition,pearson Education,2008.*

2. *Stanley B.Lippman Josee Lajoie,Barbara E.Moo,"**C++ Primer**",4ᵗʰ Edition,Pearson Education,2008*

References 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++**",2ⁿᵈ Edition,Pearson Education ,2008.*

4. *VenuGopal K.r.,Rajkumar,Ravishankar.T,"**Mastering C++**", Tata Mc Graw-Hill Pub.Co.Ltd.,1999.*

12L205 ELECTRICAL ENGINEERING

L T P C
3 0 0 3

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.

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.

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.

INDUCTION MACHINES (9)

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

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.

TOTAL:45 HOURS

Text Books

1. *J.B.Guptha, **"Theory and Performance of Electrical machines",** S.K.Kataria & Sons, newDelhi 2009.*

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

References 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

L T P C
3 0 0 3

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-Transition or space charge capacitance-Diffusion capacitance-Effect of temperature on PN junction diodes-Diode switching characteristics -PN diode and Zener diode applications.

BIPOLAR JUNCTION TRANSISTORS (9)

Transistor current components-Eber moll'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.

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 T FET-Operation and Characteristics.

BIASING OF BJT AND FET (9)

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

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, optocouplers and LASER diodes-Theory and Characteristics of Schottky diode, Tunnel diode and Varactor diode, SCR, TRIAC, LDR.

TOTAL: 45 HOURS

Text Books

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

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

References 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

[Common to all branches]

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 experiment only)

TOTAL: 45 HOURS

12L208 ENGINEERING GRAPHICS

(Common to all branches except IBT)

L T P C
2 0 3 4

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.

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

SECTION OF SOLIDS AND DEVELOPMENT   (15)

Section of solids-Development of surfaces

INTERPETRATION OF SOLIDS   (10)

Cylinder and cylinder, cone and cylinder only

PICTORIAL VIEWS   (10)

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

LECTURE: 30   PRACTICAL: 45 TOTAL HOURS : 75

References Books

*1. K. Vengopal, "**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, 11ᵗʰ Edition, 2001*

12L209 ELECTRICAL ENGINEERING LABORATORY

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 : 45 HOURS

References Book

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

(Common to all branches)

L T P C

3 1 0 4

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.

FOURIER SERIES (9)

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

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

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.

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 HOURS

Text Book

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

References 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 3rd 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

L T P C
3 1 0 4

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.

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.

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

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.

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

L T P C
3 1 0 4

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.

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.

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.

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.

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.*

References 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*

<div align="center">

12L304 DATA STRUCTURES AND ALGORITHMS

</div>

<div align="right">

L T P C
3 0 0 3

</div>

ALGORITHM ANALYSIS (9)

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

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.

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.

.

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.

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.

<div align="right">

TOTAL: 45 HOURS

</div>

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.*

References 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, PHI Learning Pvt.Ltd, 2009.*

3. *Alfred V. Aho, John E. Hoporoft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, 2003.*

12L305 SIGNALS AND SYSTEMS

L T P C
3 1 0 4

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.

ANALYSIS OF CONTINUOUS TIME SIGNALS (9)

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

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.

ANALYSIS OF DISCRETE TIME SIGNALS (9)

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

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.*

References 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 WAVEGUIDES

L T P C
3 1 0 4

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.

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.

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.

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.

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*

References Books

1. *S.Baskaran, "**Transmission Lines and Waveguides**", Scitech Publications(India) PVT.LTD,Chennai,2011*

2. *D avid 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

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

References 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 McGraw Hill,2008.*

3. *Robert L. Boylestad and Louis Nashelsky,"**Electronic Devices and Circuit Theory**",9thEdition, Pearson Education / PHI, 2007.*

12L308 DATA STRUCTURES LABORATORY

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

References 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.*

12L401 RANDOM PROCESS AND QUEUING THEORY

L T P C

3 1 0 4

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.

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.

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.

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.

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 Book

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

References 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, 2nd Edition, 2005.

12L402 ENVIRONMENTAL SCIENCE AND ENGINEERING

(Common to all branches)

L T P C
3 0 0 3

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.

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.

ENVIRONMENTAL POLLUTION (9)

Air pollution- classification of air pollutants gaseous particulars- sources effects and control of gaseous pollutants SO_2- NO_2- H_2S- CO- CO_2 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.

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.

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.

Total : 45 Hours

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

References 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

	L	T	P	C
	3	0	0	3

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.

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.

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.

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.

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

TOTAL: 45 HOURS

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.*

References 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

L	**T**	**P**	**C**
3	**0**	**0**	**3**

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.

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.

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.

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.

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.

TOTAL:45 HOURS

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*

References 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

L T P C
3 1 0 4

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.

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.

SEQUENTIAL 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.

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.

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 Book

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

References 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

L T P C
3 0 0 3

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.

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.

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.

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.

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.

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.*

References 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

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

References 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

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

References 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

L T P C
3 1 0 4

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.

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.

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.

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.

MULTIRATE SIGNAL PROCESSING **(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 HOURS

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.

References 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

L T P C

3 0 2 4

8086 ARCHITECTURE   (9)

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

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.

8051 MICROCONTROLLER   (9)

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

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.

PIC MICROCONTROLLER   (9)

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

List of Experiments :

8086 Programming:

·   Array Processing

·   Code Conversions

·   String Manipulation

·   Peripheral Interfacing

8051 Programming:

·   Bit manipulation

·   Peripheral programming and Interfacing

LECTURE : 45 PRACTICALS : 30 TOTAL: 75 HOURS

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.*

References 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 GillispieMazidi, 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

L T P C
3 0 0 3

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.

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.

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.

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.

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.

TOTAL:45 HOURS

Text Books

1. *Simon Haykins, "**Communication Systems**" John Wiley, 2009.*

2. *Amitabha Battacharya, "**Digital Communications**", Tata McGraw Hill, 2006.*

References 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

L T P C
3 0 0 3

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.

CENTRAL PROCESSING UNIT (9)

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

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.

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.

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.

TOTAL : 45 HOURS

Text Book

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

References 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

L T P C
3 0 0 3

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.

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.

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.

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.

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.

TOTAL: 45 HOURS

Text Books

*1. John P.Uyemura, **"Introduction to VLSI Circuits and systems",** John Wiley & Sons, 2003.*

*2. Keng, Lable Bick, **"CMOS Digital Integrated Circuits",** Tata McGraw Hill, 1999.*

References Books

*1. Neel H.E.WesteEshraghian, **"Principles of CMOS VLSI Design",** Addison Wesley, 1999*

*2. Sjohoem S. & Lindh L., **"VHDL for Designers",** Prentice Hall, 1997.*

*3. Smith, **"Application Specific Integrated Circuits",** Addison Wesley, 1997.*

*4. Mukherjee, **"Introduction NMOS and CMOS VLSI System Design",** PH 1986.*

*5. Douglas A. Pucknell & K. Eshranghian, **"Basic VLSI Design",** PHI 3rd Edition 1994.*

12L506 CONTROL SYSTEMS

L T P C

3 1 0 4

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.

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.

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.

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.

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 HOURS

Text Book

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

References 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**", Tata McGraw-Hill, Inc., 1995.

5. Richard C. Dorf , Robert H. Bishop, "**Modern Control Systems**", Addison – Wesley, 1999.

12L507 DIGITAL COMMUNICATION SYSTEMS LABORATORY

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 HOURS

References 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

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 HOURS

References Books

*1. Cyril, " **Fundamentals of HDL Design",** Pearson Education, 2009.*

*2. Samir Palnitkar, "Verilog HDL",** Pearson Education, 2003*

12L601 MANAGEMENT THEORY AND PRACTICE

L T P C

3 0 0 3

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

PLANNING (9)

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

ORGANIZING (9)

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

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.

CONTROLLING (9)

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

TOTAL : 45 HOURS

Text Books

1. *Harold Koontz, Weihrich, "**Essentials of Management**", Tata McGraw Hill, New Delhi, 2010*

2. *Tripathy,P.C And Reddy, P.N., "**Principles of Management**", Tata McGraw Hill,2010*

References Books

1. *Joseph Massie, "**Essentials of Management**", Prentice Hall of India, New Delhi,2007.*

3. *Prasad, L.M., "**Principles and Practice of Management**", Sultan Chand and Sons, New Delhi, 2010*

12L602 MIXED SIGNAL CIRCUITS AND INTERFACING

L T P C
3 0 0 3

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.

SAMPLE AND HOLD ARCHITECTURES **(9)**

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

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

ANALOG TO DIGITAL CONVERTER ARCHITECTURE **(9)**

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

CMOS POWER AMPLIFIERS **(9)**

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

TOTAL:45 HOURS

Text Books

1. *Behzad Razavi, "**Principles of Data Conversion System Design**", John Wiley & Sons, 2011.*

2. *Sundaram Natarajan, "**Microelectronics Analysis & design**", McGraw Hill 2006.*

References 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

L T P C
3 0 0 3

ANTENNA FUNDAMENTALS AND PARAMETERS   (9)

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

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.

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.

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.

WAVE PROPAGATION   (9)

Fundamental equation for free space propagation—modes of propagationstructure of atmosphere and characteristics-sky wave propagation-effects of Earths 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.

TOTAL:45 HOURS

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.*

References 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

L T P C

3 0 0 3

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.

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.

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.

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.

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.

TOTAL: 45 HOURS

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.*

References 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

L T P C
3 0 0 3

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 .

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).

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.

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.

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

TOTAL : 45 HOURS

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.*

References 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

L T P C

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 HOURS

References 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

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

NETWORK MANAGEMENT

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 HOURS

References 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 MICRO WAVE AND RF SYSTEMS

L T P C

3 0 0 3

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.

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.

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

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.

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.

TOTAL:45 HOURS

Text Books

1. *David M.Pozar, "**Microwave Engineering**", John Wiley & Sons, 2001*

2. *Annapurna Das & Sisir K.Das, "**Microwave Engineering**", Tata McGraw Hill, 2000.*

3. *John Rogers & Calvin Plett, "**Radio Frequency Integrated Circuits**", Artech House, 2003.*

References 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

L T P C
3 0 0 3

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.

POWER OPTIMIZATION (9)

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

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.

POWER ESTIMATION (9)

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

SYNTHESIS AND SOFTWARE DESIGN FOR LOW POWER (9)

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

TOTAL: 45 HOURS

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.*

References 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

L T P C
3 0 0 3

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.

CELLULAR ARCHITECTURE   (9)

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

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.

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.

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.

TOTAL: 45 HOURS

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.

References 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

L T P C
3 0 0 3

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.

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.

MODULATION TECHNIQUES (9)

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

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.

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.

TOTAL: 45 HOURS

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.*

References 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

L	T	P	C
0	0	3	2

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.

TOTAL:45 HOURS

References 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 LABORATORY

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.

TOTAL:45 HOURS

References 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

L T P C
3 0 0 3

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)

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.

EMBEDDED SYSTEM PROGRAMMING AND DEBUGGING (9)

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

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.

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.

TOTAL:45 HOURS

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, "**Understanding 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

	L	T	P	C
	3	0	0	3

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.

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).

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.

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.

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.

TOTAL: 45 HOURS

Text Book

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

L T P C
3 0 0 3

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.

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.

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.

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.

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.

TOTAL: 45 HOURS

Text Books

1. *Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, **"Operating System Concepts"**, John Wiley & Sons, 7ndEdition, 2005.*

2. *Dhamdhere D.M., **"Operating Systems – A Concept-Based Approach "**, 3rd Edition, Tata McGraw Hill, New Delhi, 2012.*

References Books

1. *William Stallings, **"Operating Systems"**, Prentice Hall, New Delhi, 6thEdition, 2005.*

2. *Harvey M. Deitel, Paul J. Deitel, David R. Choffnes, **"Operating Systems"**, Prentice Hall, New Delhi, 3rdEdition, 2004.*

3. *Jean Bacon, Tim Harris, **"Operating Systems",** Addison Wesley, New Delhi, 1stEdition, 2003.*

12L6E3 MEASUREMENTS AND INSTRUMENTATION

L T P C

3 0 0 3

BASICS OF MEASUREMENT (9)

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

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.

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.

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.

DATA DISPLAY AND RECORDING SYSTEMS (9)

Dual trace CRO 0 -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.

TOTAL: 45 HOURS

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.*

References 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

L T P C
3 0 0 3

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.

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.

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.

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

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

TOTAL: 45

HOURS

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.*

References Book

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

12L6E5 STATISTICAL THEORY OF COMMUNICATION

L T P C

3 0 0 3

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.

DISCRETE MEMORYLESS CHANNEL   (9)

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

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.

DETECTION OF SIGNALS IN NOISE   (9)

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

DISCRETE OPTIMUM LINEAR FILTERING   (9)

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

TOTAL:45 HOURS

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*

References Book

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

12L7E0 SPREAD SPECTRUM TECHNIQUES

L T P C
3 0 0 3

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.

SPREAD SPECTRUM TECHNIQUES (9)

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

SPREAD SPECTRUM ANALYSIS (9)

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

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.

APPLICATIONS (9)

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

TOTAL:45 HOURS

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.*

References 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

L T P C
3 0 0 3

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.

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.

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.

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.

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.

TOTAL:45 HOURS

Text Book

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

References 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

L T P C
3 0 0 3

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.

UNFOLDING (9)

Unfolding –Algorithm- Properties and Applications of Unfolding- Unfolding for retiming-1D & 2D systollic 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.

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.

BITLEVEL ARIHTMETIC 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.

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.

TOTAL : 45 HOURS

Text Book

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

References 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

[Common to CSE and IT]

L T P C

3 0 0 3

SOFTWARE PROCESS (9)

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

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.

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 time software 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.

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 data flow 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.

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.

TOTAL:45 HOURS

Text Book

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

References 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

L T P C
3 0 0 3

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.

FEED FORWARD 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.

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.

SOM AND 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.

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.

TOTAL:45 HOURS

Text Book

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

References 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 MATLAB 6.0**", *Tata Mc-Graw-Hill Publishing Company Limited, New Delhi, 2006.*

12L7E5 RADAR SYSTEMS

L T P C

3 0 0 3

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.

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.

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.

RADAR DETECTION (9)

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

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 monopulse. Optimum monopulse systems.

TOTAL: 45 HOURS

Text Books

*1. Peyton Z. Peebles, "**Radar Principles**", Johnwiley, 2004.*

*2. Merrill I. Skolnik ,"**Introduction to Radar Systems**", Tata McGraw-Hill (3rd Edition) 2003*

References Book

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

12L7E6 IMAGE PROCESSING

<div align="right">

L T P C

3 0 0 3

</div>

DIGITAL IMAGE FUNDAMENTALS (9)

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

IMAGE TRANSFORMS (9)

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

IMAGE ENHANCEMENT AND RESTORATION (9)

Histogram modification- Noise distributions- Spatial averaging- Directional Smoothing- Median- Geometric mean- Harmonic mean- Contraharmonic 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.   .

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-Backpropagation network and training, Neural network to recognize shapes.

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.

<div align="right">

TOTAL : 45 HOURS

</div>

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.*

References Books

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

2. *Milan Sonka et al, "**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 McGrawHill Education pvt ltd, 2010.*

12L7E7 MULTIMEDIA COMPRESSION TECHNIQUES

L T P C
3 0 0 3

MULTIMEDIA COMPONENTS   (9)

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

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.

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..

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.

VIDEO COMPRESSION   (9)

Video compression techniques - Standards - MPEG 1, 2, 4, 7 Video coding - Motion estimation and compensation techniques - H.261-H.263.

TOTAL: 45 HOURS

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.*

References 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

	L	T	P	C
	3	0	0	3

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.

MECHANICS FOR MEMS DESIGN (9)

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

ELECTRO STATIC DESIGN AND SYSTEM ISSUES (9)

Electrostatics: basic theory- electro static instability. Surface tension- gap and finger pull up- Electro static actuators- Comb generators- gap closers- rotary motors- inch worms- Electromagnetic actuators. bistable actuators. Electronic Interfaces- Feed back systems- Noise - Circuit and system issues.

MEMS APPLICATION (9)

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

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 Memes -design basics- case study-Capacitive RF MEMS switch- performance issues.

TOTAL: 45 HOURS

Text Books

1. *Stephen Santeria, " **Microsystems Design**", Kluwer publishers, 2000.*

2. *N.P.Mahalik, "**MEMS**",Tata McGraw hill, 2007*

References 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. *Tai Ran Hsu," **MEMS & Micro systems Design and Manufacture**" Tata McGraw Hill, New Delhi, 2002.*

5. *Liu,"**MEMS**", Pearson education, 2007.*

12L7E9 AVIONICS

L T P C

3 0 0 3

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 - MIL STD 1553, ARINC 429, ARINC 629.

RADIO NAVIGATION (9)

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

INERTIAL AND SATELLITE NAVIGATION SYSTEMS (9)

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

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.

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.

TOTAL:45 HOURS

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.

References 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", CRC Press, 2000.

4. Pallet, E.H.J, "Aircraft Instruments and Integrated Systems", Longman Scientific

12L8E0 PROFESSIONAL ETHICS

L T P C
3 0 0 3

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.

ENGINEERING AS SOCIAL EXPERIMENTATION   (9)

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

SAFETY   (9)

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

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.

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

TOTAL : 45 HOURS

Text Books

1. *Mike Martin and Roland Schinzinger, "**Ethics in Engineering**", McGraw-Hill, New York 1996.*

2. *Govindarajan M, Natarajan S, Senthil Kumar V. S, "**Engineering Ethics**", Prentice Hall of India, New Delhi, 2004.*

References 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 SYTEM DESIGN

L T P C
3 0 0 3

ADSP 21XX ARCHITECTURE AND PROGRAMMING (9)

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

FFT AND FILTER IMPLEMENTATION USING ADSP 21XX (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.

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.

CODE OPTIMIZATION (9)

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

FRAME PROCESSING, REAL TIME ANALYSIS AND SCHEDULING (9)

Frame processing: DMA DSP 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.

TOTAL:45 HOURS

Text Books

1. *"Digital Signal Processing Applications using the ADSP – 2100 Family"*, *Volume 1 Analog devices, DSP Division Prentice Hall, 1992.*

2. *Nasser Kehtarnavaz and Mansour Keramat, "DSP System design using the TMS320C600", Prentice hall, 2001*

References Books

1. *Sophocles J.Orfanidis,"Introduction to Signal Processing" , Prentice Hall,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

L T P C

3 0 0 3

INTRODUCTION TO NANOTECHNOLOGY (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 tunnelling microscope - nanomanipulator - nanotweezers - atom manipulation - nanodots - self assembly - dip pen nanolithography. Nanomaterials: preparation - plasma arcing - chemical vapor deposition - sol-gels - electrodeposition - ball milling - applications of nanomaterials;

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.

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.

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.

MOLECULAR ELECTRONICS (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.

TOTAL: 45 HOURS

Text Books

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

References 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

L T P C

3 0 0 3

FUZZY SET THEORY (9)

Introduction to Neuro Fuzzy 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 Fuzzy Modeling.

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.

ARTIFICIAL INTELLIGENCE (9)

Introduction- Knowledge Representation -Reasoning- Issues and Acquisition: Prepositional and Predicate Calculus Rule Based knowledge Representation-Symbolic Reasoning -Under Uncertainity- 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.

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 NeuroFuzzy Spectrum.

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE (9)

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

TOTAL: 45 HOURS

Text Books

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

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

References 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

L T P C
3 0 0 3

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.

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

TQM TOOLS & TECHNIQUES (9)

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

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.

QUALITY SYSTEMS (9)

Need for ISO 9000- ISO 9000-2000 Quality System - Elements, Documentation, Quality auditing- QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - Case studies of TQM implementation in manufacturing and service sectors including IT.

TOTAL: 45 HOURS

Text Books

1. *Dale H.Besterfiled, et at., "**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.*

References 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

L T P C
3 0 0 3

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.

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.

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.

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.

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.

TOTAL : 45 HOURS

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 .*

References 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

L T P C

3 0 0 3

POWER SEMICONDUCTOR DEVICES (9)

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

CONTROLLED RECTIFIERS AND AC VOLTAGE CONTROLLERS (9)

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

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.

INVERTERS (9)

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

APPLICATIONS (9)

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

TOTAL:45 HOURS

Text Book

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

References 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

L T P C

3 0 0 3

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.

TEST GENERATION (9)

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

TESTABLE DESIGN (9)

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

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

FAULT DIAGNOSIS (9)

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

TOTAL: 45 HOURS

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.

References 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"*, Prentice Hall International, 2002.

12L8E8 SATELLITE COMMUNICATION

L T P C

3 0 0 3

SATELLITE ORBITS AND TRAJECTORIES (9)

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

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.

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.

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.

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.

TOTAL:45 HOURS

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.*

References Books

1. *W.L.Pritchard,H G Suyderhoud and R A Nelson, "**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 Space craft**", Prentice Hall, 2007.*

12L8E9 NETWORK SECURITY

L T P C
3 0 0 3

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

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.

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

NETWORK SECURITY (9)

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

SYSTEM LEVEL SECURITY (9)

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

TOTAL:45 HOURS

Text Book

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

References 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, New York, 2001.*