ANNA UNIVERSITY
CHENNAI - 600 025

UNIVERSITY DEPARTMENTS

REGULATIONS 2012

CURRICULA AND SYLLABI FOR I TO VIII SEMESTERS

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING (FULL TIME)

ANNA UNIVERSITY, CHENNAI-600 025

UNIVERSITY DEPARTMENTS R –

2012

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING I – VIII

SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

Course Code	Course Title	L	T	P	C
THEORY					
HS8151	Technical English I	3	1	0	4
MA8151	Mathematics I	3	1	0	4
PH8151	Engineering Physics	3	0	0	3
CY8151	Engineering Chemistry	3	0	0	3
GE8151	Computing Techniques	3	0	0	3
GE8152	Engineering Graphics	2	0	3	4
PRACTICAL					
PH8161	Physics Laboratory	0	0	2	1
CY8161	Chemistry Laboratory	0	0	2	1
GE8161	Computer Practice Laboratory	0	0	3	2
GE8162	Engineering Practices Laboratory	0	0	3	2
	TOTAL	**17**	**2**	**13**	**27**

SEMESTER II

Course Code	Course Title	L	T	P	C
THEORY					
HS8251	Technical English II	3	1	0	4
MA8251	Mathematics - II	3	1	0	4
PH8252	Physics for Electronics Engineering	3	0	0	3
CS8251	Data Structures and Object Oriented Programming in C++	3	0	0	3
EC8201	Electronic Devices	3	0	0	3
EC8251	Circuit Theory	3	1	0	4
PRACTICAL					
CS8213	Data Structures and Object Oriented Programming Laboratory.	0	0	3	2
EC8214	Electronic Devices and Circuits Laboratory.	0	0	3	2
	TOTAL	**18**	**3**	**6**	**25**

SEMESTER III

Course Code	Course Title	L	T	P	C
Theory					
MA8357	Transform Techniques and Partial Differential Equation	3	1	0	4
GE8351	Environmental Science and Engineering	3	0	0	3
EC8301	Electronic Circuits – I	3	1	0	4
EC8351	Digital Electronics and System Design	3	0	0	3
EC8353	Signals and Systems	3	0	0	3
EE8351	Basics of Electrical Engineering	3	0	0	3
PRACTICAL					
EC8311	Digital Systems Laboratory	0	0	3	2
EC8312	Electronic Circuits – I Laboratory	0	0	3	2
	TOTAL	**18**	**2**	**6**	**24**

SEMESTER IV

Course Code	Course Title	L	T	P	C
THEORY					
MA8401	Linear Algebra and Numerical Methods	3	1	0	4
EC8401	Communication Theory	3	0	0	3
EC8402	Electromagnetic Fields and Waves	3	0	0	3
EC8403	Electronic Circuits – II	3	1	0	4
EC8451	Computer Architecture and Organization	3	0	0	3
EC8452	Operational Amplifiers and Analog Integrated Circuits	3	0	0	3
PRACTICAL					
EC8411	Electronic Circuits – II Laboratory	0	0	3	2
EE8262	Electrical Engineering Laboratory	0	0	3	2
	TOTAL	**18**	**2**	**6**	**24**

SEMESTER V

Course Code	Course Title	L	T	P	C
THEORY					
EC8501	Control System Engineering	3	0	0	3
EC8502	Digital Communication Techniques	3	0	0	3
EC8503	Microprocessor and Microcontrollers	3	0	0	3
EC8504	Transmission Lines and Wave Guides	3	0	0	3
EC8551	Discrete Time Signal Processing	3	1	0	4
PRACTICAL					
HS8561	Employability Skills	0	0	2	1
EC8511	Microcontroller and Interfacing Laboratory	0	0	3	2
EC8512	Communication Systems Laboratory	0	0	3	2
EC8561	Digital Signal Processing Laboratory	0	0	3	2
	TOTAL	**15**	**1**	**11**	**23**

SEMESTER VI

Course Code	Course Title	L	T	P	C
THEORY					
MG8653	Principles of Management	3	0	0	3
EC8601	Antennas and Wave Propagation	3	0	0	3
EC8602	Communication Networks	3	0	0	3
EC8651	Digital VLSI	3	0	0	3
E1	Elective I	3	0	0	3
E2	Elective II	3	0	0	3
PRACTICAL					
EC8611	Networking Laboratory	0	0	3	2
EC8612	VLSI Design Laboratory	0	0	3	2
	TOTAL	**18**	**0**	**6**	**22**

SEMESTER VII

Course Code	COURSE	L	T	P	C
THEORY					
EC8701	Optical Communication	3	0	0	3
EC8702	Wireless Communication	3	0	0	3
E3	Elective III	3	0	0	3
E4	Elective IV	3	0	0	3
E5	Elective V	3	0	0	3
E6	Elective VI	3	0	0	3
PRACTICAL					
EC8711	High frequency Communication Laboratory	0	0	3	2
EC8712	Innovative System Design Laboratory	0	0	3	2
	TOTAL	**18**	**0**	**6**	**22**

SEMESTER VIII

Course Code	Course Title	L	T	P	C
THEORY					
E7	Elective – VII	3	0	0	3
E8	Elective – VIII	3	0	0	3
PRACTICAL					
EC8811	Project Work	0	0	12	6
	TOTAL	**6**	**0**	**12**	**12**

TOTAL NO OF CREDITS: 179

E LECTIVES

Course Code	Course Title	L	T	P	C
EC8001	Advanced Digital Signal Processing	3	0	0	3
EC8002	Advanced Microcontrollers	3	0	0	3
EC8003	Advanced Wireless Communication	3	0	0	3
EC8004	Avionics	3	0	0	3
EC8005	CAD for VLSI	3	0	0	3
EC8006	CMOS Analog IC Design I	3	0	0	3
EC8007	CMOS Analog IC Design II	3	0	0	3
EC8008	Cognitive Radio Communication	3	0	0	3
EC8009	Digital Control Engineering	3	0	0	3
EC8010	Digital Switching and Transmission	3	0	0	3
EC8011	Embedded and Real-Time Systems	3	0	0	3
EC8012	Information Theory	3	0	0	3
EC8013	Internet and Java	3	0	0	3
EC8014	Measurements and Instrumentation	3	0	0	3
EC8015	Medical Electronics	3	0	0	3
EC8016	Microwave Engineering	3	0	0	3
EC8017	Parallel and Distributed processing	3	0	0	3

EC8018	RF Microelectronics	3	0	0	3
EC8019	Satellite Communication	3	0	0	3
EC8020	Speech Processing	3	0	0	3
EC8021	VLSI Signal Processing	3	0	0	3
EC8022	Wireless Networks	3	0	0	3
EC8071	Cryptography and Network Security	3	0	0	3
EC8072	Electro Magnetic Interference and Compatibility	3	0	0	3
EC8073	Foundations for Nano-Electronics	3	0	0	3
EC8074	Multimedia Compression and Communication	3	0	0	3
EC8075	Robotics	3	0	0	3
EC8076	Soft Computing and Applications	3	0	0	3
GE8751	Engineering Ethics and Human Values	3	0	0	3
MG8654	Total Quality Management	3	0	0	3
BM8751	Principles of Digital Image Processing	3	0	0	3
CS8451	Operating Systems	3	0	0	3
IT8451	Web technology	3	0	0	3
CS8075	Foundation Skills in Integrated Product Development	3	0	0	3
GE8072	Disaster Management	3	0	0	3
GE8073	Human Rights	3	0	0	3

HS8151 **TECHNICAL ENGLISH I** **L T P C**

(For all branches of B.E / B.Tech programmes) **3 1 0 4**

OBJECTIVES

- To enable all students of engineering and technology develop their basic communication Skills in English.
- To give special emphasis to the development of speaking skills amongst the students of Engineering and Technology students.
- To ensure that students use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading for pleasure.

UNIT I

Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); **Speaking -** Speaking about one's place, important festivals etc. – Introducing oneself, one's family / friend; **Reading -** Skimming a reading passage – Scanning for specific information - Note-making; **Writing -** Free writing on any given topic (My favourite place / Hobbies / School life, etc.) - Sentence completion - Autobiographical writing (writing about one's leisure time activities, hometown, etc.); **Grammar -** Prepositions - Reference words
- Wh-questions - Tenses (Simple); **Vocabulary -** Word formation - Word expansion (root words / etymology); **E-materials -** Interactive exercises for Grammar & Vocabulary - Reading comprehension exercises - Listening to audio files and answering questions.

UNIT II

Listening - Listening and responding to video lectures / talks**; Speaking -** Describing a simple process (filling a form, etc.) - Asking & answering questions - Telephone skills – Telephone etiquette; **Reading –** Critical reading - Finding key information in a given text - Sifting facts from opinions**; Writing -** Biographical writing (place, people) - Lab descriptions (general/specific description of laboratory experiments) - Definitions - Recommendations; **Grammar -** Use of imperatives - Subject-verb agreement**; Vocabulary -** Compound words - Word Association**; E-materials -** Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures – Picture-based activities.

UNIT III

Listening - Listening to specific task - focused audio tracks; **Speaking -** Role-play – Simulation - Group interaction - Speaking in formal situations (teachers, officials, foreighners);

Reading

- Reading and interpreting visual material**; Writing -** Jumbled sentences - Coherence and cohesion in writing - Channel conversion (flowchart into process) - Types of paragraph (cause & effect / compare & contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing**; Grammar -** Tenses (Past) - Use of sequence words - Adjectives**; Vocabulary**

- Different forms and uses of words, Cause and effect words**; E-materials -** Interactive exercises for Grammar and Vocabulary - Excerpts from films related to the theme and follow up exercises - Pictures of flow charts and tables for interpretations.

UNIT IV

Listening - Watching videos / documentaries and responding to questions based on them**; Speaking -** Responding to questions - Different forms of interviews - Speaking at different types of interviews; **Reading -** Making inference from the reading passage - Predicting the content of a reading passage; **Writing -** Interpreting visual materials (line graphs, pie charts etc.) - Essay writing – Different types of essays**; Grammar -** Adverbs **–** Tenses – future time reference; **Vocabulary -** Single word substitutes - Use of abbreviations & acronyms**; E-materials -** Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.

UNIT V

Listening - Listening to different accents, Listening to Speeches / Presentations, Listening to broadcast & telecast from Radio & TV**; Speaking -** Giving impromptu talks, Making presentations on given topics**; Reading -** Email communication - Reading the attachment files having a poem/joke/proverb - Sending their responses through email **Writing -** Creative writing, Poster making**; Grammar -** Direct and indirect speech**; Vocabulary -** Lexical items (fixed / semi fixed expressions); **E-materials -** Interactive exercises for Grammar & Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents, - Interpreting posters

TOTAL: 60 PERIODS

OUTCOMES:

Learners should be able to:

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.
- Listen/view and comprehend different spoken discourses/excerpts in different accents.Excel in academic and professional writing.

TEXT BOOKS:

1. Mindscapes: English for Technologists and Engineers, Orient Black Swan, 2012
2. S.P. Dhanavel, English and Communication Skills for students of Science and Engineering. Oriented Black Swan, Chennai, 2011

REFERENCES:

1. Pickett, Nell Ann, Ann A.Laster and Katherine E.Staples. **Technical English: Writing, Reading and Speaking.** New York: Longman, 2001.
2. Bailey, Stephen. **Academic Writing: A practical guide for students.** New York: Rutledge, 2011.
3. Morgan, David and Nicholas Regan**. Take-Off: Technical English for Engineering** Reading: Garnet Publishing Limited, 2008.
4. Thorn, Michael and Alan Badrick. **An Introduction to Technical English.** Harlow**:** Prentice Hall Europe, 1993.
5. Rizvi, M.Ashraf. **Effective Technical Communication.** New Delhi: Tata McGraw-Hill PublishingCompany, 2007.

EXTENSIVE READERS:

1. Murthy, Sudha. **Wise & Otherwise**. New Delhi: Penguin Books India, 2006.
2. Gates, Bill and Collins Hemingway. **Business @ the Speed of Thought: Succeeding in the Digital Economy.** New York: Warner Business Books, 2000.

WEBSITE RESOURCES:

1. www.uefap.com
2. www.eslcafe.com
3. www.listen-to-english.com
4. www.owl.english.purdue.edu
5. www.chompchomp.com

MA8151 MATHEMATICS – I L T P C

(Common to all branches of B.E. / B.Tech. Programmes in I Semester) 3 1 0 4

OBJECTIVES:

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series

approximations for solutions arising in mathematical modeling.

- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I MATRICES 9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II INFINITE SERIES 9+3

Sequences – Convergence of series – General properties – Series of positive terms – Tests of convergence (Comparison test, Integral test, Comparison of ratios and D'Alembert's ratio test) – Alternating series – Series of positive and negative terms – Absolute and conditional convergence – Power Series – Convergence of exponential, logarithmic and Binomial Series.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3

Limits and Continuity – Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Errors and approximations – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV IMPROPER INTEGRALS 9+3

Improper integrals of the first and second kind and their convergence – Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions – Properties – Evaluation of integrals using Beta and Gamma functions – Error functions.

UNIT V MULTIPLE INTEGRALS 9+3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of Solids – Change of variables in double and triple integrals – Area of a curved surface.

TOTAL : 60 PERIODS

OUTCOMES:

- This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus.

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2007.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.

REFERENCES:

1. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
2. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media(An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.
4. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

PH8151 ENGINEERING PHYSICS L T P C

(Common to ALL Branches of B.E./B.Tech. Programmes) 3 0 0 3

OBJECTIVE:

To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity - Poisson's ratio and relationship between moduli (qualitative) - Stress-strain diagram - factors affecting elasticity - bending of beams - cantilever - bending moment - theory and experiment of Young's modulus determination - Uniform and non-uniform bending - I shaped girders - twisting couple - hollow cylinder - shaft - torsion pendulum - determination of rigidity modulus- moment of inertia of a body (regular and irregular).

UNIT II ACOUSTICS AND ULTRASONICS 9

Classification of sound - loudness and intensity - Weber-Fechner Law - standard intensity and intensity level - decibel - reverberation - reverberation time - rate of growth and decay of sound intensity - derivation of Sabine's formula - absorption coefficient and its determination - factors affecting acoustics of buildings : focussing, interference, echo, Echelon effect, resonance - noise and their remedies. Ultrasonics - production -

magnetostriction and piezoelectric methods - detection of ultrasound - acoustic grating - industrial applications - NDT - Ultrasonic method: scan modes and practice.

UNIT III THERMAL PHYSICS 9

Thermal expansion - thermal stress - expansion joints - bimetallic strips - thermal conductivity - conductions in solids - Forbe's and Lees' disc methods - Rectilinear flow of heat through a rod - flow of heat through a compound materials - radical flow of heat through a spherical shell - thermal insulation of buildings – Laws of blackbody radiation: Kirchoffs law, Stephens law, Wiens law, Raleigh-Jean law and Planks law (derivation). Laws of thermodynamics - Otto and diesel engines and their efficiency - entropy - entropy of Carnot's cycle - reverse Carnot's cycle - refrigerator.

UNIT IV APPLIED OPTICS 9

Interference - Michelson interferometer: construction, working, determination of wave length and thickness - anti-reflection coating - air wedge and its application - Lasers - Einstein's coefficients - CO_2 , Nd:YAG and semiconductor lasers - homo junction and hetro junction - construction and working - applications - Optical fibres - classification (index & mode based) - principle and propagation of light in optical fibres - acceptance angle and numerical aperture - fibre optic communication system - active and passive sensors.

UNIT V SOLID STATE PHYSICS 9

Nature of bonding - growth of single crystals (qualitative) - crystal systems - crystal planes and directions - expressions for interplanar distance - coordination number and packing factor for simple structures: SC, BCC, FCC and HCP - structure and significance of NaCl, ZnS, diamond and graphite - crystal imperfections: point defects, dislocations and stacking faults - unit cell, Bravais space lattices - miller indices.

TOTAL: 45 PERIODS

OUTCOMES:

The students will have knowledge on the basics of physics related to properties of matter, Optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications

TEXT BOOKS:

1. Gaur R.K., and Gupta, S.L., Engineering Physics, Dhanpat Raj Publications, 2003
2. Palanisamy, P.K., Engineering Physics, Scitech Publications (P) Ltd, 2006.
3. Arumugam, M., Engineering Physics, Anuradha Publications, 2000.

REFERENCES:

1. Sankar, B.N., Pillai.S.O., Engineering Physics, New Age International (P) Ltd., 2007.
2. Rajendran.V Engineering Physics, Tata McGraw-Hill, 2009.

CY8151 **ENGINEERING CHEMISTRY** **L T P C**

(Common to all branches of Engineering and Technology) **3 0 0 3**

OBJECTIVES:

- To make the students acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To make the students conversant with basics of polymer chemistry.
- To make the students understand the concepts of **Kinetics and Catalysis**
- To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.
- To acquaint the students with the basics of nano materials, their properties and applications.

UNIT I CHEMICAL THERMODYNAMICS 9

Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius-Clapeyron equation; Maxwell relations – Van't Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation – variation of chemical potential with temperature and pressure.

UNIT II POLYMER CHEMISTRY 9

Introduction: Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerisation. Types and mechanism of polymerisation: Addition (Free Radical, cationic, anionic and living); condensation and copolymerisation. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.

UNIT III KINETICS AND CATALYSIS 9

Introduction – reaction velocity, factors affecting reaction velocity, rate constant, order of reaction, molecularity, pseudo molecular reactions, zero, first, second and third order reactions, reactions of fractional orders, determination of order of reactions. Catalysis: Auto catalysis - Enzyme Catalysis: Michaelis - Menton equation; factors affecting enzyme catalysis. Heterogeneous Catalysis: Types of adsorption isotherms: Langmuir–Hinselwood and Rideal– Eley Mechanism.

UNIT IV PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert-Beer Law. Photoprocesses - Internal Conversion, Inter-system crossing, Fluorescence, Phosphorescence, Chemiluminescence and Photo-sensitisation. Spectroscopy: lectromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and rotational transitions. Width and intensities of spectral lines. Spectrophotometric estimation of iron. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram) and applications.

UNIT V NANOCHEMISTRY 9

Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoparticles: Nanocluster, nanorod, nanotube and nanowire. Synthesis: Precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and Applications. Risk discussion and Future perspectives.

OUTCOMES:

- The knowledge gained on polymer chemistry, thermodynamics. spectroscopy, **Kinetics and Catalysis** and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.

TEXT BOOKS:

1. P. Kannan and A. Ravikrishnan, “Engineering Chemistry”, Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2009.
2. S. Vairam, P. Kalyani and Suba Ramesh, “Engineering Chemistry”, Wiley India, 2011

REFERENCES:

1. P.W. Atkins and de Paula Julio, “Physical Chemistry”, Oxford University Press, 8th Ed., (Indian Student Edition) (2009).
2. K. K. Rohatgi-Mukherjee, “Fundamental of Photochemistry” New Age International (P) Ltd., New Delhi, 1986.
3. G.A. Ozin and A.C. Arsenault, “Nanochemistry: A Chemical Approach to Nanomaterials”, RSC Publishing, 2005.
4. V.R.Gowariker, N.V.Viswanathan and Jayadev Sreedhar, “Polymer Science”, New Age International P (Ltd.,), Chennai, 2006

GE8151 COMPUTING TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:

The students should be made to:

- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT I INTRODUCTION 8

Generation and Classification of Computers- Basic Organization of a Computer – Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking– Algorithm – Pseudo code – Flow Chart.

UNIT II C PROGRAMMING BASICS 10

Problem formulation – Problem Solving - Introduction to ' C' programming –fundamentals – structure of a 'C' program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in 'C' – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

UNIT III ARRAYS AND STRINGS 9

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

UNIT IV FUNCTIONS AND POINTERS 9

Function – definition of function – Declaration of function – Pass by value – Pass by reference– Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays-Example Problems.

UNIT V STRUCTURES AND UNIONS 9

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Design C Programs for problems.
- Write and execute C programs for simple applications

TEXTBOOKS:

1. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009
2. Ashok N. Kamthane, “Computer programming”, Pearson Education, 2007.
3. Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011.

REFERENCES:

1. Kernighan,B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2006
2. Byron S Gottfried, “ Programming with C”, Schaum’s Outlines, Second Edition, Tata McGraw-Hill, 2006.
3. R.G. Dromey, “How to Solve it by Computer”, Pearson Education, Fourth Reprint, 2007

GE8152 ENGINEERING GRAPHICS L T P C
2 0 3 4

OBJECTIVES :

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

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HAND SKETCHING 14

Basic Geometrical Constructions, Curves Used In Engineering Practices

Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves, **Scales:** Construction of Diagonal and Vernier scales.

VISUALIZATION CONCEPTS AND FREE HAND SKETCHING: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 14

Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 14

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 14

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 15

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids- Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) 3

Introduction to drafting packages and demonstration of their use.

TOTAL: 75 PERIODS

OUTCOMES:

On Completion of the course the student will be able to:

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projections and solids and development of surfaces.
- Prepare isometric and perspective sections of simple solids.
- Demonstrate computer aided drafting

TEXT BOOK:

1. N.D.Bhatt and V.M.Panchal, “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010

REFERENCES:

1. K.R.Gopalakrishna., “Engineering Drawing” (Vol I&II combined) Subhas Stores, Bangalore, 2007
2. Luzzader, Warren.J., and Duff,John M.,,” Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production”, Eastern Economy Edition, Prentice Hall of India Pvt Ltd, New Delhi, 2005

3. M.B.Shah and B.C.Rana, “Engineering Drawing”, Pearson, 2nd Edition, 2009
4. K.Venugopal and V.Prabhu Raja, “Engineering Graphics”, New Age International (P) Limited ,2008.
5. K. V.Natrajan, “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.
6. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi,2008.

PUBLICATION OF BUREAU OF INDIAN STANDARDS:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special Points Applicable To University Examinations On Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

PH8161	**PHYSICS LABORATORY**	**L T P C**
	(common to all branches of B.E./B.Tech. Programmes)	**0 0 2 1**

OBJECTIVES:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

1.	Torsional pendulum	Determination of rigidity modulus of wire and moment of inertia of disc
2.	Non – uniform bending	Determination of Young’s modulus
3.	Lee’s disc	Determination of thermal conductivity of a bad
4.	Potentiometer	Determination of thermo e.m.f. of thermocouple
5.	Air wedge	Determination of thickness of a thin sheet of paper

6.	i. Optical fibre	Determination of Numerical Aperture and acceptance
	ii. Compact disc	Determination of width of the groove using laser
7.	Acoustic grating	Determination of velocity of ultrasonic waves in liquids
8.	Post office box	Determination of Band gap of a semiconductor
9.	Spectrometer	Determination of wavelength using grating
10.	Viscosity of liquids	Determination of co-efficient of viscosity of a liquid by

TOTAL: 30 PERIODS

OUTCOMES:

The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

CY8161 CHEMISTRY LABORATORY L T P C

(Common to all branches of Engineering and Technology) 0 0 2 1

OBJECTIVES:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
  To acquaint the students with the determination of molecular weight of a polymer by vacometry

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1,10- phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
11. Determination of molecular weight of poly vinyl alcohol using Ostwald viscometer.

12. Pseudo first order kinetics – ester hydrolysis.
13. Corrosion experiment – weight loss method.
14. Determination of CMC.
15. Phase change in a solid.

OUTCOMES:

- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TOTAL: 30 PERIODS

REFERENCE BOOKS:

1. A text of quantitative inorganic analysis, A. L. Vogel , ELBS London. 1995.
2. Experiments in physical chemistry, D.P. Shoemarker and C.W. Gardad, McGraw Hill, London, 2001.
3. American Public Health Association.

GE8161 COMPUTER PRACTICES LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

LIST OF EXPERIMENTS:

1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function and conversion from given program to flow chart.

10. Program using structures and unions.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.

GE8162	ENGINEERING PRACTICES LABORATORY	L T P
	(Common to all Branches of B.E. / B.Tech. Programmes)	**0 0 3 2**

OBJECTIVE:

To provide exposure to the students with hands-on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

ROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICE **12**

PLUMBING

- Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
- Laying pipe connection to the suction side of a pump – inlet.
- Laying pipe connection to the delivery side of a pump – out let.
- Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

- Sawing, planing and making common joints: T-Joint, Mortise and Tennon joint, Dovetail joint.

STUDY:

- Study of joints in door panels, wooden furniture
- Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICE **9**

- Basic household wiring using switches, fuse, indicator – lamp etc.,

- Preparation of wiring diagrams
- Stair case light wiring
- Tube – light wiring
- Study of iron-box, fan with regulator, emergency lamp

GROUP – B (MECHANICAL AND ELECTRONICS) 15

3. MECHANICAL ENGINEERING

PRACTICE WELDING

- Arc welding of butt joints, lap joints, tee joints
- Gas welding Practice.
- Basic Machining
- Simple turning, drilling and tapping operations.
- Machine assembly Practice.
- Study and assembling the following:
- Centrifugal pump, mixies and air conditioners.
- Demonstration on
  (a) Smithy operations like the production of hexagonal bolt.
  (b) Foundry operation like mould preparation for grooved pulley.

4. ELECTRONIC ENGINEERING PRACTICE 9

- Soldering simple electronic circuits and checking continuity.
- Assembling electronic components on a small PCB and testing.
- Study of Telephone, FM radio, low-voltage power supplies.

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to fabricate carpentry components and pipe connections including plumbing works.
- Ability to use welding equipments to join the structures.
- Ability to fabricate electrical and electronics circuits.

HS8251 TECHNICAL ENGLISH II L T P C

(For all branches of B.E / B.Tech programmes) 3 0 0 3

- To make the students acquire listening and speaking skills meant for both formal and informal contexts
- To help them develop their reading skills by exposing them to different types of reading strategies
- To equip them with writing skills needed for academic as well as workplace situations
- To make them acquire language skills at their own pace by using e-materials and language lab component

UNIT I

Listening - Listening to informal conversations and participating**; Speaking -** Opening a conversation (greetings, comments on something, weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); **Reading -** Developing analytical skills, Deductive and inductive reasoning - Extensive reading**; Writing -** Effective use of SMS for sending short notes and messages - Using 'emoticons' as symbols in email messages; **Grammar -** Regular & irregular verbs - Active and passive voice**; Vocabulary -** Homonyms (e.g. 'can') - Homophones (e.g. 'some', 'sum'); **E-materials -** Interactive exercise on Grammar and vocabulary – blogging; **Language Lab -** Listening to different types of conversation and answering questions.

UNIT II

Listening - Listening to situation based dialogues**; Speaking -** Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); **Reading -** Reading a short story or an article from newspaper, Critical reading, Comprehension skills**; Writing -** Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his success, thanking one's friend / relatives); **Grammar -** modal verbs, Purpose expressions**; Vocabulary -** Phrasal verbs and their meanings, Using phrasal verbs in sentences**; E-materials -** Interactive exercise on Grammar and vocabulary, Extensive reading activity (reading stories / novels from links), Posting reviews in blogs - **Language Lab**
- Dialogues (Fill up exercises), Recording students' dialogues.

UNIT III

Listening - Listening to the conversation - Understanding the structure of conversations**; Speaking -** Conversation skills with a sense of stress, intonation, pronunciation and meaning
- Seeking information – expressing feelings (affection, anger, regret etc.); **Reading -** Speed reading – reading passages with the time limit - Skimming**; Writing -** Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading the articles from the journals - Format for the journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; **Grammar -** Conditional clauses - Cause and effect expressions; **Vocabulary -** Words used as nouns and verbs without any change in the spelling (e.g. 'rock', 'train', 'ring'); **E-materials -** Interactive exercise on Grammar & vocabulary - Speed Reading practice exercises; **Language Lab -** Intonation practice using EFLU materials – Attending a meeting and writing minutes.

UNIT IV

Listening - Listening to a telephone conversation, Viewing a model interview (face-to-face, telephonic and video conferencing) and observing the practices**; Speaking -** Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping the interview skills; **Reading -** Reading the job advertisements and the profile of the company concerned – scanning**; Writing -** Applying for a job – cover letter - résumé preparation – vision, mission and goals of the candidate**; Grammar -** Numerical expressions - Connectives (discourse markers); **Vocabulary**
- Idioms and their meanings – using idioms in sentences**; E-materials -** Interactive exercises on Grammar & Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; **Language Lab -** Telephonic interview – recording the responses - e-résumé writing.

UNIT V

Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener**; Speaking -** Group discussion skills – initiating the discussion – exchanging suggestions and proposals – expressing dissent/ agreement – assertiveness in expressing opinions – mind mapping technique**; Reading -** Note making skills – making notes from books, or any form of written materials - Intensive reading **Writing -** Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); **Grammar -** Use of clauses**; Vocabulary –** Collocation**; E-materials -** Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises - Pictures for discussion; **Language Lab -** Different models of group discussion

TOTAL : 60 PERIODS

OUTCOMES:

Learners should be able to

- Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
- Listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings

TEXT BOOKS:

1. Mindscapes: English for Technologists and Engineers, Orient Black Swan, 2012 .
2. S.P. Dhanavel, English Language Teaching in India, the shifting paradigms, Tata McGraw-Hill Publishing, 2012.

REFERENCE BOOKS

1. Laws, Anne. **Presentations.** Hyderabad: Orient BlackSwan, 2000.
2. Lewis, Hedwig. **Body Language: A Guide for Professionals.** New Delhi: Sage Publications, 1998.
3. Naterop, Jean B. and Rod Revell. **Telephoning in English.** Cambridge: Cambridge University Press, 1987.
4. Rutherford, Andrea J. **Basic Communication Skills for Technology**. New Delhi: Pearson Education, 2001.
5. Ur, Penny. **Teaching Listening Comprehension**. Cambridge: Cambridge University Press, 1984.

EXTENSIVE READERS

1. Abdul Kalam, A P J. **Ignited Minds: Unleashing the Power within India.** New Delhi: Penguin Books India, 2002.
2. Parameswaran, Uma. **C.V.Raman: A Biography.** New Delhi: Penguin Books India, 2011.

WEB RESOURCES

1. www.esl-lab.com
2. www.englishgrammar.org
3. www.englishclub.com
4. www.mindtools.com
5. www.esl.about.com

MA8251 MATHEMATICS II L T P C
(Common to all branches of B.E. / B.Tech. Programmes in II Semester) 3 1 0 4

OBJECTIVES:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated

UNIT I DIFFERENTIAL EQUATIONS 9+3

Method of variation of parameters – Method of undetermined coefficients –Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

UNIT II VECTOR CALCULUS 9+3

Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral and volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION 9+3

Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c$, az, $1/Z$, Z^2 - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 9+3

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT V LAPLACE TRANSFORMS **9+3**

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems –Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem –– Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

TOTAL : 60 PERIODS

OUTCOMES:

The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2007.
2. Ramana, B.V. "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi, 2010.

REFERENCES:

1.Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education,New Delhi, 2007.

2.Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, Delhi, 3rd Edition, 2007.

3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi,7th Edition, 2009.

4. Peter V.O'Neil, Advanced Engineering Mathematics, Cengage Learning India Pvt., Ltd, New Delhi, 2007.

PH8252 PHYSICS FOR ELECTRONICS ENGINEERING **L T P C**

3 0 0 3

OBJECTIVES:

- To Illustrate, with suitable examples, the concepts of conductors, semiconductors, dielectric, magnetic and superconducting materials.
- To make the students familiarize with the optical properties of materials.
- To introduce the essential principles of physics for electronics and communication engineering applications.

UNIT I ELECTRICAL PROPERTIES OF METALS 9

Classical theory: Drude model - thermal conductivity, thermal resistance - electrical conductivity of nonmetals: semiconductors, ionic crystals and glasses - thin metal films: conductivity and resistivity - Schrödinger wave equation - particle in a box - Tunneling (qualitative) degenerate states - Fermi-Dirac statistics - density of states: electron concentration and Fermi level - band theory of solids: energy band formation (qualitative) - electron effective mass.

UNIT II SEMICONDUCTORS 9

Intrinsic semiconductors: energy band-diagram - direct and indirect band gap semiconductors - carrier concentrations and conductivity - extrinsic semiconductors: compensation doping - temperature dependence of conductivity - degenerate and nondegenerate semiconductors - recombination and minority carrier injection: direct and indirect recombination - minority carrier lifetime - diffusion and conduction equations and random motion - optical absorption - Hall effect and devices - Ohmic contacts - Schottky diode and solar cell.

UNIT III DIELECTRIC MATERIALS AND INSULATION 9

Matter polarization and relative permittivity: definition - dipole moment and polarization vectorP-polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization- frequency dependence - local field and Clausius-Mossetti equation - dielectric constantand dielectric loss - Gauss's law and boundary conditions - dielectric strength and insulation break-down in gases, liquids and solids - capacitor materials - typical capacitor constructions- piezoelectricity, ferroelectricity and pyroelectricity - quartz oscillators and filters - piezo and pyroelectric crystals.

UNIT IV MAGNETIC PROPERTIES AND SUPERCONDUCTIVITY 9

Magnetic dipole moment - origin: atomic magnetic moments - magnetic materials: diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, ferrimagnetism, ferromagnetism - origin and the exchange interaction - saturation magnetization and Curie temperature - ferromagnetic materials: magnetic domains magnetocrystalline anisotropy, domain walls and motion - M versus H behaviour, demagnetization - soft and hard magnetic materials - examples and uses - Giant Magneto Resistance and materials - superconductivity: properties and classifications - High Tc superconductors - applications.

UNIT V OPTICAL PROPERTIES OF MATERIALS 9

Light waves in a homogeneous medium - refractive index - dispersion: refractive index-wave- length behaviour - group velocity and group index - Fresnel's equations: amplitude, reflection and transmission coefficients, intensity, reflectance and transmittance - complex refractive index and light absorption - Luminescence, phosphors and white LEDs - polarization - optical anisotropy: uniaxial crystals, birefringence, dichroism - electro-optic effect and amplitude modulators.

TOTAL : 45 PERIODS

OUTCOMES:

The student will be able to

- Apply the electrical properties of matter while understanding the relevant electrical phenomenon.
- Apply the concepts of semi conductors and understand the working principle of all types of semiconductor devices
- Apply the concepts of dielectric materials and magnetic properties and understand the electrostatic, electromagnetic, electromechanical behavior of equipments.
- Apply the optical properties of materials and understand the electro optic effects.

TEXT BOOKS:

1. Palanisamy, P.K., Materials Science, Scitech, 2003
2. Arumugam, M., Materials Science, Anirudha Publ., 2002.

REFERENCES:

1. Kasap, S.O., Principles of Electronic Materials and Devices, Tata McGraw-Hill, 2007.
2. Ali Omar, M., Elementary Solid State Physics, Adition Wiley, 1974.
3. Kittel, C., Introduction to Solid State Physics, John Wiley, 1996.
4. Millman J and Halkias C, Electronic Devices and Circuits, Tata-McGraw Hall, 2004.

CS8251	DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING IN C++	L T P C 3 0 0 3

OBJECTIVES:

This course comprehends the fundamentals of object oriented programming, particularly in C++, which are then used to implement data structures. This also gives an idea of linear and non-linear data structures and their applications.

UNIT I DATA ABSTRACTION & OVERLOADING 9

Overview of C++ – Structures – Class Scope and Accessing Class Members – Reference Variables – Initialization – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Container Classes and Integrators – Proxy Classes – Overloading: Function overloading and Operator Overloading.

UNIT II INHERITANCE & POLYMORPHISM 9

Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object To

Base – Class Object Conversion – Composition Vs. Inheritance – Virtual functions – This Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors – Dynamic Binding.

UNIT III LINEAR DATA STRUCTURES 11

Asymptotic Notations: Big-Oh, Omega and Theta – Best, Worst and Average case Analysis: Definition and an example – Arrays and its representations – Stacks and Queues – Linked lists – Linked list based implementation of Stacks and Queues – Evaluation of Expressions – Linked list based polynomial addition.

UNIT IV NON-LINEAR DATA STRUCTURES 9

Trees – Binary Trees – Binary tree representation and traversals – Threaded binary trees – Binary tree representation of trees – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals – Connected components.

UNIT V SORTING & SEARCHING 7

Insertion sort – Merge sort – Quick sort – Heap sort – Linear Search – Binary Search.

TOTAL: 45 PERIODS

OUTCOMES

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

- Comprehend the fundamentals of object oriented programming, particularly in C++, which is used to implement data structures.
- Have an idea of linear and non-linear data structures and their applications

TEXT BOOKS

1. Deitel and Deitel, " C++, How To Program", Fifth Edition, Pearson Education, 2005.
2. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++, Galgotia, New Delhi, 1995.

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Addison-Wesley, 2007.
2. Bhushan Trivedi, " Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2010.
3. Goodrich, Michael T., Roberto Tamassia, "David Mount. Data Structures and Algorithms in C++", 7th ed, Wiley. 2004.

EC8201 ELECTRONIC DEVICES L T P C
3 0 0 3

OBJECTIVES:

- To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

UNIT I SEMICONDUCTOR DIODE 9

PN junction diode, Current equations, Diffusion and drift current densities, forward and reverse bias characteristics, Switching Characteristics.

UNIT II BIPOLAR JUNCTION TRANSISTOR 9

NPN -PNP -Junctions-Early effect-Current equations – Input and Output characteristics of CE, CB CC-Hybrid -π model - h-parameter model, Ebers Moll Model- Gummel Poon-model, Multi Emitter Transistor.

UNIT III FIELD EFFECT TRANSISTORS 9

JFETs – Drain and Transfer characteristics,-Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation,D-MOSFET, E-MOSFET-,Current equation - Equivalent circuit model and its parameters, FINFET,DUAL GATE MOSFET.

UNIT IV SPECIAL SEMICONDUCTOR DEVICES 9

Metal-Semiconductor Junction- MESFET, Schottky barrier diode-Zener diode-Varactor diode–Tunnel diode- Gallium Arsenide device, LASER diode, LDR.

UNIT V POWER DEVICES AND DISPLAY DEVICES 9

UJT, SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS. LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.

TOTAL : 45 PERIODS

Outcomes:

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

Understand the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

TEXT BOOK:

1. Donald A Neaman, “Semiconductor Physics and Devices”, Third Edition, Tata Mc GrawHill Inc. 2007.

REFERENCES:

1. Yang, “Fundamentals of Semiconductor devices”, McGraw Hill International Edition, 1978.
2. Robert Boylestad and Louis Nashelsky, “Electron Devices and Circuit Theory” Pearson Prentice Hall, 10th edition,July 2008.

EC8251 CIRCUIT THEORY L T P C
3 1 0 4

OBJECTIVES

- To introduce the basic concepts of DC and AC circuits behavior
- To study the transient and steady state response of the circuits subjected to step and sinusoidal excitations.
- To introduce different methods of circuit analysis using Network theorems, duality and topology.

UNIT I DC CIRCUIT ANALYSIS 9

Basic Components of electric Circuits, Charge, current, Voltage and Power, Voltage and Current Sources, Ohms Law, Kirchoff’s Current Law, Kirchoff’s voltage law, The single Node – Pair Circuit, series and Parallel Connected Independent Sources, Resistors in Series and Parallel, voltage and current division, Nodal analysis, Mesh analysis.

UNIT II NETWORK THEOREM AND DUALITY 8

Useful Circuit Analysis techniques - Linearity and superposition, Thevenin and NortonEquivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion. Duals, Dual circuits.

UNIT III SINUSOIDAL STEADY STATE ANALYSIS 10

Sinusoidal Steady – State analysis , Characteristics of Sinusoids, The Complex Forcing Function, The Phasor, Phasor relationship for R, L, and C, impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams, AC Circuit Power Analysis, Instantaneous Power, Average Power, apparent Power and Power Factor, Complex Power.

UNIT IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS 9

Basic RL and RC Circuits, The Source- Free RL Circuit, The Source-Free RC Circuit, The Unit- Step Function, Driven RL Circuits, Driven RC Circuits, RLC Circuits, Frequency Response, Parallel Resonance, Series Resonance, Quality Factor.

UNIT V COUPLED CIRCUITS AND TOPOLOGY 9

Magnetically Coupled Circuits, mutual Inductance, the Linear Transformer, the Ideal Transformer, An introduction to Network Topology, Trees and General Nodal analysis, Links and Loop analysis.

TOTAL : 45 +15 = 60 PERIODS

OUTCOMES:

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

- Comprehend the basic concepts of DC and AC circuits.
- Evaluate the transient and steady state response of the circuits subjected to step and sinusoidal excitations.
- Solve different methods of circuit analysis using Network theorems, duality etc.,
- Understand the basic concepts of network topology and coupled circuits.

TEXT BOOKS

1. William H.Kayt, Jr.Jack E. Kemmerly, Steven M.Durbin, "Engineering Circuit Analysis", Sixth Edition, Tata McGraw-Hill Edition, 2006.
2. David A Bell, "Electric Circuits", PHI,2006

REFERENCES

1. Charles K. Alexander & Mathew N.O.Sadiku, Fundamentals of Electric Circuits", Second Edition, McGraw- Hill 2003.
2. Sudhakar. A and Shyammohan S. Palli, Tata Mc Graw –Hill, Third Edition, 2007.
3. D.R.Cunningham, J.A.Stuller, "Basic Circuit Analysis", Jaico Publishing House, 1996.
4. David E.Johnson, Johny R. Johnson, John L.Hilburn, "Electric Circuit Analysis", Second Edition, Prentice-Hall international Editions, 1997
5. K.V.V.Murthy, M.S.Kamath, "Basic Circuit Analysis", Jaico Publishing House, 1999.
6. Norman Balabanian, "Electric Circuits", International Edition,1994.

CS8213 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LABORATORY **L T P C 0 0 3 2**

OBJECTIVES:

The student should be made to:

- Learn C++ programming language.
- Be exposed to the different data structures
- Be familiar with applications using different data structures

Constructors and destructors – Function overloading – Operator overloading. Inheritance – Polymorphism – Constructors and Destructors in derived Classes. Stacks – Queues – linked list.
Binary tree traversal – graph traversal.

Merge sort – Linear Search – Binary Search.

1. Basic Programs for C++ Concepts
2. Array implementation of List Abstract Data Type (ADT)
3. Linked list implementation of List ADT
4. Cursor implementation of List ADT
5. Stack ADT - Array and linked list implementations
6. The next two exercises are to be done by implementing the following source files i. Program source files for Stack Application 1
   ii. Array implementation of Stack ADT
   iii. Linked list implementation of Stack ADT
   iv. Program source files for Stack Application 2
   v. An appropriate header file for the Stack ADT should be included in (i) and
7. Implement any Stack Application using array implementation of Stack ADT (by implementing files (i) and (ii) given above) and then using linked list
8. Implementation of Stack ADT (by using files (i) and implementing file (iii))
9. Implement another Stack Application using array and linked list implementations of Stack ADT (by implementing files (iv) and using file (ii), and then by using files (iv) and (iii))
10. Queue ADT – Array and linked list implementations
11. Search Tree ADT - Binary Search Tree
12. Hash Table – separate chaining
13. Implement an interesting application as separate source files and using any of the searchable ADT files developed earlier. Replace the ADT file alone with other appropriate ADT files. Compare the performance.
14. Heap Sort
15. Quick Sort

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Design and implement C++ programs for manipulating stacks, queues, linked lists, trees, and graphs.
- Apply good programming design methods for program development.
- Apply the different data structures for implementing solutions to practical problems.

LABORATORY REQUIREMENTS

Pentium IV PCs with C++	30 Nos
(or)	
Unix server with C++	30 terminals

EC8214 ELECTRONIC DEVICES AND CIRCUITS LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- Be exposed to the characteristics of basic electronic devices
- Be exposed to RL and RC circuits
- Be familiar with Thevinin & Norton theorem KVL & KCL, and Super Position Theorems

1. Characteristics of PN Junction Diode
2. Zener diode Characteristics & Regulator using Zener diode
3. Common Emitter input-output Characteristics
4. Common Base input-output Characteristics
5. FET Characteristics
6. SCR Characteristics
7. Clipper and Clamper & FWR
8. Verifications Of Thevinin & Norton theorem
9. Verifications Of KVL & KCL
10. Verifications Of Super Position Theorem
11. verifications of maximum power transfer & reciprocity theorem
12. Determination Of Resonance Frequency of Series & Parallel RLC Circuits
13. Transient analysis of RL and RC circuits

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:

- Analyze the characteristics of basic electronic devices
- Design RL and RC circuits
- Apply KVL, KCL, Thevinin, Norton and Super Position Theorems for circuit analysis

LABORATORY REQUIREMENTS

BC 107, BC 148,2N2646,BFW10	-	25 each
1N4007, Zener diodes	-	25 each
Resistors, Capacitors, Inductors	-	sufficient quantities
Bread Boards	-	15 Nos
CRO (30MHz)	–	10 Nos.
Function Generators (3MHz)	–	10 Nos.
Dual Regulated Power Supplies (0 – 30V)	–	10 Nos.

MA8357 TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATION (BRANCH SPECIFIC COURSE) **L T P C 3 1 0 4**

OBJECTIVES:

- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes;
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems;
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic;
- To develop Z- transform techniques which will perform the same task for discrete timesystems as Laplace Transform, a valuable aid in analysis of continuous time systems

UNIT I PARTIAL DIFFERENTIAL EQUATIONS **9+3**

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's Linear equation – Integral surface passing through a given curve – Classification of Partial Differential Equations – Solution of linear equations of higher order with constant coefficients – Linear non-homogeneous PDE.

UNIT II FOURIER SERIES **9+3**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval's identity –Harmonic Analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION 9+3

Method of separation of Variables – Solutions of one dimensional wave equation and one- dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in cartesian coordinates.

UNIT IV FOURIER TRANSFORM 9+3

Fourier integral theorem – Fourier transform pair-Sine and Cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 9+3

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value theorems – Formation of difference equation – Solution of difference equation using Z-transform.

OUTCOMES:

- The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

TOTAL: 60 PERIODS

TEXT BOOK:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2007.

REFERENCES:

1. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, New Delhi, 2007.
2. Ramana, B.V. "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi, 11th Reprint , 2010.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media(An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
4. Peter V.O'Neil, Advanced Engineering Mathematics, Cengage Learning India Pvt., Ltd, New Delhi, 2007.

GE8351 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

To the study of nature and the facts about environment.

- To find and implement scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT- I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India

– value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds

Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT- II ENVIRONMENTAL POLLUTION 8

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

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT- III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over

water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies
– Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.
Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT-IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation-central and state pollution control boards- Public awareness.

UNIT-V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

- Public awareness of environment at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions.
- Development and improvement in standard of living has lead to serious environmental disasters

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New

Delhi, (2006).

REFERENCE BOOKS:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005)

EC8301 ELECTRONIC CIRCUITS – I L T P C
3 1 0 4

OBJECTIVES:

- To learn about biasing of BJTs and MOSFETs
- To design and construct amplifiers
- To study the effect of source and load
- To construct amplifiers with active loads
- To study high frequency response of all amplifiers

UNIT I BIASING OF DISCRETE BJT AND MOSFET 9

DC Load line , operating point, Various biasing methods for BJT-Design-Stability-Bias compensation, Thermal stability, Design of biasing for JFET, Design of biasing for MOSFET

UNIT II BJT AMPLIFIERS 9

Small signal Analysis of Common Emitter-AC Loadline, Voltage swing limitations, Common collector and common base amplifiers – Differential amplifiers- CMRR-Darlington Amplifier- Bootstrap technique - Cascaded stages - Cascode Amplifier,

UNIT III JFET AND MOSFET AMPLIFIERS 9

Small signal analysis of JFT amplifiers- Small signal Analysis of MOSFET and JFET, Common source amplifier, Voltage swing limitations, Small signal analysis of MOSFET and JFET Source follower and Common Gate amplifiers, - BiMOS Cascode amplifier

UNIT IV FREQUENCY ANALYSIS OF BJT AND MOSFET AMPLIFIERS 9

Low frequency and Miller effect , High frequency analysis of CE and MOSFET CS amplifier, Short circuit current gain, cut off frequency – f_α and f_β unity gain and Determination of bandwidth of single stage and multistage amplifiers

UNIT V IC MOSFET AMPLIFIERS **9**

IC Amplifiers- IC biasing Current steering circuit using MOSFET- MOSFET current sources- PMOS and NMOS current sources. Amplifier with active loads - enhancement load, Depletion load and PMOS and NMOS current sources load- CMOS common source and source follower- CMOS differential amplifier- CMRR

TOTAL: 45L + 15T: 60 PERIODS

OUTCOMES:

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

- Identify biasing of BJTs and MOSFETs.
- Design and construct amplifiers.
- Determine the effect of source and load.
- Construct amplifiers with active loads.
- Exposed to high frequency response of BJT and FET amplifiers.
- Know the construction of IC amplifiers.

TEXT BOOKS

1. Donald .A. Neamen, Electronic Circuit Analysis and Design –2nd edition,Tata McGraw Hill, 2009.
2. Adel .S. Sedra, Kenneth C. Smith, Micro Electronic circuits, 6th Edition, Oxford University Press, 2010.

REFERENCES:

1. David A. “Bell Electronic Devices and Circuits”, Oxford Higher Education press,5th Edition,2010
2. Behzad Razavi, “ Design of Analog CMOS Integrated Circuits”, Tata McGraw Hill, 2007.
3. Paul Gray, Hurst, Lewis, Meyer “Analysis and Design of Analog Integrated Circuits”, 4th Edition, John Willey & Sons 2005
4. Millman .J. and Halkias C.C, “Integrated Electronics”, McGraw Hill, 2001.
5. D.Schilling and C.Belove, “Electronic Circuits”, 3rd edition, McGraw Hill, 1989.

EC8351 DIGITAL ELECTRONICS AND SYSTEM DESIGN **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce Boolean algebra and its applications in digital systems
- To introduce design of various combinations nal digital circuits using logic gates
- To bring out the analysis and design procedures for synchronous and asynchronous sequential circuits
- To introduce the electronic circuits involved in the making of logic gates

• To introduce semiconductor memories and related technology

UNIT I BASIC CONCEPTS AND COMBINATIONAL CIRCUITS 9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1s and 2s complements, Codes– Binary, BCD, 84-2-1, 2421, Excess 3, Biquinary, Gray, Alphanumeric codes, Boolean theorems, Logic gates , Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map and Tabulation methods, Problem formulation and design of combinational circuits, Code-Converters

UNIT II MSI CIRCUITS 9

Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder, Carry Look Ahead Adder, BCD Adder, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Mux/ Demux, Implementation of combinational logic using standard ICs, ROM, EPROM and EEPROM, PLA and PAL

UNIT III SYNCRONOUS SEQUENTIAL CIRCUITS 9

Flip flops – SR, JK, T, D, Master/Slave FF, Triggering of FFS, Analysis and design of clocked sequential circuits – Moore / Mealy models, state minimization, state assignment, circuit implementation, Counters, Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

UNIT III ASYNHRONOUS SEQUENTIAL CIRCUITS 9

Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits

UNIT V LOGIC FAMILIES AND SEMICONDUCTOR MEMORIES 9

Logic families- TTL, MOS, CMOS, Comparison of Logic families, Basic memory cell, RAM, Memory decoding, Static and Dynamic memories.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Use Boolean algebra and applied to digital systems.
- Design various combinational digital circuits using logic gates.
- Bring out the analysis and design procedures for synchronous and asynchronous sequential circuits.
- Understand electronic circuits involved in the design of logic gates.
- Understand the semiconductor memories and related technology.

TEXT BOOKS:

1. Morris Mano, " Digital logic ", Pearson, 2009
2. Charles H. Roth, Jr, "Fundamentals of Logic Design", Fourth edition, Jaico Books, 2002

REFERENCES:
1. William I. Fletcher, “An Engineering Approach to Digital Design”, Prentice- Hall of India, 1980
2. Floyd T.L., “Digital Fundamentals”, Charles E. Merril publishing company,1982
3. John. F. Wakerly, “Digital design principles and practices”, Pearson Education, Fourth Edition, 2007 .

EC8353 SIGNALS AND SYSTEMS L T P C
3 0 0 3

OBJECTIVES:
- To understand the basic properties of signal & systems and the various methods of classification
- To learn Laplace Transform &Fourier transform and their properties
- To know Z transform & DTFT and their properties
- To characterize LTI systems in the Time domain and various Transform domains

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9
Continuous time signals (CT signals)- Discrete time signals (DT signals) – Step, Ramp, Pulse, Impulse, Exponential - classification of CT and DT signals – periodic and a periodic signals, random signals, Energy & Power signals - CT systems and DT systems, Classification of systems.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 9
Fourier series analysis- Spectrum of Continuous Time (CT) signals- Fourier and Laplace transforms in Signal Analysis.

UNIT III LINEAR TIME INVARIANT –CONTINUOUS TIME SYSTEMS 9
Differential Equation-Block diagram representation-impulse response, convolution integrals- Fourier and Laplace transforms in Analysis.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 9
Baseband Sampling of CT signals- Aliasing, Reconstruction of CT signal from DT signal DTFT and properties, Z-transform & properties.

UNIT V LINEAR TIME INVARIANT –DISCRETE TIME SYSTEMS 9
Difference Equations-Block diagram representation-Impulse response-Convolution sum-DTFT and Z Transform analysis of Recursive & Non-Recursive systems.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the students will be able to
- Analyze the properties of a continuous time signal in the Fourier transform and Laplace Transform domain.
- Analyze the properties of a discrete time- signal in the Fourier transform and Z transform domain.

- Characterize a continuous time system in the time domain, Fourier Transform domain and Laplace Transform domain.
- Characterize a discrete time system in the time domain, Fourier Transform domain and Z-transform domain.

TEXTBOOKS

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson,Indian Reprint, 2007.
2. P.Ramakrishna Rao, "Signals and Systems" , Tata Mc Graw Hill Publications, 2008.
3. B. P. Lathi, "Principles of Linear Systems and Signals", Oxford, Second Edition, 2009.

REFERENCES

1. H P Hsu, "Signals and Systems", Schaum's Outlines, Tata McGraw Hill,2006
2. Edward W. Kamen, Bonnie S. Heck, "Fundamentals of Signals and Systems Using the Web and MATLAB", Pearson, Indian Reprint, 2007
3. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007
4. M.J.Roberts, "Signals & Systems, Analysis using Transform methods & MATLAB", Tata McGraw Hill (India), 2007.

EE8351 BASICS OF ELECTRICAL ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

- To introduce three phase supply and power measurement
- To teach concepts in electrical generators, motors and transformers
- To introduce power generation, transmission and distribution concepts.

UNIT I THREE PHASE CIRCUITS 9

Three phase supply – Star connection – Delta connection –Balanced and Unbalanced Loads- Power in three-phase systems – Measurement of power and power factor in three-phase systems – Comparison of star and delta - Advantages

UNIT II DC MACHINES 9

Construction of DC machines – Theory of operation of DC generators – Characteristics of DC generators- Operating principle of DC motors – Types of DC motors and their characteristics– Speed control of DC motors- Applications.

UNIT III TRANSFORMER 9

Introduction – Single phase transformer construction and principle of operation – EMF equation of transformer-Transformer no–load phasor diagram –– Transformer on–load phasor diagram –– Equivalent circuit of transformer – Regulation of transformer – Transformer losses and efficiency-All day efficiency –auto transformers.

UNIT IV INDUCTION MACHINES AND SYNCHRONOUS MACHINES 9

Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit –Construction of single-phase induction motors – Types of single phase induction motors– Double revolving field theory – starting methods - Principles of alternator – Construction details – Types – Equation of induced EMF – Voltage regulation. Methods of starting of synchronous motors – Torque equation – V curves – Synchronous motors.

UNIT V MEASUREMENT AND INSTRUMENTATION 9

Static and Dynamic Characteristics of Measurement – Errors in Measurement - Classification of Transducers – Variable resistive – Strainguage, thermistor RTD – transducer - Variable Capacitive Transducer – Capacitor Microphone - Piezo Electric Transducer – Variable Inductive transducer – LVDT, RVDT – DVM, DMM – Storage Oscilloscope. Types of Electrical Instruments-Essentials of Indicating Instruments-Principles of Electrical Instruments –Measurement of Electrical quantities using Moving Iron ,Moving Coil meters and Dynamometer type meters-Digital meters. Transmission & Distribution of electrical energy –Over head Vs Underground system – Protection of power system -types of tariff –power factor improvement.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Understand three phase supply and power measurement.
- Comprehend concepts in electrical generators, motors, transformers, power generation, transmission and distribution concepts.

TEXT BOOKS

1. I.J Nagarath and Kothari DP ‘Electrical Machines ’ Tata McGraw Hill ,1997
2. Del Toro ‘Electrical Engineering Fundamentals’ Pearson Education, New Delhi, 2007.
3. John Bird ‘Electrical Circuit theory and technology’ Elsevier, First Indian Edition, 2006.
4. David A. Bell, “Electronic Instrumentation and Measurement”, Second edition, Prentice Hall of India, (2007)
5. Albert D.Helfrick and William D. Cooper, “Modern Electronic Instrumentation and Measurement Techniques”, Prentice Hall of India, 2007.

REFERENCES:
1. Rajendra Prasad 'Fundamentals of Electrical engineering' Prentice Hall of India, 2006.
2. Thereja .B.L 'Fundamentals of Electrical Engineering and Electronics' S chand & Co Ltd, 2008
3. A. K. Sawhney, "Course in Electrical and Electronic measurement and Instrumentation", Dhanpat Rai Publisher, 2000.
4. V.K Mehta and Rohit Mehta ' Principle of Electrical Engineering' S Chand & Company,2008

EC8311 DIGITAL SYSTEMS LABORATORY L T P C
0 0 3 2

OBJECTIVES:

- To learn hardware implementation and testing of digital circuits
- To learn building digital circuits such as adders, encoders, decoders, magnitude comparators, Flipflops, counters, shift registers using relevant digital ICs
- To simulate basic combinational and sequential circuits using Hardware Description Language

1 Implementation of Boolean expression using universal gates
2 Priority encoder
3 Half adder, Full adder and BCD adder
4 2-bit Magnitude Comparator
5 Implementation of Boolean expressions using MUX
6 RS, JK, T and D FFs – truth Table verification
7 BCD counter, Mod 5,6,9 counters
8 Counters with 7 segment display
9 Ring counter, Johnson counter
10 Data transfer using shift register
11 Realization of Digital circuits using HDL

TOTAL: 45 PERIODS

OUTCOMES

- Ability to design, build and test any digital logic circuit using digital ICs for handling real life projects

LAB REQUIREMENTS

1. Digital Trainer Kit - 15 Nos.
(with 5 V, Variable and fixed frequency Clock,
Bread Board, Four Seven Segment displays,
LEDs for output display, Logic 1 and 0 Input switches)
2. Logic ICs - 50 Nos each
(7400, 7402, 7404, 7408, 7410, 7420, 7432, 7447,

7448, 7474, 7476, 7483, , 7485, 7486, 7490, 7495, 74151
Common Anode and cathode 7-segment displays, LEDs)

3. Resistors (220 ohms, 1/4 Watt) – 50 Nos
4. IC Power supply (5 V fixed) - 15 Nos
5. Bread Boards - 15 Nos

EC8312 ELECTRONIC CIRCUITS – I LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- To understand Bias in Amplifier circuits
- Study the characteristic of CE,CB and CC Amplifier
- Learn the frequency response of CS Amplifiers
- Study the Transfer characteristic of differential amplifier
- Study the frequency response characteristics of multistage amplifiers
- Perform SPICE simulation of **E**lectronic **C**ircuits

1. Frequency Response of CE amplifier
2. Frequency response of CB amplifier
3. CC Amplifier - buffer
4. Frequency response of CS Amplifiers
5. Differential Amplifiers- Transfer characterisitic.
6. CMRR Measurment
7. Cascode amplifier
8. Cascade amplifier
9. Spice Simulation of Common Emitter and Common Source amplifiers

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Analyze the differential amplifier characteristics
- Analyze the frequency response characteristics of single stage and multi stage amplifiers using BJT and JFET
- Simulate various amplifiers using PSpice

LAB REQUIREMENTS

CRO (30MHz) – 10 Nos.
Function Generators (3MHz) – 10 Nos.
Dual Regulated Power Supplies (0 – 30V) – 10 Nos.
Pentium IV PC – 10 Nos.
Transistor (BJJ-NPN) – 50 Nos

MA8401 LINEAR ALGEBRA AND NUMERICAL METHODS L T P C
(Branch specific course) 3 1 0 4

OBJECTIVES:

The basic concepts and tools of the subject covered are:

- Solving systems of linear equations, Matrix operations.
- Vector spaces and subspaces; linear independence and span of a set of vectors, basis and dimension; the standard bases for common vector spaces.
- Inner product spaces: Cauchy-Schwarz inequality, orthonormal bases, the
- Gramm- Schmidt procedure, orthogonal complement of a subspace, orthogonal projection.
- Linear Transformations: kernel and range of a linear transformation, the Rank-NullityTheorem, linear transformations and matrices, change of basis, similarity of matrices.
- Eigenvalues and eigenvectors, diagonalizability of a real symmetric matrix, canonical forms.
- Mathematical foundations of numerical techniques for solving linear system, eigen value problems and generalized inverses.

UNIT I VECTOR SPACES 9+3

Vector spaces – Subspaces – Linear equations – Linear independence and Linear dependence– Basis and Dimension – Four Fundamental spaces - Linear Transformation – Matrix and representation of Linear Transformation - Null space, Range dimension theorem.

UNIT II ORTHOGONALITY 9+3

Perpendicular vectors and Orthogonal subspaces – Inner Product Spaces – Projection onto lines – Projection – Least square Approximations – Orthogonal bases, Orthogonal matrices and Gram Schmidt orthonormalization process – Fast Fourier Transforms.

UNIT III EIGENVALUES, EIGENVECTORS AND POSITIVE DEFINITE MATRICES 10

Diagonal form of a Matrix – Difference equations and the powers *Ak* – Differential equations and the exponential *e At* – similarity transformations - Minima, Maxima and Saddle points, Test for Positive, Negative and Semidefinite and Indefinite Matrices.

UNIT IV NUMERICAL SOLUTION OF LINEAR SYSTEM OF EQUATIONS 10+3

Solution of linear system of equations – Direct method: Gauss elimination method – Pivoting – Gauss-Jordan method -LU decomposition method – Cholesky decomposition method - Iterative methods: Gauss-Jacobi and Gauss-Seidel – SOR Method.

UNIT V NUMERICAL SOLUTION OF EIGENVALUE PROBLEMS AND GENERALISED INVERSES **10+3**

Eigenvalue Problems: Power method – Inverse Power method -Jacobi's rotation method –conjugate gradient method – QR algorithm - Singular Value Decomposition method.

TOTAL: 60 PERIODS

OUTCOMES:

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

- Understand the solving techniques of Linear equations and the inner product spaces using Cauchy- Schwarz inequality, Orthonormal bases, Orthogonal Complement of the subspace.
- Understand the mathematical foundation of Numerical methods.

TEXT BOOKS:

1. Strang, G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.
2. Faires, J.D. and Burden, R., "Numerical Methods", Brooks/Cole (Thomson Publications), New Delhi, 2002.

REFERENCES:

1. Kumaresan, S., "Linear Algebra – A geometric approach", Prentice – Hall of India, NewDelhi, Reprint, 2010.
2. Friedberg, A.H., Insel, A.J. and Spence, L., "Linear Algebra", Prentice - Hall of India, New Delhi, 2004.
3. Gerald, C.F, and Wheatley, P.O., "Applied Numerical Analysis", Pearson Education, New Delhi, 2002.
4. Sundarapandian. V, "Numerical Linear Algebra", Prentice – Hall of India, New Delhi, 2008.
5. Bernard Kolman, David R. Hill, "Introductory Linear Algebra", Pearson Education, New Delhi, First Reprint 2009.

EC8401 COMMUNICATION THEORY **L T P C**

3 0 0 3

OBJECTIVES:

- To introduce the concepts of various modulations and their spectral analysis
- To introduce random processes and their characteristics
- To understand noise impact on modulations and
- To introduce some of the essential baseband signal processing techniques.

UNIT I AMPLITUDE MODULATION 9

Review of Fourier and Hilbert Transforms-Amplitude Modulation – AM, DSBSC, SSBSC, VSB–Spectral analysis of modulated signals–Demodulation – Square law, envelope detectors Superheterodyne receivers

UNIT II ANGLEMODULATION 9

Angle modulation – PM and FM – Narrow band, Wideband FM - Spectral analysis of modulated signal- FM Modulators and FM Demodulators- Discriminator, PLL, Stereo FM

UNIT III RANDOM PROCESS 9

Random variables, Central limit Theorem, Random Process, Stationary Processes, Mean,Correlation & Covariance functions, Power Spectral Density, Ergodic Processes, GaussianProcess, Transmission of a Random signal Through a LTI filter.

UNIT IV NOISE PERFORMANCE 9

Noise sources and types – Noise figure and noise temperature – Noise in cascaded systems. Narrow band noise – PSD of in-phase and quadrature noise – Noise performance in AM systems – Noise performance in FM systems – Pre-emphasis and de-emphasis – Capture effect, threshold effect.

UNIT V BASEBAND TECHNIQUES 9

Quantization – Uniform and non-uniform quantization – Quantization noise – Companding laws of speech signals – PCM, DPCM, ADPCM, DM, ADM, and Subband Coding. Multiplexing– TDM (E and T lines), FDM.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Identify the concepts of various modulations and their spectral analysis.
- Understand random processes and their characteristics, noise impact on modulations and essential baseband signal processing techniques.

TEXT BOOKS:

1. S.Haykin, “Communication Systems” 4/e, John Wiley 2007
2. D.Roody, J.Coolen, “Electronic Communications”, 4/e PHI 2006

REFERENCES:

1. J.G.Proakis, M.Salehi, “Fundamentals of Communication Systems” – Pearson Education 2006.
2. H P Hsu, Schaum Outline Series - “Analog and Digital Communications” TMH 2006
3. B.P.Lathi, “Modern Digital and Analog Communication Systems”, 3/e, Oxford UniversityPress,2007.
4. B.Sklar, “Digital Communications Fundamentals and Applications” 2/e Pearson Education 2007

EC8402 ELECTROMAGNETIC FIELDS AND WAVES L T P C

3 0 0 3

OBJECTIVES:

- To impart knowledge on the basics of static electric and magnetic field and the associated laws.
- To give insight into the propagation of EM waves and also to introduce the methods in computational electromagnetics.

UNIT I STATIC ELECTRIC FIELD 9

Introduction to co-ordinate systems , Gradient , Divergence , Curl , Divergence theorem, Stokes theorem , Coulombs law , Electric field intensity , Principle of superposition , Electric scalar potential, Electric flux density. Gauss's law and its application, Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength ,Energy and Energy density, Poisson and Laplace equation and their application, Numerical examples

UNIT II STATIC MAGNETIC FIELD 9

Magnetic field of a current carrying element ,Amperes law , The Biot – Savart law , Magnetic flux Density and Field intensity , Gauss law for magnetic fields , Torque, Magnetic moment ,Magneto motive force , Permeability , Vector potential , Field computation. Inductance, Energy in an Inductor and Energy density, Boundary relation, Hysterisis, Reluctance and Permeance. Numerical examples

UNIT III TIME VARYING ELECTRIC AND MAGNETIC FIELDS 9

Faradays law , Transformer and Mutual induction , Maxwell's equation , Self and Mutual inductance ,Displacement current , Amperes law and its inconsistency for time varying fields , Boundary relation , Poynting vector , Numerical examples.

UNIT IV PLANE EM WAVES IN ISOTROPIC MEDIA 9

Wave equation from Maxwell's Equation, Uniform plane waves in perfect dielectric, conductors, free space. Polarization, Reflection and Refraction of plane waves at different boundaries, Surface impedance, Numerical examples

UNIT V APPLICATION OF STATIC FIELDS AND COMPUTATIONAL METHODS 9

Deflection of a charged particle, CRO, Ink Jet Printer, Electro static generator, Magnetic Separator, Cyclotron, Velocity selector and Mass Spectrometer, Electromagnetic pump, Introduction to field computation methods-FDM, FEM, MOM, Numerical examples

TOTAL : 45 PERIODS

OUTCOMES

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

- Have knowledge on the basics of static electric and magnetic field and the associated laws.
- Understand the propagation of EM waves and also get introduce the methods in computational electromagnetics.

TEXT BOOKS:

1. W.H.Hayt and A.Buck,"Engineering ElectroMagnetics" , 7th Edition, McgrawHill, 2010
2. David .K.Cheng, "Field and wave Electromagnetics", 2nd edition, Pearson education, 2004.
3. Mathew.N.O.Sadiku,"Elements of Electromagnetics", Fourth edition ,Oxford University Press, 2009

REFERENCES:

1. Karl E.Longman and Sava V.Savov, "Fundamentals of Electro-Magnetics" , Prentice Hall of India, 2006
2. Kraus, Fleisch, "Electromagnetics with Applications", McGraw-Hill, 2005
3. Guru & Hiziroglu, "Electromagnetic Field Theory Fundamentals`` Second edition Cambridge University press,2005
4. Ashutosh Pramanik," ElectroMagnetism" ,Prentice Hall of India, 2006
5. Nannapaneni Narayana Rao," Elements of Engineering ElectroMagnetics", 6th edition, Prentice Hall of India, 2006

EC8403 ELECTRONIC CIRCUITS II L T P C
3 1 0 4

OBJECTIVES:

- To study about feedback amplifiers and oscillator principles
- To design oscillators
- To study about tuned amplifiers
- To study about active filters
- To know the principles of DC-DC convertors

UNIT I FEEDBACK AMPLIFIERS AND STABILITY 9

Basic feedback concepts – Properties of Negative feedback – Four feedback topologies– Analysis of series–shunt, series-series, shunt-shunt and shunt-series feedback amplifiers – stability problem – Gain and Phase-margins- Frequency compensation.

UNIT II OSCILLATORS 9

Barkhausen criteria for oscillator – Analysis of RC oscillators – Phase shift and Wein bridge oscillators – LC oscillators – Colpitts, Hartley, Clapp, Crystal, Armstrong, Franklin and Ring Oscillators

UNIT III TUNED AMPLIFIERS 9

Basic principles – Inductor losses – Use of transformers – Single tuned amplifier frequency analysis - Amplifier with multiple tuned circuits – Cascade – Synchronous tuning – Stagger tuning – Stability of tuned amplifiers using Neutralization techniques

UNIT IV ACTIVE FILTERS **9**

Filter transmission –Types - specification, transfer function - Butterworth and Chebyshev filters - First and second order filter functions - circuit implementation – single-amplifier bi quadratic active filters - Switched-capacitor filters

UNIT V POWER AMPLIFIERS AND DC CONVERTERS **9**

Power amplifiers- class A-Class B-ClassAB-Class C-Power MOSFET-Temerature Effect- Class AB Power amplifier using MOSFET –DC/DC convertors – Buck, Boost, Buck-Boost analysis and design

Outcomes:

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

- Have Knowledge about feedback amplifiers and oscillator principles.
- Design and Construct oscillators,tuned amplifier`s, Multivibrators and DC-DC convertors.

TOTAL : 45 L + 15 T = 60 PERIODS

TEXTBOOKS:

1. Adel .S. Sedra, Kenneth C. Smith, Micro Electronic circuits, 6th Edition, Oxford University Press, 2010.
2. F. Bogart Jr. Electronic Devices and Circuits 6th Edition, Pearson Education, 2007.

REFERENCES

1. Donald .A. Neamen, Electronic Circuit Analysis and Design –2nd edition,Tata McGraw Hill, 2007.
2. Muhammed H.Rashid power electronics Pearson Education / PHI , 2004
3. Jacob Millman, Taub Pulse, Digital and Switching Waveforms 2nd Edition 2007

EC8451 COMPUTER ARCHITECTURE AND ORGANIZATION **L T P C**

3 0 0 3

OBJECTIVES:

- To study the general purpose architecture for computer system .
- To study the design of data path unit and control unit for ALU operation.
- Understanding the concept of various memories.
- To introduce the concept of interfacing and organization of multiple processors.

UNIT I INTRODUCTION **9**

Computing and Computers, Evolution of Computers, VLSI Era, System Design- Register Level, Processor Level, CPU Organization, Data Representation, Fixed – Point Numbers, Floating Point Numbers, Instruction Formats, Instruction Types. Addressing modes.

UNIT II DATA PATH DESIGN 9

Fixed Point Arithmetic, Addition, Subtraction, Multiplication and Division, Combinational and Sequential ALUs, Carry look ahead adder, Robertson algorithm, booth's algorithm, non- restoring division algorithm, Floating Point Arithmetic, Coprocessor, Pipeline Processing, Pipeline Design, Modified booth's Algorithm

UNIT III CONTROL DESIGN 9

Hardwired Control, Microprogrammed Control, Multiplier Control Unit, CPU Control Unit, Pipeline Control, Instruction Pipelines, Pipeline Performance, Superscalar Processing, Nano Programming.

UNIT IV MEMORY ORGANIZATION 9

Random Access Memories, Serial - Access Memories, RAM Interfaces, Magnetic Surface Recording, Optical Memories, multilevel memories, Cache & Virtual Memory, Memory Allocation, Associative Memory.

UNIT V SYSTEM ORGANIZATION 9

Communication methods, Buses, Bus Control, Bus Interfacing, Bus arbitration, IO and system control, IO interface circuits, Handshaking, DMA and interrupts, vectored interrupts, PCI interrupts, pipeline interrupts, IOP organization, operation systems, multiprocessors, fault tolerance, RISC and CISC processors, Superscalar and vector processor.

TOTAL: 45 PERIODS

OUTCOMES;

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

- Describe the general purpose architecture for computer system.
- Design data path unit and control unit for ALU operation
- Understanding the concept of various memories, interfacing and organization of multiple processors.

TEXTBOOKS:

1. John P.Hayes, 'Computer architecture and Organisation', Tata McGraw-Hill, Third edition, 1998.
2. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, " Computer Organisation", V edition, McGraw-Hill Inc, 1996.

REFERENCES

1. Morris Mano, "Computer System Architecture", Prentice-Hall of India, 2000.
2. Behrooz Paraami, "Computer Architecture, From Micrprocessor to Supercomputers", , Oxford University Press, Sixth impression 2010.
3. P.Pal Chaudhuri, , "Computer organization and design", 2nd Ed., Prentice Hall of India, 2007.
4. Miles J. Murdocca and Vincent P. Heuring, Principles of Computer Architecture, Printice Hall, 2000
5. William Stallings, "Computer Organisatin and Architecture, Designing for Performance, Pearson Education, Eighth Edition 2010.

EC8452 **OPERATIONAL AMPLIFIERS AND ANALOG INTEGRATED CIRCUITS** **L T P C 3 0 0 3**

OBJECTIVES:

- To study the circuit configuration of linear integrated circuits
- To introduce practical applications of linear integrated circuits
- To introduce the concept of analog multiplier and Phase Locked Loop with applications
- To study ADC and DAC
- To introduce special function ICs and its construction

UNIT I CIRCUIT CONFIGURATION FOR LINEAR ICS 9

Current sources, Analysis of difference amplifiers with active loads, supply and temperature independent biasing, Band gap references, Monolithic IC operational amplifiers, specifications, frequency compensation, slew rate and methods of improving slew rate.

UNIT II APPLICATION OF OPERATIONAL AMPLIFIERS 9

Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and Non inverting Amplifiers, Differentiator, Integrator Voltage to Current converter, Instrumentation amplifier, Sine wave Oscillators, Low pass and band pass filters, comparator, Multivibrator and Schmitt trigger, Triangle wave generator, Precision rectifier, Log and Antilog amplifiers, Non-linear function generator.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analysis of four quadrant and variable Tran conductance multipliers, Voltage controlled Oscillator, Closed loop analysis of PLL, AM, PM and FSK modulators and demodulators. Frequency synthesizers, Compander ICs

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTORS 9

Analog switches, High speed sample and hold circuits and sample and hold IC's, Types of D/A converter Current driven DAC, Switches for DAC, A/D converter, Flash, Single slope, Dual slope, Successive approximation, DM and ADM, Voltage to Time and Voltage to frequency converters.

UNIT V SPECIAL FUNCTION ICS 9

Timers, Voltage regulators - linear and switched mode types, Switched capacitor filter, Frequency to Voltage converters, Tuned amplifiers, Power amplifiers and Isolation Amplifiers, Video amplifiers, Fiber optics ICs and Opto couplers, Sources for Noises, Op Amp noise analysis and Low noise OP-Amps.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Describe practical applications of linear integrated circuits.
- Apply the concept of analog multiplier and Phase Locked Loop with applications.
- Analyze Analog to Digital Converter and Digital to Analog Converter
- Identify special function ICs and its construction

TEXT BOOK:

1. Sergio Franco, " Design with operational amplifiers and analog integrated circuits", McGraw Hill, 1997.

REFERENCES:

1. Gray and Meyer, " Analysis and Design of Analog Integrated Circuits ", Wiley International, 1995.
2. Michael Jacob J., " Applications and Design with Analog Integrated Circuits " , Prentice Hall of Inida,1996.
3. Ramakant A. Gayakwad, " OP - AMP and Linear IC's ", Prentice Hall, 1994.
4. Botkar K.R., " Integrated Circuits ", Khanna Publishers, 1996.
5. Taub and Schilling, " Digital Integrated Electronics ", McGraw Hill, 1977.
6. Caughlier and Driscoll, " Operational amplifiers and Linear Integrated circuits ", Prentice Hall, 1989.
7. Millman J. and Halkias C.C., " Integrated Electronics ", McGraw Hill, 2001.

EC8411 ELECTRONIC CIRCUITS – II LABORATORY L T P C

0 0 3 2

OBJECTIVES:

- To gain hands on experience in designing feedback amplifier, tuned amplifier and oscillators.
- To learn the design of active filters
- To learn simulation software used for circuit design.
- To understand the concepts of multivibrators and power amplifiers.

1. Design and Analysis of Feedback amplifiers
2. Design of RC Oscillators
3. Design of LC Oscillators
4. LPF and HPF
5. Single Tuned amplifier
6. Spice simulation of feedback amplifiers
7. Spice simulation of oscillators and Multivibrators
8. Class A and Class B Power Amplifiers.

TOTAL: 45 PERIODS .

OUTCOMES:

On completion of this lab course, the students will be able to

- Analyze feedback amplifiers
- Design sinusoidal oscillators, tuned amplifiers, wave-shaping circuits and multivibrators
- Analyze electronic circuits through simulation.

LAB REQUIREMENTS :

CRO (30MHz)	–	10 Nos.
Function Generators (3MHz)	–	10 Nos.
Dual Regulated Power Supplies (0 – 30V)	–	10 Nos.
Pentium IV PC (LTSPICE or equivalent s/w)	–	10 user license
BC 107, BC 147	–	50 Nos
Resistors, Capacitors & Inductors	–	As required
Breadboards	–	15 Nos

EE8262 ELECTRICAL ENGINEERING LABORATORY L T P C

0 0 3 2

OBJECTIVES:

- To provide hands on experience with generators and motors.
- To Understand the working of DC/AC motors and generators
- To study the characteristics of transducers
- To learn the use of transformer
- To understand the behavior of linear system through simulation
- To gain knowledge of controllers

1. Study of DC & AC motor starters
2. Open Circuit and Short Circuit test on single phase transformer to draw its equivalent circuit
3. Regulation of three phase alternator
4. Study of three phase circuits
5. Speed Control of DC shunt motor
6. Load Test on DC shunt motor
7. OCC & Load Characteristics of DC shunt generator
8. Load test on single-phase transformer
9. Load test on three-phase Induction motor
10. Load test on single-Phase Induction motor

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Perform experiments to study the load characteristics of DC motors / generators.
- Design bridge network circuit to measure the values of passive component.
- Analyse the stability of linear system through simulation software.
- Obtain transfer function of DC generators.

LAB REQUIREMENTS :

S.No	Equipment		Quantity
1.	DC Shunt Motor with Loading Arrangement 3HP,220V,14A,750RPM,0.6A(Shunt field)		2
2.	DC Shunt Motor Coupled With Three phase Alternator		1
	DC Shunt Motor kW: 5.2 volts: 220 Amps: 27.5 Speed: 1500 RPM Field	Three phase Alternator kVA: 7.5 volts: 415 Amps: 10.4 Speed: 1500 RPM Field	
3.	Single Phase Transformer;2 KVA,230/110-166 V		1
4.	Three Phase Induction Motor with Loading Arrangement 3.7KW,415v,7.5A,1430 RPM		1
5.	Single Phase Induction Motor with Loading Arrangement		1
6.	DC Shunt Motor Coupled With DC Compound		1
	DC Shunt Motor kW: 7.4 volts: 220 Amps: 38.5 Speed: 960 RPM Field	DC Compound Generator kW: 7.5 volts: 220 Amps: 38.5 Speed: 960 RPM Field	
7.	Tachometer -Digital/Analog		8

8.	Single Phase Auto Transformer;(0-270)V	2
9.	Three Phase Auto Transformer;(0-270)V	1
10.	MC Voltmeter-(0-300/600)V	5
11.	MC Ammeter (0-10/20)A	5
12.	MC Ammeter (0-2/1)A	4
13.	MI Voltmeter (0-300/600)V	5
14.	MI Ammeter (0-10/20)A	6
15.	MI Ammeter (0-1/2)A	4
16.	UPF Wattmeter (300/600V,10/20A)	4
17.	LPF Wattmeter (300/600V,10/20A)	4
18.	Single Phase Resistive Loading Bank(10KW)	2
19.	Three Phase Resistive Loading Bank(10KW)	2
20.	SPST switch	2
21.	Fuse various ranges	As per the requirement
22.	Wires	As per the requirement
23.	Rheostats(100Ω,1A;250Ω,1.5A;75Ω,16A,1000Ω,1A)	Each 2

EC8501 CONTROL SYSTEM ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To introduce the elements of control system and their modeling using various Techniques.
- To introduce methods for analyzing the time response, the frequency response and the stability of systems
- To introduce the state variable analysis method

UNIT I CONTROL SYSTEM MODELING 9

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

UNIT II TIME RESPONSE ANALYSIS 9

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

UNIT III FREQUENCY RESPONSE ANALYSIS 9

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

UNIT IV STABILITY ANALYSIS 9

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

UNIT V STATE VARIABLE ANALYSIS 9

State space representation of Continuous Time systems – State equations – Transfer function from State Variable Representation – Solutions of the state equations - Concepts of Controllability and Observability – State space representation for Discrete time systems. Sampled Data control systems – Sampling Theorem – Sampler & Hold – Open loop & Closed loop sampled data systems.

OUTCOMES

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

Have Clear concepts of continuous-time control systems design and stability analysis in time domain and in frequency domain.

TOTAL : 45 PERIODS

TEXTBOOK:

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

REFERENCES:

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.

EC8502 DIGITAL COMMUNICATION TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:

- To understand the concept of information, types of channels
- To understand the capabilities of various source coding theorems and the fundamental limit of transmission over the channel.
- To understand the capabilities of various channel coding theorems
- To develop the knowledge on pass band communication and spread spectrum.

UNIT I INFORMATION THEORY 9

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

UNIT II ERROR CONTROL CODING TECHNIQUES 9

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

UNIT III BASEBAND TECHINIQUES 9

Pulse Modulation-PAM,PPM and PDM, Line codes – RZ,NRZ, Manchester, Binary N-zero substitution codes - PSDs – ISI – Nyquist criterion for distortionless transmission – Pulse shaping – Correlative coding - M-ary schemes – Eye pattern

UNIT IV BANDPASS SIGNALING 9

Geometric representation of signals – ML detection -Correlator and matched filter detection- generation and detection of BPSK, BFSK, QPSK - BER and Power spectral DensityComparison - Structure of non-coherent receivers - generation and detection of BFSK, DPSK– Principles of QAM. Band Pass Sampling.

UNIT V SYNCHRONISATION AND SPREAD SPECTRUM TECHNIQUES 9

Synchronisation – Carrier, symbol, Chip and frame synchronisation techniques, SpreadSpectrum - PN Sequences, Direct Sequence and Frequency Hopping Spread SpectrumSystems, BER Analysis, Processing gain and Jamming Margin, Application in Cellular Systems.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Understand the concepts of information, types of channels.
- Understand the capabilities of various source coding theorems and the fundamental limit of transmission over the channel.
- Describe the capabilities of various channel coding theorems.
- Identify pass band communication and spread spectrum.

TEXT BOOKS:

1. S. Haykin, “Digital Communications”, John Wiley, 2005
2. B. Sklar, “Digital Communication Fundamentals and Applications”, 2/e, Pearson Education, 2009

REFERENCES:

1. H P Hsu, Schaum Outline Series - “Analog and Digital Communications”, TMH 2006
2. B.P.Lathi, “Modern digital and Analog Communication Systems” 3/e, Oxford University Press 2007
3. J.G Proakis, “Digital Communication”, 4/e, Tata Mcgraw Hill Company, 2001.

EC8503 MICROPROCESSOR AND MICROCONTROLLERS L T P C
3 0 0 3

OBJECTIVES:

- To study the architecture of 8085 and 8086, 8051
- To study the addressing modes and instruction set of 8085 and 8086, 8051
- To introduce the need and use of interrupt structure in 8085 and 8051.
- To develop skill in simple program writing for 8085 and 8051 applications.
- To introduce commonly used peripheral / interfacing ICs.

UNIT I ARCHITECTURE OF 8085 /8086 9

8085- Functional Block Diagram- Description - Addressing Modes, Timing diagrams. Introduction to 8086 – Architecture, Instruction set, Addressing Modes.

UNIT II ASSEMBLY LANGUAGE PROGRAMMING 9

8085: Assembly Language Programming, programming techniques, Subroutines, serial I/O and data communication, Interrupts, Interrupt programming, 8086:Simple Assembly Language Programming, Assembler Directives- Interrupts and Interrupt Applications.

UNIT III PERIPHERAL INTERFACING & APPLICATION 9

Programmable Peripheral Interface (8255), keyboard display controller (8279), ADC, DAC Interface, Programmable Timer Controller (8254), Programmable interrupt

controller (8259), Serial Communication Interface (8251).

UNIT IV MICROCONTROLLER 9

8051 – Architecture, Special Function Registers(SFRs), I/o Pins Ports and Circuits, Instruction set, Addressing modes, Assembly language programming.

UNIT V INTERFACING 8051: MEMORY, I/O, INTERRUPTS 9

Programming 8051 Timers- Serial Port Programming- Interrupts Programming–LCD & Keyboard Interfacing- ADC, DAC & Sensor Interfacing, External Memory Interface- RTC Interfacing using I2C Standard- Motor Control- Relay, PWM, DC & Stepper Motor.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Describe the architecture of 8085 and 8086, 8051.
- Identify the addressing modes and instruction set of 8085 , 8086 and 8051.
- Analyze the need and use of interrupt function.
- Write simple program writing for 8085 and 8051 based applications and Interfaces.

TEXTBOOKS:

1. Ramesh S. Gaonkar, Microprocessor Architecture Programming and Applications with 8085. Fifthh edition, Penram International Publishing 2010.
2. Douglas V.Hall, Microprocessor and Interfacing, Programming and Hardware. Revised second Edition 2006, Eleventh Reprint 2010. Tata McGraw Hill
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay The 8051 Microcontroller and Embedded Systems, Second Edition 2008, Fifth Impression 2010, Pearson Education 2008.

REFERENCES:

1. Krishna Kant, " Microprocessor and Microcontroller Architecture, programming and system design using 8085, 8086, 8051 and 8096, PHI, 2007, Seventh Reprint 2011
2. Kenneth J.Ayala., "The 8051 Microcontroller, 3rd Edition, Thompson Delmar Learning,2007, New Delhi.
3. A.K. Ray , K.M .Bhurchandi "Advanced Microprocessor and Peripherals" ,Second edition, Tata McGraw-Hill, 2007.
4. Barry B.Brey, "The Intel Microprocessors Architecture, Programming and Interfacing" Pearson Education, 2007. New Delhi.
5. Nilesh B Bahadure, " Microprocessors The 8086 to Pentium Family, PHI, 2010

EC8504 TRANSMISSION LINES AND WAVE GUIDES L T P C

3 0 0 3

OBJECTIVES:

- To introduce the various types of transmission lines and to discuss the losses associated.
- To give thorough understanding about impedance transformation and matching.
- Usage of smith chart in problem solving is dealt with.

• Knowledge on filter theories and waveguide theories are imparted.

UNIT I TRANSMISSION LINE THEORY & PARAMETERS 8

Introduction to different types of transmission lines , Transmission line Equation – Solution – Characteristic impedance-Infinite line concept - Distortion less line – loading – input impedance, Losses in Transmission lines– Reflection loss, Insertion loss, return loss, Introduction to planar transmission lines. Numerical examples

UNIT II IMPEDENCE MATCHING AND TRANSFORMATION 9

Reflection Phenomena – Standing waves – λ/8, λ/4 & λ/2 lines – λ/4 Impedance transformers,Stub Matching – Single and Double Stub – Smith Chart and Applications. Numerical examples

UNIT III NETWORKCOMPONENTS 8

Filter fundamentals, Filter design- lumped element and distributed element approach to filterdesign –Design of Attenuators and Equalizers – Lattice type , Concept of inverse networks–Transients in transmission lines, Lattice diagram. Numerical examples

UNIT IV RECTANGULAR WAVE GUIDES 10

Waves between Parallel Planes – characteristic of TE , TM and TEM waves , Velocities of propagation ,Solution of wave Equation in Rectangular guides ,TE and TM modes , Dominant Mode, Attenuation, Mode Excitation, Dielectric slab wave guides, Numerical examples .

UNIT V CYLINDRICAL WAVE GUIDES 10

Solution of wave equation in circular guides, TE and TM wave in circular guides, Wave impedance, attenuation, mode excitation, formation of cylindrical cavity, Application , cavity resonator and Q for dominant mode, Numerical examples

TOTAL: 45 PERIODS

OUTCOMES

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

- Analyze the various types of transmission lines and to discuss the losses associated.
- Understand impedance transformation and matching.
- Use smith chart in problem solving
- Apply knowledge on filter theories and waveguide theories are imparted.

TEXTBOOK:

1. John D Ryder “Networks lines and fields” Prentice Hall of India, 2005

REFERENCES

1. E.C.Jordan and K.G. Balmain, “Electromagnetic Waves and Radiating Systems” Prentice Hall of India, 2006
2. Guru & Hiziroglu,"Electromagnetic Field Theory Fundamentals” Second edition Cambridge University press, 2005
3. R. K. Shevgaonkar, "ELECTROMAGNETIC FIELDS” Tata Mc Graw Hill Publications, 2006
4. G.S.N Raju "Electromagnetic Field Theory and Transmission Lines” Pearson Education, First edition 2005

EC8551 DISCRETE TIME SIGNAL PROCESSING L T P C
3 1 0 4

OBJECTIVES:

- To introduce discrete fourier transform and its applications
- To teach the design of infinite and finite impulse response filters for filtering undesired signals
- To introduce signal processing concepts in systems having more than one sampling frequency

UNIT I DISCRETE FOURIER TRANSFORM 12

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

UNIT II DESIGN OF INFINITE IMPULSE RESPONSE FILTERS 12

Analog filters – Butterworth filters, Chebyshev Type I filters (upto 3^{rd} order), Analog Transformation of prototype LPF to BPF /BSF/ HPF. Transformation of analog filters into equivalent digital filters using Impulse invariant method and Bilinear Z transform method-Realization structures for IIR filters – direct, cascade, parallel forms.

UNIT III DESIGN OF FINITE IMPULSE RESPONSE FILTERS 12

Design of linear phase FIR filters windowing and Frequency sampling methods - Realization structures for FIR filters – Transversal and Linear phase structures-Comparison of FIR & IIR.

UNIT IV FINITE WORDLENGTH FFECTS 12

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.

UNIT V MULTIRATE SIGNAL PROCESSING 12

Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase Decomposition of FIR filter-Multistage implementation of sampling rate conversion-Design of narrow band filters - Applications of Multirate signal processing.

TOTAL: 60 PERIODS

OUTCOMES:

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

- Understand discrete Fourier transform and its applications.
- Design of infinite and finite impulse response filters for various applications.
- Apply signal processing concepts in systems having more than one sampling frequency

TEXT BOOKS:

1. A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.
2. John G Proakis and Manolakis, "Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007

REFERENCES:

1. I.C.Ifeachor and B.W. Jervis, Digital Signal Processing- A practical approach, Pearson,2002.
2. M.H.Hayes, Digital Signal Processing, Schaum's outlines, Tata McGraw Hill, 2007.
3. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata McGraw-Hill, 1998.
4. D.J. De Fatta, J.G.Lucas and W.S. Hodgkiss, Digital Signal Processing- A system Design Approach, John Wiley & sons, Singapore, 1988.
5. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.

HS8561	EMPLOYABILITY SKILLS	L T P C
	(LAB / PRACTICAL COURSE)	**0 0 2 1**

(Common to all branches of Fifth or Sixth Semester B.E / B.Tech programmes)

OBJECTIVES:

- To enhance the employability skills of students with a special focus on Presentation skills, Group discussion skills and Interview skills
- To help them improve their soft skills, including report writing, necessary for the workplace situations

1. Making presentations – introducing oneself – introducing a topic – answering questions – individual presentation practice
2. Creating effective PPTs – presenting the visuals effectively
3. Using appropriate body language in professional contexts – gestures, facial expressions, etc.
4. Preparing job applications - writing covering letter and résumé
5. Applying for jobs online - email etiquette
6. Participating in group discussions – understanding group dynamics - brainstorming the topic
7. Training in soft skills - persuasive skills – People skills - questioning and clarifying skills – mock GD
8. Writing Project proposals – collecting, analyzing and interpreting data / drafting the final report

9. Attending job interviews – answering questions confidently
10. Interview etiquette – dress code – body language – mock interview

TOTAL: 30 PERIODS

REQUIREMENTS FOR A CLASS OF 30 STUDENTS

1. A PC or a lap top with one or two speakers
2. A Collar mike and a speaker
3. An LCD projector and a screen
4. CD's and DVD's on relevant topics

OUTCOMES:

At the end of the course, learners should be able to

- Take international examination such as IELTS and TOEFL
- Make presentations and Participate in Group Discussions.
- Successfully answer questions in interviews**.**

REFERENCE BOOKS

1. Dhanavel, S.P. 2010. English and Soft Skills. Hyderabad: Orient BlackSwan Ltd.
2. Corneilssen, Joep. How to Prepare for Group Discussion and Interview. New Delhi: Tata-McGraw-Hill, 2009.
3. D'Abreo, Desmond A. Group Discussion and Team Building. Mumbai: Better Yourself Books, 2004.
4. Ramesh, Gopalswamy, and Mahadevan Ramesh. The ACE of Soft Skills. New Delhi: Pearson, 2010.
5. Gulati, Sarvesh. Corporate Soft Skills. New Delhi: Rupa and Co. 2006.
6. Van Emden, Joan, and Lucinda Becker. Presentation Skills for Students. New York: Palgrave Macmillan, 2004.

EXTENSIVE READERS

1. Covey, Stephen R. The 7 Habits of Highly Effective People. New York: Free Press, 1989.
2. Bagchi, Subroto. The Professional. New Delhi: Penguin Books India, 2009.

WEB RESOURCES

1. www.humanresources.about.com
2. www.careerride.com

OUTCOMES:

At the end of the course, learners should be able to

- Take international examination such as IELTS and TOEFL
- Make presentations and Participate in Group Discussions.
- Successfully answer questions in interviews**.**

EC8511	MICROCONTROLLER AND INTERFACING LABORATORY	L T P C 0 0 3 2

OBJECTIVES:

- To study the addressing modes and instruction set of 8085 and 8086, 8051
- To introduce the Assembly language programming skills in 8085 and 8086, 8051.
- To develop skill in the interfacing concepts using 8085 and 8086, 8051.
- To introduce the concept interfacing add on cards and peripheral / interfacing ICs.

8085 BASED EXPERIMENTS

1. Assembly Language Programming of 8085

8086 BASED EXPERIMENTS

2. Programs for 16 bit Arithmetic, Sorting, Searching and String operations,
3. Programs for Digital clock, Interfacing ADC and DAC
4. Interfacing and Programming 8279, 8259, and 8253.
5. Serial Communication between two Microprocessor Kits using 8251.
6. Interfacing and Programming of Stepper Motor and DC Motor Speed control and Parallel Communication between two Microprocessor Kits using Mode 1 and Mode 2 of 8255.
7. Macroassembler Programming for 8086

8051 BASED EXPERIMENTS

8. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051 microcontroller.
9. Programming and verifying Timer, Interrupts and UART operations in 8051 microcontroller.
10. Interfacing – DAC and ADC and 8051 based temperature measurement
11. Interfacing – LED and LCD
12. Interfacing – stepper motor traffic light control
13. Communication between 8051 Microcontroller kit and PC.
14. R8C based applications

LAB REQUIREMENTS:

1. 8085 trainer kit 15 Nos.
2. 8051 trainer kit 15 Nos.
3. 8086 trainer kit 10 Nos.
4. Macro assembler MASM (Simulator) - 10 Users.
5. 8279 Interfacing card compatible with 8085, 8051 and 8086 trainers. – 2Nos.
6. 8251 Interfacing card compatible with 8085, 8051 and 8086 trainers. – 2Nos.

7. ADC and DAC Interfacing card compatible with 8085, 8051 and 8086 trainers. – 2Nos.
8. Traffic Light - Interfacing card compatible with 8085, 8051 and 8086 trainers. – 2Nos.
9. Stepper motor Interfacing - Interfacing card compatible with 8085, 8051 and 8086 trainers. – 2Nos.
10. (16X2) LCD Display - Interfacing card compatible with 8085, 8051 and 8086 trainers.– 2Nos
11. Temperature measurement card - Interfacing card compatible with 8085, 8051 and 8086 trainers. – 2Nos
12. DC motor speed control card- Interfacing card compatible with 8085, 8051 and 8086 trainers. – 2Nos

TOTAL: 45 PERIODS

OUTCOME:

- The student will be familiar in the architecture and instruction set of the following processors and controller 8085 and 8086, 8051.
- The lab will equip the student with the interfacing knowledge and right selection of processors.
- The lab will equip the student with the right selection of add on cards and peripheral / interfacing ICs for a specific task.

EC8512 COMMUNICATION SYSTEMS LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- To visualize the effects of sampling and TDM
- To Implement AM & FM modulation and demodulation
- To implement PCM & DM
- To implement FSK, PSK and DPSK schemes
- To implement Equalization algorithms
- To implement Error control coding schemes

1. Signal Sampling and reconstruction

2. Time Division Multiplexing
3. AM / FM Modulator and Demodulator
4. Pulse Code Modulation and Demodulation
5. Delta Modulation and Demodulation
6. Line coding schemes
7. FSK, PSK and DPSK schemes (Simulation)
8. Error control coding schemes (Simulation)
9. Spread spectrum communication (Simulation)
10. Communication link simulation
11. Symbol Timing Synchronization
12. Equalization – Zero Forcing & LMS algorithms

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Simulate end-to-end Communication Link
- Demonstrate their knowledge in base band signaling schemes through implementation of FSK, PSK and DPSK
- Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of communication system
- Simulate & validate the various functional modules of a communication system

LAB FREQUIREMENTS:

i) Kits for Signal Sampling, TDM, AM, FM, PCM, DM and Line Coding Schemes
ii) Software Defined Radio platform for link simulation studies
iii) MATLAB / SCILAB for simulation
experiments iv) PCs - 6 No.s

EC8561 DIGITAL SIGNAL PROCESSING LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- To implement Linear and Circular Convolution
- To implement FIR and IIR filters
- To study the architecture of DSP processor
- To demonstrate Finite word length effect

DSP PROCESSOR IMPLEMENTATION

1. Study of architecture of Digital Signal Processor
2. MAC operation using various addressing modes
3. Implementation of difference equations

4. Linear Convolution
5. Circular Convolution
6. Waveform generation

MATLAB / EQUIVALENT SOFTWARE PACKAGE

7. Generation of sequences
8. Linear and Circular Convolutions
9. DFT
10. FIR filter design
11. IIR filter design
12. Finite wordlength effects
13. Decimation and Interpolation

OUTCOMES:

Students will be able to

- Carry out simulation of DSP systems
- Demonstrate their abilities towards DSP processor based implementation of DSP systems
- Analyze Finite word length effect on DSP systems
- Demonstrate the applications of FFT to DSP
- Implement adaptive filters for various applications of DSP

LAB REQUIREMENTS:

TMS 320C5x / TMS 320C6x Kits – 15 Nos.

MATLAB or Equivalent S/w – 15 User License

MG8653 PRINCIPLES OF MANAGEMENT L T P C
3 0 0 3

AIM

To learn the different principles and techniques of management in planning, organizing, directing and controlling.

OBJECTIVES

- To study the Evolution of Management
- To study the functions and principles of management
- To learn the application of the principles in an organization

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management –Science or Art – Manager Vs Entrepreneur- types of

managers- managerial roles and skills – Evolution of Management –Scientific, human relations , system and contingency approaches– Types of Business organization- Sole proprietorship, partnership, company-public and private sector enterprises- Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart– organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization –Job Design - Human Resource Management –HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour– motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership –communication – process of communication – barrier in communication – effective communication –communication and IT.

UNIT V CONTROLLING 9

System and process of controlling –budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Apply management principles to become a versatile professional.
- Demonstrate a vivid understanding and significance of inventory systems, finance and management tools.

TEXT BOOKS:

1. Stephen P. Robbins & Mary Coulter, " Management", Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", Pearson Education, 6th Edition, 2004.

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, “Fundamentals of Management” Pearson Education, 7th Edition, 2011.
2. Robert Kreitner & Mamata Mohapatra, “ Management”, Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich “Essentials of management” Tata McGraw Hill,1998.
4. Tripathy PC & Reddy PN, “Principles of Management”, Tata Mcgraw Hill, 1999

EC8601 ANTENNAS AND WAVE PROPAGATION L T P C

3 0 0 3

OBJECTIVES:

- To give insight into the radiation phenomena.
- To give a thorough understanding of the radiation characteristics of different types of antennas .
- To create awareness about the the different types of propagation of radio waves at different frequencies

UNIT I FUNDAMENTALS OF RADIATION 9

Definition of antenna parameters – Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam width, Input Impedance. Matching – Baluns, Polarization mismatch, Antenna noise temperature, Radiation from oscillating dipole, Half wave dipole. Folded dipole, Yagi array.

UNIT II APERTURE AND SLOT ANTENNAS 9

Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna , Reflector antenna , Aperture blockage , Feeding structures , Slot antennas ,Microstrip antennas – Radiation mechanism – Application ,Numerical tool for antenna analysis

UNIT III ANTENNA ARRAYS 9

N element linear array, Pattern multiplication, Broadside and End fire array – Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis-Binomial array

UNIT IV SPECIAL ANTENNAS 9

Principle of frequency independent antennas –Spiral antenna, Helical antenna, Log periodic. Modern antennas- Reconfigurable antenna, Active antenna, Dielectric antennas, Electronic band gap structure and applications, Antenna Measurements-Test Ranges, Measurement of Gain, Radiation pattern, Polarization, VSWR

UNIT V PROPAGATION OF RADIO WAVES 9

Modes of propagation , Structure of atmosphere , Ground wave propagation , Tropospheric propagation , Duct propagation, Troposcatter propagation , Flat earth and Curved earth concept ,Sky wave propagation – Virtual height, critical frequency , Maximum usable frequency – Skip distance, Fading , Multi hop propagation

TOTAL : 45 PERIODS

OUTCOMES:

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

- Have insight into the radiation phenomena
- Have a thorough understanding of the radiation characteristics of different types of Antennas.
- Identify the different types of propagation of radio waves at various frequencies.

TEXT BOOKS :

1. John D Kraus," Antennas for all applications",3 Ed, McGraw Hill, 2005
2. Edward C.Jordan and Keith G.Balmain"Electromagnetic Waves and Radiating Systems" Prentice Hall of India,2006
3. R.E.Collin,"Antennas and radiowave propagation"Mcgraw hill 1985

REFERENCES:

1. Constantine.A.Balanis"Antenna Theory Analysis and Design" Wiley student edition,2006
2. Rajeswari Chatterjee,:"Antenna Theory and Practice "Revised Second edition "New Age international Publishers, 2006
3. S.Drabowitch, "Modern Antennas" Second edition,Springer Publications,2007
4. Robert S.Elliott"Antenna theory and Design "Wiley student edition,2006
5. H.Sizun" Radio Wave Propagation for Telecommunication Applications "First Indian Reprint, Springer Publications,2007

EC8602 COMMUNICATION NETWORKS L T P C

3 0 0 3

OBJECTIVES:

- To introduce the layered communication architectures
- To understand various physical, data link and routing layer protocols
- To understand application layer protocols and security issues
- To understand various digital switching techniques.

UNIT I NETWORK FUNDAMENTALS AND PHYSICAL LAYER 9

Introduction to Networks, definition of layers, services, interface and protocols. OSI reference model- layers and duties. TCP/IP reference model – layers and duties. Physical layer- general description, characteristics, signaling media types, topologies, examples physical layer (RS232C, ISDN, ATM,SONET)

UNIT II DATA LINK LAYER AND NETWORK INTERCONNECTION 9

Logical link control Functions:- Framming, Flow control , Error control: CRC, LLC protocols:- HDLC, P to P. Medium access layer:- Random access, Controlled access, Channelization, IEEE standards:- 802.3, 802.4 and 802.5. Internetworking, Interconnection issues, Interconnection devices:- Repeaters, Hubs, Routers/switches and Gateways.

UNIT III MESSAGE ROUTING TECHNOLOGIES 9

Circuit switching, packet switching, message switching. Internet protocols; IPV4, IPV6, ARP, RARP, ICMP, IGMP, VPN. Network Routing Algorithms: - Distance vector routing, OSPF, Dijikstra's , Bellaman Ford, Congestion control algorithms.

UNIT IV END-END PROTOCOLS AND SECURITY 9

Process-process delivery:- TCP, UDP and SCTP. Application protocols: WWW, HTTP, FTP and TELNET, Network management protocol: SNMP, Network security.

UNIT V DIGITAL SWITCHING 9

Switching functions, Space Division Switch, Time Division Switch, STS switching, TST switching, No 4 ESS Toll switch, digital cross connect systems.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Describe the layered communication architectures.
- Understand various physical, data link and routing layer protocols.
- Analyze the application layer protocols and security issues and also the various

TEXT BOOKS

1. Behrouz.A. Forouzan, Data Communication And Networking, 4th Edition, Tata McGraw Hill, 2007.
2. John C. Bellamy, Digital Telephony, 3rd Edition, John Wiley 2006.

REFERENCES:

1. Stallings.W., Data And Computer Communication, 4th Edition, Prentice Hall of India,1996
2. Tanenboum, A.S, Computer Netwotks, 3rd Edition , Prentice Hall Of India, 1996
3. Keshav.S. An Engineering Approach To Computer Networking, Addision – Wesley,1999.
4. J.E.Flood, Telecommunication Switching, Traffic and networks, Ist edition, Pearson Education, 2006.

EC8651 DIGITAL VLSI L T P C

3 0 0 3

OBJECTIVES:

- In this course, the MOS circuit realization of the various building blocks that is common to any microprocessor or digital VLSI circuit are studied.
- Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed.
- The main focus in this course is on the transistor circuit level design and realization for digital operation and the issues involved as well as the topics covered are quite distinct from those encountered in courses on CMOS Analog IC design.

UNIT I MOS TRANSISTOR PRINCIPLE 9

NMOS and PMOS transistors, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modeling, Scaling principles and fundamental limits, CMOS inverter scaling, propagation delays, Stick diagram, Layout diagrams

UNIT II COMBINATIONAL LOGIC CIRCUITS 9

Examples of Combinational Logic Design, Elmore's constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design, Power dissipation – Low power design principles

UNIT III SEQUENTIAL LOGIC CIRCUITS 9

Static and Dynamic Latches and Registers, Timing issues, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design

UNIT IV DESIGNING ARITHEMETIC BUILDING BLOCKS 9

Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers, dividers, Barrel shifters, speed and area tradeoff

UNIT V IMPLEMENTATION STRATEGIES 9

Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Realize the digital building blocks using MOS circuit.
- Design combinational circuits, sequential circuits and memory circuits
- Understand the concepts of ASIC design flow.

TEXTBOOKS:

1. Jan Rabaey, Anantha Chandrakasan, B.Nikolic, “Digital Integrated circuits: A design perspective”. Second Edition, Prentice Hall of India, 2003.
2. M.J. Smith, “Application specific integrated circuits”, Addisson Wesley, 1997

REFERENCES:

1. N.Weste, K.Eshraghian, “Principles of CMOS VLSI DESIGN”, second edition, Addision Wesley 1993
2. R.Jacob Baker, Harry W.LI., David E.Boyee, “CMOS Circuit Design, Layout and Simulation”, 2005 Prentice Hall of India
3. A.Pucknell, Kamran Eshraghian, “BASIC VLSI DESIGN”, Third edition, Prentice Hall of India, 2007.

EC8611 NETWORKING LABORATORY L T P C

0 0 3 2

OBJECTIVES:

- To design and analysis various physical layer protocols that are used in present day technologies
- To understand Medium access layer Protocols
- To understand routing layer protocols
- To understand wired security protocols

1. Analysis of logical link control layer protocols – Stop & wait, Sliding Window, Go-back N
2. Analysis of MAC protocols 6 – ALOHA, SLOTTED ALOHA, CSMA, CSMA/CD, TOKEN BUS, TOKEN RING.
3. Analysis of Routing protocols – OSPF, LINK STATE ROUTING, BELLMAN FORD
4. Client / Server communication using TCP / UDP Socket programming
5. Data Packet Scheduling, Congestion Control

6. Switches / Routers
7. Wi – Fi Physical Layer
8. Wi – Fi MAC Layer
9. Cryptography (Network Security)
10. LAN / MAN / WAN simulation and performance evaluation

TOTAL: 45 PERIODS

LAB REQUIREMENTS:

LAN TRAINER KITS FOR LLC PROTOCOL STUDIES	–	2 No.s
LAN TRAINER KITS FOR MAC PROTOCOL STUDIES	–	4 No.s
NETWORK SIMULATION SOFTWARE	-	NETSIM / QUALNET / Ns2 / GLOMOSIM
PCs	-	8 No.s

OUTCOMES:

- The students get familiarized about the various operations of the computer communication networks.
- Ability of the students is enhanced to design and analyze existing physical , MAC and routing layer protocols.

EC8612 VLSI DESIGN LABORATORY L T P C
0 0 3 2

OBJECTIVES:

- To learn Hardware Descriptive Language(Verilog/VHDL)
- To learn the fundamental principles of VLSI circuit design in digital and analog domain
- To familiarise fusing of logical modules on FPGAs
- To provide hands on design experience with professional design (EDA) platforms.

FPGA Based experiments.

1. HDL based design entry and simulation of simple counters, state machines, adders (min 8 bit) and multipliers (4 bit min).
2. Synthesis, P&R and post P&R simulation of the components simulated in (I) above. Critical paths and static timing analysis results to be identified. Identify and verify possible conditions under which the blocks will fail to work correctly.

3. Hardware fusing and testing of each of the blocks simulated in (I). Use of either chipscope feature (Xilinx) or the signal tap feature (Altera) is a must. Invoke the PLL and demonstrate the use of the PLL module for clock generation in FPGAs.

IC Design Experiments: (Based on Cadence/MAGMA/Tanner)

4. Design and simulation of a simple 5 transistor differential amplifier. Measure gain, ICMR, and CMRR
5. Layout generation, parasitic extraction and resimulation of the circuit designed in (I)
6. Synthesis and Standard cell based design of an circuits simulated in 1(I) above. Identification of critical paths, power consumption.
7. For expt (c) above, P&R, power and clock routing, and post P&R simulation.
8. Analysis of results of static timing analysis.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to

- Write HDL code for basic as well as advanced digital integrated circuits.
- Import the logic modules into FPGA Boards.
- Synthesize, Place and Route the digital IPs.
- Design, Simulate and Extract the layouts of Analog IC Blocks using EDA tools.

LAB REQUIREMENTS:

Xilinx or Altera FPGA	12 nos
Xilinx software	
Cadence/MAGMA/Tanner or equivalent software package	10 User License
PCs	10 No.s

EC8701 OPTICAL COMMUNICATION L T P C

3 0 0 3

OBJECTIVES:

- To introduce the principle of light propagation through optical fibers
- To understand signal distortion mechanisms in the fiber
- To introduce optical transmitters and receivers for fiber /free space links
- To introduce optical network concepts and components involved.

UNIT I OPTICAL FIBERS 9

Introduction, light propagation in optical fibers, ray and mode theory of light, optical fiber structure and parameters, fiber materials, fiber fabrication techniques, optical signal attenuation mechanisms, merits and demerits of guided and unguided optical signal transmissions.

UNIT II TRANSMISSION CHARACTERISTICS 9

Optical signal distortion – Group delay, material dispersion, waveguide dispersion, polarization mode dispersion, intermodal dispersion, profile dispersion, fiber types, Standard Singlemode Fibers, Dispersion Shifted Fibers, Dispersion Flattened Fibers, Polarization Maintaining Fibers, Dispersion compensation, Principles of fiber nonlinearities.

UNIT III OPTICAL TRANSMITTERS 9

Materials for optical souces, light-emitting diodes, semiconductor laser diodes , longitudinal modes, gain and index-guiding, power-current characteristics, spectral behaviour, longitudinal mode control and tunability, noise, direct and external modulation, Laser sources and transmitters for free space communication.

UNIT IV OPTICAL RECEIVERS 9

Principles of optical detection, spectral responsivity, PIN, APD, preamplifier types, receiver noises, Signal to Noise Ratio (SNR) and Bit Error Rate (BER), Principles of coherent detection, link power and risetime budget.

UNIT V OPTICAL NETWORKING PRINCIPLES AND COMPONENTS 9

Network Components: Optical couplers, filters, isolators, switches, optical amplifiers: erbium doped fiber amplifiers, semiconductor optical amplifiers, Networking Concepts: SONET/SDH/FDDI optical networks, WDM optical networks, layered optical network architecture.

TOTAL: 45 PERIODS

OUTCOMES

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

- Understand the principle of light propagation through optical fibers, signal distortion mechanisms in the fiber.
- Describe the optical transmitters and receivers for fiber /free space links.
- Identify optical network techniques and understand the components involved.

TEXTBOOKS:

1. Gerd Kaiser , “Optical Fiber Communications”, 4 th edition,Sixth reprint,Tata Mc Graw Hill, New Delhi,2009.
2. John M. Senior, ”Optical Fiber Communications- Principles And Practice”, Third Edition, Pearson Education, 2010.

REFERENCES:

1. Gerd Keiser, “Optical communications Essentials”, Special Indian Edition, Tata Mc Graw Hill, New Delhi,2008.
2. Govind P. Agrawal, “ Fiber-Optic Communication Systems”, Third Edition, John Wiley & Sons, 2004.
3. Rajiv Ramasamy & Kumar N. Sivarajan, “Optical Networks – A Practical Perspective”,2 Ed, Morgan Kauffman 2002.

EC8702 WIRELESS COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To study the characteristic of wireless channel
- To understand the design of a cellular system
- To study the various digital signaling techniques and multipath mitigation techniques
- To understand the concepts of multiple antenna techniques

UNIT I WIRELESS CHANNELS 9

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

UNIT II CELLULAR ARCHITECTURE 9

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS 9

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV MULTIPATH MITIGATION TECHNIQUES 9

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing andLMS Algorithms. Diversity – Micro and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver,

UNIT V MULTIPLE ANTENNA TECHNIQUES 9

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Illustrate advanced concepts in 2.5G, 3G mobile networks, Adhoc and Sensor networks.
- Identify the importance of internetworking between LAN and 3GWANS.

TEXTBOOKS:

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

REFERENCES:

1. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
2. Upena Dalal, “Wireless Communication”, Oxford University Press, 2009.
3. Van Nee, R. and Ramji Prasad, “OFDM for wireless multimedia communications”, Artech House, 2000.
4. Simon Haykins & Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.
5. Vijay. K. Garg, “Wireless Communication and Networking”, Morgan Kaufmann Publishers, 2007.

EC8711 HIGH FREQUENCY COMMUNICATION LABORATORY L T P C
0 0 3 2

OBJECTIVES:

- To enable the student to verify the basic principles and design aspects involved in high frequency bandpass communication system components design and the performance parameters for the components and the overall system.
- To enable the stuident to gain insight into the practical aspects of radiation phenomena and thoroughly understand the radiation characteristics of different types of antennas.
- To enable the student to appreciate the practical aspects of bandpass system design and understand the associated link power and risetime budgeting challenges and enable them to design and conduct experiments, as well as to analyze and interpret data to produce meaningful conclusions and match with theoretical concepts.

1. Characterisation of Glass and Plastic Optical Fibers – Measurement of Numerical Aperture and Attenuation, Coefficient OTDR Principle
2. DC Characteristics of LEDs and PIN Photodiodes – Determination of external power Efficiency and dark current of detecter Responsivity
3. P-I of LED Characteristics of Laser Diode Sources – Threshold Current Determination and Study of Temperature Effects

4. Gain Characteristics of APDs – Determination of Threshold Voltage and Average gain estimation
5. Analog Transmission Characteristics of a Fiber Optic Link – Determination of Operating Range of LED and System Bandwidth for Glass and Plastic fiber links and determination of device capacity of photo detection
6. Determination of Capacity of a Digital Fiber Optic Link – Maximum Bit Rate estimation for Glass and Plastic fiber links
7. Spectral Characterisation of Optical Sources – Determination of Peak Emission Wavelength and Spectral Width
8. Study of WDM Link Components – WDM Mux / Demux, Isolator, Circulator, Fiber Bragg Grating, EDFA.
9. Gain and Radiation Pattern Measurement of an Antenna - Horn Antenna, Dipole Antenna, Array Antenna,
10. Log-Periodic Antenna, Loop Antenna
11. Determination of Mode Characteristics of a Reflex Klystron Oscillator
12. VSWR and Inpedance Measurement and Impedance Matching
13. Dielectric Constant Measurement
14. Characterisation of Directional Couplers and Multiport junctions
15. Gunn Diode Characteristics
16. Microwave IC – Filter Characteristics

OUTCOMES:

1. The student would be able to design and conduct experiments to demonstrate the trade-offs involved in the design of high frequency bandpass communication links and the associated components.
2. The student would be able to comprehensively record and report the measured data, and would be capable of analyzing and interpreting the experimental measurement data and produce meaningful conclusions.

TOTAL: 45 PERIODS

LAB REQUIREMENTS:

MM/SM Glass and plastic fiber patch chords with ST/SC/E2000 connectors

LEDs and LDs with ST / SC / E2000 receptacles – 650 / 850 nm

PiN PDs and APDs with ST / SC / E2000 receptacles – 650 / 850 nm

Stabilized current sources,

Signal generators, Pulse generators,

Oscilloscopes Optical power meters and

Spectrum Analyzers WDM modules

MICROWAVE COMPONENTS ?

Microwave source X-band Reflex klystron oscillator / Gunn oscillatior 5 nos Klystron / gunn power supply
5 nos Isolator
5 nos Variable attenuator
5 nos Freq meter direct reading type
5 nos Detector with mount
5 nos VSWR meter
2 nos Waveguide slotted-section with probe and carriage
2 nos Directional coupler 3 dB and 10 dB
1 each Waveguide TEE E-plane, H-plane and hybrid
1 each PIN modulator
1no Horn antenna
2 nos Turn table for receiver antenna
1 no Waveguide 90 deg twist
1 no Plane short
1 no CRO (100 MHz)
5 nos Waveguide stands
15 nos Matched Terminations
5 nos Variable short circuit
2 nos Nuts and bolts
100 nos

EC8712 INNOVATIVE SYSTEM DESIGN LABORATORY L T P C
0 0 3 2

OBJECTIVE:

The objective of this laboratory is

- To encourage the students to identify socially relevant problems.
- To make them think of creative solutions for the same.
- To develop low cost proof of concept system prototype.

METHODOLOGY:

- Students could form teams not exceeding 4 members,
- Students should submit / present their ideas to the Lab-in-Charge and get it approved,
- Student should submit proposal with system/ technical details and cost implications,
- Students should periodically demonstrate the progress they have made,
- Students should be evaluated on the basis of the social relevance and utility of the system developed, level of proof of concept, industry support if obtained, etc.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the student will able to

- Demonstrate an ability to think and work independently towards conceptualizing a process or product.

EC8001 ADVANCED DIGITAL SIGNAL PROCESSING L T P C
3 0 0 3

OBJECTIVES:

- To bring out the concepts related to stationary and non-stationary random signals
- To emphasize the importance of true estimation of power spectral density
- To introduce the design of linear and adaptive systems for filtering and linear prediction
- To introduce the concept of wavelet transforms in the context of image processing

UNIT – I DISCRETE-TIME RANDOM SIGNALS 9

Discrete random process – Ensemble averages, Stationary and ergodic processes, Autocorrelation and Autocovariance properties and matrices, White noise, Power Spectral Density, Spectral Factorization, Innovations Representation and Process, Filtering random processes, ARMA, AR and MA processes.

UNIT – II SPECTRUM ESTIMATION 9

Bias and Consistency, Periodogram, Modified periodogram, Blackman-Tukey method, Welchmethod, Parametric methods of spectral estimation, Levinson-Durbin recursion.

UNIT - III LINEAR ESTIMATION AND PREDICTION 9

Forward and Backward linear prediction, Filtering - FIR Wiener filter- Filtering and linear prediction, non-causal and causal IIR Wiener filters, Discrete Kalman filter.

UNIT - IV ADAPTIVE FILTERS 9

Principles of adaptive filter – FIR adaptive filter – Newton's Steepest descent algorithm – LMSalgorithm – Adaptive noise cancellation, Adaptive equalizer, Adaptive echo cancellers.

UNIT – V WAVELET TRANSFORM 9

Short Time Fourier Transform, Continuous and discrete wavelet transform, Multiresolution analysis, Application of wavelet transform, Cepstrum and Homomorphic filtering.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Demonstrate an ability to think and work independently towards conceptualizing a process or product.

TEXTBOOKS:

1. Monson H, Hayes, Statistical Digital Signal Processing and Modeling, John Wiley and Sons Inc., New York, Indian Reprint, 2007.
2. John G.Proakis, Dimitris G. Manolakis, Digital Signal Processing, Pearson, Fourth 2007.
3. Dwight F. Mix, Random Signal Processing, Prentice Hall, 1995.

REFERENCE:

1. Sophocles J. Orfanidis, Optimum Signal Processing, An Introduction, McGraw Hill,1990.

EC8002 ADVANCED MICROCONTROLLERS L T P C
3 0 0 3

OBJECTIVES:

- To study the properties and evolution of RISC and CISC processors.
- To study the architecture addressing modes and instruction set of R8C microcontroller.
- To impart knowledge on embedded software development.
- To introduce the concept of microcontroller based system development.

UNIT I RISC PROCESSORS 9

RISC Vs CISC, RISC properties and evolution, Advanced RISC microcontrollers, PIC 8-bit microcontrollers.

UNIT II R8C 16-BIT MICROCONTROLLER 9

The R8CArchitecture, CPU Registers, Instruction Set, On-Chip Peripherals, R8C Tiny Development Tools, ADC, PWM, UART, Timer Interrupts, System design using R8C Microcontroller.

UNIT III MSP430 16 - BIT MICROCONTROLLER 9

The MSP430 Architecture, CPU Registers, Instruction Set, On-Chip Peripherals, MSP430Development Tools, ADC, PWM, UART, Timer Interrupts, System design using MSP430Microcontroller.

UNIT IV EMBEDDED SOFTWARE DEVELOPMENT 9

Cross development tools, Debugging techniques, Real-time Operating System, Memory Management, Scheduling techniques.

UNIT V SYSTEM DEVELOPMENT 9

Microcontroller based System Design, Peripheral Interfacing, Inter-Integrated Circuit Protocol for RTC, EEPROM, ADC/DAC, CAN BUS interfacing, Application in Automobiles, Robotics and consumer Electronics.

TOTAL : 45 PERIODS

OUTCOMES:

- The student will be familiar in the architecture and instruction set of the following microcontrollers Renesas R8C and Texas MSP430 microcontrollers.
- The student will derive the ability to design and implement any microcontroller based system after undergoing this course.

TEXT BOOK:

1. Julio Sanchez Maria P.Canton, "Microcontroller Programming: The microchip PIC", CRC Press, Taylor & Francis Group,2007.

REFERENCES

1. D. E. Simon, "An Embedded Software Primer", Addison-Wesley, 1999.
2. Wayne Wolf, "Computers as Components: Principles of Embedded Computing System Design", Morgan Kaufman Publishers, 2006.
3. John H.Davis , "MSP 430 Micro controller basics" Eelsevier, 2008.

EC8003 ADVANCED WIRELESS COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To teach the importance of improving capacity of wireless channel using MIMO
- To teach the characteristic of wireless channel
- To teach techniques for channel improvements using space-time block and Trellis codes
- To teach advanced MIMO system like layered space time codes, MU-MIMO System and MIMO-OFDM systems

UNIT I INTRODUCTION 9

The crowded spectrum, need for high data rate, MIMO systems – Array Gain, Diversity Gain, Data Pipes, Spatial MUX, MIMO System Model. MIMO System Capacity – channel known the TX, Ch unknown to the TX – capacity of deterministic channels, Random channels and frequency selective channels.

UNIT II RADIO WAVE PROPAGATION 9

Radio wave propagation – Macroscopic fading - free space and out door, small scale fading – Fading measurements – Direct pulse measurements, spread spectrum correlation channel sounding frequency domain channel sounding, Antenna Diversity – Diversity combining methods.

UNIT III STBC **9**

Delay Diversity scheme, Alamoti space time code – Maximum likelihood decoding maximum ratio combining. Transmit diversity space time block codes for real signal constellation and complex signal constellation- decoding of STBC.

UNIT IV STTC **9**

Space time coded systems, space time code word design criteria, design of space time T C on slow fading channels, design of STTC on Fast Fading channels, performance analysis in slow and fast fading channels, effect of imperfect channel estimation and Antenna correlation on performance, comparison of STBC & STTC.

UNIT V LAYERED SPACE TIME CODES **9**

LST transmitter – Horizontal and Vertical LST receiver – ML Rx, Zero forcing Rx; MMSE Rx, SIC Rx, ZF V-blast Rx -MMSE V-blast Rx, Iterative Rx- capacity of MIMO – OFDM systems – capacity of MIMO multi user systems.

TOTAL : 45 PERIODS

OUTCOMES:

- The ability to implement the concepts and the mathematical principles with respect to MIMO systems
- The basics of advanced MIMO communication and MIMO OFDM systems help them to understand the operation of present days wireless network systems.

TEXT BOOKS:

1. Mohinder Jankiraman, Space-time codes and MIMO systems, Artech House, Boston, London . www.artech house.com, ISBN 1-58053-865-7-2004
2. Paulraj Rohit Nabar, Dhananjay Gore, Introduction of space time wireless communication systems, Cambridge University Press, 2003.

REFERENCES:

1. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
2. Sergio Verdu “ Multi User Detection” Cambridge University Press, 1998
3. Andre Viterbi “ Principles of Spread Spectrum Techniques” Addison Wesley 1995
4. Volker Kuhn, “ Wireless communication over MIMO channels” John Wiley and Sons Ltd.2006.

EC8004 **AVIONICS** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce the hardware required for aircraft
- To introduce communication and navigation techniques used in aircrafts
- To introduce autopilot and cockpit display related concepts

UNIT I INTRODUCTION **9**

Introduction to aircraft – Axes system – Parts, importance and role of Avionics – systems which interface directly with pilot – Aircraft state sensor systems – Navigation systems – External world sensor systems – task automation systems. Avionics architecture evolution. Avionics Data buses - MIL STD 1553, ARINC 429, ARINC 629.

UNIT II RADIO NAVIGATION **9**

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

UNIT III INERTIAL AND SATELLITE NAVIGATION SYSTEMS **9**

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

UNIT IV AIR DATA SYSTEMS AND AUTOPILOT **9**

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

UNIT V AIRCRAFT DISPLAYS **9**

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

TOTAL : 45 PERIODS

OUTCOMES:

- The student would be able to comprehend the hardware challenges involved in the design of aircrafts and the principles involved in the design of air data systems , autopilots and navigation systems.
- The student would be capable of understanding the differences between the different practical navigation systems and the evolution of the aircraft display systems.

TEXT BOOK:

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

REFERENCES:

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

EC8005 CAD FOR VLSI L T P C
3 0 0 3

OBJECTIVES:

- To understand the suite of tools available for support and design of VLSI circuits
- To introduce rules and planning methodologies for synthesizing VLSI circuits
- To introduce different modeling schemes for aynthesizing VLSI circuits

UNIT I VLSI DESIGN METHODOLOGIES 9

Introduction to VLSI Design methodologies - Review of Data structures and algorithms – Review of VLSI Design automation tools - Algorithmic Graph Theory and Computational Complexity - Tractable and Intractable problems - general purpose methods for combinatorial optimization.

UNIT II DESIGN RULES 9

Layout Compaction - Design rules - problem formulation - algorithms for constraint graph compaction - placement and partitioning - Circuit representation - Placement algorithms – partitioning.

UNIT III FLOOR PLANNING 9

Floor planning concepts - shape functions and floorplan sizing - Types of local routing problems- Area routing - channel routing - global routing - algorithms for global routing.

UNIT IV SIMULATION 9

Simulation - Gate-level modeling and simulation - Switch-level modeling and simulation - Combinational Logic Synthesis - Binary Decision Diagrams - Two Level Logic Synthesis.

UNIT V MODELLING AND SYNTHESIS 9

High level Synthesis - Hardware models - Internal representation - Allocation assignment and scheduling - Simple scheduling algorithm - Assignment problem - High level transformations.

TOTAL : 45 PERIODS

Outcomes:

Upon completion of the course the student will be able to:

- Understand VLSI design Methodologies and design rules
- Understand Floor planning concepts
- Know about gate level and switch level modeling and simulation

TEXT BOOK:

1. S.H. Gerez, “Algorithms for VLSI Design Automation”, John Wiley & Sons, 2002.

REFERENCE:

1. N.A. Sherwani, “Algorithms for VLSI Physical Design Automation”, Kluwar Academic Publishers, 2002.

EC8006 CMOS ANALOG IC DESIGN I L T P C

3 0 0 3

OBJECTIVES:

- To study the DC biasing conditions of various MOS amplifier configurations
- To understand the small signal model of various MOS circuits
- To study OPAMP circuits and its stability conditions
- To study in general negative feedback concept in MOS circuits

UNIT I BASIC BUILDING BLOCKS 9

NMOS and PMOS device operation in saturation and sub-threshold regions, device transconductane, output impedance and equivalent circuit. Introduction to Device models for simulation. CG, CG, and source follower circuits.

UNIT II MULTIPLE TRANSISTOR STAGES 9

Cascode circuits. folded cascode circuits, , Differential amplifier circuits, quantitative analysisof differential pair, CMRR, Differential pair with MOS loads, Gilbert Cell, Current Mirrors.

UNIT III FREQUENCY RESPONSE, NOISE. 9

Frequency response of CS and CG stages. Miller effect and association of poles with nodes. Characteristics of noise – thermal and flicker noise. Noise in CS, CG, Cascode and source follower stages.

UNIT IV OPERATIONAL AMPLIFIERS 9

Two stage op-amps, gain boosting, common mode feedback, input range limitation, slew rate, power supply rejection, noise in op-amps.

UNIT V FEEDBACK AND STABILITY 9

Properties of feedback circuits, topologies, effect of loading and noise in feedback circuits. Stability in multipole systems, phase margin, frequency compensation in two stage op-amps, other compensation techniques.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- To built the different configuration of MOS amplifier
- Able to design small signal model MOS circuits
- Analyze stability conditions and other compensation techniques in OPAMPS circuits

TEXT BOOK:

1. B.Razavi, **"**Design of CMOS Analog Integrated Circuits", Tata McGraw Hill 2002.

REFERENCE:

1. Willy Sansen , **"** Analog Design Essentials:" Springer 2006

EC8007 CMOS ANALOG IC DESIGN II L T P C

3 0 0 3

OBJECTIVES:

- To design MOS circuits applied for various data conversion stages namely, sample and hold, ADC and DAC
- To study designs with better precision in data conversion
- To study various ADC and DAC circuit architectures

UNIT I SAMPLE AND HOLD: 9

Properties of MOS Switches, multiplexed input architectures, recycling architecture, open and closed loop sampling architectures, switched capacitor and current mode architectures.

UNIT II BUILDING BLOCK OF DATA CONVERSION CIRCUITS: 9

Amplifiers, open loop and closed loop amplifiers, gain boosting, common mode feedback,bipolar, CMOS and BiCMOS comparators.

UNIT III PRECISION TECHNIQUES: 9

Comparator cancellation, input and output offset storage principles, comparators using offset cancelled latches, opamp offset cancellation, ADC and DAC calibration techniques.

UNIT IV ADC/DAC ARCHITECTURES: 9

DAC Performance metrics, reference multiplication and division, switching and logical functions of DACs, Current steering architectures, DAC Performance metrics, Flash ADC architecture, Gray encoding, thermometer encoding and metastability.

UNIT V OVER SAMPLING CONVERTERS. 9

Delta sigma modulators, alternative modulator architectures, quantization and noise shaping, decimation filtering, implementation of Delta sigma modulators, delta sigma DACs,

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Build Data Conversion circuits.
- Discus calibration techniques
- Analyze ADC/DAC Architecture and Performance

TEXT BOOKS:

1. B.Razavi “Data Conversion System Design” IEEE Press and John Wiley, 1995.
2. Phillip Allen and Douglas Holmberg “CMOS Analog Circuit Design” Second Edition, Oxford University Press, 2004.

EC8008 COGNITIVE RADIO COMMUNICATION L T P C

3 0 0 3

OBJECTIVE:

• To introduce the concept of software defined radios and their architectures
• To introduce the concept of cognitive radio communication and the components involved
• To introduce the cognitive radio architecture and the functions and issues involved in communication system design.

UNITI INTRODUCTION TO SOFTWARE DEFINED RADIO 9

Definitions and potential benefits, software radio architecture evolution – foundations,technology tradeoffs and architecture implications.

UNIT II SDR ARCHITECTURE 9

Essential functions of the software radio, architecture goals, quantifying degrees of programmability, top level component topology, computational properties of functional components, interface topologies among plug and play modules, architecture partitions.

UNITIII INTRODUCTION TO COGNITIVE RADIOS 9

Marking radio self-aware, the cognition cycle, organization of cognition tasks, structuring knowledge for cognition tasks, Enabling location and environment awareness in cognitive radios – concepts, architecture, design considerations.

UNIT IV COGNITIVE RADIO ARCHITECTURE 9

Primary Cognitive Radio functions, Behaviors, Components, A–Priori Knowledge taxonomy, observe – phase data structures, Radio procedure knowledge encapsulation, components of orient, plan, decide phases, act phase knowledge representation, design rules.

UNIT V NEXT GENERATION WIRELESS NETWORKS 9

The XG Network architecture, spectrum sensing, spectrum management, spectrum mobility, spectrum sharing, upper layer issues, cross – layer design.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Describe the basics of the software defined radios.
- Design the wireless networks based on the cognitive radios
- Explain the concepts behind the wireless networks and next generation networks

TEXT BOOKS:

1. Qusay. H. Mahmoud, “Cognitive Networks : Towards Self Aware Network”, John Wiley & Sons Ltd. 2007.
2. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, “Software Defined Radio”, John Wiley, 2003.
3. Huseyin Arslan, “Cognitive Radio, SDR and Adaptive System”, Springer, 2007.
4. Joseph Mitola, “Cognitive Radio Architecture”, John Wiley & Sons, 2006.
5. Alexander M. Wyglinski, Maziarnekovee, Y. Thomas Hu, “Cognitive Radio Communication and Networks”, Elsevier, 2010.

REFERENCES:

1. J. Mitola, “ The Software Radio Architecture”, IEEE Communications Magazine, May 1995.
2. Joseph Mitola III and Gerald Q. Maquire, “Cognitive radio: making software radios more personal”, IEEE Personal Communications, August 1999.
3. J. Mitola, “ Cognitive Radio: An Integrated Agent Architecture for software defined radio”, Doctor of Technology thesis, Royal Inst. Technology, Sweden 2000.
4. Simon Haykin, “Cognitive Radio: Brain –empowered wireless communications”, IEEE Journal on selected areas in communications, Feb 2005.
5. Hasari Celebi, Huseyin Arslan , “ Enabling location and environment awareness in cognitive radios”, Elsevier Computer Communications , Jan 2008.

6. Ian F. Akyildiz, Won – Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, " Next generation / dynamic spectrum access / cognitive radio wireless networks: A Survey" Elsevier Computer Networks, May 2006.

EC8009 DIGITAL CONTROL ENGINEERING L T P C
3 0 0 3

AIM

The aim of this course is to familiarize the student with the concept of digital control engineering under the topics continuous time systems, digital control algorithms and its state variable based signal processing techniques.

OBJECTIVES

- Study the characteristics of continuous time systems and its effects.
- Learn the basics of signal processing techniques in the digital control systems.
- Design and implementation of the various digital control algorithms.
- Outline the state variable techniques for digital control systems.
- Discuss the concepts of controllability, observability and stability of the digital control system.

UNIT I CONTINUOUS TIME SYSTEMS 6

Review of frequency and time response analysis and specifications of control systems, need for controllers, continuous time compensations, continuous time PI, PD, PID controllers.

UNIT II SIGNAL PROCESSING IN DIGITAL CONTROL 12

Sampling, time and frequency domain descriptions, aliasing, hold operations, mathematical model of sample and hold, zero and first order hold, factors limiting the choice of sample rate, reconstruction, Difference equation description, Z-transform method of description, pulse transfer function, time and frequency response of discrete time control systems.

UNIT III DESIGN OF DIGITAL CONTROL ALGORITHMS 9

Review of principle of compensator design, Z-plane specifications, digital compensator design using frequency response plots, discrete integrator, discrete differentiator, development of digital PID controller, transfer function, design in Z-plane.

UNIT IV STATE VARIABLE TECHNIQUES 9

Discrete State Variable concepts, Characteristic equation, Eigenvalues and Eigenvectors, Jordan canonical models, Phase Variable companion forms.

UNIT V CONTROLLABILITY, OBSERVABILITY AND STABILITY 9

Definitions and Theorems of Controllability and Observability, Relationships between Controllability, Observability and Transfer Functions, Jury, Routh, Lyapunov stability analysis, Principles of state and output feedback.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course the student will be able to:

- Outline the characteristics of continuous time systems and determine their impacts on the design of digital control systems. (**Level – I (Knowledge)**)
- Discuss the basics of digital signal processing techniques in the applications of digital control systems. (**Level – II (Comprehension)**)
- Demonstrate the design of various digital control algorithms and its implementation issues in digital control systems. (**Level – III (Application)**)
- Investigate the usage of discrete state variable concepts and its control system specifications. (**Level – IV (Analysis)**)
- Merge the concepts of controllability, observability and stability in a design of modern digital control systems. (**Level – V (Synthesis)**)

TEXT BOOKS:

1. Benjamin C.Kuo, Digital Control Systems, OXFORD University Press, II Edition, 2007
2. M.Gopal, Digital Control and State Variable Methods, Tata McGraw Hill, II Edition, 2007.

REFERENCES

1. K.Ogata, Discrete-Time Control Systems, PHI, II Edition,2007.
2. Gene. F.Franklin, J.D.Powell, M.Workman, Digital Control of Dynamic Systems, Addison-Wesley, III Edition, 2000.

EC8010 DIGITAL SWITCHING AND TRANSMISSION L T P C

3 0 0 3

OBJECTIVES:

- To introduce different types of signaling in digital telephony
- To introduce various transmission schemes for telephony and broadband
- To introduce modeling and analysis techniques for data transmission

UNIT I INTRODUCTION 9

Overview of existing Voice, Data and Multimedia Networks and Services; Review of Basic Communication principles; Synchronous and Asynchronous transmission, Line Codes

UNIT II TRUNK TRANSMISSION 9

Multiplexing & Framing- types and standards; Trunk signaling; Optical Transmission-line codes and Muxing: SONET/SDH; ATM; Microwave and Satellite Systems.

UNIT III LOCAL LOOP TRANSMISSION 9

The Analog Local Loop; ISDN local loop; DSL and ADSL; Wireless Local Loop; Fiber in the loop; Mobile and Satellite Phone local loop.

UNIT IV SWITCHING 9

Evolution; Space switching, Time switching and Combination Switching; Blocking and Delay characteristics; Message ,Packet and ATM switching; Advances in switching techniques – shared memory fast packet switches, shared medium fast packet switches and space division fast packet switches, Photonic switching- Optical TDM, WDM.

UNIT V TELETRAFFIC ENGINEERING 9

Telecom Network Modeling; Arrival Process; Network Blocking performance; Delay Networks--Queuing system analysis and delay performance.

TOTAL : 45 PERIODS

OUTCOMES:

- The student would be able to appreciate the importance of quality of service requirements for different applications and the expectation from the provider networks
- The student would be able to differentiate between the design aspects of trunk networks, the local loop systems and switching systems
- The student would able to understand the concepts behind the traffic modeling and network dimensioning problems

TEXTBOOKS:

1.J. Bellamy, “Digital Telephony”, John Wiley, 2003, 3rd Edition.
2. JE Flood, “Telecommunications Switching, Traffic and Networks”, Pearson, 2005.

REFERENCES:

1. R.A.Thompson, “Telephone switching Systems”, Artech House Publishers, 2000.
2. W. Stalling, “ Data and Computer Communications”, Prentice Hall, 1993.
3. T.N.Saadawi, M.H.Ammar, A.E.Hakeem, “Fundamentals of Telecommunication Networks”, Wiley Interscience, 1994.
4. W.D. Reeve, “Subscriber Loop Signalling and Transmission Hand book”,IEEE Press(Telecomm Handbook Series), 1995.
5. Tarmo Anttalaien, “ Introduction to Telecommunication Network Engineering”, 2nd edition, Artech House, 2003.
6. T. Viswanathan, “Telecommunication Switching Systems”, Prentice-Hall, 1992.

EC8011 EMBEDDED AND REAL -TIME SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

- To study the architecture and programming of ARM processor.
- To introduce the basic concepts of hard real time multiprocessing.
- To introduce the analysis concepts for effective programming .
- To study about the basics of the buses used for embedded system networking.

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS 9

Complex systems and microprocessors – Embedded system design process – Formalism for system design– Design example: Model train controller- ARM Processor Fundamentals- Instruction Set and Programming using ARM Processor.

UNIT II COMPUTING PLATFORM 9

CPU: Programming input and output – Supervisor mode, exception and traps – Coprocessor – Memory system mechanism – CPU performance – CPU power consumption- CPU buses – Memory devices – I/O devices – Component interfacing- System Level Performance Analysis- Parallelism. Design Example : Data Compressor.

UNIT III PROGRAM DESIGN AND ANALYSIS 9

Program design – Model of programs – Assembly and Linking – Basic compilation techniques – Program Optimization- Analysis and optimization of execution time, power, energy, program size – Program validation and testing- Example : Software Modem.

UNIT IV PROCESS AND OPERATING SYSTEMS 9

Multiple tasks and Multi processes – Processes – Context Switching – Operating Systems –Priority based Scheduling- RMS and EDF - Inter Process Communication mechanisms – Evaluating operating system performance – Power optimization strategies for processes.

UNIT V HARDWARE ACCELERATORS & NETWORKS 9

Multiprocessors- CPUs and Accelerators – Performance Analysis- Distributed Embedded Architecture – Networks for Embedded Systems: - I^2C, CAN Bus, SHARC link supports, Ethernet, Myrinet – Network based design – Internet enabled systems. Design Example: Digital Still Camera – Video Accelerator.

TOTAL : 45 PERIODS

OUTCOMES:

- After undergoing this course the student will derive the ability to design and implement embedded system for a given problem.
- The student will be familiar in the programming concept and right selection of interfacing bus /peripheral / interfacing ICs.
- The concept of RTOS will help the student in right selection of OS for a given embedded system.

TEXT BOOKS:

1. Wayne Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Morgan Kaufmann Publisher (An imprint from Elsevier), Second Edition ,2008.
2. Andrew N Sloss, Dominic Symes, Chris Wright, “ARM System Developer’s Guide- Designing and Optimizing System Software”, Elsevier/Morgan Kaufmann Publisher, 2008.

REFERENCES:

1. David E-Simon, “An Embedded Software Primer”, Pearson Education, 2007.
2. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dreamtech press, 2005.
3. Jane.W.S. Liu, “Real-Time systems”, Pearson Education Asia.
4. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc- Graw Hill, 2004.
5. Tammy Noergaard, “Embedded Systems Architecture”, Elsevier,2006.

EC8012 INFORMATION THEORY L T P C
3 0 0 3

OBJECTIVES:

- To teach different types of entropy
- To teach entropy in the context of data compresson
- To teach channel capacities over different channels

UNIT I QUANTITATIVE STUDY OF INFORMATION 8

Basic inequalities, Entropy, Kullback-Leibler distance, Mutual information, Bounds on entropy, Fisher information , Cramer Rao inequality, Second law of thermodynamics , Sufficient statistic, Entropy rates of a Stochastic process .

UNIT II CAPACITY OF NOISELESS CHANNEL 8

Fundamental theorem for a noiseless channel, Data compression, Kraft inequality, Shannon- Fano codes, Huffman codes, Asymptotic equipartition, Rate distortion theory.

UNIT III CHANNEL CAPACITY 9

Properties of channel capacity, Jointly typical sequences, Channel Coding Theorem, converse to channel coding theorem, Joint source channel coding theorem

UNIT IV DIFFERENTIAL ENTROPY AND GAUSSIAN CHANNEL 9

AEP for continuous random variables, relationship between continuous and discrete entropy, properties of differential entropy, Gaussian channel definitions, converse to coding theorem for Gaussian channel, channels with colored noise, Gaussian channels with feedback

UNIT V NETWORK INFORMATION THEORY 11

Gaussian multiple user channels, Multiple access channel, Encoding of correlated sources, Broadcast channel, Relay channel, Source coding and rate distortion with side information, General multi-terminal networks.

OUTCOMES:

The course teaches types of entropy, data compression and channel capacities over different channels The student will be capable of understanding and designing various sources ,for various types of channel , and means to achieve full channel capacity.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Thomas Cover, Joy Thomas ,"Elements of Information theory ", Wiley, 2005.

REFERENCE:

1. David Mackay , "Information theory, interference & learning algorithms", Cambridge University Press, I edition, 2002.

EC8013 INTERNET AND JAVA L T P C

3 0 0 3

OBJECTIVES:

- To introduce various concepts of internetworking with TCP/IP
- To introduce the principles of world wide web
- To introduce Java programming and Java script programming
- To teach students to develop simple web pages with data bases

UNIT I INTERNET WORKING WITH TCP/IP 9

Review of network technologies, Internet addressing, Address resolution protocols (ARP/ RARP), Routing IP data grams Reliable stream transport service (TCP) TCP/IP over ATM networks, Internet applications-E-mail, Telnet, FTP, NFS, Internet traffic management.

UNIT II WORLD WIDE WEB **9**

HTTP protocol, Web browsers Netscape, Internet explorer, Web site and web page design, HTML,XHTML, XML, CSS, Dynamic HTML, CGI.

UNIT III JAVASCRIPT PROGRAMMING **9**

Introduction, Control statements, Functions, Arrays and Objects - Programming

UNIT IV JAVA PROGRAMMING **9**

Language features, Classes, Object and methods. Sub-classing and dynamic binding, Multithreading, Overview of class library, Object method serialization, Remote method invocation, Java Servelets and Javaserver pages.

UNIT V WEB DESIGN AND DATABASES **9**

Macromedia Dream Weaver, Web Servers, Databases – SQL, MYSQL, DBI and ADO.NET, Web design

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Implement Java programs.
- Create a basic website using HTML and Cascading Style Sheets.
- Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
- Design rich client presentation using AJAX.
- Design and implement simple web page in PHP, and to present data in XML format.
- Design and implement server side programs using Servlets and JSP.

TEXT BOOKS:

1. Deitel, Internet and World Wide Web, Pearson Education / PHI, 2007
2. Deitel, “Java How to Program”, Pearson Education / PHI, 2006.
3. Herbert Schildt, The complete Reference JAVA 2, Fifth Edition, Tata McGRaw Hill Publishing Com.Ltd, New Delhi.
4. A S Godbole A Kahate, “Web Technoligies, TCP/IP to Internet Application Archtiectures”, TMH 2007

REFERENCES:

1. Margaret Levine Young, “Internet The Complete Reference”, Tata McGraw Hill, 1999
2. Balagurusamy.E.`Programming with Java, A premier` Second Edition, Tata McGraw Hill,2006
3. Douglas E.Comer,”Internetworking with TCP/IP”, Vol 1: 3rd edition, Prentice Hall of India, 1999..
4. Cay S. Horstmann & Gary Cornell, Core Java™ Volume – I & II, Pearson Education,

2006

EC8014 MEASUREMENTS AND INSTRUMENTATION L T P C

3 0 0 3

OBJECTIVES:

- To introduce principles of various measurement techniques using analog and digital equipments
- To teach Importance of signal generators and analyzers in measurements
- To emphasize the need for data acquisition systems and optical domain measurement techniques

UNIT I SCIENCE OF MEASUREMENT 9

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

UNIT II TRANSDUCERS 9

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

UNIT III SIGNAL CONDITIONING AND SIGNAL ANALYZERS 9

DC and AC bridges – Wheatstone, Kelvin, Maxwell, Hay and Schering.Pre- amplifier – Isolation amplifier – Filters – Data acquisition systems. Spectrum Analyzers – Wave analyzers – Logic analyzers.

UNIT IV DIGITAL INSTRUMENTS 9

Digital Voltmeters – Millimeters – automation in Voltmeter – Accuracy and Resolution in DVM - Guarding techniques – Frequency counter- Data Loggers – Introduction to IEEE 488/GPIB Buses.

UNIT V DATA DISPLAY AND RECORDING SYSTEMS 9

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

TOTAL : 45 PERIODS

OUTCOMES:

Students should have gained knowledge about the transducers and measurement systems and ability to develop and design measurement systems

TEXT BOOKS:

1. Albert D.Helfrick and William D. Cooper, “Modern Electronic Instrumentation and Measurement Techniques”, Prentice Hall of India, 2007.
2. Ernest o Doebelin and dhanesh N manik, “Measurement systems” ,5th edition ,McGraw- Hill, 2007.

REFERENCES:

1. John P. Bentley, “Principles of Measurement Systems”, Fourth edition, pearsonEducation Limited, 2005.
2. A. K. Sawhney, “Course In Electrical And Electronic Measurement And Instrumentation”, Dhanpat Rai Publisher, 2000.
3. Bouwens,A.J, “Digital Instrumentation”, Tata Mc-Graw Hill, 1986.
4. David A.Bell, “Electronic Instrumentation and Measurements”, Second edition, Prentice Hall of India, 2007.

EC8015 MEDICAL ELECTRONICS L T P C
3 0 0 3

OBJECTIVES:

- To gain knowledge about the various physiological parameters both electrical and non electrical and the methods of recording and also the method of transmitting these parameters.
- To study about the various assist devices used in the hospitals.
- To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING 9

The origin of Bio-potentials; biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9

pH, PO_2, PCO_2, colorimeter, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III ASSIST DEVICES 9

Cardiac pacemakers, DC Defibrillator, Dialyser, Heart lung machine

UNIT IV PHYSICAL MEDICINE AND BIOTELEMETRY 9

Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radiopill, electrical safety

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermograph, endoscopy unit, Laser in medicine, cryogenic application, Introduction to telemedicine

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

- Discuss the application of electronics in diagnostic and therapeutic area.
- Measure biochemical and various physiological information.
- Describe the working of units which will help to restore normal functioning.

TEXTBOOKS:

1. Leslie Cromwell, "Biomedical instrumentation and measurement", Prentice Hall of India, New Delhi, 2007.
2. John G.Webster," Medical Instrumentation Application and Design", 3rd Edition, Wiley India Edition, 2007

REFERENCES:

1. Khandpur, R.S., "Handbook of Biomedical Instrumentation", TATA McGraw-Hill, New Delhi, 2003.
2. Joseph J.Carr and John M.Brown, "Introduction to Biomedical equipment Technology", John Wiley and Sons, New York, 2004.

EC8016 MICROWAVE ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

- To inculcate understanding of the basics required for circuit representation of RF networks
- To deal with the issues in the design of microwave amplifier
- To instill knowledge on the properties of various microwave components
- To deal with the microwave generation and microwave measurement techniques

UNIT I TWO PORT RF NETWORKS-CIRCUIT REPRESENTATION 9

Low frequency parameters-impedance , admittance, hybrid and ABCD. High frequency parameters-Formulation of S parameters, properties of S parameters-Reciprocal and lossless networks, transmission matrix, Introduction to component basics, wire, resistor, capacitor and inductor,

UNIT II MICROWAVE TRANSISTOR AMPLIFIER DESIGN AND MATCHING NETWORKS 9

Amplifier power relation, stability considerations, gain considerations, noise figure, impedance matching networks, frequency response, T and Π matching networks, microstripline matching networks

UNIT III PASSIVE AND ACTIVE MICROWAVE DEVICES AND CIRCUITS 9

Open, short and matched terminations; coupling probes and loops; power divider; directional coupler; attenuators; phase shifter; circulator; isolator; Impedance matching Devices– Tuning screw, stub and quarter-wave transformers. Crystal diodes and Schottkey diode detector and mixers; PIN diode switch, Gunn diode oscillator; IMPATT diode oscillator and amplifier; varactor diode; Introduction to MIC.

UNIT IV MICROWAVE GENERATION 9

High frequency effects in Tubes, Two cavity klystron amplifier; Reflex klystron oscillator; TWT amplifier, Backwards wave oscillator; Magnetron oscillator – Theory and applications.

UNIT V MICROWAVE MEASUREMENTS 9

Measuring Instruments – VSWR meter, Power meter, Spectrum Analyser, Network Analyser – principles; Measurement of Impedance, frequency, power, VSWR, Q factor, dielectric constant, S-Parameter.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

- Explain the active & passive microwave devices & components used in Microwave communication systems.
- Analyze the multi- port RF networks and RF transistor amplifiers.
- Generate Microwave signals and design microwave amplifiers.
- Measure and analyze Microwave signal and parameters.

TEXTBOOKS:

1. Robert E.Colin, “Foundations for Microwave Engineering”, 2 edition, McGraw Hill, 2001.
2. Reinhold.Ludwig and Pavel Bretshko ‘RF Circuit Design”, Pearson Education, Inc., 2006.
3. Guillermo Gonzalez,”Microwave transistor amplifier design “Second edition.Prentice hall,1997.
4. Annapurna Das and Sisir K Das, “Microwave Engineering”, Tata Mc Graw Hill Inc., 2004.

REFERENCES:

1. Thomas H.Lee, “Planar Microwave Engineering”, Cambridge University Press,2004
2. M.M.Radmanesh,“RF and Microwave Electronics”, Pearson Education, Inc., first edition 2005
3. S.Y.Liao, “Microwave Devices and Circuits”, Pearson Education Limited, third edition2006.
4. D.M.Pozar, “Microwave Engineering.”, John Wiley & sons, Inc., 2006

EC8017 PARALLEL AND DISTRIBUTED PROCESSING L T P C
3 0 0 3

OBJECTIVES:

- To study the principles of parallel processing
- To understand the concept of shared memory architecture in multiprocessing
- To study the parallel programming models.

UNIT I PARALLEL ARCHITECTURE 9

Parallel Computer Models, Program and Network properties, Principles of scalable performance

UNIT II PROCESSORS AND MEMORY HIERARCHY, BUS 9

Advanced processor Technology, Super scalar and vector processor, Memory hierarchy technology, Virtual Memory Technology, Backplane Bus systems.

UNIT III PIPELINING AND SUPER SCALAR TECHNIQUES 9

Linear Pipeline, Nonlinear pipeline, Instruction pipeline, Arithmetic pipeline, Superscalar and super pipeline design, Parallel and scalable architectures- Multiprocessor and Multicomputers.

UNIT IV SOFTWARE FOR PARALLEL PROGRAMMING 9

Parallel programming models, languages, compliers- Parallel Program Development and Environments.

UNIT V DISTRIBUTED SYSTEMS 9

Models, Hardware concepts, communication, synchronization mechanism, case study: MPI and PVM, Distributed file systems.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

- Know about processors and memory hierarchy technology
- Understand various types of pipelining methods
- Understand models, languages and compilers for parallel programming
- Understand the concepts of distributed systems.

TEXT BOOKS:

1. Hwang. K, “Advanced computer Architecture”, Parallelism, scalability, Programmability, Tata McGraw Hill, 1993.
2. Tanenbaum A.S, “Distributed Operating Systems”, Peaeson Education Asia, 2002.
3. Dezso Sima,Terence Fountain, Peter Kacsuk, “Advanced Computer Architectures”, Pearson Education, 2007.

REFERENCES:

1. V.Rajaraman and C.Siva Ram Murthy, “Parallel Computers Architecture and Programming”, PHI, 2000.
2. Quinn, M.J., “Designing Efficient Algorithms for Parallel Computers”, McGraw - Hill, 2003.
3. Culler, D.E., “Parallel Computer Architecture”, A Hardware – Software approach, Harcourt Asia Pte. Ltd., 1999.

EC8018 RF MICROELECTRONICS L T P C
3 0 0 3

OBJECTIVES:

- To introduce radio transceiver architectures
- To understand the design issues in CMOS LNAs , Mixers, Oscillators, PLLs, Synthesizers and Power Amplifiers.

UNIT I TRANSCEIVER ARCHITECTURES 9

Heterodyne and Homodyne architectures, Discrete and CMOS realization passive components for RF, Impedance Matching, Distortion, IIP3 and Blocking Effects, Noise Figure, Noise matching conditions. Friis Formula for cascaded blocks. .

UNIT II CMOS LNAS AND MIXERS 9

Noise Figure of and impedance matching issues CS, CG and differential LNAs, Passive mixers and conversion loss, Active mixers, Gilbert cells, linearity and Noise Figure of mixers.

UNIT III OSCILLATORS 9

Negative transconductance, nonlinearity and Differential LC tuned oscillators, Ring oscillators and Colpitts oscillator, Quadrature oscillators–Phase noise.

UNIT IV PLLS AND SYNTHESIZERS 9

Phase Detectors, charge pumps and their transfer functions, Synthesizers based on first, second and third order PLLs and stability issues, Introduction to integer and fractional N synthesizers.

UNIT V POWER AMPLIFIERS 9

Class A, B, C, D, E, F and AB power amplifiers, Linearization and impedance matching issues of power amplifiers.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

- Understand radio transceiver achitectures
- Design and Analyze CMOS LNAs , Mixers, Oscillators, PLLs,
- Synthesizers and Power Amplifiers.

TEXT BOOK

1. Thomas Lee, "The Design of Radio Frequency Integrated Circuits", Cambridge University Press, Second Edition, 2004

REFERENCE:

1. B. Razavi, "RF Microelectronics", Pearson Education, 1997.

EC8019 SATELLITE COMMUNICATION L T P C

3 0 0 3

OBJECTIVES:

- To introduce orbital mechanics and related parameters
- To introduce the different satellite subsytems
- To introduce different aspects of communication link design, multiple access methods
- To expose some of the important applications of satellites

UNIT I SATELLITE ORBITS AND TRAJECTORIES 8

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

UNIT II SATELLITE SUBSYSTEM 10

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

UNIT III LINK DESIGN, MODULATION AND ERROR CONTROL 10

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

UNIT IV MULTIPLE ACCESS FOR SATELLITE COMMUNICATIONS 9

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

UNIT V SOME APPLICATIONS 8

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 PERIODS

OUTCOMES:

- The student would be able to demonstrate an understanding of the basic principles of satellite orbits , placement and control, satellite link design and the communication system components.
- The student would be able to demonstrate an understanding of the different communication, sensing and navigational applications of satellite and their implementation.

TEXT BOOKS:

1. T.Pratt, C. Bostian and J.Allnutt; “Satellite Communications”, John Wiley and Sons, Second Edition., 2003.
2. D.Rody, “Satellite Communications”, Regents/Prentice Hall; Englewoods (NJ), 1989**.**
3. M. Richharia, “Satellite communication systems”, McGraw-Hill Professional , 1999.

REFERENCES:

1. W.L.Pritchard,H G Suyderhoud and R A Nelson, “Satellite Communication System Engineering”, Second edition, Prentice Hall, 1993.
2. Tri. T. Ha, “Digital Satellite Communications”, McGraw Hill, Second Edition, 1990.
3. B.N.Agarwal, “Design of Geosynchronous Space craft”, Prentice Hall, 1986.

EC8020 SPEECH PROCESSING L T P C

3 0 0 3

OBJECTIVES:

- To introduce speech production and related parameters of speech
- To show the computation and use of techniques such as short time Fourier transform, linear predictive coefficients and other coefficients in the analysis of speech
- To understand different speech modeling procedures such as Markov and their implementation issues• To introduce speech recognition and synthesis techniques

UNIT I BASIC CONCEPTS 10

Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – Acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.

UNIT II SPEECH ANALYSIS 10

Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log–Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths.

UNIT III SPEECH MODELING 8

Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, Implementation issues.

UNIT IV SPEECH RECOGNITION 8

Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – n-grams, context dependent sub-word units; Applications and present status.

UNIT V SPEECH SYNTHESIS 9

Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

- Model speech production system and describe the fundamentals of speech.
- Extract and compare different speech parameters.
- Choose an appropriate statistical speech model for a given application.
- Design a speech recognition system.
- Use different speech synthesis techniques.

TEXTBOOKS:

1. Lawrence Rabinerand Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson Education, 2003.
2. Daniel Jurafsky and James H Martin, “Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition”, Pearson Education, 2002.
3. Frederick Jelinek, “Statistical Methods of Speech Recognition”, MIT Press, 1997.

REFERENCES:

1. Steven W. Smith, “The Scientist and Engineer’s Guide to Digital Signal Processing”, California Technical Publishing, 1997.
2. Thomas F Quatieri, “Discrete-Time Speech Signal Processing – Principles and Practice”, Pearson Education, 2004.
3. Claudio Becchetti and Lucio Prina Ricotti, “Speech Recognition”, John Wiley and Sons, 1999.
4. Ben Gold and Nelson Morgan, “Speech and audio signal processing, Processing and Perception of Speech and Music”, Wiley- India Edition, 2006 Edition.

EC8021 VLSI SIGNAL PROCESSING L T P C
3 0 0 3

OBJECTIVES:

- To design DSP architectures that are suitable for VLSI implementation for a given algorithm
- To learn high-level algorithms that reduce the number of multipliers, area of implementation and power consumption.
- To address issues related to high performance VLSI architectures such as pipelining styles.

UNIT I PIPELINING AND PARALLEL PROCESSING 9

Introduction to DSP Systems, Typical DSP algorithms, Data flow graph representations, Loop bound and Iteration bound, Longest Path Matrix algorithm; Pipelining and parallel processing of FIR digital filters, Pipelining and Parallel processing for low power.

UNIT II RETIMING AND ALGORITHMIC STRENGTH REDUCTION 9

Retiming - definitions and properties; Unfolding – an algorithm for Unfolding, properties of unfolding, sample period reduction and parallel processing application; Algorithmic strength reduction in filters and transforms – 2-parallel FIR filter, 2-parallel fast FIR filter, DCT algorithm architecture transformation, Odd-Even Merge-Sort architecture, Parallel Rank-Order filters.

UNIT III FAST CONVOLUTION AND COMBINED PIPELINING AND PARALLEL PROCESSING OF IIR FILTERS 9

Fast convolution – Cook-Toom algorithm, Modified Cook-Took algorithm; Pipelined and parallel recursive adaptive filters, Look- Ahead pipelining in first- order IIR filters, Look- Ahead pipelining with power-of-two decomposition, Clustered Look-Ahead pipelining, parallel processing of IIR filters, combined pipelining and parallel processing of IIR filters, pipelined adaptive digital filters, relaxed look-ahead, pipelined LMS adaptive filter.

UNIT IV BIT-LEVEL ARITHMETIC ARCHITECTURES 9

Bit-Level Arithmetic Architectures- parallel multipliers with sign extension, parallel carry-ripple array multipliers, parallel carry-save multiplier, 4x 4 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, Distributed Arithmetic

UNITV NUMERICAL STRENGTH REDUCTION AND WAVE PIPELINING 9

Numerical Strength Reduction – subexpression elimination, Multiple Constant Multiplications, Synchronous pipelining and Clocking styles, Clock skew in edge-triggered single-phase clocking, Wave pipelining.

TOTAL : 45 PERIODS

OUTCOMES

- Ability to recognize issues of power, area and speed requirements in the development of dedicated and general purpose DSP architectures
- Ability to design and implement algorithms that reduce the number of multipliers, area of implementation and power consumption in DSP structures

TEXT BOOK

1. Keshab K.Parhi, " VLSI Digital Signal Processing systems, Design and implementation ", Wiley, Inter Science, 1999.

REFERENCES:

1. Mohammed Ismail 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.

EC8022 WIRELESS NETWORKS L T P C

3 0 0 3

OBJECTIVES:

- To teach advanced Mobile technology of 2.5G and 4G techniques
- To introduce 4G technologies such as Adhoc and Sonsor networks
- To teach the importance of internetworking between LAN and 3GWWANS

UNIT I 2G & 2.5G EVOLUTION 9

Evolution of cellular communication, GSM – Architecture, Frame format, channels, call progress. CDMA –IS95 Forward and reverse channel, GPRS and EDGE

UNIT II 3G SYSTEMS 9

Migration path to UMTS, UMTS Basics, Air Interface, 3GPP Network Architecture, CDMA2000 overview- Radio and Network components, Network structure, Radio network, TD-CDMA, TD-SCDMA.

UNIT III WIRELESS LOCAL AREA NETWORKS 9

Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer- MAC sublayer- MAC Management Sublayer- Overview of WIMAX systems.

UNIT IV ADHOC & SENSOR NETWORKS 9

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

UNIT V 4G & INTERWORKING 9

4G features and challenges, Technology path, Overview of LTE, Interworking Objectives and requirements, Schemes to connect WLANs and 3G Networks, Session Mobility, Interworking Architectures for WLAN and GPRS, System Descripltion, LMDS and MMDS

TOTAL : 45 PERIODS

OUTCOME:

Ability to understand and implement the concepts and the mathematical principles of almost always used essential fundamental of advanced Mobile technology of 2.5G and 4G such as Adhoc and Sensor networks

TEXT BOOKS

1. Clint Smith. P.E., and Daniel Collins, “3G Wireless Networks”, 2nd Edition, Tata McGraw Hill, 2007.
2. Vijay. K. Garg, “Wireless Communication and Networking”, Morgan Kaufmann Publishers, 2007.
3. Rappaport,T.S., “Wireless communications”, Pearson Education, Second Edition, 2010.
4. Schiller, “ Mobile Communications” , Pearson Education, 2nd edition, 2005

REFERENCES:

1. William Stallings, “Wireless Communications and networks” Pearson / Prentice Hall of India, 2nd Ed., 2007.
2. Dharma Prakash Agrawal & Qing-An Zeng, “Introduction to Wireless and Mobile Systems”, Thomson India Edition, 2nd Ed., 2007.
3. Gary. S. Rogers & John Edwards, “An Introduction to Wireless Technology”, Pearson Education, 2007.
4. Sumit Kasera and Nishit Narang, “ 3G Networks – Architecture, Protocols and Procedures”, Tata McGraw Hill, 2007

5. Jeffrey. G. Andrews ," Fundamentals of WIMAX – Understanding Broadband Wireless Networking", Prentice Hall Publication, 2007.
6. C.Sivaramoorthy and C.S.Manoj, "Adhoc Wireless Networks Architecture& Protocols", Pearson Education, 2008.

EC8071 CRYPTOGRAPHY AND NETWORK SECURITY L T P C
3 0 0 3

OBJECTIVES:

- To teach the importance of security for networks
- To teach the basics of number theory and galois field concepts
- To teach symmetric and asymmetric key in crypto systems
- To teach authentication and key management techniques
- To teach security specific to network layer.

UNIT I NUMBER THEORETIC AND ALGEBRAIC ALGORITHMS 9

Introduction – Integer Arithmetic Modular Arithmetic – matrices – Linear congruence - Substitution ciphers – Transposition ciphers – Stream cipher - Block ciphers – Algebraic structures – GF(2^n) fields.

UNIT II MODERN SYMMETRIC KEY CIPHERS 9

Modern block ciphers – Modern stream ciphers – DES – AES – uses of modern block ciphers and stream cipher.

UNIT III ASYMMETRIC KEY ENCIPHERMENT 9

Mathematics of cryptography – Primality Testing – Factorization – Chinese Remainder Theorem – Quadratic – Exponentiation & Logarithm – RSA, Rabin – Elliptic curve

UNIT IV INTEGRITY AUTHENTICATION AND KEY MANAGEMENT 9

Message integrity – random oracle model – message authentication – SHA-512 – WHIRL POOL - Digital signature schemes Entity anthentication– password – challenge response – zero knowledge – Biometrics – Kerberos – symmetric key management – public key distribution – stegnography

UNIT V NETWORK SECURITY 9

Security at the Application Layer: E-mail – PGP – S/MIME – Security at the transport layer: SSL and TLS – Security at the network layer: IPsec, Two Security Protocol – Security Association – Internet Key Exchange – ISAKMP.

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students should be able to:

- Compare various Cryptographic Techniques
- Design Secure applications
- Inject secure coding in the developed applications

TEXT BOOKS

1. Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata McGraw Hill, 2007.
2. W.Stallings0, “Cryptography & Network Security: Principles and Practice”, Prentice Hall, Third Edition, 2003.

REFERENCES

1. Douglas R.Stlinson, “Cryptography Theory and Practice”, CRC Press series on Discrete Mathematics and its application 1995.
2. Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security Private Communication in a Public World”, Pearson Education, Second Edition, 2003.

EC8072 ELECTRO MAGNETIC INTERFERENCE AND COMPATIBILITY L T P C

3 0 0 3

OBJECTIVES:

- To tutor the basics of EMI,EMC
- To instill knowledge on the EMI coupling mechanism and its mitigation techniques
- To impart comprehensive insight about the current EMC standards and about various measurement techniques

UNIT I BASIC CONCEPTS 7

Definition of EMI and EMC; Intra and Inter system EMI; Sources and victims of EMI, Conducted and Radiated EMI emission and susceptibility; Transient & ESD; Case Histories; Radiation Hazards to humans.

UNIT II COUPLING MECHANISM 9

Common made coupling; Differential mode coupling; Common impedance coupling; Ground loop coupling; Field to cable coupling; Cable to cable coupling; Power mains and Power supply coupling.

UNIT III EMI MITIGATION TECHNIQUES 10

Shielding – principle, choice of materials for H, E and free space fields, and thickness; EMI gaskets; Bonding; Grounding – circuits, system and cable grounding; Filtering; Transient EMI control devices and applications; PCB Zoning, Component selection, mounting, trace routing.

UNIT IV STANDARDS AND REGULATION 7

Units of EMI; National and International EMI Standardizing Organizations – IEC, ANSI, FCC, CISPR, BIS, CENELEC; FCC standards; EN Emission and Susceptibility standards and specifications; MIL461E Standards.

UNIT V TEST METHODS AND INSTRUMENTATION 12

EMI test sites - Open area site; TEM cell; Shielded chamber; Shielded Anechoic chamber; EMI test receivers; Spectrum Analyzer; Transient EMI Test wave Simulators; EMI coupling Networks - Line impedance Stabilization Networks; Feed through capacitors; Antennas and factors; Current probes and calibration factor; MIL-STD test methods; Civilian STD Test methods.

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to

- To design a EMI free system
- To reduce system level crosstalk
- To design high speed Printed Circuit board with minimum interference
- To make our world free from unwanted electromagnetic environment

TEXT BOOKS:

1. V.P. Kodali, “Engineering EMC Principles, Measurements and Technologies”, IEEE Press, Newyork, 2010 (2nd Edition)
2. Henry W.Ott., “Noise Reduction Techniques in Electronic Systems”, A Wiley Inter Science Publications, John Wiley and Sons, Newyork, 2009
3. C.R. Paul, “Introduction to Electromagnetic Compatibility”, John wiley & sons Inc. 2006

REFERENCES:

1. Don R.J.White Consultant Incorporate, “Handbook of EMI/EMC”, Vol I-V, 1988
2. Bemhard Keiser, “Principles of Electromagnetic Compatibility”, 3rd Ed, Artech house, Norwood, 1987

EC8073 FOUNDATIONS FOR NANO-ELECTRONICS L T P C

3 0 0 3

OBJECTIVES:

The objectives of the course is to introduce quantum mechanics concepts, approximations and statistical mechanics for understanding nano systems

UNIT I INTRODUCTION TO QUANTUM MECHANICS 9

Particles, waves, probability amplitudes, schrodinger equation, wavepackets solutions, operators, expectation values, eigenfuntions, piecewise constant potentials.

UNIT II SIMPLE HARMONIC OSCILLATORS AND APPROXIMATIONS 9

SHM Operators, SHM wavepacket solutions, Quantum LC circuit, WKB approximations, variational methods.

UNIT III SYSTEMS WITH TWO AND MANY DEGREES OF FREEDOM 9

Two level systems with static and dynamic coupling, problems in more than one dimensions, electromagnetic field quantization, density of states.

UNIT IV STATISTICAL MECHANICS 9

Basic concepts, microscopic, quantum systems in equilibrium, statistical models applied to metals and semiconductors

UNIT V APPLICATIONS 9

Hydrogen and Helium atoms, electronic states, Atomic force microscope, Nuclear Magnetic Resonance, carbon nanotube properties and applications

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to

- Understand concepts of quantum mechanics
- Know about simple harmonic oscillator
- Understand basic concepts of statistical mechanics in metals and semiconductors

TEXT BOOKS:

1. Hagelstein, Peter L., Stephen D. Senturia, and Terry P. Orlando, “Introduction to Applied Quantum and Statistical Physics.”, New York, NY: Wiley, 2004.
2. Rainer Waser, “Nanoelectronics and Information Technology”, Wiley 2005
3. Michael A. Nielsen and Isaac L. Chuang, “Quantum Computation and Quantum Information”, Cambridge University Press, 2000.

REFERENCES:

1. Neil Gershenfeld “The Physics of Information Technology”, Cambridge University Press, 2000.
2. Adrian Ionesu and Kaustav Banerjee eds. “ Emerging Nanoelectronics: Life with and after CMOS” , Vol I, II, and III, Kluwer Academic, 2005.

EC8074 MULTIMEDIA COMPRESSION AND COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To introduce probability related study of the characteristics of text, voice, image and video data
- To introduce various compression schemes for text, voice, image and video
- To analyse the compression schemes
- To introduce communication protocols for voice over internet and multimedia networking

UNIT I MULTIMEDIA COMPONENTS 9

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

UNIT II AUDIO AND VIDEO COMPRESSION 9

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

UNIT III TEXT AND IMAGE COMPRESSION 9

Compression principles-source encoders and destination encoders-lossless and lossy compression-entropy encoding –source encoding -text compression –static Huffman coding dynamic Huffman coding –arithmetic coding –Lempel Ziv-Welsh Compression-image compression

UNIT IV VOIP TECHNOLOGY 9

Basics of IP transport, VoIP challenges, H.323/ SIP –Network Architecture, Protocols, Call establishment and release, VoIP and SS7, Quality of Service- CODEC Methods-VOIP applicability

UNIT V MULTIMEDIA NETWORKING 9

Multimedia networking -Applications-streamed stored and audio-making – best Effort service- protocols for real time interactive Applications-distributing multimedia-beyond best effort service- secluding and policing Mechanisms-integrated services-differentiated Services-RSVP.

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to

- Describe various multimedia components
- Describe compression and decompression techniques.
- Apply the compression concepts in multimedia communication.

TEXT BOOKS:

1. Fred Halshall, “Multimedia communication - Applications, Networks, Protocols and Standards”, Pearson education, 2007.
2. Tay Vaughan, “Multideai: Making It Work”, 7/e, TMH, 2007.
3. Kurose and W.Ross, “Computer Networking “A Top Down Approach, Pearson education, 3rd ed, 2005.

REFERENCES:

1. Marcus Goncalves “Voice over IP Networks”, McGraw Hill,
2. KR. Rao,Z S Bojkovic, D A Milovanovic, “Multimedia Communication Systems: Techniques, Standards, and Networks”, Pearson Education 2007
3. R. Steimnetz, K. Nahrstedt, “Multimedia Computing, Communications and Applications”, Pearson Education, First ed, 1995.
4. Ranjan Parekh, “Principles of Multimedia”, TMH, 2006

EC8075 ROBOTICS L T P C
3 0 0 3

OBJECTIVES:

- To introduce the electronics and software aspects in robots
- To bring out the different languages for programming robot
- To specify robot requirements in the industry
- To introduce latest state of the art robots

UNIT I SCOPE OF ROBOTS 4

The scope of industrial Robots - Definition of an industrial robot - Need for industrial robots –Economic and Social Issues- applications.

UNIT II ROBOT COMPONENTS 9

Fundamentals of Robot Technology - Automation and Robotics - Robot anatomy - Work volume - Precision of movement - End effectors - Sensors.

UNIT III ROBOT PROGRAMMING 9

Robot Programming - Methods - interlocks textual languages. Characteristics of Robot level languages, characteristic of task level languages.

UNIT IV ROBOT WORK CELL 9

Robot Cell Design and Control - Remote Center compliance - Safety in Robotics.

UNIT V FUTURE TRENDS 14

Advanced robotics, Advanced robotics in Space - Specific features of space robotics systems - long-term technical developments, Advanced robotics in under - water operations. Robotics Technology of the Future - Future Applications.

TOTAL : 45 PERIODS

OUTCOME:

- After undergoing this course the student will gain the ability to design, test and implement robotics for the industry.
- The concept of robotic programming will help him in the selection of right robot level language for the given system..
- The student will be familiar with the future trends in robotics and give a robotic solution for a given task.

TEXTBOOK:

1. Barry Leatham - Jones, “Elements of industrial Robotics” PITMAN Publishing , 1987.

REFERENCES:

1. Mikell P.Groover, Mitchell Weiss, Roger N.Nagel Nicholas G.Odrey, “Industrial Robotics Technology, Programming and Applications “, McGraw Hill Book Company 1986.
2. Fu K.S. Gonzaleaz R.C. and Lee C.S.G., “Robotics Control Sensing, Vision and Intelligence “ McGraw Hill International Editions, 1987.
3. Bernard Hodges and Paul Hallam, “ Industrial Robotics”, British Library Cataloging in Publication 1990.
4. Deb, S.R. Robotics Technology and flexible automation, Tata Mc GrawHill, 1994.

EC8076 SOFT COMPUTING AND APPLICATIONS L T P C
3 0 0 3

OBJECTIVES:

- This course gives an idea and principles of various soft computing techniques, which are applicable to core areas such as networks , pattern recognition, image processing
- To introduce fuzzy set theory
- To teach different optimization techniques
- To introduce neural networks and neuro-fuzzy modeling

- To teach various applications of computational intelligence

UNIT I FUZZY SET THEORY 10

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.

UNIT II OPTIMIZATION 8

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

UNIT III NEURAL NETWORKS 10

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV NEURO FUZZY MODELING 9

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

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE 8

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel EfficiencyPrediction – Soft Computing for Color Recipe Prediction**.**

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Apply various soft computing frame works.
- Design of various neural networks.
- Use fuzzy logic.
- Discuss hybrid soft computing.

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:

1. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
2. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional, Boston, 1996.
5. Dr.S.N.Sivanandam and S.N.Deepa, “Principles of Soft Computing”, Wiley India, 2007.
6. Amit Konar, “Artificial Intelligence and Soft Computing Behaviour and Cognitive model of the human brain”, CRC Press, 2008.

GE8751 ENGINEERING ETHICS AND HUMAN VALUES L T P C
3 0 0 3

OBJECTIVES:

- The course explains various moral issues through predominant theories. It educates the code of ethics as well as the industry standards and how they can be used for ensuring safety and reducing the risk. The course enunciated the Rights and Responsibilities of individuals. Various other ethical global issues also have been explained along with case studies.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality.

UNIT II ENGINEERING ETHICS 9

Senses of ‘Engineering Ethics’ – Variety of moral issues – Types of inquiry – Moral dilemmas– Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy– Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk– The Three Mile Island and Chernobyl Case Studies Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample Code of Conduct

TOTAL: 45 PERIODS

OUTCOMES

- Ability to understand and implement the concepts and the mathematical principles of almost always used essential fundamental preprocessing algorithms in image processing such as enhancement, denoising, deblurring, segmentation.
- Ability to compress the images to the desired level as required in storage and internet transmission of images

TEXTBOOK

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.

REFERENCES:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Wadsworth, A Division of Thomson Learning Inc., United States, 2000
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, “Fundametals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001

WEB SOURCES:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org

4. www.ethics.org

MG8654 TOTAL QUALITY MANAGEMENT L T P C

3 0 0 3

AIM

To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES:

- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Basic concepts of TQM – TQM Framework - Contributions of Quality Gurus – Barriers to TQM – Cost of Quality.

UNIT II TQM PRINCIPLES 9

Quality statements - Customer focus –Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I 9

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

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures - BPR.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Quality Council – Leadership, Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward.

TOTAL : 45 PERIODS

OUTCOME:

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK:

1. Dale H.Besterfiled, et al., “Total Quality Management”, Pearson Education Asia, Third Edition, Indian Reprint , 2006.

REFERENCE BOOKS:

1. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, (6th Edition), South-Western (Thomson Learning), 2005.
2. Oakland, J.S. “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, Third Edition , 2003.
3. Suganthi,L and Anand Samuel, “Total Quality Management”, Prentice Hall (India) Pvt. Ltd., 2006 .
4. Janakiraman,B and Gopal, R.K, “Total Quality Management – Text and Cases”,Prentice Hall (India) Pvt. Ltd., 2006.

BM8751 PRINCIPLES OF DIGITAL IMAGE PROCESSING L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn digital image fundamentals.
- Be exposed to simple image processing techniques.
- Be familiar with image compression and segmentation techniques.
- Learn to represent image in terms of features

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Elements of digital image processing systems, Vidicon and Digital Camera working principles, - Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two- dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

UNIT II IMAGE ENHANCEMENT 9

Point processing, Histograms, Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION 9

Image Restoration - degradation model, Unconstrained and Constrained restoration, Inverse filtering, Wiener filtering, Geometric transformations-spatial transformations.

UNIT IV IMAGE SEGMENTATION **9**

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation– Region growing – Region splitting and Merging – Segmentation by morphological watersheds – Hybrid methods

UNIT V IMAGE COMPRESSION **9**

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Discuss digital image fundamentals.
- Apply image enhancement and restoration techniques.
- Use image compression and segmentation Techniques.
- Represent features of images.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson, Education, Inc., Second Edition, 2004.
2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.

REFERENCES:

1. Kenneth R. Castleman, "Digital Image Processing", Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, "Digital Image Processing using MATLAB", Pearson Education, Inc., 2004.
3. D,E. Dudgeon and RM. Mersereau, "Multidimensional Digital Signal Processing", Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, "Digital Image Processing" , John Wiley, New York, 2002
5. Milan Sonka et al, "Image Processing, Analysis and Machine vision", Brookes/Cole, Vikas Publishing House, 2nd edition, 1999
6. Alan C. Bovik, "Handbook of image and video processing" Elsevier Academic press, 2005
7. S.Sridhar, " Digital Image processing" Oxford University press, Edition 2011

CS8451 **OPERATING SYSTEMS** **L T P C**
3 0 0 3

OBJECTIVES:

- To learn the components and operations of operating systems
- To get an idea about process synchronization
- To learn concepts behind inter-process communication
- To learn disk scheduling and process scheduling
- To understand deadlock handling and memory management

UNIT I OPERATING SYSTEMS OVERVIEW **9**

Introduction to operating systems – Computer system organization, architecture – Operating system structure, operations – Process, memory, storage management – Protection and security – Distributed systems – Computing Environments – Open-source operating systems – OS services – User operating-system interface – System calls – Types – System programs – OS structure – OS generation – System Boot – Process concept, scheduling – Operations on processes – Cooperating processes – Inter-process communication – Examples – Multithreading models – Thread Libraries – Threading issues – OS examples

UNIT II PROCESS MANAGEMENT **9**

Basic concepts – Scheduling criteria – Scheduling algorithms – Thread scheduling – Multiple-processor scheduling – Operating system examples – Algorithm Evaluation – The critical-section problem – Peterson's solution – Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – Synchronization examples – Deadlocks – System model – Deadlock characterization – Methods for handling deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock detection – Recovery from deadlock

UNIT III STORAGE MANAGEMENT **9**

Memory Management – Swapping – Contiguous memory allocation – Paging – Segmentation – Example: The Intel Pentium - Virtual Memory: Background – Demand paging – Copy on write – Page replacement – Allocation of frames – Thrashing**.**

UNIT IV I/O SYSTEMS **9**

File concept – Access methods – Directory structure – File-system mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management – Protection

UNIT V CASE STUDY **9**

The Linux System – History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Network Structure – Security – Windows 7 – History – Design Principles – System Components – Terminal Services and Fast User – File system – Networking.

TOTAL: 45 PERIODS

OUTCOMES:

- To write programs using multi-threading
- To solve problems related to process scheduling and disk scheduling
- To use synchronization concepts in real-time programs
- To apply banker's algorithm for solving problems in deadlocks
- To solve problems related to paging and segmentation
- To implement OS concepts in Linux

TEXT BOOKS:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts Essentials", John Wiley & Sons Inc., 2010.

REFERENCES:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education", 1996.
3. D M Dhamdhere, "Operating Systems: A Concept-based Approach", Second Edition, Tata McGraw-Hill Education, 2007.
4. William Stallings, "Operating Systems: Internals and Design Principles", Seventh Edition, Prentice Hall, 2011.

IT8451 WEB TECHNOLOGY L T P C
3 0 0 3

AIM:

To provide an introduction to Java and basic Web concepts and enable the student to create simple Web based applications.

OBJECTIVES:

- To introduce the features of object oriented programming languages using Java
- To design and create user interfaces using Java frames and applets
- To have a basic idea about network programming using Java
- To create simple Web pages and provide client side validation
- To understand the MVC concept using Strut, Hibernate and Spring

UNIT I JAVA FUNDAMENTALS 9

Java Data types – Class – Object – I / O Streams – File Handling concepts – Threads – Applets – Swing Framework – Reflection

UNIT II JAVA NETWORKING FUNDAMENTALS 9

Overview of Java Networking - TCP - UDP - InetAddress and Ports - Socket Programming- Working with URLs - Internet Protocols simulation - HTTP - SMTP - POP - FTP - Remote Method Invocation - Multithreading Concepts

UNIT III CLIENT SIDE TECHNOLOGIES 9

XML - Document Type Definition - XML Schema - Document Object Model - Presenting XML - Using XML Parsers: DOM and SAX – JavaScript Fundamentals - Evolution of AJAX - AJAX Framework - Web applications with AJAX - AJAX with PHP - AJAX with Databases

UNIT IV SERVER SIDE TECHNOLOGIES 9

Servlet Overview - Life cycle of a Servlet - Handling HTTP request and response - Using Cookies - Session tracking - Java Server Pages - Anatomy of JSP - Implicit JSP Objects – JDBC - Java Beans - Advantages - Enterprise Java Beans - EJB Architecture - Types of Beans - EJB Transactions

UNIT V APPLICATION DEVELOPMENT ENVIRONMENT 9

Overview of MVC architecture - Java Server Faces: Features - Components - Tags - **Struts:** Working principle of Struts - Building model components - View components - Controller components - Forms with Struts - Presentation tags - Developing Web applications - **Hibernate:** Configuration Settings - Mapping persistent classes - Working with persistent objects - Concurrency - Transactions - Caching - Queries for retrieval of objects - **Spring:** Framework - Controllers - Developing simple applications

TOTAL: 45 PERIODS

OUTCOMES:

Able to program in Java and create simple Web based applications.

TEXT BOOK:

1. Deitel, Deitel, Goldberg, “Internet & World Wide Web How To Program”, Third Edition, Pearson Education, 2006.

REFERENCE BOOKS:

1. Marty Hall and Larry Brown, “Core Servlets And Javaserver Pages”, Second Edition
2. Bryan Basham, Kathy Siegra, Bert Bates, “Head First Servlets and JSP”, Second Edition
3. Uttam K Roy, “Web Technologies”, Oxford University Press, 2011.

CS8075 FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT **L T P C 3 0 0 3**

OBJECTIVE:

This program can be offered with all Undergraduate programs/courses for all engineering streams. The FSIPD program aims to improve student‘s awareness and understanding of the basic concepts involved in Integrated product Development (IPD) by providing exposure to the key product development concepts. Students, who complete this program, will stand a better chance to be considered for jobs in the Engineering industry.

COURSE OBJECTIVES:

After completing this program, the student will be able to obtain the technical skills needed to effectively play the entry level design engineer role in an engineering organization.

The student will be able to:

- Understand the global trends and development methodologies of various types ofproducts and services
- Conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- Understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- Understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- Gain knowledge of the Innovation & Product Development process in the Business Context

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends - Introduction to Product Development Methodologies and Management - Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies - Product Life Cycle - Product Development Planning and Management

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - Traceability Matrix and Analysis - Requirement Management - System Design & Modeling - Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – Challenges in Integration of Engineering Disciplines - Concept Screening & Evaluation - Detailed Design - Component Design and Verification – Mechanical, Electronics and Software Subsystems - High Level Design/Low Level Design of S/W Program - Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – Prototyping - Introduction to Rapid Prototyping and Rapid Manufacturing - System Integration, Testing, Certification and Documentation

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product validation processes and stages - Product Testing standards and Certification - Product Documentation - Sustenance - Maintenance and Repair – Enhancements - Product EoL - Obsolescence Management - Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product development in Industry versus Academia - The IPD Essentials - Introduction to vertical specific product development processes - Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and S/W systems – Product development Trade-offs - Intellectual Property Rights and Confidentiality - Security and configuration management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer
- Work independently as well as in teams
- Manage a project from start to finish

COURSE MATERIAL AND PEDAGOGY:

- NASSCOM has agreed to prepare / revise the course materials [selected teachers Anna University from major disciplines will be included in the process] as PPT slides for all the UNITS. The PPTs can be printed and given to each student if necessary at a Nominal Fee. This is the best possible material for this special course.

- NASSCOM will train the teachers of Anna University to enable them to teach this course. Atraining programme for nearly 3500 teachers needs to be organized. The team
  is exploring use of technology including the EDUSAT facility at Anna University.
- The course is to be offered as an elective to all UG Students both in the Constituent Colleges and Affiliated colleges of Anna University.

TEXT BOOKS [INDIAN ECONOMY EDITIONS]:

1. Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", TataMcGraw Hill, Fifth Edition, New Delhi, 2011
2. John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill,Eleventh Edition, New Delhi, 2005.

REFERENCES:

1. Hiriyappa B, “Corporate Strategy – Managing the Business”, Authorhouse, USA, 2013
2. Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier],Oxford, UK, 2004.
3. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Conceptsand Practice”, Prentice Hall India, New Delhi, 2003
4. Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design",McGraw Hill Education, Seventh Edition, New Delhi, 2013.

GE8072 DISASTER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don’ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of-community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to:

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management

TEXTBOOK:

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy,2009.

GE8073 HUMAN RIGHTS L T P C
3 0 0 3

OBJECTIVES :

- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons andDisabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO’s, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME:

- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

1. Kapoor S.K., “Human Rights under International law and Indian Laws”, Central Law Agency, Allahabad, 2014.
2. Chandra U., “Human Rights”, Allahabad Law Agency, Allahabad, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.