NOOURL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY, KUMARACOIL

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER I

(Common for All B.E/B.Tech. Programmes Except Marine Engineering)

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	EG1101	Technical English – I	3	1	0	4
2.	MA1101	Engineering Mathematics – I	3	1	0	4
3.	PH1101	Engineering Physics – I	3	0	0	3
4.	CH1101	Engineering Chemistry - I	3	0	0	3
5.	ME1101	Engineering Graphics	3	0	0	3
6.	CS1101	Fundamentals of Computing and Programming	3	0	0	3
PRACTICAL						
7.	CS1171	Computer Practice Lab - I	0	1	2	2
8.	ME1171	Computer Aided Drafting and Modeling Lab	0	1	2	2
9.	PH1171	Physics Lab – I	0	0	2	1
10.	CH1171	Chemistry Lab - I	0	0	2	1
TOTAL			18	4	8	26

*** Those who have admitted from the Academic Year 2013-2014 onwards**

EG1101 TECHNICAL ENGLISH – I 3 1 0 4

UNIT-I 9

Verb-Tenses -12 Tenses-8 Passive Forms- Word formation with prefixes and suffixes

UNIT-II 9

Expansion of Compound Nouns – Punctuation - Definitions of Technical Terms - Changing words from one form to another - Imperatives and Instructions - Conditional clauses.

UNIT-III 9

Interrogatives and Question Tags - Asking Questions - Comprehension – Discourse Markers

UNIT –IV 9

Concord - Identifying Common Errors - Cause and Effect Expressions – Paragraph Writing – Copy Writing: Slogans and Captions - Writing Instructions - Letter Writing (Formal Letters)

UNIT –V 9

Creative Writing – Transcoding: Bar Chart, Flow Chart - Pie Chart - Tree Diagram - Tabular Column

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOK:

Department of Humanities and Social Sciences, Anna University, English for Engineers and Technologists, Combined Edition (Volumes 1 @ 2), Chennai: Orient Black Swan Pvt.Ltd.,2006 Themes 1-4 (Resources, Energy, Computer, Transport)

EXTENSIVE READING:

A.P.J.Abdul Kalam with Arun Tiwari, Wings of Fire: An Autobiography, University Press (India) Pvt.Ltd, 1999, 30 Impression 2007

***NOTE*:**

The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA1101 ENGINEERING MATHEMATICS - I 3 1 0 4

AIM:

To impart the fundamental knowledge of Engineering Mathematics to the students in order to achieve a well founded knowledge about the principles of Mathematics.

OBJECTIVE:

The course objective is to develop the required skill of the students in the area of

Engineering Mathematics with special emphasis on the characteristic equation of matrices, differential calculus, Beta and Gamma functions and to develop basic knowledge to the students in double and triple integration.

UNIT I MATRICES 9

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of eigen values and eigen vectors(without proof)– Cayley Hamilton theorem (statement only), verification and its applications – Orthogonal and Symmetric matrices and their properties(excluding proof)- Orthogonal transformation of a symmetric matrix to diagonal form.

UNIT II DIFFERENTIAL CALCULUS 9

Curvature – Cartesian co-ordinates and parametric form -Centre and radius of curvature, Circle of curvature – Evolutes.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9

Partial derivatives – Total derivatives – Jacobians – Properties – Maxima and minima for functions of two variables–Lagrange Multiplier method- Taylor's expansion.

UNIT IV BETA AND GAMMA INTEGRALS 9

Evaluation of improper integrals- Beta and Gamma functions – Properties – Relation between Beta and Gamma functions - Evaluation of integrals using Beta and Gamma functions.

UNIT V MULTIPLE INTEGRALS 9

Evaluation of double and triple integrals – Area as double integral in cartesian and polar co-ordinates– Change of order of integration- Transformation of Cartesian coordinates into polar coordinates.

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOK:

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

REFERENCES:

1 Veerarajan T, " Engineering Mathematics (for first year)", Tata McGraw- Hill Publishing Company Ltd.,New Delhi , 2007
2 Erwin Kreyszig, " Advanced Engineering Mathematics", 7th Edition, Wiley India, 2007.
3 P.Kandasamy , K.Thilagavathy , K.Gunavathy" Engineering Mathematics" Vol,1 S.Chand & Company Ltd.2002
4. B.V. Ramana,"Higher Engineering Mathematics" Tata McGraw- Hill, Publishing Company Ltd.,New Delhi, 2006

PH1101 ENGINEERING PHYSICS – I 3 0 0 3

AIM:

To provide a sound knowledge on the principles of Physics and its practical applications in various areas of Engineering and Technology.

OBJECTIVE:

At the end of the course students would be exposed to

- The mechanical properties of matter and its engineering applications
- Application of ultrasonics in Industry and Medical field
- The important properties of light and their application
- Application of laser and fiber optics in communication and technology
- The fundamentals of heat- energy conversion and its application.

UNIT I Properties of matter 9

Elasticity – Poisson's ratio – 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

UNIT - II Ultrasonics 9

Introduction-production of ultrasonic waves- magnetostriction effect- magnetostriction generator-piezoelectric effect-piezoelectric generator-detection of ultrasonic waves-properties - velocity measurement - acoustic grating-industrial applications-drilling, welding, soldering and cleaning- SONAR- non destructive testing pulse echo system-medical applications-sonograms.

UNIT –II Optics 9

Interference: air wedge- theory and experiment-testing of flat surfaces- Michelson's Interferometer-types of fringes- applications (determination of wavelength and thickness of thin transparent medium).

Polarization: Introduction- double refraction, quarter and half wave plates- production of plane, circularly and elliptically polarized light-detection of plane, circularly & elliptically polarized light.

Photoelasticity- Stress-optic law- photoelastic bench

UNIT- IV Lasers & Fiber Optics 9

Introduction- principle of spontaneous emission and stimulated emission, Einsteins A and B coefficients-derivation- population inversion, pumping, types of lasers- Nd-YAG, CO_2-applications.

Principle and propagation of light in optical fibre- numerical aperture and acceptance angle- types of optical fibres (material, refractive index, mode)- double crucible technique of fibre drawing, fibre optic communication system (Block diagram)-fibreoptic sensors.

UNIT – V Heat and Thermodynamics **9**

Thermal conductivity- Forbe's and Lee's disc methods-radial flow of heat- thermal conductivity of rubber and glass-thermal insulation in buildings - Laws of thermodynamics- Carnot's cycle as heat engine – efficiency, Otto engine & Diesel engine (qualitative).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. R.K. Gaur and S.L.Gupta, 'Engineering Physics' Dhanpat Rai publications, New Delhi.
2. Marikani A, 'Engineering Physics' PHI learning pvt ltd, III Edition, New Delhi.
3. Palanisamy.P.K., 'Engineering Physics' Scitech publications, Chennai.
4. M.N. Avadhanulu and PG Kshirsagar. ' A Text book of Engineering Physics', S.Chand and company, Ltd., New Delhi.

REFERENCES:

1. Serway and Jewett, 'Physics for Scientists and Engineers with Modern Physics', 6th Edition, Thomson Brooks/Cole, Indian reprint.
2. Brijlal and Subrahmanyam 'Heat and Thermodynamics' S. Chand , Limited.
3. Ajoy Ghatak, ' Optics' Tata McGraw Hill Publications, New Delhi.
4. Brijlal and Subrahmanyam 'Properties of Matter' S. Chand , Limited.

CH1101 ENGINEERING CHEMISTRY-I 3 0 0 3

AIM

To have a thorough knowledge of the basics of chemistry particularly engineering oriented topics to engineering students.

OBJECTIVES

To make the students conversant with the principles of the following topics: (i) Water Technology, (ii) Engineering Materials and Polymers,(iii) Surface Chemistry and Nanomaterials,(iv) Analytical Techniques and (v) Chemical Kinetics

UNIT I WATER TECHNOLOGY 9

Water as a universal solvent – hard and soft water – reasons for hardness – disadvantages of hard water in washing and industrial purposes - estimation of hardness by EDTA method, problems; boiler feed water – characteristics- softening methods - external conditioning – demineralization (ion exchange) process, desalination by reverse osmosis method- internal conditioning (phosphate, calgon and carbonate conditioning methods); stages in domestic water treatment – disinfection by chlorination, ozone and UV treatments.

UNIT-II ENGINEERING MATERIALS AND POLYMERS 9

Abrasives – Natural & synthetic – Moh's scale, diamond, carborundum – Refractories – classification and properties – Cement – Manufacture. Lubricants- Types – properties of lubricants – oiliness, fire & flash points, pour & cloud point (definition only) – solid lubricants – Graphite and MoS_2.

Polymer and polymerization (definition only)- examples for natural & synthetic polymers, Preparation, properties and uses of Kevlar, Nomex, Rubber – natural and synthetic – neoprene, butyl rubber- vulcanization of rubber,Introduction to Conducting polymers and Liquid crystal polymers.

UNIT III SURFACE CHEMISTRY AND NANOMATERIALS 9

Adsorption – classification- adsorption of gases on solids- adsorption isotherms- Freundlich and Langmuir adsorption isotherms- adsorption of solutes from solution- application of adsorption-catalysis and pollution control-Nanomaterials – introduction – carbon nanotubes (CNT) and their applications.

UNIT IV ANALYTICAL TECHNIQUES 9

Importance of spectroscopic techniques- Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (block diagram only) – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy. Thermal Analysis- TGA and DTA- principles- thermogram of calcium oxalate monohydrate.

UNIT-V CHEMICAL KINETICS 9

Introduction – rate, rate constant, order & molecularity of reactions –First order reaction – Derivation of rate constant – Second order reactions – rate constant (no derivation, equation and problem only) - activation energy – concept-Arrhenius equation-derivation- steady state approximation.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C. Jain and Monica Jain, Engineering Chemistry DhanpatRai Pub, Co., New Delhi (2002)
2. S.S. Dara, A text book of engineering chemistry S. Chand & C. Ltd., New Delhi (2006)
3. B. Sivasankar Engineering Chemistry Tate McGraw- Hill Pub. Co. Ltd, New Delhi (2008)

REFERENCES:

1. B. K. Sharma Engineering Chemistry Krishna Prakasan Media (P) Ltd., Meerut (2001)
2. R. Gopalan, D. Venkappayya, Sulochana Nagarajan, Engineering Chemistry Vikas Pub, Co., New Delhi (2006)
3. Principles of physical chemistry by Samuel Glasstone,Van Nostrand pub.comp, Newyork.
4. Principles of physical chemistry by Puri & Sharma,Vikas pub.comp,2008

ME1101 ENGINEERING GRAPHICS 3 0 0 3

OBJECTIVE

- To know the fundamental principles of geometrical drawing
- To visualize the various machine components

Unit I - Introduction 9

Introduction to Engineering Drawing, Drawing Standard, ISI code of practice, Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

Unit II - Orthographic Projection (Points, Lines & Planes) 9

Principles of orthographic projection-projection of points, straight lines, traces and projection of planes inclined to both planes Orthographic projection of simple engineering components-missing view exercises.

Unit III - Orthographic Projection (Solids) 9

Projection of solids – Inclined to one plane - Sections and Sectional Views of Right Angular Solids covering - Prism, Cylinder, Pyramid, Cone – Auxiliary Views

Unit IV - Pictorial Projections 9

Principles of pictorial views, isometric view of simple solids. Free hand sketching of orthographic views from pictorial views. Free hand sketching of isometric views from given two or three views.

Unit V - Development Of Surfaces & Perspective Projection 9

Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Perspective Projection of Planes and Solids

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOKS:

1. Venugopal K and Prabhu Raja V, “Engineering Graphics”, New Age International Publishers, 2007.
2. . Luzadder W J, “Fundamentals of Engineering Drawing”, Prentice Hall Book Co., New York, 1998
3. Bhat, N.D.& M. Panchal , *Engineering Drawing*, Charotar Publishing House,2008

REFERENCES:

1. Kumar M S, “Engineering Graphics”, Ninth Edition, DD Publications, Chennai, 2007.
2. Bureau of Indian Standards, “Engineering Drawing Practices for Schools and Colleges SP 46-2003”, BIS, New Delhi, 2003.
3. Shah, M.B. & B.C. Rana , *Engineering Drawing and Computer Graphics*, Pearson *Education,2008*

CS1101 FUNDAMENTALS OF COMPUTING AND PROGRAMMING 3 0 0 3

AIM:

To provide an awareness to Computing and Programming

OBJECTIVES:

- To enable the student to learn the major components of a computer system
- To know the correct and efficient ways of solving problems
- To learn to use office automation tools
- To learn to program in C

UNIT - I Introduction to Computers 9

Introduction – Characteristics of Computers – Evolution of Computers - Computer Generations – Classification of Computers – Basic Computer organization – Number Systems

UNIT -II Computer Software 9

Computer Software –Types of Software – Software Development Steps – Internet Evolution - Basic Internet Terminology – Getting connected to Internet Applications.

UNIT – III Problem Solving and Office Application Software 9

Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudocode - Application Software Packages- Introduction to Office Packages (not detailed commands for examination).

UNIT – IV Introduction to C 9

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making - Branching and Looping.

UNIT – V Functions and Pointers 9

Handling of Character Strings – User-defined Functions – Definitions – Declarations - Call by reference – Call by value – Structures and Unions – Pointers – Arrays – The Preprocessor – Developing a C Program : Some Guidelines

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ashok.N.Kamthane,“ Computer Programming”, Pearson Education (India) (2008).
2. Behrouz A.Forouzan and Richard.F.Gilberg, “A Structured Programming Approach Using C”, II Edition, Brooks-Cole Thomson Learning Publications, (2007).

REFERENCES:

1. Pradip Dey, Manas Ghoush, “Programming in C”, Oxford University Press. (2007).
2. Byron Gottfried, “Programming with C”, 2nd Edition, (Indian Adapted Edition), TMH publications, (2006).
3. Stephen G.Kochan, “Programming in C”, Third Edition, Pearson Education

India, (2005).
4. Brian W.Kernighan and Dennis M.Ritchie, “The C Programming Language”, Pearson Education Inc., (2005).
5. E.Balagurusamy, “Computing fundamentals and C Programming”, Tata McGraw-Hill Publishing Company Limited, (2008).
6. S.Thamarai Selvi and R.Murugan, “C for All”, Anuradha Publishers, (2008).

CS1171 COMPUTER PRACTICE LAB - I 0 1 2 2

LIST OF EXERCISES

a) Word Processing **15**

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing - flow Chart

b) Spread Sheet **15**

5. Chart - Line, XY, Bar and Pie.
6. Formula - formula editor.
7. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
8. Sorting and Import / Export features.

c) Simple C Programming * **15**

9. Data types, Expression Evaluation, Condition Statements.
10. Arrays
11. Structures and Unions
12. Functions

*** For programming exercises flow chart and pseudo code are mandatory.**

TOTAL: 45 PERIODS

Hardware / Software required for a batch of 30 Students

Hardware

LAN System with 33 nodes (OR) Standalone PCs– 33 Nos.
Printers– 3 Nos.

Software

OS– Windows / UNIX Clone
Application Package– Office suite
Compiler– C

ME1171 COMPUTER AIDED DRAFTING AND MODELING LAB

L-T-D: 0-0-2 Credits: 2

(i) Introduction to computer aided drafting and solid modeling: software and hardware.

(ii) Understand basic 2D geometric construction techniques.
a. Cartesian and polar coordinate systems: locating points, coordinate entry methods, units and limits.
b. Object generation: lines, arcs, polylines, and multilines; rectangles, circles, polygons, and ellipses.
c. Transformations: move, copy, rotate, scale, mirror, offset and array; trim, extend, fillet, chamfer
d. Layers: creation, naming, properties manager.
e. Blocks: create, edit, import and explode.
f. Text: creating and editing, formatting, text styles.
g. Dimensions: creating and editing, dimension styles.

(iii) Exercise on basic drafting principles to create technical drawings.
a. Create orthographic views of machine parts from pictorial views.
b. Create isometric views of machine parts from orthographic views
c. Create hatched sectional views of machine parts.

(iv) Understanding basic solid modeling techniques
a. Creation of solid primitives
b. Boolean operations
c. Extrude, Revolve operations
d. 3D Views

(v) Exercise on basic modeling to create machine parts Create solid models from pictorial views

TOTAL: 45 PERIODS

University Examination:

Question paper may contain two parts. Part A shall contain 2D drafting which carries 40% marks, Part B shall contain 3D drafting which carries 40% marks and 20% marks is for viva voce conducted during the exam.

PH1171 **PHYSICS LAB- I** **0 0 2 1**

LIST OF EXPERIMENTS

(Any five experiments)

1. (a) Particle size determination using Diode Laser
   (b) Determination of Laser parameters- Wavelength and Numerical aperture
2. Determination of velocity of sound and compressibility of liquid- Ultrasonic Interferometer.
3. Determination of thermal conductivity of a bad conductor- Lee's Disc method
4. Determination of thickness of a thin wire- Airwedge
5. Torsional Pendulum- Determination of rigidity modulus
6. Compound pendulum- Determination of acceleration due to gravity
7. Determination of Young's Modulus- Non-Uniform bending

Reference: Physics lab manual- Department of Physics

CH1171 **CHEMISTRY LAB - I** **0 0 2 1**

List of Experiments

1. Determination of total hardness of water by EDTA method.
2. Determination of alkalinity (titrimetry method)
3. Determination of percentage purity of washing soda
4. Conductometric titration of a strong acid with a strong base
5. Determination of strength of hydrochloric acid (p^Hmetry)
6. Determination of the amount of Na^+ in water sample (Flame photometry)
7. Determination of molecular weight and degree of polymerization of a polymer
8. Determination of the amount of Ca^{2+} in water sample .
9. Determination of iron in rust by Permanganometry.

Minimum five experiments shall be offered.

References:

1. J. Bassette, R. B. Deanen& G. H. Jeffery & J. Mendham, Text book of Vogel Quantitative Inorganic Analysis, ELBS, England.

TOTAL: 45 PERIODS

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B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER II

(Common for All B.E/B.Tech Programmes Except Marine Engineering)

Sl. No	Course Code	Course Title	L	T	P	C
Theory						
1.	EG1102	Technical English – II	3	0	0	3
2.	MA1102	Engineering Mathematics – II	3	1	0	4
3.	PH1102	Engineering Physics – II	3	0	0	3
4.	CH1102	Engineering Chemistry – II	3	0	0	3
5.	ME1102	Engineering Mechanics	3	0	0	3
6.	BE1101	Basic Engineering - I (Basic Electrical and Electronics Engineering)	3	1	0	4
7.	BE1102	Basic Engineering – II (Basic Mechanical and Civil Engineering)	3	1	0	4
Practical						
8.	CS1172	Computer Practice Lab - II	0	1	2	2
9.	PH1172	Physics Lab – II	0	0	2	1
10	CH1172	Chemistry Lab - II	0	0	2	1
11.	BE1171	Basic Engineering Lab – I (Basic Electrical and Electronics Engineering Lab)	0	0	4	2
12.	BE1172	Basic Engineering Lab – II (Basic Mechanical and Civil Engineering Lab)	0	0	4	2
TOTAL			21	4	14	32

***Those who have admitted from the Academic Year 2013-2014 onwards.**

EG1102 TECHNICAL ENGLISH - II 3 0 0 3

UNIT-I **9**

Technical Vocabulary - Active and Passive Vocabulary – Articles - Prepositions – Expansion of Abbreviations and Acronyms

UNIT-II **9**

Phrases- Adverbs –Different grammatical forms of the same word –Active Voice-Passive Voice

UNIT-III **9**

Phonemes - Vowels, Consonants and Diphthongs – Word Stress and Intonation

UNIT-IV **9**

Writing Recommendations – Checklists - Essay Writing - Business Letters: - Letter Calling for quotation, Letter Placing Order, Letter of Complaint, Letter Seeking Clarification - Business Proposal Writing

UNIT-V **9**

Numerical Adjectives – CV/Resume Writing – One Word Substitutes – Virtual Communication: E-Mail Writing

TOTAL: 45 PERIODS

TEXT BOOK:

Department of Humanities and Social Sciences, Anna University, English for Engineers and Technologists, Combined Edition (Volumes 1 @ 2), Chennai: Orient Black Swan Pvt.Ltd. 2006 Themes 5-8 (Technology, Communication, Environment, Industry)

EXTENSIVE READING:

Shiv Khera, You Can Win, Milan, Delhi, 2004

OR

CanField Jack, Chicken Soup for the Soul, Westland, Chennai, 1999.

***NOTE*:**

The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA1102 ENGINEERING MATHEMATICS II 3 1 0 4

AIM:

To impart the fundamental knowledge of Engineering Mathematics to the studentsin order to achieve a well founded knowledge about the principles of Mathematics.

OBJECTIVE:

To develop basic knowledge to the students in differential equations and vector calculus. This subject is further broadened to the functions of complex variables and complex integration. A thorough knowledge about Laplace transforms is also covered to aid the students solve the differential equations.

UNIT I ORDINARY DIFFERENTIAL EQUATIONS 9

Linear differential equations of second order with constant and variable coefficients- Cauchy's and Legendre's linear equations – Method of variation of parameters

UNIT II COMPLEX VARIABLES 9

Functions of a complex variable – Analytic function – Necessary conditions- Cauchy-Riemann equations in cartesian and polar co-ordinates - Sufficient conditions(excluding proof) –Properties of analytic function – Harmonic and its conjugate – Construction of analytic function by Milne Thomson method – Conformal mappings
$w = z + c$, cz , $1/z$ and Bilinear transformation.

UNIT III COMPLEX INTEGRATION 9

Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Laurent's expansion – Singular points – Residues – Cauchy's Residue theorem – Evaluation of real definite integral using contour integration(excluding poles on the real axis) - $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ and $\int_{-\infty}^{\infty} \frac{f(x)}{g(x)}dx$

UNIT IV VECTOR CALCULUS 9

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

UNIT V LAPLACE TRANSFORMS 9

Laplace transform –Existence condition– Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Transform of Periodic functions. Inverse Laplace transform – Convolution, Initial and Final value theorems (statement only) – Solutions of linear ordinary differential equation of second order with constant coefficients using Laplace transform techniques.

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOK:

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

REFERENCES:

1. Erwin Kreyszig, " Advanced engineering Mathematics", 7th Edition, Wiley India, 2007
2. Veerarajan T, " Engineering Mathematics (for first year)", Tata McGraw- Hill Publishing Company Ltd.,New Delhi,2007.
3. P.Kandasamy , K.Thilagavathy , K.Gunavathy" Engineering Mathematics" S.Chand & Company Ltd.2002.
4. B.V. Ramana,"Higher Engineering Mathematics" Tata McGraw- Hill Publishing Company Ltd.,New Delhi,2006.

PH1102 ENGINEERING PHYSICS – II 3 0 0 3

AIM:

To enable the students' understand the Physics behind various engineering materials and correlate it to technological applications.

OBJECTIVE:

At the end of the course students would be exposed to

- Fundamentals of quantum mechanics and its application to electron microscopy
- Various crystal structures and their defects
- The synthesis, properties and applications of various engineering materials

UNIT –1 Quantum Mechanics 9

Matter waves- de-Broglie wavelength - Schrodinger's wave equation-time independent and time dependent equations- physical significance of wave function- particle in a one dimensional box- electron microscope- scanning electron microscope- transmission electron microscope.

UNIT II Elementary crystal physics 9

Lattice – Unit cell, Bravais lattice ,lattice planes-Miller indices ,d-spacing in cubic lattice. Calculation of number of atoms per unit cell,atomic radius, coordination number and packing
factor for SC,BCC,FCC and HCP structures- diamond cubic, NaCl and ZnS structures. Crystal defects.

UNIT- III Conducting & Semiconducting Materials 9

Conducting materials – Drawbacks of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states Semiconducting materials: intrinsic semiconductor-carrier concentration derivation

- fermi level - electrical conductivity- band gap determination, extrinsic semiconductors, compound semiconductors (qualitative), Hall effect -determination of hall coefficient - applications.

UNIT- IV Magnetic, Superconducting and Dielectric Materials 9

Magnetic Materials: Origin of magnetic moment-Bohr magneton - ferromagnetism – magnetic domains- hysteresis-soft and hard magnetic materials- applications.

Superconductivity: Properties-types of super conductors - BCS theory of superconductivity (qualitative) - applications of superconductors.

Dielectric materials - active and passive dielectrics - types of polarization- dielectric loss- dielectric breakdown – uses of dielectric materials.

UNIT- V New Engineering Materials 9

Metallic glasses: preparation, properties and applications. Shape Memory Alloys (SMA): characteristics, properties and applications.

Nanomaterials -synthesis-top-down approach (Ball milling), bottom-up approach (CVD)- properties and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Rajendran, V, and Marikani A, 'Materials science' TMH publications, New Delhi
2. Palanisamy P.K "Materials Science", Scitech publications Pvt Ltd, Chennai
3. Arumugam M, "Materials Science", Anuradha publications, Kumbakonam
4. R.K. Gaur and S.L.Gupta, 'Engineering Physics' Dhanpat Rai publications, New Delhi

REFERENCES:

1. Charles Kittel ," Introduction to solid state physics ", John Wiley & sons, 8ed.
2. Charles P.Poole and Frank J. Owner, " Introduction to Nanotechnology, Wiley India.
3. Pillai, S.O. 'Solid state physics' NewAge international pubishers, Chennai.

CH1102 ENGINEERING CHEMISTRY-II 3 0 0 3

AIM

To have a thorough knowledge of the basics of chemistry particularly engineering oriented topics to engineering students

OBJECTIVES

To make the students conversant with the principles of the following topics: (i) Fuels And Combustion,(ii) Electrochemistry And Corrosion, (iii) Energy Sources And Batteries, (iv) Phase Rule And Alloys And (v) Thermodynamics.

UNIT I FUELS AND COMBUSTION 9

Classification of fuels with examples– characteristics of a good fuel- fossil fuels- Coal – proximate and ultimate analysis- metallurgical coke – manufacture by Otto-Hoffmann method – Petroleum processing and refining – cracking (definition only) - knocking – octane number and cetane number – synthetic petrol – Bergius process- Calorific value –GCV, LCV (problems)- Gaseous fuels- water gas and producer gas, Flue gas analysis – Orsat apparatus – theoretical air for combustion (problems).

UNIT-II ELECTROCHEMISTRY AND CORROSION 9

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – single electrode potential – Nernst equation– reference electrodes – Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance- Electrochemical corrosion – protective coatings – paints – constituents and functions.

UNIT –III ENERGY SOURCES AND BATTERIES 9

Renewable & non-renewable energy sources- wind energy, solar energy and solar cell- Nuclear reactions – Fission and fusion – nuclear reactors – light water and breeder nuclear reactors (elementary ideas only) – Nuclear power plants in India.

Batteries- primary and secondary cells- alkaline battery- lead acid battery- nickel cadmium battery- lithium battery (Li-TiS_2)- H_2-O_2 fuel cell.

UNITV PHASE RULE AND ALLOYS 9

Statement and explanation of terms involved – one component system – water system – condensed phase rule – simple eutectic system (lead-silver system only) – alloys – importance, ferrous alloys – nichrome, invar and stainless steel – heat treatment of steel, non-ferrous alloys – brass, bronze and solder.

UNIT-V THERMODYNAMICS 9

Introduction- I law of thermodynamics (statement only)- Relation between ΔE & ΔH -II law of thermodynamics (statement only)- concept of entropy – Clausius-Clapeyron equation (no derivation)- Importance, terms involved (problem) -Free energy changes- ΔG – Gibbs Helmoltz equation (derivation) - III law of thermodynamics- concept of absolute entropy- zeroth law of thermodynamics (statement only).

TOTAL: 45 PERIODS

TEXT BOOKS:

1 P.C. Jain and Monica Jain, Engineering Chemistry DhanpatRai Pub, Co., New Delhi (2002)

2 S.S. Dara, A text book of engineering chemistry S. Chand & C. Ltd., New Delhi (2006)

3. B. Sivasankar Engineering Chemistry Tate McGraw- Hill Pub. Co. Ltd, New Delhi (2008).

REFERENCES:

1 B. K. Sharma Engineering Chemistry Krishna Prakasan Media (P) Ltd., Meerut (2001)
2 Principles of physical chemistry by Samuel Glasstone,Van Nostrand pub.comp, Newyork.
3 Principles of physical chemistry by Puri & Sharma,Vikas pub.comp,2008.

ME1102 ENGINEERING MECHANICS 3 0 0 3

OBJECTIVE

This is a basic engineering course common to all branches to inculcate in the students, problem
solving abilities and to enhance their analytical abilities.

Unit I - Statics of Particles 10

Statics –Basics Concepts, Fundamental principles & concepts: Vector algebra, Newton‟s laws, gravitation, force (external and internal, transmissibility), couple, moment (about point and about axis), Varignon‟s theorem, resultant of concurrent and non-concurrent coplanar forces, static equilibrium, free body diagram, reactions. Problem formulation concept; 2-D statics, two and three force members, alternate equilibrium equations, constraints and static determinacy; 3-D statics.

Unit II - Application of Statics & Friction 9

Analysis of Structures- Trusses: Assumptions, rigid and non-rigid trusses; Simple truss (plane and space), analysis by method of joints. Analysis of simple truss by method of sections;

FRICTION: Friction- Coulomb dry friction laws, simple surface contact problems, friction angles, types of problems, wedges. Sliding friction and rolling resistance

Unit III - Centroid, Centre of Gravity and Moment of Inertia 8

Moment of Inertia- First moment of mass and center of mass, centroids of lines, areas, volumes, composite bodies. Area moments- and products- of inertia, radius of gyration, transfer of axes, composite areas. Rotation of axes, principal area-moments-of-inertia,. Second moment of mass, Mass moments- and products- of inertia, radius of gyration, transfer of axes, flat plates (relation between area- and mass- moments- and products- of inertia), composite bodies. Rotation of axes, principal mass-moments-of-inertia.

Unit IV - Particle Dynamics 8

Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton’ s 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

Unit V Kinematics & Kinetics of Rigid Bodies: 10

Plane kinematics of rigid bodies- Rotation; Parametric motion. Relative velocity,

instantaneous center of rotation. Relative acceleration, rotating reference frames. Rotating reference frames, 3-part velocity and 5-part acceleration relations, Coriolis acceleration. Plane kinetics of rigid bodies- Kinetics of system of particles and derivation of moment equation. Translation. Fixed axis rotation; General planar motion.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Beer F P and Johnson E R, "Vector Mechanics for Engineers, Statics and Dynamics", Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi, 2006.
2. Tayal A K, "*Engineering Mechanics- Statics and Dynamics*" , Umesh Publications, Delhi,2004
3. Irving H. Shames, Engineering Mechanics, Prentice Hall, New Delhi 1997.

REFERENCES:

1. Bansal R K, "Engineering Mechanics", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
2. Bhavikatti S S, "Engineering Mechanics", New Age International Pvt. Ltd., New Delhi, 2003.
3. Young D H and Timashenko S, "Engineering Mechanics", Tata Mcgraw-Hill, Fourth Edition, 2006.
4. Jivan Khachane, Ruchi Shrivastava, "Engineering Mechanics: Statics and Dynamics", ANE Books, 2006.
5. Rajasekaran S and Sankarasubramanian G, "Engineering Mechanics-Statics and Dynamics", Vikas Publishing House Pvt. Ltd., New Delhi, 2006.
6. NPTEL courses: *http://nptel.iitm.ac.in/courses.php*, web and video resources on *Engineering Mechanics*.

BE1101 BASIC ENGINEERING - I 3 1 0 4

(Basic Electrical and Electronics Engineering)

Objectives:

- To understand the basic solutions of AC and DC circuits.
- To study the basic principle and operation of AC and DC machines.
- To study the fundamental operations of measuring instruments.
- To study the layout of power system.

Unit: 1 – Electrical circuits 9

Ohms Law, Kirchhoff's laws, Mesh and Nodal Analysis for DC Circuits.
Introduction to AC Circuits, Faraday's Law of Electromagnetic Induction, Lenz law, Inductor, Capacitor, Power factor, Waveforms and RMS value, Average Value, Peak factor and Form factor, Single phase circuits- Series and Parallel, Three phase balanced circuits. Fundamentals of wiring and earthing.

Unit: II – Electrical Measurements, Machines and Power system 9

Operating principles of Moving coil and Moving iron instruments (Ammeter and voltmeter), Dynamometer type watt meter and Energy meter, Errors in Measurements. Construction, Principle of operation and Applications of DC Generators, DC Motors, Single phase transformers. Structure of power system

UNIT- III Semiconductor devices and applications 9

Characteristics of PN Junction diode-Zener Effect-Zener diode and its characteristics-Half wave and Full wave Rectifiers-Voltage regulation,Bipolar Junction transmitter-CB,CE,CC Configuration and characteristics.

UNIT-IV Digital Electronics 9

Binary number system-logic gates-Boolean algebra-Combinational Circuit-half and Full adder,Sequential Circuit-Flip flops-Shift Registers(SIPO,SISO,PIPO,PISO) – Counters: Synchronous and Asynchronous –A/D conversion-Successive approximation,D/A conversion-Weighted Resistor

UNIT – V Fundamentals of Communication Engineering 9

Types of Signals: Analog and Digital Signals – Modulation and Demodulation – Principles of Amplitude and Frequency modulation – Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fiber (Block Diagram)

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOKS:

1. V.N. Mittle “Basic Electrical Engineering”, Tata McGraw Hill Edition, New Delhi, 1990.
2. V.K.Mehta “Principles of Power System”, S.Chand & Company Ltd, New Delhi, 2001.
3. R.S.Sedha,”Applied electronics”S.Chand&Co.,2006.

REFERENCES:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”, Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford press (2005).
3. Chakrabarti A, Soni M.L, Gupta P.V, Bhatnagar U.S , “ A Text book on Power System Engineering,” Dhanpat Rai & Co, New Delhi,2010.
4. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basc Electrical Electronics and Computer engineering”,Tata McGraw Hill, Second edition(2006).
5. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford Press(2005).
6. Mehta V K, “Principles of Electronics”,S.Chand&Company Ltd(1994).
7. Mahmood Nahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series McGraw Hill,(2002).
8. Premkumar N, “Basic Electrical Engineering”, Anuradha Publishers,(2003)

BE1102 **BASIC ENGINEERING – II** **3 1 0 4**

(Basic Mechanical and Civil Engineering)

Aim:

To introduce students to the profession of Mechanical and Civil Engineering and involve them in small-scale projects which would allow them to develop teamwork skills.

Objective:

- To understand the basic knowledge about the Mechanical components used in various application
- To be aware of the different fields of Civil Engineering, such as Surveying, Structural and Transportation Engineering.

Unit I – IC Engine and Boilers **9**

IC Engines: Working and comparison of two stroke and four stroke petrol and diesel engines - general description of various systems using block diagrams – air system, fuel system and ignition system. A brief description of CRDI, MPFI, GDI and Hybrid Vehicles.

Steam boilers: Classification – Cochran boiler, Babcock and Wilcox boiler, High pressure Boilers - Lamont, Benson boiler

Unit II – Compressor, Blower, Pumps, Power plants, Refrigeration and Air Conditioning **9**

Principles and fields of application of compressors - reciprocating and centrifugal, blower principle, pumps- reciprocating, and centrifugal pumps steam

Elementary ideas of hydroelectric, thermal and nuclear power plants

Refrigeration & Air Conditioning: Refrigerants, Vapor compression system, Vapor absorbtion system window air conditioning unit -types (general description only).

Unit III – Manufacturing Processes **9**

Basic Principles of Manufacturing processes – casting, metal forming - forging, rolling, Metal joining - soldering, Welding Machining processes- Lathe construction, operation - turning, taper turning, thread cutting

UNIT - IV Civil Engineering and Materials **9**

Introduction: Civil Engineering, branches of Civil Engineering, contribution to society, Scope,

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections, glass, wood, FRP

Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

Sub Structure: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering– Types of Bridges and Dams

UNIT- V Civil Engineering structures

Building planning **9**

Residential, Institutional and industrial – functional requirements. – Basics of Interior Design and Landscaping.

Roads- benefits- classifications- traffic signs

Bridges-components od bridges-Dam-Purpose of reservoir.

Environmental Engineering: Protected water supply, water treatment methods-sewage treatment- Pollution-Types-causes-remedial measures

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOKS

1) Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kr. Jain, "Basic Civil Engineering", Laxmi Pulications,
2) Roy and Choudhary, "*Elements of Mechanical Engineering*"
3) J Benjamin, "*Basic Mechanical Engineering*"

References

1. K.Venugopal and v prabu raja "*Basic Mechanical Engineering*" Anuradha Agencies
2. Shanmugam G and Palanichamy M.S "*Basic Mechanical Engineering*" Tata MC Graw Hill.
3. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering",Tata McGraw Hill Publishing Co., New Delhi, (1996).
4. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd. (1999).
5. Seetharaman S. "Basic Civil Engineering", Anuradha Agencies, (2005).

CS1172 COMPUTER PRACTICE LAB – II 0 1 2 2

Prerequisite: None

List of Experiments

1. Unix Commands **15**

Study of Unix OS - Basic Shell Commands - Unix Editor

2. Shell Programming **15**

Simple Shell program - Conditional Statements - Testing and Loops

3. C Programming on Unix **15**

Dynamic Storage Allocation-Pointers-Functions-File Handling

TOTAL: 45 PERIODS

Hardware / software requirements for a batch of 30 students

Hardware

1 UNIX Clone Server
33 Nodes (thin client or PCs)
Printer– 3 Nos.

Software

OS– UNIX Clone (33 user license or License free Linux)
Compiler- C

PH1172 PHYSICS LAB - II 0 0 2 1

LIST OF EXPERIMENTS

(Any five experiments)

1. Determination of focal length of convex lens- Newtons Rings
2. Determination of wavelength of mercury spectrum- Spectrometer grating
3. Determination of Viscosity of a liquid- Poiseuille's method.
4. Determination of hysteresis loss in a ferromagnetic material.
5. Determination of dielectric constant of a material at room temperature.
6. Determination of band gap of a semiconducting material.
7. Determination of Young's modulus- Uniform bending.

REFERENCE: Physics lab manual- Department of Physics

CH1172 CHEMISTRY LAB- II 0 0 2 1

LIST OF EXPERIMENTS

1. Determination of concentration of ferrous ion by potentiometry.
2. Conductometric titration of mixture of acids.
3. Estimation of copper in brass by EDTA method.
4. Determination of chloride content in water sample by argentometry.
5. Determination of acidity by titrimetry.
6. Determination of iron content in a solution by spectrophotometric method.
7. Determination of amount of water of crystallization in hydrated barium chloride.
8. Percentage purity of limestone (permanganometry)

Minimum five experiments shall be offered.

TOTAL: 45 PERIODS

REFERENCES:

1. J. Bassette, R. B. Deanen & G. H. Jeffery & J. Mendham, Text book of Vogel Quantitative Inorganic Analysis, ELBS, England.

BE1171 **BASIC ENGINEERING LAB – I** **0 0 4 2**

(Basic Electrical and Electronics Engineering Lab)

I. Electrical Engineering Lab

1. Study of Symbols, Cables and Earthing.
2. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
3. Fluorescent lamp wiring.
4. Stair case wiring / Lamp control from three different places/ Doctor Room control/ Go down control
5. Measurement of electrical quantities – voltage, current, power & computation of power factor in RLC circuit.
6. Measurement of energy using single phase energy meter.
7. Fan Wiring.

II. Electronics Engineering Lab

1. Study of Electronic components and equipments – Resistor, colour coding, Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
2. Study of logic gates AND, OR, EX-OR and NOT, NAND and NOR.
3. Generation of Clock Signal.
4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.
6. Characteristics of PN Junction diode
7. Characteristics of Zener diode
8. Voltage Regulator using Zener diode

TOTAL: 45 PERIODS

BE1172 **BASIC ENGINEERING LAB – II** **0 0 4 2**

(Basic Mechanical and Civil Engineering Lab)

OBJECTIVE:

Introduction to different materials in engineering practices with respect to their workability, formability & machinability with hand tools & power tools and to develop skills through hands on experience.

I. Mechanical Engineering Lab

1. Welding - Metal arc welding tools and equipment, exercises.
2. Fitting - Tools, operations, exercises, types of joints. (*Term work to include one job involving fitting to size, male-female fitting with drilling and tapping*.)

3. Foundry- Tools, preparation of moulding sand, patterns, cores, foundry exercises.
4. Carpentry- Tools, carpentry process, carpentry exercises, types of joints.
5. Assembly and Inspection.(*Assembly and Disassembly of some products, tools used. Videos of advancement in manufacturing technology. Inspection of various components using different measuring instruments.*)
6. Machine Tools I - Demonstration of drilling machine.
7. Machine Tools II - Demonstration of Lathe.
8. Study of Automobile and Power Transmission.
9. Wood working - Demonstration of wood working machinery and furniture manufacturing.(*Term work includes one job involving joint and woodturning*)

II. Civil Engineering Lab

Buildings:

(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

(b) Study of pipe connections requirements for pumps and turbines.

(c) Preparation of plumbing line sketches for water supply and sewage works.

(d) Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

(c) Demonstration of elementary surveying techniques

TOTAL: 45 PERIODS

List of equipment and components
(For a Batch of 30 Students)

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. **15 Sets.**
2. Carpentry vice (fitted to work bench) **15 Nos.**
3. Standard woodworking tools **15 Sets.**
4. Models of industrial trusses, door joints, furniture joints **5 each**
5. Power Tools:

(a) Rotary Hammer	**2 Nos**
(b) Demolition Hammer	**2 Nos**
(c) Circular Saw	**2 Nos**
(d) Planer	**2 Nos**
(e) Hand Drilling Machine	**2 Nos**
(f) Jigsaw	**2 Nos**

6. Surveying equipment for Demonstration

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY, KUMARACOIL

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER III

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1	MA1201	Engineering Mathematics –III	3	1	0	4
2	IT1217	Fundamentals of Data Structures and Algorithms	3	0	0	3
3	EC1201	Electromagnetic Field Theory	3	1	0	4
4	EC1202	Electron Devices	3	1	0	4
5	EC1203	Electric Circuits and Machines	3	1	0	4
6	EC1204	Digital Electronics	3	1	0	4
PRACTICAL						
7	EC1271	Electric Circuits and Electron Devices Lab	0	1	2	2
8	EC1272	Digital Electronics Lab	0	1	2	2
TOTAL			18	7	4	27

MA1201 ENGINEERING MATHEMATICS - III 3 1 0 4

AIM:

To impart the fundamental knowledge of Engineering Mathematics to the students in order to achieve a well founded knowledge about the principles of Mathematics.

OBJECTIVE:

To develop the skill of the students in the areas of boundary value problems and Transform techniques. This will be necessary for their effective studies in a large number of Engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. This course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of standard types of first order partial differential equations – Lagrange's linear equation –Homogeneous linear partial differential equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES 9

Dirichlet's conditions – Fourier series – Change of interval - Odd and Even functions – Half range sine and cosine series – Parseval's identity – Harmonic Analysis.

UNIT III BOUNDARY VALUE PROBLEMS 9

Classification of second order linear partial differential equations – One dimensional wave and heat equations – Assumptions – Fourier series solution – Steady state solution of two dimensional heat equation (insulated edges excluded) – Fourier series solution in Cartesian co-ordinates.

UNIT IV FOURIER TRANSFORMS 9

Fourier integral theorem(without proof) – Fourier transform – Sine and Cosine transforms – Properties - Inverse Fourier transform – Inverse sine and cosine transforms – Properties - Transforms of simple functions – Convolution theorem – Parseval's identity

UNIT V Z-TRANSFORMS 9

Z- transform – Elementary properties – convolution theorem-Inverse Z-transform –Partial fraction Method, Inversion integral method and Convolution – Initial and Final value theorems –Formation of difference equations – Solution of difference equations using Z-transform

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK:

Grewal B.S., "Higher Engineering Mathematics" – 40th Edition , Khanna Publishers, Delhi 2011.

REFERENCES:

1. Kandasamy P, Thilagavathy K, and Gunavathy K., "Engineering Mathematics Volume III",First Edition, S.Chand & Company Ltd., New Delhi, 1996

2. Veerarajan T., “Engineering Mathematics(for Semester III), Third Edition, Tata McGraw – Hill Publishing Company Limited, New Delhi 2007.
3. Bali, N.P. and Manish Goyal, A Text Book of Engineering Mathematics, Seventh Edition, Lakshmi Publications Pvt. Ltd., New Delhi, 2009.

IT11217 FUNDAMENTALS OF DATA STRUCTURES AND ALGORITHMS

3 0 0 3

AIM: To master the design and applications of linear, tree, and graph structures. To understand various algorithm design and analysis techniques.

OBJECTIVE:

- To learn the systematic way of solving problems
- To understand the different methods of organizing large amounts of data

UNIT - I LINEAR STRUCTURES 9

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – applications of lists – Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues

UNIT - II TREE STRUCTURES 9

Tree ADT – tree traversals – left child right sibling data structures for general trees – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT – AVL trees – binary heaps

UNIT - III HASHING AND SETS 9

Hashing – Separate chaining – open addressing – rehashing – extendible hashing – Disjoint Set ADT – dynamic equivalence problem – smart union algorithms – path compression – applications of Sets

UNIT - IV GRAPHS 9

Definitions – Topological sort – breadth-first traversal - shortest-path algorithms – minimum spanning tree – Prim's and Kruskal's algorithms – Depth-first traversal – biconnectivity – Euler circuits – applications of graphs

UNIT - V ALGORITHM DESIGN AND ANALYSIS 9

Introduction to algorithm design techniques: Greedy algorithms, Divide and conquer, Dynamic programming, backtracking, branch and bound, Randomized algorithms – Introduction to algorithm analysis: asymptotic notations, recurrences – Introduction to NP-complete problems

TOTAL: 45 PERIODS

TEXT BOOK:

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 1997.

REFERENCES:

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.

2. R. F. Gilberg, B. A. Forouzan, “Data Structures”, Second Edition, Thomson India Edition, 2005.
3. A. M. Tenenbaum, Y. Langsam, and M. J. Augenstein, “Data Structures using C”, Pearson Education, 1998.
4. K.S. Easwarakumar, Object Oriented Data Structures using C++, Vikas Publishing House pvt. Ltd., 2000
5. Sara Baase and A. Van Gelder, “Computer Algorithms”, Third Edition, Pearson Education, 2000.
6. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Second Edition, Prentice Hall of India Ltd, 2001.

EC1201 ELECTROMAGNETIC FIELD THEORY 3 1 0 4

AIM

To familiarize the student to the concepts, calculations and pertaining to electric, magnetic and electromagnetic fields so that an in depth understanding of antennas, electronic devices, waveguides are possible.

OBJECTIVES

- To analyze field potentials due to static changes
- To evaluate static magnetic fields
- To understand how materials affect electric and magnetic fields
- To understand the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves.

UNIT - I STATIC ELECTRIC FIELDS 9

Introduction to line, Surface and Volume Integrals – Definition of Curl, Divergence and Gradient –Strokes theorem and Divergence theorem, Coulomb’s Law in Vector Form – Definition of Electric Field Intensity – Principle of Superposition – Electric Field due to discrete charges - Electric Field due to charges distributed uniformly on an infinite and finite line – Electric Field on the axis of a uniformly charged circular disc. Electric Scalar Potential – Relationship between potential and electric field - Potential due to infinite uniformly charged line – Potential due to electrical dipole - Electric Flux Density – Gauss Law .

UNIT - II STATIC MAGNETIC FIELD 9

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

UNIT - III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS 9

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

UNIT – IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS 9

Displacement current – Ampere's circuital law in integral form – Modified form of Ampere's circuital law as Maxwell's first equation in integral form – Equation expressed in point form. Faraday's law – Maxwell's Second Equation in integral form from Faraday's Law – Equation expressed in point form. Maxwell's four equations in integral form and differential form- Poynting Vector and the flow of power.

UNIT - V ELECTROMAGNETIC WAVES 9

Derivation of Wave Equation – Uniform Plane Waves – Maxwell's equation in Phasor form – Wave equation in Phasor form – Plane waves in free space and in a homogenous material. Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good conductors – Skin effect, Brewster angle.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXTBOOKS

1. William H.Hayt : "Engineering Electromagnetics" TATA Mc Graw-Hill,2007 .
2. M.N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, Third edition.

REFERENCES

1. Ramo, Whinnery and Van Duzer: "Fields and Waves in Communications Electronics" John Wiley & Sons (3rd edition 2003)
2 NarayanaRao, N : "Elements of Engineering Electromagnetics" 4th edition, Prentice Hall of India, New Delhi, 1998.
3. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Prentice Hall of India 2nd edition 2003.. McGraw-Hill, 9th reprint
4. David K.Cherp: "Field and Wave Electromagnetics - Second Edition-Pearson Edition.
5. David J.Grithiths: "Introduction to Electrodynamics- III Edition-PHI.

EC1202 ELECTRON DEVICES 3 1 0 4

AIM

To learn the fundamental operation of electron devices

OBJECTIVES

- To introduce basic construction and working principles of Electron devices
- To outline the basic of power and Display devices

UNIT I SEMICONDUCTOR DIODES 9

Review of intrinsic & extrinsic semiconductors –Theory of PN junction diode – Energy band structure – current equation – space charge and diffusion capacitances – effect of temperature and breakdown mechanism. Zener diode-Theory and applications,The Hall Effect.Application of diodes -Clippers and Clampers,

UNIT II BIPOLAR JUNCTION TRANSISTOR 9

Construction of transistor-Transistor biasing,Principle of operation of PNP and NPN transistors, Characteristics of transistor configurations(CE, CB and CC), comparison of their characteristics,Relation between current gain of CE,CB and CC, Breakdown in transistors ,Application of transistor-Switch,regulators and amplifiers.

UNIT III FIELD EFFECT TRANSISTORS 9

The Junction Field Effect Transistor- JFET concepts, MOS transistor,Ideal I-V characteristics,C-V characteristics,Non ideal effects,DC transfer characteristics. Equivalent Circuit and Frequency Limitations. MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT IV SPECIAL SEMICONDUCTOR DEVICES 9

Metal-Semiconductor Junction- Schottky barrier diode- Varactor diode – Tunnel diode- Gallium Arsenic device- LASER diode,LDR, and MESFETs(Principle of operation and applications only)

UNIT V POWER DEVICES AND DISPLAY DEVICES 9

UJT,SCR,DIAC,TRIAC,DMOS,VMOS,FINFET,DUALGATE MOSFET, LED, LCD, Photo transistor(construction, characteristics and applications)Opto Coupler, Solar cell, CCD,. Introduction to simulation tools-pspice.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOKS

1. Donald A Neaman,“Semiconductor Physics and Devices”, Third Edition, Tata McGrawHill Inc. 2007.
2. Jacob Millman & Christos C. Halkias Electronic Devices & Circuits McGraw-Hill 2012.

REFERENCES

1. B.Jayant Baliga “Power semiconductor Devices”-THOMPSON Press-1996
2. H.Taub Donald Schilling “Digital Integrated Electronics” Mc Graw Hill-2006
3. Yang, “Fundamentals of Semiconductor devices”, McGraw Hill International Edition,
4. Streetman,”Solid State Electronic Devices “-Fifth Edition-Prentice Hall Of India-2004.
5. Neil H.E Weste and K.Eshragain,”Principles of CMOS VLSI Design”second edition,Addison Wesley ,New Jersey-2000.

EC1203 ELECTRIC CIRCUITS AND MACHINES 3 1 0 4

AIM

To expose the students to the concepts of various types of electrical machines and the analysis of basic circuits.

OBJECTIVES

To impart knowledge on

- The methods of analyzing basic and complex circuits.
- Analysis of magnetically coupled circuits and resonance and two port networks

- Analysis of circuits using Laplace and Fourier transforms.
- Constructional details, performance of DC and AC machines and transformers.

UNIT – I NETWORK THEOREMS 9

Useful Circuit Analysis Techniques: Superposition, Reciprocity, Thevenin's, Norton's and Maximum Power Transfer Theorem, Star- Delta Conversion.

UNIT – II TRANSIENTS AND RESONANCE IN RLC CIRCUITS 9

Transient response of Basic RL, RC and RLC series and parallel Circuits using Laplace Transform for DC and sinusoidal AC input. Series and parallel response- their frequency response-bandwidth-Q factor-Solutions

UNIT - III TWO PORT NETWORK AND DUALITY 9

Two port network: Driving point and transfer impedance/admittance-voltage/current ratio of two port network-Admittance, impedance, Hybrid, transmission parameters for two port network,Interconnection of two port networks, Duality.

UNIT IV D.C. MACHINES, TRANSFORMERS 9

Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generator. Principle of operation of D.C. motor-Characteristics of series, shunt and compound motor, Types of starters . Constructional details of core and shell type transformer-Types of windings-Principle of operation– emf equation – transformation ratio.

UNIT V AC MACHINES 9

Three phase Induction motor-constructional details-Types of rotors-principle of operation-slip-slip torque characteristics.Synchronous generators-Constructional details – Types of rotors – emf equation – Synchronous reactance – Armature reaction – Voltage regulation, Principle of operation of synchronous motors– Torque equation

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK:

1. William H. Hayt, Jr, Jack E. Kemmerly, Steven M. Durbin, "Engineering Circuit Analysis", Sixth Edition, Tata McGraw-Hill Edition, 2002.
2. B.L.Theraja and A.K.Theraja, " A Text book of Electrical Technology" Vol II, S.Chand publications,2008

REFERENCES:

1. David E. Johnson, Johny R. Johnson, John L. Hilburn, "Electric Circuit Analysis", Second Edition, Prentice-Hall International Editions. 1999.
2. K.V.V.Murthy, M.S. Kamath, "Basic Circuit Analysis", Jaico Publishing House, 1999
3. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, 'Electric Machinery', Tata McGraw Hill publishing Company Ltd, 2003.
4. J.B. Gupta, 'Theory and Performance of Electrical Machines', S.K.Kataria and Sons, 2002.
5. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003.
6. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.

EC1204 DIGITAL ELECTRONICS 3 1 0 4

AIM

To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

OBJECTIVES

- To introduce basic postulates of Boolean algebra and show the correlation between Boolean expressions
- To introduce the methods for simplifying Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concept of memories and programmable logic devices.
- To illustrate the concept of synchronous and asynchronous sequential circuits

UNIT I NUMBER SYSTEMS 9

Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD-2421-Gray code-Excess 3 code-ASCII –Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality- Boolean expression – Boolean function- Minimization of Boolean expressions – Sum of Products (SOP) –Product of Sums (POS)-Minterm- Maxterm- Canonical forms – Conversion between canonical forms –Karnaugh map Minimization – Don't care conditions.

UNIT II LOGIC GATES AND INTEGRATED CIRCUITS 9

LOGIC GATES: AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR-Implementations of Logic Functions using gates, NAND –NOR implementations –Multi level gate implementations- Multi output gate implementations. RTL,DTL,TTL and CMOS Logic and their characteristics –Tristate gates.

UNIT III COMBINATIONAL CIRCUITS 9

Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parity checker – code converters. Implementation of combinational logic using MUX, ROM, PAL and PLA.

UNIT IV SYNCHRONOUS SEQUENTIAL CIRCUIT 9

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation –Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops –Asynchronous / Ripple counters – Synchronous counters –Modulo – n counter – Classification of sequential circuits – Moore and Mealy -Design of Synchronous counters: state diagram- State table –State minimization –State assignment- Register – shift registers-Universal shift register – Shift counters – Ring counters.

UNIT V ASYNCHRONOUS SEQUENTIAL CIRCUITS AND MEMORY DEVICES 9

Design of fundamental mode and pulse mode circuits– Races –Hazards: Static –Dynamic – Essential –Hazards elimination.Memory Devices-RAM, MOSFET RAM,DYNAMIC RAM, ROM-PROM, EPROM, EEPROM, EAPROM, PLA, PAL .

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOKS

1. M. Morris Mano, Digital Design, 4.ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2006/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003 –
2. John .M Yarbrough, Digital Logic Applications and Design, Thomson- Vikas publishing house, New Delhi, 2002.

REFERENCES

1. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 2nd ed., Vikas Publishing House Pvt. Ltd, New Delhi, 2004
2. Charles H.Roth. "Fundamentals of Logic Design", Thomson Publication Company, 2003.
3. R.P.Jain, Modern Digital Electronics, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.
4. Thomas L. Floyd, Digital Fundamentals, Pearson Education, Inc, New Delhi, 2003
5. Anand Kumar A.: Fundamentals of Digital Circuits, PHI,2009.

EC1271 ELECTRIC CIRCUITS AND ELECTRON DEVICES LAB 0 1 2 2

1. Characteristics of PN diode.
2. Characteristics of Zener diode.
3. Applications of Diode (Clippers, Clampers, Rectifiers.)
4. Characteristics of BJT.
5. Characteristics of FET.
6. Characteristics of UJT.
7. Application of Zener Diode as Voltage regulators.
8. SCR- Characteristics.
9. TRIAC- Characteristics.
10. DIAC- Characteristics.
11. Characteristics of Photodiode and Phototransistors.
12. Verification of Ohm's law,Kirchoff's current law and voltage law.
13. Verification of Thevenin's and Norton's theorem
14. Verification of Reciprocity theorem and superposition theorem.
15. Measurement of Z and Y parameters.
16. Measurement of ABCD and hybrid parameters.

TOTAL: 45 PERIODS

EC1272 DIGITAL ELECTRONICS LAB 0 1 2 2

1. Half adder and full adder
2. Half subtractor and full subtractor

3. Multiplexer and Demultiplexer using gates
4. Encoder and Decoder
5. Magnitude Comparator
6. Flip flops-SR,JK,D,T
7. Counters(synchronous and Asynchronous) using flip flops.
8. Shift Regisrers(SISO,SIPO,PISO,PIPO) using flip flops,7495.
9. MUX,DeMUX using 74150,74154.
10. BCD to decimal converter
11. Simulation of half adder,full adder using VHDL

TOTAL: 45 PERIODS

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY, KUMARACOIL

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER IV

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1	MA1208	Random Process and Queueing Theory	3	1	0	4
2	MS1201	Environmental Science	3	0	0	3
3	EC1205	Signals & Systems	3	1	0	4
4	EC1206	Electronic Circuits - I	3	1	0	4
5	EC1207	Linear Integrated Circuits	3	1	0	4
6	EC1208	Analog Communication Systems	3	1	0	4
PRACTICAL						
7	EC1273	Linear Integrated Circuits Lab	0	1	2	2
8	EC1274	Electronic Circuits Lab	0	1	2	2
TOTAL			18	7	4	27

MA1208 RANDOM PROCESSES AND QUEUEING THEORY 3 1 0 4

AIM:

The probabilistic models are applicable in all areas of Science and Engineering. This course provides necessary mathematical support to solve real life problems.

OBJECTIVE:

To have the fundamental knowledge of basic probability concepts, the standard distributions, the classification of processes and spectral density which can describe real life phenomena.

UNIT I RANDOM VARIABLE AND DISTRIBUTIONS 9

Random variable - Probability mass functions - Probability density functions - Distribution functions- Properties – Expectation – Moments - Moment generating function and its properties. Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, and Normal distributions and their properties (problems only).

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and Conditional distributions – Covariance - Correlation and Regression.

UNIT III RANDOM PROCESS 9

Definition and Examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic process - Markov process - Binomial, Poisson and Gaussian processes - Sine wave process.

UNIT IV CORRELATION AND SPECTRAL DENSITIES 9

Auto Correlation - Cross Correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – Fundamental theorem of power spectral density.

UNIT V QUEUING THEORY 9

Birth and Death process - Markovian queuing models – Little's formulae - M/M/1, M/M/C, finite and infinite capacity (steady state solutions only).

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK:

1. Veerarajan. T., "Probabilitiy, Statistics and Random Processes", Second Edition, Tata McGraw-Hill Publications, New Delhi, 2007.

REFERENCES:

1. Ross, S., "A First Course in Probability", 6th Edition, Pearson Education, Delhi, 2007 (Chapters 2 to 8)
2. Peebles Jr. P.Z., "Probability Random Variables and Random Signal Principles", Fourth Edition, Tata McGraw-Hill Publishers, New Delhi, 2002 (Chapters 6, 7 and 8).

3. Henry Stark and John W. Woods "Probability and Random Processes with Applications to Signal Processing", Third Edition, Pearson Education, Delhi, 2012.
4. Medhi J., "Stochastic Models in Queuing Theory", Academic Press, Second Edition, 2003
5. Medhi J., "Stochastic Processes", New Age Publishers, Second Edition, New Delhi, 2006

MS1201 ENVIRONMENTAL SCIENCE 3 0 0 3

OBJECTIVES

- To provide the students about general aspirants of environment and ecology, the environment pollution and the current social issues.

UNIT I: NATURE OF ENVIRONMENT STUDIES AND NATURAL RESOURCES 9

Environment studies- definition- multi disciplinary nature – scope and importance- need for public awareness- Natural resources- Forest resources- energy resources- food Resources- water resources – land resources - mineral resources.

UNIT II: ECO SYSTEMS AND BIO-DIVERSITY 9

Concept and component of eco systems- producer, consumer, decomposer- structure and function of eco system- food chain and food web- energy flow model- aquatic eco system- forest eco system- desert eco system- pyramid of biomass- ocean eco system- grass land eco system- Bio diversity in India- value of bio diversity- biodiversity threatens- biodiversity protection- In-situ and Ex-situ conservation.

UNIT III: ENVIRONMENTAL POLLUTION 9

Meaning of environmental pollution- air pollution- acid rain – global warming- water pollution- water pollution control- soil pollution- urban waste and soil pollution- marine pollution- noise pollution- thermal pollution- solid and hazardous waste management- waste disposal methods- solid waste and India- natural disaster and disaster management. Low carbon perspectives, Energy savings, Safety and Security

UNIT IV: SOCIAL ISSUES AND THE ENVIRONMENT 9

Unsustainable to sustainable development- sustainable development in India- water conservation, watershed management and water harvesting- environmental ethics- role of engineer in environmental protection- economic aspects of environment.

UNIT V: HUMAN POPULATION AND ENVIRONMENT 9

Population growth- distribution of population- factors affecting variation in population- theories of population- future of human population- family welfare programme- HIV and AIDS- environment and human health- human rights- value education- women and child welfare.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Cunnigham & saigo: 'Environmental science :A global concern' 4th Ed.W.c. Brown Publishers. USA. 1997

2. Chauhan A.S, 'Environmental studies' 2nd revised ed.2004, Jain Brother publishers, New Delhi

REFERENCE BOOKS

1. Benny Joseph : 'Environmental Science and Engineering', 2006, Tata McGraw- Hill Publication.
2. Siddique K.A. : Elements of Ecology and Environmental Pollution, 1st Ed. 2002, Kushal Publication, Varanasi.

EC1205 SIGNALS AND SYSTEMS 3 1 0 4

AIM

To study and analyse characteristics of continuous, discrete signals and systems.

OBJECTIVES

- To study the properties and representation of discrete and continuous signals.
- To study the sampling process and analysis of discrete systems using z-transforms.
- To study the analysis and synthesis of discrete time systems.

UNIT - I REPRESENTATION OF SIGNALS 9

Continuous and discrete time signals: Classification of Signals – Periodic aperiodic even – odd, energy and power signals, Deterministic and random signals, complex exponential and sinusoidal signals, periodicity – properties of discrete time complex, exponential, unit impulse – unit step impulse functions – Transformation in independent variable of signals: time scaling, time shifting. Determination of Fourier series representation of continuous time and discrete time periodic signals – Explanation of properties of continuous time and discrete time Fourier series.

UNIT – II ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS 9

Continuous time Fourier Transform and Laplace Transform analysis with examples – Properties of Continuous time Fourier Transform, properties of Laplace Transform, Parseval's relation, and convolution in time and frequency domains.Basic properties of continuous time systems: Linearity, Causality, time invariance, stability, magnitude and Phase representations of frequency response of LTI systems -Analysis and characterization of LTI systems using Laplace transform: Computation of impulse response and transfer function using Laplace transform.

UNIT – III SAMPLING THEOREM AND Z-TRANSFORMS 9

Representation of continuous time signals by its sample - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals. Basic principles of Z-transform - Z-transform definition – region of convergence – properties of ROC – Properties of Z-transform – Poles and Zeros – inverse Z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion, Relationship between Z-transform and Fourier transform.

UNIT - IV DISCRETE TIME SYSTEMS 9

Computation of Impulse response & Transfer function using Z Transform. DTFT Properties and examples – LTI-DT systems -Characterization using difference equation – Block

diagram representation – Properties of convolution and the interconnection of LTI Systems – Causality and stability of LTI Systems.

UNIT - V SYSTEMS WITH FINITE AND INFINITE DURATION IMPULSE RESPONSE 9

Systems with finite duration and infinite duration impulse response – recursive and non-recursive discrete time system – realization structures – direct form – I, direct form – II, Transpose, cascade and parallel forms.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK

1. AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, "Signals & Systems", 2nd Edition., Pearson Education, 2009.

REFERENCES

1. John G.Proakis and Dimitris G.Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", 4th edn., PHI, 2007.
2. M.J.Roberts, "Signals and Systems Analysis using Transform method and MATLAB", 2nd TMH 2011.
3. Simon Haykin and Barry Van Veen, "Signals and Systems", John Wiley, 2nd edition,2003
4. K.Lindner, "Signals and Systems", McGraw Hill International, 1999.
5. Moman .H. Hays," Digital Signal Processing", Schaum's outlines, Tata McGraw-Hill Co Ltd., 2009.
6. Ashok Amhardar, "Analog and Digital Signal Processing", 2 nd Edition Thomson 2002.

EC1206 ELECTRONIC CIRCUITS - I 3 1 0 4

AIM

The aim of this course is to familiarize the student with the analysis and design of basic transistor Amplifier circuits and power supplies.

OBJECTIVE

On completion of this course the student will understand

- The methods of biasing transistors
- Design of simple amplifier circuits
- Mid – band analysis of amplifier circuits using small - signal equivalent circuits to determine gain input impedance and output impedance
- Method of calculating cutoff frequencies and to determine bandwidth
- Design of power amplifiers and heat sinks
- Analysis and design of power supplies and power control using SCR.

UNIT - I TRANSISTOR BIASING 9

BJT – Need for biasing – Different types of biasing circuit-Fixed bias circuit, Load line and quiescent point. Stability factors-collector to base bias-self bias- Advantage of Self bias (voltage divider bias) over other types of biasing. Use of Self bias circuit as a constant current circuit. MOSFET - Biasing Use of MOSFET as a voltage variable resistor.

UNIT - II MID BAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 9

CE, CB and CC amplifiers. Method of drawing small-signal equivalent circuit. Midband analysis of various types of single stage amplifiers to obtain gain, input impedance and output impedance. Miller's theorem. Comparison of CB, CE and CC amplifiers and their uses. Darlington connection using similar and Complementary transistors. Methods of increasing input impedance using Darlington connection and bootstrapping. CS, CG and CD (FET) amplifiers. Multistage amplifiers. Basic emitter coupled differential amplifier circuit. Differential gain- CMRR- Use of constant current circuit to improve CMRR. Derivation of transfer characteristic, Transconductance.

UNIT - III FREQUENCY RESPONSE OF AMPLIFIERS 9

Frequency response of amplifiers. Definition of cut off frequencies and bandwidth. Low frequency analysis of amplifiers to obtain lower cut off frequency, Hybrid – pi equivalent circuit of BJTs. High frequency analysis of BJT amplifiers to obtain upper cut off frequency. High frequency equivalent circuit of FETs. High frequency analysis of FET amplifiers. Gain-bandwidth product of FETs. General expression for frequency response of multistage amplifiers-RC coupled amplifier-transformer coupled amplifier-direct coupled amplifier-Calculation of overall upper and lower cut off frequencies of multistage amplifiers. Amplifier rise time and sag and their relation to cut off frequencies.

UNIT - IV LARGE SIGNAL AMPLIFIERS 9

Classification of amplifiers (Class A, B, AB, C&D), Efficiency of class A, RC coupled and transformer-coupled power amplifiers. Class B complementary-symmetry amplifier push-pull power amplifiers. Calculation of power output, efficiency and power dissipation. Crossover distortion ,Heat flow calculations using analog circuit. Calculation of actual power handling capacity of transistors with and without heat sink. Heat sink design.

UNIT -V RECTIFIERS AND POWER SUPPLIES 9

Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for Vdc and ripple voltage with C, CL, L-C and C-L-C filters. Voltage multipliers Zenerdiode regulator. Electronically regulated d.c power supplies. Line regulation, output resistance and temperature coefficient. Switched mode power supplies. Inverters, UPS ,Power control using SCR.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOKS

1. Millman J. and Halkias .C., " Integrated Electronics ", Tata McGraw-Hill,2007

REFERENCES

1. Robert L. Boylestad and Louis Nashelsky, "Electronics Devices and Circuit Theory " 10^{th} edn., PHI, 2002.
2. S.Salivahanan, et.al, "Electronic Devices and Circuits", TMH, 1998.
3. Floyd, "Electronic Devices", Sixth edition, Pearson Education, 2003.
4. I.J. Nagrath, Electronics – Analog and Digital, PHI, 1999.

EC1207 LINEAR INTEGRATED CIRCUITS 3 1 0 4

AIM

To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

OBJECTIVES

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC
- To introduce a few special functions integrated circuits.

UNIT - I MONOLITHIC IC FABRICATION AND CIRCUIT CONFIGURATION 9

Monolithic IC fabrication-Basic planar process-fabrication of a circuit,Current sources-Basic current source-Widler Current source, Analysis of difference amplifiers with active loads, Monolithic IC operational amplifiers-specifications, frequency compensation-types and slew rate.

UNIT - II APPLICATIONS 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 Oscillator, Low-pass and band-pass filters, Comparator, Multivibrators and Schmitt trigger, Triangular wave generator, Precision rectifier,

UNIT III ANALOG MULTIPLIER AND PLL 9

Analysis of four quadrant (Gilbert cell) and variable transconductance 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 CONVERTERS 9

Analog switches, High speed sample and hold circuits and sample and hold ICs, Types of D/A converter, Current driven DAC, Switches for DAC, A/D converter-Flash, Single slope, Dual slope, Successive approximation, Delta Sigma Modulation, Voltage to Time converters.

UNIT V SPECIAL FUNCTION ICS 9

Astable and Monostable Multivibrators using 555 Timer, Voltage regulators-linear and switched mode types-723 General purpose regulatorsSwitched capacitor filter, Frequency to Voltage converters, Tuned amplifiers, Power amplifiers.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK

1. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd.,4 th edition 2013.

REFERENCES

1. Gray and Meyer, 'Analysis and Design of Analog Integrated Circuits', Wiley International, 4th edition 2008.
2. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India, 2nd edition edition 2006.
3. Ramakant A.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 4thedition 2006.

EC1208 ANALOG COMMUNICATION SYSTEMS 3 1 0 4

AIM

To study the various analog communication fundamentals viz., Amplitude modulation and demodulation, angle modulation and demodulation. Noise performance of various receivers and information theory with source coding theorem are also dealt.

OBJECTIVE

- To provide various Amplitude modulation and demodulation systems.
- To provide various Angle modulation and demodulation systems.
- To provide some depth analysis in noise performance of various receiver.
- To study some basic information theory with some channel coding theorem.

UNIT I INTRODUCTION AND AMPLITUDE MODULATION 9

Introduction to Analog communication system. Need for modulation. Different modulation systems .Generation and demodulation of AM, Modulation Index, DSB-SC, SSB-SC, VSB Signals, Filtering of sidebands, Comparison of Amplitude modulation systems, Frequency translation, Frequency Division multiplexing, AM transmitters – Superhetrodyne receiver, AM receiver.

UNIT II ANGLE MODULATION 9

Angle modulation, frequency modulation, Narrowband and wideband FM, transmission bandwidth of FM signals, Generation of FM signal – Direct FM – indirect FM, Demodulation of FM signals, FM stereo multiplexing, PLL ,FM Broadcast receivers, FM stereo receives., AFC, amplitude limiters

UNIT III NOISE PERFORMANCE OF DSB, SSB RECEIVERS 9

Noise – Shot noise, thermal noise, White noise, Noise equivalent Bandwidth, Narrowband noise, Representation of Narrowband noise in terms of envelope and phase components, Sinewave plus Narrowband Noise, Receiver model in AM, DSB-SC receiver and SSB receivers.

UNIT IV NOISE PERFORMANCE OF AM AND FM RECEIVERS 9

Noise in AM receivers, threshold effect, Noise in FM receivers capture effect, FM threshold effect, FM threshold reduction, Pre-emphasis and de-emphasis in FM, Comparison of performance of AM and FM systems.

UNIT V FUNDAMENTALS OF INFORMATION THEORY AND APPLICATIONS 9

Uncertainty, Information and entropy, Source coding theorem, Discrete memory less channels, mutual information, channel capacity, channel coding theorem, Variable length coding, Huffman Coding, Shannon Fano Coding, Arithmetic coding, Shannon Fano Coding.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK

1. Simon Haykin, Communication Systems, John Wiley & sons, NY, 4th Edition, 2008.

REFERENCES

1. Roddy and Coolen, Electronic communication, PHI, New Delhi, 4th Edition, 2003.
2. Taub and Schilling, Principles of communication systems, TMH, New Delhi, 1995.
3. Bruce Carlson et al, Communication systems, McGraw-Hill Int., 4th Edition, 2002.

EC1273 LINEAR INTEGRATED CIRCUITS LAB 0 1 2 2

Design and Construction of

1. Inverting and Non inverting amplifier
2. Integrator and Differentiator
3. Comparator
4. Schmitt trigger
5. First order filter and second order filter
6. Astable Multivibrator
7. Monostable multivibrator
8. Triangular wave generator
9. D/A converter
10. Wein Bridge oscillator
11. RC phase shift oscillator
12. Voltage Regulator using ICs

TOTAL: 45 PERIODS

EC1274 ELECTRONIC CIRCUITS LAB 0 1 2 2

1) Frequency response of Common- Emitter amplifier using BJT
2) Frequency response of Common- Collector amplifier using BJT
3) Frequency response of Darlington amplifier using BJT
4) CMRR calculation for Differential amplifier
5) Frequency response of RC Coupled amplifier
6) Frequency response of Class A power amplifier
7) Frequency response of source follower
8) Frequency response of Class B Complementary Symmetry Push- Pull amplifier
9) Simulation of common base amplifier using P-spice

10) Simulation of DC amplifier using P-spice
11) Simulation of cascode amplifier using P-spice
12) Simulation of differential amplifier using P-spice
13) Series Regulator using transistor
14) Shunt Regulator using transistor

TOTAL: 45 PERIODS

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NOORUL ISLAM UNIVERSITY, KUMARACOIL

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER V

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1	MS1202	Professional and Business Ethics	3	0	0	3
2	EC1209	Electronic Circuits-II	3	1	0	4
3	EC1210	Control Systems	3	1	0	4
4	EC1211	Digital Signal Processing	3	1	0	4
5	EC1212	Digital Communication	3	1	0	4
6	EC1213	Transmission Lines and Waveguides	3	1	0	4
PRACTICAL						
7	EC1275	Digital Signal Processing Lab	0	1	2	2
8	EC1276	Communication System Lab	0	1	2	2
TOTAL			18	7	4	27

MS1202 PROFESSIONAL AND BUSINESS ETHICS 3 0 0 3

OBJECTIVES

• To create an awareness on Engineering Ethics and Human Values.
• To instill Moral and Social Values and Loyalty
• To appreciate the rights of Others.

UNIT I: HUMAN VALUES 9

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – 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 9

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

TOTAL: 45 PERIODS

TEXT BOOKS

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

REFERENCES

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint now available).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available)

3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi,2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

EC1209 ELECTRONIC CIRCUITS II L T P C
3 1 0 4

AIM:
The aim of this course is to familiarize the student with the analysis and design of feedback amplifiers, oscillators, tuned amplifiers, wave shaping circuits, multivibrators and blocking oscillators and their application.

OBJECTIVES:
- To understand the advantages and method of analysis of feedback amplifiers.
- Analysis, design and applications of LC and RC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time base generators.

UNIT I FEEDBACK AMPLIFIERS 9
Block diagram, Loop gain, Gain with feedback, Effects of negative feedback – Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections – voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of feedback amplifiers. Applications of feedback amplifiers.

UNIT II OSCILLATORS 9
Classification, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators - Hartley, Colpitts, Clapp, Franklin, Armstrong, Tuned collector oscillators, RC oscillators - phase shift – Wienbridge - Twin-T Oscillators, Frequency range of RC and LC Oscillators, Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal oscillators, frequency stability of oscillators. Applications of oscillators.

UNIT III TUNED AMPLIFIERS 9
Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers - Analysis of capacitor coupled single tuned amplifier – double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers – large signal tuned amplifiers – Class C tuned amplifier – Efficiency and applications of Class C tuned amplifier - Stability of tuned amplifiers – Neutralization - Hazeltine neutralization method. Applications of tuned amplifiers.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9
RC & RL Integrator and Differentiator circuits – Storage, Delay and Calculation of Transistor Switching Times – Speed-up Capacitor. Collector coupled and Emitter coupled Astable multivibrator - Monostable multivibrator - Bistable multivibrators - Triggering methods for Bistable multivibrators - Schmitt trigger circuit. Applications of wave shaping and multivibrator circuits.

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS 9

UJT sawtooth waveform generator, Pulse transformers – equivalent circuit – response - applications, Blocking Oscillator – Free running blocking oscillator - Astable Blocking Oscillators with base timing – Push-pull Astable blocking oscillator with emitter timing, Frequency control using core saturation, Triggered blocking oscillator – Monostable blocking oscillator with base timing – Monostable blocking oscillator with emitter timing, Time base circuits - Voltage-Time base circuit, Current-Time base circuit - Linearization through adjustment of driving waveform. Applications of blocking oscillators and timebase generators.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOKS:

1. Sedra / Smith, Micro Electronic Circuits Oxford University Press, 2004.
2. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2 nd Edition, TMH, 2007.

REFERENCES:

1. Millman J. and Taub H., Pulse Digital and Switching Waveforms, TMH, 2000.
2. Schilling and Belove, Electronic Circuits, 3rd Edition, TMH, 2002.
3. Robert L. Boylestad and Louis Nasheresky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2002.
4. David A. Bell, Solid State Pulse Circuits, Prentice Hall of India, 1992.
5. Millman and Halkias. C., Integrated Electronics, TMH, 1991.

EC1210 CONTROL SYSTEMS 3 1 0 4

AIM

To familiarize the students with concepts related to the operation analysis and stabilization of control systems

OBJECTIVES

- To understand the open loop and closed loop (feedback) systems
- To understand time domain and frequency domain analysis of control systems required for stability analysis.
- To understand the compensation technique that can be used to stabilize control systems

UNIT I CONTROL SYSTEM MODELING 9

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

UNIT II TIME RESPONSE ANALYSIS 9

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

UNIT III FREQUENCY RESPONSE ANALYSIS 9

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

UNIT IV STABILITY ANALYSIS **9**

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

UNIT V STATE VARIABLE ANALYSIS & DIGITAL CONTROL SYSTEMS **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 – Sample & Hold – Open loop & Closed loop sampled data systems.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXTBOOKS:

1. J.Nagrath and M.Gopal," Control System Engineering", New Age International Publishers, 5th Edition, 2007.
2. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 2nd Edition, 2002.

REFERENCES:

1. Benjamin.C.Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition,1995.
2. M.Gopal, Digital Control and State Variable Methods, 2nd Edition, TMH, 2007.
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 McGrow-Hill, Inc., 1995.
5. Richard C. Dorf & Robert H. Bishop, " Modern Control Systems", Addidon – Wesley, 1999.

EC1211 DIGITAL SIGNAL PROCESSING 3 1 0 4

AIM: To study the signal processing methods and processors.

OBJECTIVES:

- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the fundamentals of digital signal processors

UNIT I DISCRETE FOURIER TRANSFORM **9**

DFT and its properties, Relation between DTFT and DFT, FFT computations using Decimation in time and Decimation in frequency algorithms, Overlap-add and save methods

UNIT II INFINITE IMPULSE RESPONSE DIGITAL FILTERS **9**

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

UNIT III FINITE IMPULSE RESPONSE DIGITAL FILTERS 9

Symmetric and Antisymmetric FIR filters – Linear phase FIR filters – Design using Hamming, Hanning and Blackmann Windows – Frequency sampling method – Realization of FIR filters – Transversal, Linear phase and Polyphase structures.

UNIT IV FINITE WORD LENGTH EFFECTS 9

Fixed point and floating point number representations – Comparison – Truncation and Rounding errors - Quantization noise – derivation for quantization noise power – coefficient quantization error – Product quantization error - Overflow error – Roundoff noise power - limit cycle oscillations due to product roundoff and overflow errors - signal scaling

UNIT V MULTIRATE SIGNAL PROCESSING 9

Introduction to Multirate signal processing-Decimation-Interpolation-Multistage implementation of sampling rate conversion- Design of narrow band filters - Applications of Multirate signal processing-sub band coding. Computer architecture for signal processing – Architecture of TMS320C5X, C54X.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOKS:

1. John G Proakis and Manolakis, "Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
2. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, TMH/McGraw Hill International, 2007.

REFERENCES:

1. E.C. Ifeachor and B.W. Jervis, "Digital signal processing – A practicalapproach", Second edition, Pearson, 2002.
2. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata Mc GrawHill, 1998.
3. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.
4. Johny R. Johnson, Introduction to Digital Signal Processing, PHI, 2006.
5. B.Venkataramani & M.Bhaskar, Digital Signal Processor Architecture, Programming and Application, TMH 2002.

EC1212 DIGITAL COMMUNICATION L T P C
3 1 0 4

AIM

To introduce the basic concepts of Digital Communication modulation to baseband, passband modulation and to give an exposure to error control coding and finally to discuss about the spread spectrum modulation schemes.

OBJECTIVES

- To know the principles of sampling & quantization
- To study the various waveform coding schemes
- To learn the various baseband transmission schemes
- To understand the various Band pass signaling schemes
- To know the fundamentals of channel coding

UNIT I SAMPLING & QUANTIZATION **9**

Low pass sampling – Aliasing- Signal Reconstruction-Quantization - Uniform & non-uniform quantization - quantization noise - Logarithmic Companding of speech signal- PCM - TDM

UNIT II WAVEFORM CODING **9**

Prediction filtering and DPCM - Delta Modulation - ADPCM & ADM principles-Linear Predictive Coding

UNIT III BASEBAND TRANSMISSION **9**

Properties of Line codes- Power Spectral Density of Unipolar / Polar RZ & NRZ – Bipolar NRZ - Manchester- ISI – Nyquist criterion for distortionless transmission – Pulse shaping – Correlative coding – M-ary schemes – Eye pattern - Equalization

UNIT IV DIGITAL MODULATION SCHEME **9**

Geometric Representation of signals - Generation, detection, PSD & BER of Coherent BPSK, BFSK & QPSK - QAM - Carrier Synchronization - structure of Non-coherent Receivers - Principle of DPSK. Real time applications of modulation schemes.

UNIT V ERROR CONTROL CODING **9**

Channel coding theorem - Linear Block codes - Hamming codes - Cyclic codes - Convolutional codes - Vitterbi Decoder, Latest developments in digital communications - Software defined radio, Cognitive radio.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOK:

1. S. Haykin, “Digital Communications”, John Wiley, 2005

REFERENCES:

1. B. Sklar, “Digital Communication Fundamentals and Applications”, 2nd Edition, Pearson Education, 2009
2. B.P.Lathi, “Modern Digital and Analog Communication Systems” 3rd Edition, Oxford University Press 2007.
3. H P Hsu, Schaum Outline Series - “Analog and Digital Communications”, TMH 2006
4. J.G Proakis, “Digital Communication”, 4th Edition, Tata Mc Graw Hill Company
5. Taub & Schilling, “Principles of Digital Communication” Tata McGraw-Hill, 30th Reprint, 2008.
6. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, “Software Defined Radio”, John Wiley, 2003.
7. Bruce A. Fette, “Cognitive Radio Technology”, Elsevier, 2009.

EC1213 TRANSMISSION LINES AND WAVEGUIDES 3 1 0 4

AIM

To lay a strong foundation on the theory of microwave communication systems, transmission lines and wave guides by highlighting their applications.

OBJECTIVES

- To introduce the various types of transmission lines and to discuss the losses associated.
- To give thorough understanding about impedance transformation and matching.
- To use the Smith chart in problem solving.
- To impart knowledge on filter theories and waveguide theories

UNIT I TIME VARRYING FIELDS AND MAXWELL'S EQUATIONS 9

Motional Electromotive Force, General Expression for motional EMF, Faraday's Law of Induction, Displacement current, Maxwell's equation in the point or differential form, Maxwell's equations in Integral form, Maxwell's equations from Gauss's Law, Maxwell's equations and Boundary conditions, Poynting's theorem, Time harmonic (sinusoidal) fields, Maxwell's equations in phasor form.

UNIT II TRANSMISSION LINES 9

Need for Transmission Lines, Types of Transmission lines, Characterization in terms of primary and secondary constants, Characteristic impedance, General wave equation, Loss less propagation, Propagation constant, Wave reflection at discontinuities, Voltage standing wave ratio, Transmission line of finite length, The Smith Chart, Smith Chart calculations for lossy lines, Impedance matching by Quarter wave transformer, Single and double stub matching.

UNIT III THE UNIFORM PLANE WAVE 9

Wave propagation in free space, Wave propagation in dielectrics, Forward and Backward Travelling Wave, Poynting Theorem and Wave Power, Energy of the Radiated wave, Propagation in good conductors and good dielectrics, Skin effect, Wave polarization, Linearly, Elliptically and Circularly polarized waves,

UNIT IV TRANSMISSION AND REFLECTION OF PLANE WAVES AT BOUNDARIES 9

Normal incidence of Uniform Plane waves: Conductor-Conductor interface, Dielectric-Dielectric interface, Dielectric-perfect Conductor interface, Dielectric-Conductor interface. Oblique incidence on a plane boundary for perpendicular polarization, Dielectric-Dielectric interface, Dielectric-Conductor interface.

UNIT V WAVE GUIDES AND CAVITY RESONATORS 9

General Wave behaviours along uniform Guiding structures, Transverse Electromagnetic waves, Transverse Magnetic waves, Transverse Electric waves, TM and TE waves between parallel plates, TM and TE waves in Rectangular wave guides, Bessel's differential equation and Bessel function, TM and TE waves in Circular wave guides, Rectangular and circular cavity Resonators.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOK:

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

REFERENCES:

1. William H Hayt and Jr John A Buck, “Engineering Electromagnetics” Tata Mc Graw-Hill Publishing Company Ltd, New Delhi, 2008
2. David K Cheng, “Field and Wave Electromagnetics”, Pearson Education Inc, Delhi, 2004
3. John D Kraus and Daniel A Fleisch, “Electromagnetics with Applications”, Mc Graw Hill Book Co, 2005
4. GSN Raju, “Electromagnetic Field Theory and Transmission Lines”, Pearson Education, 2005
5. Bhag Singh Guru and HR Hiziroglu, “Electromagnetic Field Theory Fundamentals”, Vikas Publishing House, New Delhi, 2001.
6. N. Narayana Rao, “Elements of Engineering Electromagnetics” 6th edition Prentice Hall,2004

EC1275 DIGITAL SIGNAL PROCESSING LABORATORY 0 1 2 2

AIM

To introduce the student to various digital Signal Processing techniques using TMS 320c5x family processors and MATLAB.

OBJECTIVES:

To implement the processing techniques using the instructions of TMS320C5X/TMS320C 67XX/ADSP 218X/219X/BS531/532/561 To implement the IIR and FIR filter using MATLAB.

USING TMS320C5X/TMS320C 67XX/ADSP 218X/219X/BS531/532/561

1. Study of various addressing modes of DSP using simple programming examples
2. Implementation of Linear and Circular Convolution
3. Sampling of input signal and display
4. Waveform generation
5. Implementation of FIR filter

USING MATLAB

1. Generation of Signals
2. Linear and circular convolution of two sequences
3. Sampling and effect of aliasing
4. Design of FIR filters
5. Design of IIR filters
6. Calculation of FFT of a signal
7. Decimation by polyphase decomposition.

TOTAL: 45 PERIODS

EC1276 COMMUNICATION SYSTEMS LAB 0 1 2 2

AIM

To introduce the student to various analog and digital communication techniques .

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

LIST OF EXPERIMENTS:

1. Signal Sampling and reconstruction
2. Time Division Multiplexing
3. AM Modulator and Demodulator
4. FM Modulator and Demodulator
5. Pulse Code Modulation and Demodulation
6. Delta Modulation and Demodulation
7. Observation (simulation) of signal constellations of BPSK, QPSK and QAM
8. Line coding schemes
9. FSK, PSK and DPSK schemes (Simulation)
10. Error control coding schemes - Linear Block Codes (Simulation)
11. Communication link simulation
12. Equalization – Zero Forcing & LMS algorithms(simulation)

TOTAL: 45 PERIODS

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY, KUMARACOIL

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER VI

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1	IT1212	Cyber Security	3	0	0	3
2	EC1214	Microprocessors and Microcontrollers	3	1	0	4
3	EC1215	Antenna & Wave Propagation	3	1	0	4
4	EC1216	Computer Communication	3	1	0	4
5	EC12AX	Elective I	3	0	0	3
6	EC12AX	Elective II	3	0	0	3
PRACTICAL						
7	EC1277	Electronic Circuits and Simulation Lab	0	1	2	2
8	EC1278	Microprocessor and Microcontroller Lab	0	1	2	2
TOTAL			18	5	4	25

IT1212 CYBER SECURITY 3 0 0 3

AIM

The Course curriculum aims at imparting the fundamentals of cyber crime investigation, the tools used for the investigation, in addition to giving an exposure to the various kinds of cyber security threats and their impact on connected systems/resources.

OBJECTIVES

- The course also gives an exposure to the different types of mechanisms to sanitize the cyber space by adopting standardized operating procedures while transacting business/commerce online, and also to ensure security of information handled over the net.
- Introduction to the Cyber Laws and the IPC/Cr.PC equips the students with sufficient legal knowledge about deterrence in preventing cyber crimes.

UNIT I COMPUTER ORGANIZATION& ARCHITECTURE AND OPERATINGSYSTEMS 6

Computer Organization, Architecture, Operating Systems, Process Management, CPU Scheduling, I/O Memory Management, file systems and deadlocks. LAN, MAN, WAN, ISO/OSI seven layer architecture.

UNIT II INFORMATION SECURITY FUNDAMENTALS 6

Background, Importance, statistics, national and international scenarios. Identification and authentication, confidentiality, privacy, integrity, non-repudiation. Goals of security: prevention, detection and recovery. E-commerce security. Critical Infrastructure Protection.

UNIT III SECURITY THREATS AND VULNERABILITIES 9

Overview of security threats, various kinds of threats; Authentication-weak passwords. Insecure internet connection- internet cookies, viruses and other infections. Security of hard drives, security of laptops; sniffers, backdoors and Trojans. Buffer overflow and other programming bugs. Common attacks- DoS, man-in-the-middle, brute force attacks

UNIT IV OVERVIEW OF SECURITY PRINCIPLES 15

Security policies and procedures, International standards, Security consideration of OS- OS hardening - Internet protocols and security: SSL/TLS, IP Security, Application layer security - Access Control: Physical, Logical and Biometric - Tools and Techniques: Firewalls, Antivirus, IDS, Log analysis, Cryptography, steganography - Security Infrastructure: PKI, VPN, Digital signature - Network scanners, vulnerability scanners - Device Security - Cloud computing security, Database security.

UNIT V CYBER CRIMES. 9

Cyber crimes, Cyber crime Investigation, and Cyber forensic tools. Cyber Laws. Information Technology Act, Cyber laws and cyber crime investigation. Social networks and analysis.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Thomas Calabres and Tom Calabrese, “Information Security Intelligence: Cryptographic Principles & Application”, Thomson Delmar Learning, 2004.
2. Bernadette H Schell, Clemens Martin, “Cyber Crime”, ABC-CLIO Inc, California, 2004.
3. Swiderski, Frank and Syndex, “Threat Modeling”, Microsoft Press, 2004.
4. William Stallings and Lawrie Brown, “Computer Security: Principles and Practice”, Prentice Hall, 2008.

REFERENCES

1. Silberschatz A, Galvin P, Gagne G, "Operating Systems Concepts", John Wiley & Sons, Singapore, 2006.
2. Principles and Practices of Information Security by Michael.E. Whiteman and Herbert .J. Mattord.
3. Cyber Laws by Aparna Viswanathan.
4. Joseph M Kizza, “Computer Network Security”, Springer Verlag, 2005.

EC1214 MICROPROCESSORS AND MICROCONTROLLERS 3 0 0 3

AIM

To learn the architecture programming and interfacing of microprocessors and microcontrollers.

OBJECTIVES

- Study the Architecture of 8086 microprocessor.
- Learn the design aspects of I/O and Memory Interfacing circuits.
- Study about communication and bus interfacing.
- Study the Architecture of 8051 microcontroller.

UNIT I INTRODUCTION TO MICROPROCESSOR 9

Introduction to 8-bit microprocessor-8085 (Architecture), Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation

UNIT II 8086 SYSTEM BUS STRUCTURE 9

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure - Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

UNIT IV MICROCONTROLLER 9

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

UNIT V INTERFACING AND ADVANCED MICROCONTROLLER 9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation. Introduction to PIC and ARM.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 4th Edition, Penram International Publishing, New Delhi, 2000.
2. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007.
3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011.

REFERENCES:

1. Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware",TMH,2012
2. John Uffenbeck, The 80x86 Family, Design, Programming and Interfacing, Third Edition. Pearson Education, 2002.
3. A.K. Ray and K.M.Burchandi, Intel Microprocessors Architecture Programming and Interfacing, McGraw Hill International Edition, 2000
4. Kenneth J Ayala, The 8051 Microcontroller Architecture Programming and Application, 2nd Edition, Penram International Publishers (India), New Delhi, 1996.
5. M. Rafi Quazzaman, Microprocessors Theory and Applications: Intel and Motorola prentice Hall of India, Pvt. Ltd., New Delhi, 2003.

EC1215 ANTENNA AND WAVE PROPAGATION 3 1 0 4

AIM

To enable the student to study the various types of antennas and wave propagation.

OBJECTIVES:

- To give insight of the radiation phenomena.
- To give a thorough understanding of the radiation characteristics of different types of antennas
- To create awareness about 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 ANTENNA ARRAYS **9**

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

UNIT III 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 IV SPECIAL ANTENNAS AND ANIENNA MEASUREMENTS **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

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOK:

1. John D Kraus," Antennas for all Applications", 3rd Edition, Mc Graw Hill, 2005.

REFERENCES:

1. Edward C.Jordan and Keith G.Balmain" Electromagnetic Waves and Radiating Systems" Prentice Hall of India, 2006
2. R.E.Collin,"Antennas and Radiowave Propagation", Mc Graw Hill 1985.
3. Constantine.A.Balanis "Antenna Theory Analysis and Design", Wiley Student Edition, 2006.
4. Rajeswari Chatterjee, "Antenna Theory and Practice" Revised Second Edition New Age International Publishers, 2006.
5. S. Drabowitch, "Modern Antennas" Second Edition, Springer Publications, 2007.
6. Robert S.Elliott "Antenna Theory and Design" Wiley Student Edition, 2006.
7. H.Sizun "Radio Wave Propagation for Telecommunication Applications", First Indian Reprint, Springer Publications, 2007.

EC1216 COMPUTER COMMUNICATION 3 0 0 3

AIM

To understand the division of network functionalities into layers.

OBJECTIVES:

- To be familiar with the components required to build different types of networks
- To learn the required functionality of each layer
- To learn the flow control and congestion control algorithms

UNIT I: FUNDAMENTALS & LINK LAYER **9**

Building a network – Requirements, network topology, types of network, Layering and protocols - Internet Architecture – Network software – Performance ; Link layer Services - Framing - Error Detection - Flow control.

UNIT II MEDIA ACCESS & INTERNETWORKING **9**

Media access control - Ethernet (802.3) - Wireless LANs – 802.11 – Bluetooth - Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP)

UNIT III ROUTING **9**

Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing (DVMRP, PIM)

UNIT IV TRANSPORT LAYER **9**

Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management - Flow control - Retransmission – TCP Congestion control - Congestion avoidance (DECbit, RED) – QoS – Application requirements

UNIT V APPLICATION LAYER **9**

Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS - SNMP

TOTAL: 45 PERIODS

TEXT BOOK:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011. 65

REFERENCES:

1. James F. Kurose, Keith W. Ross, “Computer Networking - A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
2. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.
3. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, Mc Graw Hill Publisher, 2011.
4. Behrouz A. Forouzan, “Data communication and Networking”, Fourth Edition, Tata McGraw – Hill, 2011.

EC1277 ELECTRONIC CIRCUITS AND SIMULATION LAB

L T P C
0 1 2 2

AIM

To introduce the student to various electronic circuits,network protocols and basics of control systems.

OBJECTIVES:

The student should be made to:

- Design electronic circuits like amplifiers,oscillators and multivibrators.
- Simulate network protocols using network simulation software.
- Understand the basic concepts of control systems by simulation using matlab software.

Electronic Circuits

1.Series feedback amplifier.
2.Shunt feedback amplifier.
3.RC phase shift Oscillator.
4.Hartley Oscillator.
5.Colpitts Oscillator.
6.Astable multivibrator.
7.Monostable multivibrator.

Simulation using Netsim software.

8.PC to PC communication
Parallel communication using 8 bit parallel cable.
Series communication using RS 232C
9. To study the performance of Ethernet LAN protocol(CSMA/CD protocol) through simulation.
10.To study the performance of token bus and token ring protocols.
11.To study the performance of WLAN and compare its performance with ETHERNET LAN.

Using MATLAB software

12.Time response analysis – impulse and step responses.
13.Frequency response analysis - Bode plot,Polar plot.
14. System analysis- Nyquist plot,Root locus plot
15.State space analysis .

TOTAL: 45 PERIODS

EC1278 MICROPROCESSOR AND MICROCONTROLLER LAB

L T P C
0 0 0 3

AIM
To enhance the programming skill using microprocessor and microcontroller.

OBJECTIVES:

The student should be made to:
- Introduce ALP concepts and features
- Write ALP for arithmetic and logical operations in 8086 and 8051
- Differentiate Serial and Parallel Interface
- Interface different I/Os with Microprocessors

1. Programs for 8/16 bit Arithmetic operations (Using 8085 , 8086).
2. Programs for Sorting and Searching (Using 8085, 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Interfacing ADC and DAC.

6. Parallel Communication between two MP Kits using Mode 1 and Mode 2 of 8255.
7. Interfacing and Programming 8279, 8259, and 8253.
8. Serial Communication between two MP Kits using 8251.
9. Interfacing and Programming of Stepper Motor and DC Motor Speed control.
10. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051microcontroller.
11. Programming and verifying Timer, Interrupts and UART operations in 8031 microcontroller.
12. Communication between 8051 Microcontroller kit and PC.

TOTAL: 45 PERIODS

LIST OF ELECTIVES IN ODD SEMESTER

Sl.No	Subject Code	Subject Name	L	T	P	C
1.	EC12A1	Digital Image Processing	3	0	0	3
2.	EC12A2	Wireless Networks	3	0	0	3
3.	EC12A3	Cryptography and Network Security	3	0	0	3
4.	EC12A4	Embedded and Real Time Systems	3	0	0	3
5.	EC12A5	Electronics Packaging	3	0	0	3
6.	EC12A6	Electromagnetic Interference and Compatibility	3	0	0	3
7.	EC12A7	Cognitive Radio	3	0	0	3
8.	EC12A8	Global Positioning System	3	0	0	3
9.	EC12A9	Advanced Electronic System Design	3	0	0	3
10.	EC12B1	High Speed Networks	3	0	0	3
11.	EC12B2	Television and Video Engineering	3	0	0	3
12.	MA1203	Numerical Methods	3	1	0	4

EC12A1 DIGITAL IMAGE PROCESSING L T P C
3 0 0 3

AIM:
To learn about the fundementals of Digital Image Processing and Different Image Processing Techniques

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 form of features.

UNIT I DIGITAL IMAGE FUNDAMENTALS 9
Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models.

UNIT II IMAGE ENHANCEMENT 9
Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT III IMAGE RESTORATION AND SEGMENTATION 9
Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation Morphological processing- erosion and dilation.

UNIT IV WAVELETS AND IMAGE COMPRESSION 9
Wavelets – Subband coding - Multiresolution expansions - Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding –Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V IMAGE REPRESENTATION AND RECOGNITION 9
Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments –Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors –Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.

REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.

2. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.
3. Willliam K Pratt, “Digital Image Processing”, John Willey, 2002.
4. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011.
5. http://eeweb.poly.edu/~onur/lectures/lectures.html.
6. http://www.caen.uiowa.edu/~dip/LECTURE/lecture.html

EC12A2 WIRELESS NETWORKS L T P C
3 0 0 3

AIM:

To learn about Wireless Networks and Network Layers

OBJECTIVES:

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications.

UNIT I WIRELESS LAN 9

Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum - IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM,BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol,security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX

UNIT II MOBILE NETWORK LAYER 9

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol - mobile ad-hoc network: Routing,Destination Sequence distance vector, Dynamic source routing

UNIT III MOBILE TRANSPORT LAYER 9

TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP,Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks.

UNIT IV WIRELESS WIDE AREA NETWORK 9

Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3GSGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

UNIT V 4G NETWORKS 9

Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies:Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jochen Schiller, ”Mobile Communications”, Second Edition, Pearson Education 2012. (Unit I,II,III)
2. Vijay Garg , “Wireless Communications and networking”, First Edition, Elsevier 2007.
   (Unit IV,V)

REFERENCES:

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband”, Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, “Wireless Networking”, First Edition, Elsevier 2011.
3. Simon Haykin , Michael Moher, David Koilpillai, “Modern Wireless Communications”, First Edition, Pearson Education 2013

EC12A3 CRYPTOGRAPHY AND NETWORK SECURITY L T P C
3 0 0 3

AIM:

To learn the basis of different cryptography techniques.

OBJECTIVES:

The student should be made to:

- Understand OSI security architecture and classical encryption techniques.
- Acquire fundamental knowledge on the concepts of finite fields and number theory.
- Understand various block cipher and stream cipher models.
- Describe the principles of public key cryptosystems, hash functions and digital signature.

UNIT I INTRODUCTION & NUMBER THEORY 10

Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic Euclid‟s algorithm-Finite fields- Polynomial Arithmetic –Prime numbers The Chinese remainder theorem.

UNIT II BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY 10

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT III HASH FUNCTIONS AND DIGITAL SIGNATURES 8

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols –DSS – EI Gamal – Schnorr.

UNIT IV SECURITY PRACTICE & SYSTEM SECURITY 8

Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls

SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats –Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

UNIT V E-MAIL, IP & WEB SECURITY 9

E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys-client authentication-PKI as deployed by SSLAttacks fixed in v3-Exportability-Encoding-Secure Electronic Transaction (SET).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013. (UNIT I,II,III,IV).
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002. (UNIT V).

REFERENCES:

1. Behrouz A. Ferouzan, "Cryptography & Network Security", T ata Mc Graw Hill, 2007.
2. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
3. Charles Pfleeger, "Security in Computing", 4th Edition, Prentice Hall of India, 2006.
4. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication in Public World", PHI 2002.
6. Bruce Schneier and Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
7. Douglas R Simson "Cryptography – Theory and practice", First Edition, CRC Press, 1995.
8. http://nptel.ac.in/.

EC12A4 EMBEDDED AND REAL TIME SYSTEMS L T P C

3 0 0 3

AIM

To learn the fundamentals of Embedded System Design

OBJECTIVES:

The student should be made to:

- Learn the architecture and programming of ARM processor.
- Be familiar with the embedded computing platform design and analysis.
- Be exposed to the basic concepts of real time Operating system.
- Learn the system design techniques and networks for embedded systems

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS **9**

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and outputsupervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

UNIT II EMBEDDED COMPUTING PLATFORM DESIGN **9**

The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis - Components for embedded programsModels of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT III PROCESSES AND OPERATING SYSTEMS **9**

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE.

UNIT IV SYSTEM DESIGN TECHNIQUES AND NETWORKS **9**

Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques- Distributed embedded systems – MPSoCs and shared memory multiprocessors.

UNIT V CASE STUDY **9**

Data compressor - Alarm Clock - Audio player - Software modem-Digital still camera - Telephone answering machine-Engine control unit – Video accelerator.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Marilyn Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Third Edition “Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

REFERENCES:

1. Jonathan W.Valvano, “Embedded Microcomputer Systems Real Time Interfacing”, Third Edition Cengage Learning, 2012.
2. David. E. Simon, “An Embedded Software Primer”, 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.
3. Raymond J.A. Buhr, Donald L.Bailey, “An Introduction to Real-Time Systems-From Design to Networking with C/C++”, Prentice Hall, 1999.

EC12A5 ELECTRONICS PACKAGING L T P C
3 0 0 3

AIM:

To learn about the fundamentals of Electronic Packaging Technologies

OBJECTIVES:

- To give a comprehensive introduction to the various packaging types used along with the associated same the thermal, speed, signal and integrity power issues.
- To introduce about CAD used in designing wiring boards

UNIT I OVERVIEW OF ELECTRONIC SYSTEMS PACKAGING 9

Definition of a system and history of semiconductors, Products and levels of packaging, Packaging aspects of handheld products, Definition of PWB, Basics of Semiconductor and Process flowchart, Wafer fabrication, inspection and testing, Wafer packaging; Packaging evolution; Chip connection choices, Wire bonding, TAB and flip chip.

UNIT II SEMICONDUCTOR PACKAGES 9

Single chip packages or modules (SCM), Commonly used packages and advanced packages; Materials in packages; Thermal mismatch in packages; Multichip modules (MCM)-types; System-inpackage (SIP); Packaging roadmaps; Hybrid circuits; Electrical Design considerations in systems packaging, Resistive, Capacitive and Inductive Parasitics, Layout guidelines and the Reflection problem, Interconnection.

UNIT III CAD FOR PRINTED WIRING BOARDS 9

Benefits from CAD; Introduction to DFM, DFR & DFT, Components of a CAD package and its highlights, Beginning a circuit design with schematic work and component, layout, DFM check, list and design rules; Design for Reliability,Printed Wiring Board Technologies: Board-level packaging aspects, Review of CAD output files for PCB fabrication; Photo plotting and mask generation, Process flow-chart; Vias; PWB substrates; Surface preparation, Photoresist and application methods; UV exposure and developing; Printing technologies for PWBs, PWB etching; PWB etching; Resist stripping; Screen-printing technology, hrough-hole manufacture process steps; Panel and pattern plating methods, Solder mask for PWBs; Multilayer PWBs; Introduction to, microvias, Microvia technology and Sequential build-up technology process flow for high-density, interconnects

UNIT IV SURFACE MOUNT TECHNOLOGY AND THERMAL CONSIDERATIONS 9

SMD benefits; Design issues; Introduction to soldering, Reflow and Wave Soldering methods to attach SMDs, Solders; Wetting of solders; Flux and its properties; Defects in wave soldering, Vapour phase soldering, BGA soldering and Desoldering/Repair; SMT failures, SMT failure library and Tin Whisker, Tin-lead and lead-free solders; Phase diagrams; Thermal profiles for reflow soldering; Lead freevAlloys, Lead-free solder considerations; Green electronics; RoHS compliance and e-waste recycling, Issues, Thermal Design considerations in systems packaging (L. Umanand, Thermal Design considerations in systems packaging

UNIT V EMBEDDED PASSIVES TECHNOLOGY 9

Introduction to embedded passives; Need for embedded passives; Design Library; Embedded resistor processes, Embedded capacitors; Processes for embedding capacitors; Case study examples.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Rao R. Tummala, "Fundamentals of Microsystems Packaging", McGraw Hill, NY, 2001

REFERENCE:

1. William D. Brown, "Advanced Electronic Packaging", IEEE Press, 1999.

EC12A6 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

3 0 0 3

AIM:

To learn the basic theories of EMI, EMC, Standards and testing Methods

OBJECTIVES:

- To understand 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 THEORY 9

Introduction to EMI and EMC, Intra and inter system EMI, Elements of Interference, Sources and Victims of EMI, Conducted and Radiated EMI emission and susceptibility, Case Histories, Radiation hazards to humans, Various issues of EMC, EMC Testing categories, EMC Engineering Application.

UNIT II COUPLING MECHANISM 9

Electromagnetic field sources and Coupling paths, Coupling via the supply network, Common mode coupling, Differential mode coupling, Impedance coupling, Inductive and Capacitive coupling, Radiative coupling, Ground loop coupling, Cable related emissions and coupling, Transient sources, Automotive transients.

UNIT III EMI MITIGATION TECHNIQUES 10

Working principle of Shielding and Murphy‟s Law, LF Magnetic shielding, Apertures and shielding effectiveness, Choice of Materials for H, E, and free space fields, Gasketting and sealing, PCB Level shielding, Principle of Grounding, Isolated grounds, Grounding strategies for Large systems, Grounding for mixed signal systems, Filter types and operation, Surge protection devices, Transient protection.

UNIT IV STANDARDS AND REGULATION 9

Need for Standards, Generic/General Standards for Residential and Industrial environment, Basic Standards, Product Standards, National and International EMI Standardizing Organizations; IEC,

ANSI, FCC, AS/NZS, CISPR, BSI, CENELEC, ACEC. Electro Magnetic Emission and susceptibility standards and specifications, MIL461E Standards.

UNIT V EMI TEST METHODS AND INSTRUMENTATION 9

Fundamental considerations, EMI Shielding effectiveness tests, Open field test, TEM cell for immunity test, Shielded chamber , Shielded anechoic chamber, EMI test receivers, Spectrum analyzer, EMI test wave simulators, EMI coupling networks, Line impedance stabilization networks, Feed through capacitors, Antennas, Current probes, MIL -STD test methods, Civilian STD test methods.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Clayton Paul, "Introduction to Electromagnetic Compatibility", Wiley Interscience, 2006

REFERENCES:

1. V Prasad Kodali, "Engineering Electromagnetic Compatibility", IEEE Press, Newyork, 2001.
2. Henry W. Ott, "Electromagnetic Compatibility Engineering", John Wiley & Sons Inc, Newyork, 2009
3. Daryl Gerke and William Kimmel, "EDN‟s Designer‟s Guide to Electromagnetic Compatibility", Elsevier Science & Technology Books, 2002
4. W Scott Bennett, "Control and Measurement of Unintentional Electromagnetic Radiation", John Wiley & Sons Inc., (Wiley Interscience Series) 1997.
5. Dr Kenneth L Kaiser, "The Electromagnetic Compatibility Handbook", CRC Press 2005,

EC12A7 COGNITIVE RADIO L T P C
3 0 0 3

AIM:

To learn the basics of the software defined radios and concepts of wireless networks and next generation networks.

OBJECTIVES:

The student should be made to:

- Know the basics of the software defined radios.
- Learn the design of the wireless networks based on the cognitive radios
- Understand the concepts of wireless networks and next generation networks

UNIT I INTRODUCTION TO SOFTWARE DEFINED RADIO 9

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

UNIT II SDR ARCHITECTURE 9

Essential functions of the software radio, basic SDR, hardware architecture, Computational processing resources, software architecture, top level component interfaces, interface topologies among plug and play modules.

UNIT III INTRODUCTION TO COGNITIVE RADIOS 9

Marking radio self-aware, cognitive techniques – position awareness, environment awareness in cognitive radios, optimization of radio resources, Artificial Intelligence Techniques.

UNIT IV COGNITIVE RADIO ARCHITECTURE 9

Cognitive Radio - functions, components and design rules, Cognition cycle - orient, plan, decide and act phases, Inference Hierarchy, Architecture maps, Building the Cognitive Radio Architecture on Software defined Radio Architechture.

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

TEXT BOOKS:

1. Joseph Mitola III,"Software Radio Architecture: Object-Oriented Approaches to Wireless System Engineering", John Wiley & Sons Ltd. 2000.
2. Thomas W.Rondeau, Charles W. Bostain, "Artificial Intelligence in Wireless communication",ARTECH HOUSE .2009.
3. Bruce A. Fette, "Cognitive Radio Technology", Elsevier, 2009.
4. 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.

REFERENCES:

1. Simon Haykin, "Cognitive Radio: Brain –Empowered Wireless Communications", IEEE Journal on selected areas in communications, Feb 2005.
2. Hasari Celebi, Huseyin Arslan, "Enabling Location and Environment Awareness in Cognitive Radios", Elsevier Computer Communications , Jan 2008.
3. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, "Software Defined Radio", John Wiley, 2003.
4. Huseyin Arslan, "Cognitive Radio, SDR and Adaptive System", Springer, 2007.
5. Alexander M. Wyglinski, Maziarnekovee, Y. Thomas Hu, "Cognitive Radio Communication and Networks", Elsevier, 2010.

EC12A8 GLOBAL POSITIONING SYSEMS 3 0 0 3

AIM

To introduce the basic concepts of global positioning systems .

OBJECTIVES

- To study the concept of GPS concept,signals
- To learn the GPS coordinate systems, errors and orbits.

UNIT I INTRODUCTION TO GPS 9

Overview of GPS : Basic concept, system architecture, space segment, user segment, GPS aided Geo-augmented navigation (GAGAN) architecture.

UNIT II GPS SIGNALS 9

GPS Signals Signal structure, anti spoofing (AS), selective availability, Difference between GPS and GALILEO satellite construction.

UNIT III GPS COORDINATES 9

GPS coordinate frames, Time references: Geodetic and Geo centric coordinate systems, ECEF coordinates, world geodetic 1984 (WGS 84), GPS time.

UNIT IV GPS ORBITS AND PARAMETERS 9

GPS orbits and satellite position determination : GPS orbital parameters, description of receiver independent exchange format (RINEX) – Observation data and navigation message data parameters, GPS position determination.

UNIT V GPS ERRORS 9

GPS Errors : GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

TOTAL: 45 PERIODS

TEXTBOOK:

1. G S RAO, Global Navigation Satellite Systems, McGraw-Hill publications, New Delhi, 2010

REFERENCE BOOKS:

1. B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, 'GPS – Theory and Practice', Springer – Wien, New York (2001).
2. James Ba – Yen Tsui, 'Fundamentals of GPS receivers – A software approach', John Wiley & Sons (2001)

EC12A9 ADVANCED ELECTRONIC SYSTEM DESIGN

L T P C
3 0 0 3

AIM

To get knowledge about usage of electronic devices in Communication Engineering and Power supplies.

OBJECTIVES

- To learn the fundementals RF components, analysis and filter designs
- Study about RF Amplifiers.
- Study about the physical Design of RF circuits

UNIT I INTRODUCTION TO RF DESIGN 9

RF behaviour of passive components, Chip components and circuit board considerations, Review of transmission lines, Impedance and admittance transformation, Parallel and series connection of networks, ABCD and scattering parameters, Analysis of amplifier using scattering parameter. RF filter – Basic resonator and filter configurations – Butterworth and Chebyshev filters. Implementations of microstrip filter design. Band pass filter and cascading of band pass filter elements.

UNIT II RF TRANSISTOR AMPLIFIER DESIGN 9

Impedance matching using discrete components. Microstrip line matching networks. Amplifier classes of operation and biasing networks – Amplifier power gain, Unilateral design(S_{12} =0) – Simple input and output matching networks – Bilateral design - Stability circle and conditional stability, Simultaneous conjugate matching for unconditionally stable transistors. Broadband amplifiers, High power amplifiers and multistage amplifiers.

UNIT III DESIGN OF POWER SUPPLIES 9

DC power supply design using transistors and SCRs, Design of crowbar and foldback protection circuits, Switched mode power supplies, Forward, flyback, buck and boost converters, Design of transformers and control circuits for SMPS.

UNIT IV DESIGN OF DATA ACQUISITION SYSTEMS 9

Amplification of Low level signals, Grounding, Shielding and Guarding techniques, Dual slope, quad slope and high speed A/D converters, Microprocessors Compatible A/D converters, Multiplying A/D converters and Logarithmic A/D converters, Sample and Hold, Design of two and four wire transmitters.

UNIT V DESIGN OF PRINTED CIRCUIT BOARDS 9

Introduction to technology of printed circuit boards (PCB), General lay out and rules and parameters, PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits, Computer Aided design of PCBs.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Reinhold Luduig and Pavel Bretchko, RF Circuit Design – Theory and Applications, Pearson Education, 2000.
2. Sydney Soclof, “Applications of Analog Integrated Circuits”, Prentice Hall of India, 1990.
3. Walter C.Bosshart, “Printed circuit Boards – Design and Technology”, TATA McGraw-Hill, 1983.

REFERENCES

1. Keith H.Billings, “Handbook of Switched Mode Supplies” McGraw-Hill Publishing Co., 1989.
2. Michael Jaacob, “Applications and Design with Analog Integrated Circuits” Prentice Hall of India, 1991.
3. Otmar Kigenstein, “Switched Mode Power supplies in Practice”, John Wiley and Sons, 1989.
4. Muhammad H.Rashid, Power Electronics – Circuits, Devices and Applications, Prentice Hall of India, 2004.

EC12B1 HIGH SPEED NETWORKS

L T P C
3 0 0 3

AIM

To highlight the features of different technologies involved in High Speed Networking and their performance.

OBJECTIVES

- To understand the features of frame relay networks.
- To study the congestion control mechanisms

UNIT I HIGH SPEED NETWORKS **9**

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL.

High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements – Architecture of 802.11

UNIT II CONGESTION AND TRAFFIC MANAGEMENT **9**

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

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

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM.

Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES **9**

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

UNIT V PROTOCOLS FOR QOS SUPPORT **9**

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

TOTAL: 45 PERIODS

TEXT BOOK

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.

EC12B2 TELEVISION AND VIDEO ENGINEERING 3 0 0 3

AIM

The syllabus aims at a comprehensive coverage of Television Systems with all the new developments in Television Engineering

OBJECTIVES

- To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture Tubes and Television Camera Tubes
- To study the principles of Monochrome Television Transmitter and Receiver systems.

- To study the various Color Television systems with a greater emphasis on PAL system.
- To study the advanced topics in Television systems and Video Engineering

UNIT I FUNDAMENTALS OF TELEVISION 9

Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon - vidicon-plumbicon-silicon diode array vidicon-solid state image scanners- monochrome picture tubes- composite video signal-video signal dimension- horizontal sync. Composition- vertical sync. Details – functions of vertical pulse train – scanning sequence details. Picture signal transmission – positive and negative modulation – VSB transmission sound signal transmission – standard channel bandwidth.

UNIT II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER 9

TV transmitter – TV signal propagation – Interference – TV transmission Antennas – Monochrome TV receiver – RF tuner – UHF, VHF tuner- Digital tuning techniques- AFT-IF subsystems - AGC – Noise cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers requirements and configurations - DC re-insertion - Video amplifier circuits- Sync separation – typical sync processing circuits- Deflection current waveform – Deflection Oscillators – Frame deflection circuits – requirements- Line Deflection circuits – EHT generation – Receiver Antennas.

UNIT III ESSENTIALS OF COLOUR TELEVISION 9

Compatibility – colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals- colour television display tubes- delta – gun-precision – in-line and Trinitron colour picture tubes- purity and convergence- purity and static and dynamic convergence adjustments- pincushion correction techniques- automatic degaussing circuit- grey scale tracking – colour signal transmission-bandwidth- modulation of colour difference signals – weighting factors- Formation of chrominance signal.

UNIT IV COLOUR TELEVISION SYSTEMS: 9

NTSC colour TV system- NTSC colour receiver- limitations of NTSC system – PAL colour TV system – cancellation of phase errors- PAL –D colour system- PAL coder – Pal-Decoder ,merits and demerits of the PAL system – SECAM system – merits and demerits of SECAM system.

UNIT V ADVANCED TELEVISION SYSTEMS 9

Satellite TV technology- Cable TV – VCR- Video Disc recording and playback- Tele Text broadcast receiver – digital television – Transmission and reception- projection Television – Flat panel display TV receiver – Sterio sound in TV – 3D TV , EDTV , LED TV,LCD TV, Plasma TV, Digital equipments for TV studios.

TOTAL: 45 PERIODS

TEXT BOOKS

1. R.R.Gulati, “Monochrome Television Practice, Principles, Technology and servicing, Second edition, New age International Publishes, 2004 (Unit I,II,IV and V)
2. R.R.Gulati “Monochrome and colour television “, New age International Publisher, 2003 (Unit I,III and IV)

REFERENCES

1. A.M Dhake, "Television and Video Engineering", Second edition, TMH, 2003.
2. S.P.Bali, " Colour Television, Theory and Practice", TMH, 1994.

MA1203 NUMERICAL METHODS 3 1 0 4

AIM:

With the present development of Computer Technology, it is necessary to develop efficient algorithms for solving problems in science, Engineering and Technology. This course gives a complete procedure for solving different kinds of problems in engineering numerically.

OBJECTIVE:

To have the basic concepts in numerical methods and find the solutions of large system of linear equations where analytical methods fail to give solution. To gain the ability to solve engineering problems characterized in the form of non- linear ordinary differential equation or partial differential equation.

UNIT I SOLUTION OF EQUATIONS 9

Solution of non-linear equations-Method of false position, Newton Raphson method , Fixed point iteration method – Solution of linear system of Equations-Direct methods: Gaussian elimination and Gauss-Jordan methods – Iterative methods: Gauss Jacobi and Gauss – Seidel methods- Inverse of a matrix by Gauss-Jordan method.

UNIT II INTERPOLATION 9

Difference Operators-Forward and Backward – Differences of a polynomial -Missing terms-Interpolation for equal intervals- Newton's forward and Backward formula- Interpolation for unequal intervals-Newton's divided difference and Lagrange's formula – Interpolation with a cubic spline .

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Numerical differentiation using Newton's Forward, Backward, Newton's divided difference and Lagrange's formula – Numerical integration by Trapezoidal , Simpson's 1/3 and 3/8 rules , Romberg's method – Gaussian Quadrature -Two and three point formulae – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Solution of first order differential equations -Single step Methods : Taylor Series , Euler ,Modified Euler methods and Fourth order Runge-Kutta method . Multi-step methods : Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS 9

Finite difference solution of the second order ordinary differential equations. Classification of partial differential equation- Finite difference solution of one dimensional heat equation by implicit and explicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK:

1. Venkatraman M.K, “Numerical Methods” Fifth Edition, National Pub. Company, Chennai 2005.

REFERENCES:

1. Kandasamy, P.Thilakavathy, K and Gunavathy, K. “Numerical Methods” Second Edition, S.Chand and Co. New Delhi. 2008
2. Balagurusamy, E., “Numerical Methods”, First Edition Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2009.
3. Gerald, C.F, and Wheatley, P.O, “Applied Numerical Analysis”, Sixth Edition, Pearson
   Education Asia, New Delhi, 2006

LIST OF ELECTIVES IN EVEN SEMESTER

Sl.No	Subject Code	Subject Name	L	T	P	C
1.	EC12B3	Speech Processing	3	0	0	3
2.	EC12B4	Computer Hardware and Interfacing	3	0	0	3
3.	EC12B5	Artificial Intelligence	3	0	0	3
4.	EC12B6	Medical Electronics	3	0	0	3
5.	EC12B7	Solid State Microwave Devices	3	0	0	3
6.	EC12B8	Mobile Communication	3	0	0	3
7.	EC12B9	Soft Computing Techniques	3	0	0	3
8.	EC12C1	Satellite Communication	3	0	0	3
9.	EC12C2	Remote Sensing	3	0	0	3
10.	EC12C3	Radar and Navigational Aids	3	0	0	3
11.	EC12C4	Telecommunication Switching & Networks	3	0	0	3
12.	EC12C5	Opto Electronic Devices	3	0	0	3
13.	EC12C6	Nano Technology	3	0	0	3
14.	EC12C7	Cloud Computing	3	0	0	3
15.	EC12C8	Electronic Measurements and Instrumentation	3	0	0	3
16.	EC12C9	CMOS Analog Design	3	0	0	3

EC12B3 SPEECH PROCESSING

L T P C
3 0 0 3

AIM

To introduce the characteristics of Speech signals and the related time and frequency domain methods for speech analysis and speech compression.

OBJECTIVE

- To introduce the models for speech production
- To develop time and frequency domain techniques for estimating speech parameters.
- To introduce a predictive technique for speech compression
- To understand speech recognition, synthesis and speaker identification.

UNIT I MECHANICS OF SPEECH 9

Speech production mechanism, Classification of speech, Acoustic phonetics, nature of speech signal, models of speech production.

Speech signal processing: purpose of speech processing, digital models for speech signal, Digital processing of speech signals- Sampling, quantization, Auditory perception: psycho acoustics.

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING 9

Time domain parameters of Speech signal – Methods for extracting the parameters-Energy, Average Magnitude, Zero crossing Rate – Silence Discrimination using ZCRand energy – Short Time Auto Correlation Function – Pitch period estimation using AutoCorrelation Function.

UNIT III FREQUENCY DOMAIN METHODS FOR SPEECH PROCESSING 9

Short time Fourier analysis, filter bank analysis, spectrographic analysis - Pitch and formant-Extraction and Estimation, Homomorphic speech analysis: Cepstral analysis of Speech, Analysis by Synthesis - synthesis systems,vocoder, HomomorphicVocoders

UNIT IV LINEAR PREDICTIVE ANALYSIS OF SPEECH9

Basic Principles of linear predictive analysis – Auto correlation method – Covariancemethod – Cholesky method – Durbin's Recursive algorithm,Pitch detection using LPC parameters – Formantanalysis

UNIT VAPPLICATION OF SPEECH & AUDIO SIGNAL PROCESSING 9

Algorithms: Dynamic time warping, K-means clustering and Vector quantization,Gaussian mixture modeling, hidden Markov modeling - Automatic Speech Recognition: Feature Extraction for ASR, Deterministic sequence recognition, Statistical Sequencerecognition, Language models - Speaker identification and verification – Voice responsesystem

TOTAL: 45 PERIODS

TEXT BOOK:

1. Thomas F, Quatieri, Discrete-Time Speech Signal Processing, Prentice Hall / Pearson Education, 2004.

REFERENCES:

1. Ben Gold and Nelson Morgan, Speech and Audio Signal Processing, John Wiley and Sons Inc., Singapore, 2004
2. L.R.Rabiner and R.W.Schaffer – Digital Processing of Speech signals – Prentice Hall 1979
3. L.R. Rabiner and B. H. Juang, Fundamentals of Speech Recognition, Prentice Hall, 1993.
4. J.R. Deller, J.H.L. Hansen and J.G. Proakis, Discrete Time Processing of Speech Signals, John Wiley, IEEE Press, 1999.

EC12B4 COMPUTER HARDWARE AND INTERFACING

L T P C
3 0 0 3

AIM

To enable the student to get a detailed knowledge of all the hardware components that make up a computer and to understand the different interfaces required for connecting these hardware devices.

OBJECTIVES

- To introduce issues related to CPU and memory.
- To understand the components on the motherboard
- To understand different storage media
- To introduce the features of different I/O peripheral devices and their interfaces.

UNIT I CPU AND MEMORY **9**

CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel's CPU – CPU over clocking – over clocking requirements – over clocking the system – over clocking the Intel processors – Essential memory concepts – memory organizations – memory packages – modules – logical memory organizations – memory considerations – memory types – memory techniques – selecting and installing memory.

UNIT II MOTHERBOARDS **9**

Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots – form factor – upgrading a mother board – chipsets – north bridge – south bridge – CMOS – CMOS optimization tactics – configuring the standard CMOS setup – motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

UNIT III STORAGE DEVICES **9**

The floppy drive – magnetic storage – magnetic recording principles – data and disk organization – floppy drive – hard drive – data organization and hard drive – sector layout – IDE drive standard and features – Hard drive electronics – CD-ROM drive – construction – CDROM electronics – DVD-ROM – DVD media – DVD drive and decoder.

UNIT IV I/O PERIPHERALS **9**

Parallel port – signals and timing diagram – IEEE1284 modes – asynchronous communication - serial port signals – video adapters – graphic accelerators – 3D graphics

accelerator issues – DirectX – mice – modems – keyboards – sound boards – audio bench marks.

UNIT V BUS ARCHITECTURE **9**

Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture.

TOTAL: 45 PERIODS

TEXT BOOK

1. Stephen J.Bigelow, "Trouble Shooting, maintaining and Repairing PCs", Tata McGraw-Hill, New Delhi, 2001.

REFERENCES

1. Craig Zacker & John Rourke, "The complete reference:PC hardware", Tata McGraw-Hill, New Delhi, 2001.
2. Mike Meyers, "Introduction to PC Hardware and Trouble shooting", Tata McGraw-Hill, New Delhi, 2003.
3. B.Govindarajulu, "IBM PC and Clones hardware trouble shooting and maintenance", Tata McGraw-Hill, New Delhi, 2002.

EC12B5 ARTIFICIAL INTELLIGENCE

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

AIM:

To study the concepts of Artificial Intelligence and different methods of solving problems using Artificial Intelligence

OBJECTIVES:

The student should be made to:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of Expert Systems and machine learning.

UNIT I INTRODUCTION TO Al AND PRODUCTION SYSTEMS **9**

Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

UNIT II REPRESENTATION OF KNOWLEDGE **9**

Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

UNIT III KNOWLEDGE INFERENCE **9**

Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT IV PLANNING AND MACHINE LEARNING 9

Basic plan generation systems - Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.

UNIT V EXPERT SYSTEMS 9

Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill- 2008. (Units-I,II,VI & V)
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit-III).

REFERENCES:

1. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.
3. Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.
4. http://nptel.ac.in

EC12B6 MEDICAL ELECTRONICS 3 0 0 3

AIM

To make students to understand the applications of electronics in diagnostic and therapeutic area.

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, EOG, VAG lead systems and recording methods, typical waveforms and signal characteristics.

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9

PH, PO2, PCO2, PHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III ASSIST DEVICES AND BIO-TELEMETRY 9

Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Bio-telemetry, radio-pill and tele-stimulation.

UNIT IV RADIOLOGICAL EQUIPMENTS 9

Ionosing radiation, Diagnostic x-ray equipments, use of Radio Isotope in diagnosis, Radiation Therapy.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermograph, endoscopy unit, Laser in medicine, Diathermy units, Scanner-PET, MRI, CT, Electrical safety in medical equipment.

TOTAL: 45 PERIODS

TEXTBOOK

1. Leislie Cromwell, "Biomedical instrumentation and measurement", Prentice Hall of India, New Delhi, 2002.

REFERENCES

1. Khandpur, R.S., "Handbook of Biomedical Instrumentation", TATA McGraw-Hill, New Delhi, 1997.
2. Joseph J.Carr and John M.Brown, "Introduction to Biomedical equipment Technology", John Wiley and Sons, New York, 1997.

EC12B7 SOLID STATE MICROWAVE DEVICES

L T P C
3 0 0 3

AIM

To have fundamental knowledge about structure of devices, VI characteristics of devices like PN Junction diode, Zener diode, MOSFET, BJT and Opto electronic devices.

OBJECTIVE

- To understand the structure of diodes
- To study the VI characteristics of PN,Zener,MOSFET,BJT and optoelectronic devices.

UNIT I MICROWAVE NETWORK ANALYSIS AND IMPEDANCE MATCHING 9

Microwave Network Analysis – Equivalent voltages and currents, Impedance, Impedance and Admittance matrices, scattering matrix, The transmission matrix. Signal flow graphs. Impedance matching and tuning – Matching with lumped elements, Single stub tuning, Double stub tuning. Quarter wave transformer, Theory of small reflections.

UNIT II DIODES 9

Gunn – effect diodes – Gunn effect, Ridley – Watkins-Hilsum theory, Modes of operation, Limited space – Charge accumulation (LSA) mode of gunn diode, InP diodes,PIN diodes,Varactor diode, Microwave generation and amplification.

The Read diode, IMPATT diodes – Structure, Operation, Power output and efficiency, TRAPATT diodes –Operation, Power output and efficiency BARITTdiodes – structure, Operation.

UNIT III TRANSISTORS AND MICROWAVE INTEGRATED CIRCUITS 9

Bipolar transistors – biasing, Microwave Transistor-FET – biasing, MESFET – Structure, Operation, High Electron mobility transistors (HEMT) – Physical structure, Operation, Characteristics. Parametric devices, Parametric amplifiers.

Monolithic Microwave Integrated Circuit – Materials, Growth, MOSFET fabrication,microstrip patch antenna.

UNIT IV MICROWAVE FILTERS 9

Microwave filters – Periodic structures – Analysis of infinite periodic structures and terminated periodic structures, Filter design by image parameter method – Constant k, m-derived and composite. Filter design by insertion loss method. Filter transformation and implementation-microstrip band pass filter.

UNIT V MICROWAVE AMPLIFIERS AND OSCILLATORS 9

Microwave amplifiers and oscillators – Amplifiers – Gain and stability, Single stage transistor amplifier design. Oscillator design – One port negative resistance oscillators, transistor oscillators.

TOTAL: 45 PERIODS

TEXT BOOK

1. David M. Pozar : Microwave Engineering , 2nd edn., John Wiley & Sons (Asia) Pvt. Ltd.

REFERENCES

1. K. C. Gupta : Microwaves, New Age International Pub.,1979.
2. Sitesh Kumar Roy, Monojit Mitra : Microwave Semiconductor Devices, PHI - 2003.
3. Liao: Microwave Devices and Circuits, 3rd edn, Pearson Education, 2003.
4. Robert E Collin: Foundations of Microwave Engineering, Mc Graw Hill.
5. M.L.Sisodia: Microwaves-Introduction to Circuit,Devices and antennas, New Age International Pub.,2007.

EC12B8 MOBILE COMMUNICATION

L T P C
3 0 0 3

AIM

To introduce the concepts of mobile communication using cellular environment. To make the students to know about the various modulation techniques, propagation methods, coding and multi access techniques and various wireless network systems & standards used in the mobile communication.

OBJECTIVES

- It deals with the fundamental cellular radio concepts such as frequency reuse and handoff and coverage of mobile system.
- It presents different types of radio propagation models and small scale propagation effects such as fading, time delay spread and Doppler spread and Multipath measurements

- It provides idea about analog and digital modulation techniques used in wireless communication. It also deals with the different types of equalization techniques and diversity concepts.
- It provides an introduction to speech coding principles and linear, non-linear predictive coding techniques and also describes the various multiple access techniques.
- It deals with 1G, 2G, 3G, 4G wireless systems and standards.

UNIT I CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS 9

Introduction to wireless communication: Evolution of mobile communications, mobile radio systems- Examples, trends in cellular radio and personal communications.

Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems.

UNIT II MOBILE RADIO PROPAGATION 9

Free space propagation model, reflection, diffraction, scattering- link budget design- Outdoor Propagation models, Indoor propagation models- Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, types of small scale fading, Rayleigh and Rician Distributions.

UNIT III MODULATION TECHNIQUES AND EQUALIZATION 9

Modulation Techniques: Minimum Shift Keying, Gaussian MSK, M-ary PSK, M-ary QAM, M-ary FSK, Orthogonal Frequency Division Multiplexing.

Equalization: Fundamentals of Equalization, Equalizers in Communication Receiver, Survey of Equalization Techniques- Linear Equalization, Non-linear Equalization, Adaptive Equalization. Diversity Techniques, RAKE receiver.

UNIT IV CODING AND MULTIPLE ACCESS TECHNIQUES 9

Coding: Vo-coders, Linear Predictive Coders, Selection of Speech Coders for Mobile Communication, GSM Codec.

Multiple Access Techniques: FDMA, TDMA, FHMA, CDMA, Hybrid spread spectrum techniques, SDMA.

UNIT V WIRELESS SYSTEMS AND STANDARDS 9

1G, 2G, 3G and 4G Wireless systems and Standards - AMPS, GSM, IS-95 and DECT - Blue tooth, Zig-bee ,WLL, IEEE Standards on Wi-Fi, Wi-Max, WLAN.

TOTAL: 45 PERIODS

TEXT BOOK

1. T.S.Rappaport, “Wireless Communications: Principles and Practice, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.

REFERENCES

1. R. Blake, “Wireless Communication Technology”, Thomson Delmar, 2003.
2. W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw-Hill International, 1998.
3. Stephen G. Wilson, “Digital Modulation and Coding”, Pearson Education, 2003.

EC12B9 SOFT COMPUTING TECHNIQUES

L T P C
3 0 0 3

PREREQUISITE: Digital Logic

AIM

To introduce the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.

OBJECTIVES

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations

UNIT I ARTIFICIAL NEURAL NETWORKS 9

Basic concepts-single layer perceptron-Multi layer perceptron-Adaline-Madaline-Learning rules-Supervised learning-Back propagation networks-Training algorithm, Practical difficulties, Advanced algorithms-Adaptive network- Radial basis network-modular network-Applications

UNIT II UNSUPERVISED NETWORKS 9

Introduction- unsupervised learning -Competitive learning networks-Kohonen self organising networks-Learning vector quantisation - Hebbian learning - Hopfield network-Content addressable nature, Binary Hopfield network, Continuous Hopfield network Travelling Salesperson problem - Adaptive resonance theory –Bidirectional Associative Memory-Principle component Analysis

UNIT III FUZZY SYSTEMS 9

Fuzzy sets-Fuzzy rules: Extension principle, Fuzzy relation- fuzzy reasoning – fuzzy inference systems: Mamdani model, Sugeno model. Tsukamoto model -Fuzzy decision making- Multiobjective Decision Making,-Fuzzy classification-Fuzzy control methods - Application

UNIT IV NEURO-FUZZY MODELLING 9

Adaptive Neuro Fuzzy based inference systems – classification and regression trees: decision tress, Cart algorithm – Data clustering algorithms: K means clustering, Fuzzy C means clustering, Mountain clustering, Subtractive clustering – rule base structure identification – Neuro fuzzy control: Feedback Control Systems, Expert Control, Inverse Learning, Specialized Learning, Back propagation through Real –Time Recurrent Learning.

UNIT V GENETIC ALGORITHM **9**

Fundamentals of genetic algorithm-Mathematical foundations-Genetic modeling-Survival of the fittest-crossover-Inversion and Deletion-mutation-reproduction-Generational cycle-rank method-rank space method- Other derivative free optimization-simulated annealing, Random search, Downhill simplex search-Application

TOTAL: 45 PERIODS

REFERENCES

1. Jang J.S.R.,Sun C.T and Mizutani E – "Neuro Fuzzy and Soft computing", Pearson education (Singapore) 2004
2. David E.Goldberg : "Genetic Algorithms in Search, Optimization, and Machine Learning", Pearson Education, Asia, 1996
3. Laurene Fauseett:"Fundamentals of Neural Networks", Prentice Hall India, New Delhi, 1994.
4. Timothy J.Ross:"Fuzzy Logic Engineering Applications", McGraw Hill, NewYork, 1997.
5. S.Rajasekaran and G.A.Vijayalakshmi Pai "Neural networks,Fuzzy logics,and Genetic algorithms", Prentice Hall of India, 2003
6. George J.Klir and Bo Yuan,"Fuzzy Sets and Fuzzy Logic",Prentice Hall Inc., New Jersey, 1995

EC12C1 SATELLITE COMMUNICATION

L T P C
3 0 0 3

AIM

To enable the student to become familiar with satellites and satellite services.

OBJECTIVES

- Overview of satellite systems in relation to other terrestrial systems.
- Study of satellite orbits and launching.
- Study of earth segment and space segment components
- Study of satellite access by various users.
- Study of DTH and compression standards.

UNIT I OVERVIEW OF SATELLITE SYSTEMS, ORBITS AND LAUNCHING METHODS **9**

Introduction – Frequency Allocations for Satellite Services – Intelsat – U.S.Domsats – Polar Orbiting Satellites – Problems – Kepler's First Law – Kepler's Second Law – Kepler's Third Law – Definitions of Terms for Earth-orbiting Satellites – Orbital Elements – Apogee and Perigee Heights – Orbital Perturbations – Effects of a Nonspherical Earth – Atmospheric Drag – Inclined Orbits – Calendars – Universal Time – Julian Dates – Sidereal Time – The Orbital Plane – The Geocentric-Equatorial Coordinate System – Earth Station Referred to the IJK Frame – The Topocentric-Horizon Co-ordinate System – The Sub-satellite Point – Predicting Satellite Position, Sun-synchronous orbit.

UNIT II GEOSTATIONARY ORBIT & SPACE SEGMENT **9**

Introduction – Antenna Look Angels – The Polar Mount Antenna – Limits of Visibility – Near Geostationary Orbits – Earth Eclipse of Satellite – Sun Transit Outage – Launching Orbits – Problems – Power Supply – Attitude Control – Spinning Satellite Stabilization –

Momentum Wheel Stabilization – Station Keeping – Thermal Control – TT&C Subsystem – Transponders – Wideband Receiver – Input Demultiplexer – Power Amplifier – Antenna Subsystem – Morelos – Anik-E – Advanced Tiros-N Spacecraft

UNIT III EARTH SEGMENT & SPACE LINK 9

Introduction – Receive-Only Home TV Systems – Outdoor Unit – Indoor Unit for Analog (FM) TV – Master Antenna TV System – Community Antenna TV System – Transmit-Receive Earth Stations – Problems – Equivalent Isotropic Radiated Power – Transmission Losses – Free-Space Transmission – Feeder Losses – Antenna Misalignment Losses – Fixed Atmospheric and Ionospheric Losses – Link Power Budget Equation – System Noise – Antenna Noise – Amplifier Noise Temperature – Amplifiers in Cascade – Noise Factor – Noise Temperature of Absorptive Networks – Overall System Noise Temperature – Carrier-to-Noise Ratio – Uplink – Saturation Flux Density – Input Back Off – The Earth Station HPA – Downlink – Output Back off – Satellite TWTA Output – Effects of Rain – Uplink rain-fade margin – Downlink rain-fade margin – Combined Uplink and Downlink C/N Ratio – Intermodulation Noise.

UNIT IV SATELLITE ACCESS 9

Single Access – Preassigned FDMA, Demand-Assigned FDMA, SPADE System. Bandwidth-limited and Power-limited TWT amplifier operation, FDMA downlink analysis.

TDMA : Reference Burst; Preamble and Postamble, Carrier recovery, Network synchronization, unique word detection, Traffic Data, Frame Efficiency and Channel capacity, preassigned TDMA, Demand assigned TDMA, Speech Interpolation and Prediction, Downlink analysis for Digital transmission.

Comparison of uplink Power requirements for FDMA & TDMA. On-board signal Processing for TDMA / FDMA operation, Satellite switched TDMA.

Code-Division Multiple Access – Direct-Sequence spread spectrum – code signal c(t) – autocorrelation function for c(t) – Acquisition and tracking – Spectrum spreading and dispreading – CDMA throughput – Problems – Network Layers – TCP Link – Satellite Links and TCP – Enhancing TCP Over Satellite Channels Using Standard Mechanisms (RFC-2488) – Requests for comments – Split TCP connections – Asymmetric Channels – Proposed Systems.

UNIT V DIRECT BROADCAST SATELLITE SERVICES 9

Introduction – Orbital Spacings – Power Rating and Number of Transponders – Frequencies and Polarization – Transponder Capacity – Bit Rates for Digital Television – MPEG Compression Standards – Forward Error Correction – Home Receiver Outdoor Unit (ODU) – Home Receiver Indoor Unit (IDU) – Downlink Analysis – Uplink -Problems - Satellite Mobile Services – VSATs – Radarsat – Global Positioning Satellite System – Orbcomm.

TOTAL: 45 PERIODS

TEXT BOOK

1. Dennis Roddy, Satellite Communications, McGraw-Hill Publication Third edition 2001

REFERENCES

1. Timothy Pratt – Charles Bostian & Jeremy Allmuti, Satellite Communications, John Willy & Sons (Asia) Pvt. Ltd. 2004
2. Wilbur L. Pritchars Henri G.Suyder Hond Robert A.Nelson, Satellite Communication Systems Engineering, Pearson Education Ltd., Second edition 2003.

3. M.Richharia : Satellite Communication Systems (Design Principles Macmillan Press Ltd. Second Edition 2003.

EC12C2 REMOTE SENSING 3 0 0 3

AIM:

To learn Basic Principles of Remote sensing, different types of Remote sensing Techniques and their applications.

OBJECTIVES:

- To know the basics of Remote sensing
- To learn about the platforms of Remote sensing
- To learn data interpretations of Remote sensing

UNIT I BASIC PRINCIPLES 9

Definition – Components of Remote Sensing – Electro Magnetic Radiation (EMR) – EMR spectrum – Atmospheric interaction with EMR – Atmospheric Windows – Scattering and Absorption– EMR interaction with Earth Surface Materials- Spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil. Black Body Radiation - Planck's law – Stefan-Boltzman law.

UNIT II PLATFORMS, SENSORS AND RADAR 9

Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Repetivity – Satellites - Classification – Based on Orbits , Sensor, Active and Passive Remote Sensors , Resolution concept – Sensor description of important Earth Resources and Meteorological satellites, Satellites carrying microwave sensors, Radar – Speckle - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar

UNIT III DATA INTREPRETATION AND ANALYSIS 9

Types of Data Products –Procedure of image interpretation- Interpretation methods – Basic elements of image interpretation - interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

Maps – Types of Maps – Map projection – Types of Map projection - GIS – GIS Architecture - Data – Spatial and Non-Spatial Data, Data models- Raster and Vector GIS Models – Data Base Management Systems

UNIT V DATA ENTRY, STORAGE, ANALYSIS 9

Data Input Methods- GPS for GIS Data Capture -Data Editing- Sources of Errors and modeling error-Reclassification, Buffering Techniques- Overlay analysis- Data Output – Printers and Plotters-Need for integration of Remote sensing and GIS- Application of Remote Sensing and GIS – Water resources –Socio Economic Conditions.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Anji Reddy, Remote Sensing and Geographical Information Systems, Third Edition, BS Publications, Reprint 2011

2. Lillesand T.M. and Kiefer R.W., “Remote Sensing and Image Interpretation”, John Wiley and Sons, Inc, New York, 1987.

REFERENCES

1. Jensen, J.R., Remote sensing of the environment, Prentice Hall, 2000.
2. Kang-Tsung Chang,”Introduction to Geograhic Information Systems”, TMH, 2002
3. Janza.F.J., Blue, H.M., and Johnston, J.E., "Manual of Remote Sensing Vol. I., American Society of Photogrammetry, Virginia, U.S.A, 1975.
4. Burrough P A, “Principle of GIS for land resource assessment”, Oxford
5. Mischael Hord, "Remote Sensing Methods and Applications", John Wiley & Sons, New York, 1986.
6. Singal, "Remote Sening", Tata McGraw-Hill, New Delhi, 1990.
7. Floyd F. Sabins, Remote sensing, “Principles and interpretation”, W H Freeman and Company 1996.
8. IEEE Transactions on Geo-science and Remote sensing.
9. Manual of Remote Sensing – American society of photogrammetry & remote sensing, 1993.

EC12C3 RADAR AND NAVIGATIONAL AIDS 3 0 0 3

AIM

To make the student understand the principles of Radar and its use in military and civilian environment and also to make the student familiar with navigational aids available for navigation of aircrafts and ships.

OBJECTIVES

- To derive and discuss the Range equation and to understand the MTI Radar.
- To apply Doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars
- To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.
- To understand the Radar transmitter and Radar receiver.
- To understand principles of navigation, in addition to approach and landing aids as related to navigation

UNIT I INTRODUCTION TO RADAR AND MTI RADAR 9

Basic Radar –- Radar Block Diagram- Radar Frequencies –Applications of Radar – The Origins of Radar.The Radar Equation – Detection of Signals in Noise – Receiver Noise and the Signal-to-Noise Ratio–Pulse Repetition Frequency. Introduction to Doppler and MTI Radar– Delay –Line Cancelers– Staggered Pulse Repetition Frequencies – Digital MTI Processing –Moving Target Detector

UNIT II PULSE DOPPLER AND TRACKING RADAR 9

Pulse Doppler Radar – CW Radar - Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing –- Limitations to Tracking Accuracy – Low-Angle Tracking – Tracking in Range – Other Tracking Radar Topics –Comparison of Trackers – Automatic Tracking with Surveillance Radars (ADT).

UNIT III PROPAGATION OF RADAR WAVES AND RADAR ANTENNA 9

Radar Clutter – Introduction – surface Clutter Radar Equation-Land Clutter-Sea Clutter-Weather Clutter-Detection of targets in clutter- Propagation of Radar Waves–Standard propagation –- Nonstandard Propagation – External Noise The Radar Antenna – Reflector Antennas – Electronically Steered Phased Array Antennas – Phase Shifters – Frequency-Scan Arrays.

UNIT IV RADAR TRANSMITTERS AND RECEIVERS 9

Introduction to Radar transmitter – Linear Beam Power Tubes – Solid State RF Power Sources – Magnetron – Crossed Field Amplifiers – Other aspects of Radar Transmitter. The Radar Receiver – Receiver noise Figure – Super heterodyne Receiver – Duplexers and Receiver Protectors – Radar Displays.

UNIT V NAVIGATION SYSTEMS 9

Introduction – Four methods of Navigation. Hyperbolic Systems of Navigation–Loran-A – Loran-A Equipment- Loran-C – The Decca Navigation System – The Omega System-DME-TACAN- Doppler Navigation–The Doppler Effect –- Beam Configurations – Doppler Frequency Equations – Track Stabilization – Doppler Spectrum – Components of the Doppler Navigation System. Inertial Navigation–Principles of Operation – Navigation Over the Earth –Components of an Inertial Navigation System – Earth Coordinate Mechanization –Strapped-Down Systems – Accuracy of Inertial Navigation Systems. Satellite Navigation System–The Transit System – Navstar Global Positioning System (GPS)

TOTAL: 45 PERIODS

TEXTBOOKS

1. Merrill I. Skolnik ," Introduction to Radar Systems", Tata McGraw-Hill (3rd Edition) 2003
2. N.S.Nagaraja ," Elements of Electronic Navigation"(Second Edition)

REFERENCES

1. Peyton Z. Peebles:, "Radar Principles", John Wiley, 2004
2. J.C Toomay, " Principles of Radar", 2nd Edition –PHI, 2004

EC12C4 TELECOMMUNICATION SWITCHING AND NETWORKS 3 0 0 3

AIM

- To introduce fundamentals functions of a telecom switching office, namely, digital multiplexing, digital switching and digital subscriber access.
- To introduce a mathematical model for the analysis of telecommunication traffic.

OBJECTIVES:

- To know the basics compenents of Communication systems
- To learn about the different switching methods
- To learn of different access of Communication systems

UNIT I COMPONENTS AND PRINCIPLES 9

Block diagram of switching system – Pulse and DTMF Dialing – Signaling Tones – Strowger Switching with design examples – Principles of common control, cross bar switching

UNIT II SPACE DIVISION AND TIME DIVISION SWITCHING 9

Stored program control – Centralized and distributed SPC, 2stage, 3 stage and N stage networks, Time division time and space switching, Time multiplexed time and space switching, combination switching

UNIT III TRAFFIC ENGINEERING 9

Network traffic load and parameters, Grade of service and blocking probability, Modeling switching systems, Blocking models and loss estimates, Delay models and queue analysis

UNIT IV DIGITAL SUBSCRIBER ACCESS 9

Integrated services digital network, High data rate digital subscriber loops, Digital loop carrier systems, Fiber in the loop, Voice band modems

UNIT V INTEGERATED SERVICES DIGITAL NETWORK 9

Need for ISDN – ISDN services – Network and Protocol Architecture – Transmission channels – User – Network Interfaces, signaling, Numbering and Addressing, service characterization, ISDN standards, Broad Band ISDN, voice Data Integration.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Viswanathan.T., "Telecommunication Switching System and Networks", Prentice Hall, New Delhi, 2004.
2. William Stallings, "Wireless Communication and Networks", second edition, Pearson Education, New Delhi, 2004.

REFERENCES BOOKS:

1. Frenzel, "Communication Electronics – Principles and Applications", Tata Mc-Graw Hill Publishing Co. Ltd., Third Edition, New Delhi, 2009
2. John. C. Bellamy, "Digital Telephony", John Wiley & Sons, Singapore, 2000.
3. Behrouz Forouzan, "Introduction to Data Communication and Networking" Tata Mc-Graw Hill, New York, 1996
4. Marion Cole, "Introduction to Telecommunications Voice, Data & the Internet" Pearson Education, New Delhi, 2002.

EC12C5 OPTO ELECTRONIC DEVICES L T P C

3 0 0 3

AIM

To learn different types of optical emission, detection, modulation and opto electronic integrated circuits and their applications.

OBJECTIVES

- To know the basics of solid state physics and understand the nature and characteristics of light.
- To understand different methods of luminescence, display devices and laser types and their applications.
- To learn the principle of optical detection mechanism in different detection devices.

- To understand different light modulation techniques and the concepts and applications of optical switching.
- To study the integration process and application of opto electronic integrated circuits in transmitters and receivers.

UNIT I ELEMENTS OF LIGHT AND SOLID STATE PHYSICS 9

Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State Physics, Review of Semiconductor Physics and Semiconductor Junction Device.

UNIT II DISPLAY DEVICES AND LASERS 9

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, Classes of Lasers, Mode Locking, laser applications.

UNIT III OPTICAL DETECTION DEVICES 9

Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT IV OPTOELECTRONIC MODULATOR 9

Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acoustoptic devices, Optical, Switching and Logic Devices.

UNIT V OPTOELECTRONIC INTEGRATED CIRCUITS 9

Introduction, hybrid and Monolithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Pallab Bhattacharya “Semiconductor Opto Electronic Devices”, Prentice Hall of India Pvt., Ltd., New Delhi, 2006.
2. Jasprit Singh, “Opto Electronics – As Introduction to materials and devices”, McGraw-Hill International Edition, 1998.

REFERENCES:

1. S C Gupta, Opto Electronic Devices and Systems, Prentice Hal of India,2005.
2. J. Wilson and J.Haukes, “Opto Electronics – An Introduction”, Prentice Hall, 1995.

EC12C6 NANO TECHNOLOGY L T P C
3 0 0 3

AIM

Enabling the Engineering Students to learn the basic of Nanotechnology.

OBJECTIVES:

- The objective of this course is to make students familiar with the important concepts in Nanotechnology.

- To introduce the students to the basics of the properties of nanomaterials

UNIT I NANO MATERIALS AND NANOTECHNOLOGY 9

Basic concepts of Nano science and technology – Metal and Semiconductor Nanomaterials - Quantum wire – Quantum well – Quantum dot – Properties and technological advantages of Nano materials – Molecule to bulk transitions Bucky balls - Carbon Nanotubes and applications

UNIT II PROPERTIES OF NANO MATERIALS 9

PHYSICAL PROPERTIES

Melting point and phase transition processes- quantum-size-effect (QSE). Size-induced metal-insulator-transition (SIMIT)- nano-scale magnets, transparent magnetic materials, and ultrahigh-density magnetic recording materials - chemical physics of atomic and molecular clusters.

SURFACE PROPERTIES

Surface energy – chemical potential as a function of surface curvature-Electrostatic stabilization- surface charge density-electric potential at the proximity of solid surface-Van der Waals attraction potential.

UNIT III SYNTHESIS OF NANOMATERIALS 9

Top-down (Nanolithography, CVD),Bottom-up (Sol-get processing, chemical synthesis). Wet Deposition techniques, Self-assembly (Supra molecular approach), Molecular design and modeling.

UNIT IV CHARACTERIZATION OF NANONATERIALS 9

TEM, SEM and SPM technique, Fluorescence Microscopy and Imaging.

UNIT V APPLICATIONS 9

Solar energy conversion and catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems, Linear and nonlinear optical and electro optical properties, Applications in displays and other devices, Advanced organic materials for data storage, Photonics, Plasmonics ,Chemical and biosensors,Nanomedicine and Nano biotechnology.

TOTAL: 45 PERIODS

TEXT BOOK

1. Hari Singh Nalwa, “Nanostructured Materials and Nanotechnology”, Academic Press, 2002
2. Joel I. Gersten, “The Physics and Chemistry of Materials”, Wiley, 2001.
3. A.S.Edelstein and R. C. Cammarata, “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Pub., 1998.
4. Van Vlack, L.H., “Material Science for Engineers”, 6th edition, .Addision Wesley, 1985.
5. Thiruvadigal, J. D., Ponnusamy, S. and Vasuhi.P. S., “Materials Science”, 5th edition, Vibrant Publications, Chennai, 2007.

REFERENCE BOOKS

1. A.Nabok, “Organic and Inorganic Nanostructures”, Artech House, 2005
2. C.Dupas, P.Houdy, M.Lahmani, Nanoscience: “Nanotechnologies and Nanophysics”, Springer-Verlag Berlin Heidelberg, 2007

3. K.W. Kolasinski, “Surface Science: Foundations of Catalysis and Nanoscience”, Wiley, 2002.
4. S.Yang and P.Shen: “Physics and Chemistry of Nanostructured Materials”, Taylor & Francis, 2000.

EC12C7 CLOUD COMPUTING L T P C
3 0 0 3

AIM

To introduce the need,concept and the issues of cloud computing.

OBJECTIVES:

- To understand the concept of cloud and utility computing.
- To understand the various issues in cloud computing.
- To familiarize themselves with the types of virtualization.
- To familiarize themselves with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To be able to set up a private cloud.

UNIT I UNDERSTANDING CLOUD COMPUTING 9

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

UNIT II DEVELOPING CLOUD SERVICES 9

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

UNIT III CLOUD COMPUTING FOR EVERYONE 9

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation

UNIT IV USING CLOUD SERVICES 9

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files

UNIT V OTHER WAYS TO COLLABORATE ONLINE 9

Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis

TOTAL: 45 PERIODS

REFERENCES

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the WayYou Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in theCloud with SLAs, Emereo Pty Limited, July 2008.
3. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
4. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010.
5. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

EC12C8 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

AIM

To introduce the concept of measurement and the related instrumentation requirement as a vital ingredient of electronics and communication engineering.

OBJECTIVE

To learn

- Basic measurement concepts
- Concepts of electronic measurements
- Importance of signal generators and signal analysers in measurements
- Relevance of digital instruments in measurements
- The need for data acquisition systems
- Measurement techniques in optical domains.

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

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, pearson Education 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.

EC12C9 **CMOS ANALOG DESIGN**

L T P C
3 0 0 3

AIM:

To Learn about various CMOS Analog circuits

OBJECTIVES:

- T o study designs with better precision in data conversion
- T o 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

TEXT BOOK:

1. B.Razavi “Data Conversion System Design” IEEE Press and John Wiley , 1995.

REFERENCE:

1. Phillip Allen and Douglas Holmberg “CMOS Analog Circuit Design” Second Edition, Oxford University Press, 2004.