I SEMESTER

S.No	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S239	English – I	4		3	25	75	100
2	S298	Mathematics - I	4+1		3	25	75	100
3	S238	Engineering Physics	4		3	25	75	100
4	S211	Electrical Circuits and Networks-I	4+1		3	25	75	100
5	S170	Computer Programming	4+1		3	25	75	100
6	L142	Engineering Physics Lab		3	2	25	50	75
7	L143	Engineering Workshop		3	2	25	50	75
8	L126	Computer Programming Lab		3	2	25	50	75
9	L123	Computer Aided Engineering Drawing		3	2	25	50	75
		Total			**23**	**225**	**575**	**800**

II SEMESTER

S.No	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S240	English – II	4		3	25	75	100
2	S299	Mathematics - II	4+1		3	25	75	100
3	S232	Engineering Chemistry	4		3	25	75	100
4	S212	Electrical Circuits and Networks-II	4+1		3	25	75	100
5	S224	Electronic Devices and Circuits	4+1		3	25	75	100
6	L144	English Communication Lab		3	2	25	50	75
7	L140	Engineering Chemistry Lab		3	2	25	50	75
8	L135	Electrical Circuits and Networks Lab		3	2	25	50	75
9	L139	Electronic Devices and Circuits Lab		3	2	25	50	75
		Total			**23**	**225**	**575**	**800**

III SEMESTER

S.No	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S300	Mathematics - III	4+1		3	25	75	100
2	S126	Analog Electronic Circuits	4+1		3	25	75	100
3	S189	Digital Electronic Circuits	4+1		3	25	75	100
4	S361	Pulse and Switching Circuits	4+1		3	25	75	100
5	S428	Random Variables and Stochastic Processes	4+1		3	25	75	100
6	S378	Signals and Systems	4+1		3	25	75	100
7	**S243**	Environmental Studies	3			25	75	100
8	L107	Analog Electronic Circuits Lab.		3	2	25	50	75
9	L174	Pulse and Digital Circuits Lab.		3	2	25	50	75
		Total			**22**	**225**	**625**	**850**

Note : The Subject with Code S243 is Mandatory Course

IV SEMESTER

S.No	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S125	Analog Communications	4+1		3	25	75	100
2	S128	Analog Integrated Circuits	4+1		3	25	75	100
3	S169	Computer Organization	4+1		3	25	75	100
4	S174	Control Systems	4+1		3	25	75	100
5	S192	Digital Signal Processing	4+1		3	25	75	100
6	S223	Electromagnetic Fields and Waves	4+1		3	25	75	100
7	**S355**	Professional Ethics and Human Values	3			25	75	100
8	L108	Analog Integrated Circuits Lab		3	2	25	50	75
9	L180	Systems and Signal Processing Lab		3	2	25	50	75
		Total			**22**	**225**	**625**	**850**

Note: The Subject with Code S355 is Mandatory Course

V SEMESTER

S.No	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S187	Digital Communications	4+1		3	25	75	100
2	S195	Digital Systems Design using VHDL	4+1		3	25	75	100
3	S160	Electronic Measurements and Instrumentation	4+1		3	25	75	100
4	S313	Microprocessors and Microcontrollers	4+1		3	25	75	100
5	S398	Telecommunication Switching Systems and Networks	4+1		3	25	75	100
6	S411	Transmission Lines and Wave Guides	4+1		3	25	75	100
7	L105	Analog and Digital Communications Lab.		3	2	25	50	75
8	L161	Microprocessors and Microcontrollers Lab.		3	2	25	50	75
9	L176	Seminar		3	2	75		75
		Total			**24**	**275**	**550**	**825**

VI SEMESTER

S.No	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S131	Antennas and Wave Propagation	4+1		3	25	75	100
2	S194	Digital Systems Design using Verilog	4+1		3	25	75	100
3	S179	Data Structures and Object Oriented Programming	4+1		3	25	75	100
4	S419	VLSI Design	4+1		3	25	75	100
5		**Program Elective-I**	4+1		3	25	75	100
	S190	Digital Image Processing						
	S400	Television and Video Engineering						
	S307	Medical Electronics						
	S311	Micro Electro Mechanical Systems						
6		**Program Elective-II**	4+1		3	25	75	100
	S229	Embedded Systems Design						
	S222	Electromagnetic Compatibility						
	S176	Data Communications						
	S363	RadioFrequencyIntegratedCircuits						
7	L129	Data Structures and Object Oriented Programming Lab.		3	2	25	50	75
8	L119	Communication and Presentation Skills lab		3	2	25	50	75
9	L164	Mini Project		3	2	25	50	75
		Total			**24**	**225**	**600**	**825**

VII SEMESTER

S.No	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S270	Industrial Management	4+1		3	25	75	100
2	S314	Microwave Engineering	4+1		3	25	75	100
3	S330	Optical Communications	4+1		3	25	75	100
4	S155	Cellular and Mobile Communications	4+1		3	25	75	100
5		**Program Elective-III**	4+1		3	25	75	100
	S318	Nano Electronics						
	S356	Programmable Logic Devices						
	S193	Digital Signal Processors						
	S389	Spread Spectrum Communications						
6		**Open Elective-I**	4+1		3	25	75	100
	S173	Consumer Electronics						
	S168	Computer Networks						
	S322	Neural Networks and Fuzzy Logic						
	S327	Operating Systems						
7	L132	Digital System Design Lab		3	2	25	50	75
8	L163	Microwave and Optical Communications Lab		3	2	25	50	75
9	L153	Internship			2	75		75
		Total			**24**	**275**	**550**	**825**

VIII SEMESTER

S.No	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S362	Radar Systems	4+1		3	25	75	100
2		**Program Elective-IV**	4+1		3	25	75	100
	S375	Satellite Communications						
	S316	Mobile Computing						
	S366	Real Time Operating Systems						
	S426	Wireless Sensor Networks						
3		**Open Elective-II**	4+1		3	25	75	100
	S140	Automobile Electronics						
	S246	Evolutionary Computing Techniques						
	S371	Robot Engineering						
	S425	Web Technologies						
4	L157	Main Project			9	50	150	200
5	L121	Comprehensive Viva-Voce			2	75		75
		Total			**20**	**200**	**375**	**575**

Note: A few course as notified in the respective departments are offered to the students on electives under Massive Open Online Courses (MOOCs).

ISEMESTER

S239 - ENGLISH – I

(Common to all branches)

Prerequisite: None

Course Educational Objectives

In this course, the students will learn

1. The standard vocabulary along with the meaning and usage of the words
2. The concepts of functional grammar and syntax for better writing and speaking skills
3. The concepts of skimming, scanning and critical reading for better comprehension abilities.
4. The effective pronunciation, language usage through extensive reading
5. The concepts of writing reports, resume, statement of purpose, memos and e-mails etc.

Course Outcomes

After the completion of this course, students will have the ability to

1. Read, write and understand what ever is written and spoken in English
2. Speak fluently with acceptable pronunciation and write using appropriate words, spellings, grammar and syntax
3. Read the lines, between lines and beyond lines excelling in comprehension skills
4. Speak grammatically error free English
5. Draft reports, memos, mails & letters as part of their work.

UNIT – I

Astronomy (Learning English)
Grammar: Parts of Speech
Vocabulary: Antonyms
Analytical Writing: Unscrambling words in a sentence; Un-jumbling the sentences into a paragraph; Types of sentences; Paragraph writing

UNIT – II

Travel and Transport (Learning English)
The Trailblazers - **Jagadis Chandra Bose**(Masterminds)
Grammar: prepositions; word plurals; sentence completion
Vocabulary: Synonyms
Analytical Writing: Drafting E-Mails; Letter writing (Formal & Informal)

UNIT - III

Humour (Learning English)
The Trailblazers – **Prafulla Chandra Ray** (Masterminds)
Grammar: Active & Passive Voices
Vocabulary: Pre-fixes & Suffixes
Analytical Writing: Note-making

UNIT - IV

Health and Medicine (Learning English)
The Trailblazers – **Srinivasa Ramanujam** (Masterminds)
Grammar: Tenses
Vocabulary: Deriving words
Analytical Writing: Abstract writing/Synopsis writing

UNIT - V

The World of Figures and Physics – **Chandra Sekhara Venkata Raman** (Masterminds)
Grammar: ArticlesVocabulary: One-Word substitutes
Analytical Writing: Essay writing; Dialogue writing (Formal & Informal)

TEXT BOOKS

1 "Learning English", Orient Longman Private Limited. 2008 JNTU edition
2 Enakshi Chatterjee, "Masterminds", Orient Longman Private Limited. 2002 (Reprint)

REFERENCES

1. Andrea J Rutherford, "Basic Communication Skills for Technology", Pearson Education, New Delhi,1st edition, 2009
2. Murphy, "English Grammar with CD", Cambridge University Press, New Delhi, 2004
3. Rizvi & M. Ashraf, " Effective Technical Communication", Tata McGraw Hill, New Delhi,2008.
4. Blum Rosen, "Word Power", Cambridge University Press, New Delhi, 2009.

ISEMESTER

S298 – MATHEMATICS-I

COURSE EDUCATIONAL OBJECTIVES

In this course, the students will learn about

- The concepts of Differential Equations and solving the first order and the first degree differential equations.
- The concepts of Higher Order Differential Equations and solving such equations with constant and variable coefficients.
- Calculus of several variables and mean value theorems
- The concepts of partial differentiation and formation of partial differential equations
- The concepts of Matrix theory used in solving system of linear equations and about Eigen value problems.

COURSE OUTCOMES

After the completion of this course, prospective engineers will have the knowledge of

- The First and Higher Order Differential Equations, Procedures to solve them and their physical applications.
- Partial differentiation, functional dependence and independence and Taylor's expansion of continuous functions.
- Finding the solutions of first order linear partial differential equations
- Finding the solutions of System of Homogeneous and Non Homogeneous Linear equations and use Cayley Hamilton theorem to find the higher powers of a Matrix.

UNIT –I

Differential Equations: Differential Equations of First Order and First Degree- Exact, Linear and Bernoulli; Applications- Newton's Law of Cooling, Law of Natural Growth and Decay, Orthogonal trajectories.

UNIT –II

Higher Order Differential Equations: Linear Differential Equations of Second and Higher Order with Constant Coefficients, Method of Variation of Parameters, Linear Differential Equations of Second and Higher Order with Variable Coefficients-Cauchy's Equation and Legendre's Equations.

UNIT – III

Differential Calculus: Fundamental Theorems-Rolle's Theorem, Lagrange's Mean value theorem, Cauchy's Mean value theorem, Taylor's Theorem; Expansions of Functions-McLaurin's Series, Expansion by known Series, Taylor's Series.

Partial Differentiation: Partial Derivatives of First and Second Order, Jacobian, Euler's Theorem on Homogeneous Functions, Taylor's Theorem of Two Variables and its Application, Maxima and Minima of Two Variables, Langrange's Method of Undetermined Multipliers.

UNIT – IV

Partial Differential Equations: Formation of Partial Differential Equations by the Elimination of Arbitrary Constants and Arbitrary Functions, Solution of First Order and First Degree Linear Partial Differential Equation using Lagranze's Method.

UNIT –V

Matrices: Rank of Matrix-Echelon Form, Normal Form and PAQ Form, Solution of Linear systems-Homogeneous and Non Homogeneous System of Equations, Gauss Elimination Method.

Eigen Values and Eigen Vectors: Properties ofEigen Values and Eigen Vectors, Cayley Hamilton Theorem, Inverse and Power of a Matrix, Quadratic Forms- Reduction of Quadratic Forms to Canonical Form by Linear Transformations.

TEXTBOOKS

1. Dr. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers,42nd Edition,2012.
2. Dr. B. V. Ramana, "Higher Engineering Mathematics", TMGHPublications,1st Edition,2010.

REFERENCES

1. M. D. Greenberg , "Advanced Engineering Mathematics", Tata McGrawHil Publications, 2nd Edition, 2011.
2. Erwin Krezig, "Advanced Engineering Mathematics",John Wiley & Sons,8th Edition,2011.
3. W.E. Boyce and R.C. Diprima, "Elementary Differential equations",John Wiley & son, 7th Edition, 2001.

ISEMESTER

S238 - ENGINEERING PHYSICS

(Common to all branches)

Pre-requisite course: NONE

Course Educational Objectives:

In this course student will learn about

- The basic concepts of Optics such as Interference, Diffraction and Polarization.
- The principle of quantum mechanics,dual nature of matter waves.
- The principle and working of different Lasers.
- The principle and classification of optical fibers
- classification of magnetic materials and their properties.
- Concept of Superconductivity, types and their applications

Course Outcomes:

At the end of this course student will be able to

CO1: Understand the nature of polarization, Diffraction and interference.

CO2: Understand the dual nature of particle and significance of the wave function .

CO3: Understand the principle of LASER and optical fibers. Types of lasers and optical fibers and their applications.

CO4: Understand the different types of magnetic materials and their uses.

CO5: Understand the phenomenon of superconductivity, critical parameters, types of super conductors and their applications

UNIT – I

INTERFERENCE, DIFFRACTION, POLARIZATION

INTERFERENCE: Introduction, super position principle, coherent sources, thin films, Newton's rings (in reflected system only).

DIFFRACTION:

Introduction, Fresnel and Fraunhofer diffractions – comparsion between Fresnel's and fraunhofer's diffraction-Difference between interference and diffraction-Fraunhofer diffraction at single slit - Fraunhofer diffraction at Double slit –Diffraction Grating- Grating spectrum.

POLARIZATION:

Introduction-plane of vibration and plane of polarization -Polarization by reflection Brewster's law –geometry of calcite crystal- Double refraction -nicol prism construction,Quarter wave plate- Half wave plate.

UNIT - II

PRINCIPLES OF QUANTUM MECHANICS:

De Broglie hypothesis- Matter waves- Davison and Germer experiment- GP Thomson experiment , Heisenberg Uncertainty principle-Schrodinger time independent wave equation-Physical significance of the wave function-particle in a box.

UNIT – III

LASERS AND FIBER OPTICS

LASERS:

Introduction – Characteristics of Lasers- Principle of laser (Absorption, Spontaneous and stimulated emission of Radiation), Population Inversion- Einstein Coefficients ,three and four level pumping schemes, block diagram of laser. Ruby Laser- Helium Neon Laser, Applications of Lasers.

FIBER OPTICS :

Introduction- Principle of optical Fiber- Acceptance angle and Acceptance cone- Numerical aperture – Types of optical fibers-refractive index profile- Application of optical fibers.

UNIT – IV

MAGNETIC MATERIALS:

Magnetic properties -Origin of magnetic moments-Classification of magnetic materials- Dia, Para, Ferro magnetic , Antiferromagnetic , Ferrimagnetic materials- Domain theory of ferromagnetism(qualitative), Hysteresis curve- Soft and Hard magnetic materials. Applications of magnetic materials.

UNIT – V

SUPER CONDUCTORS:

Phenomenon, critical parameters, Meissner effect, Type-I, Type-II Super conductors, BCS theory of super conductivity,Flux Quantization,London Eqs., Penetration depth, Josephson Effects- Applications of Super conductors.

TEXT BOOKS

1. Engineering Physics by V RAJENDRAN, Tata McGrahill, 4th Edition
2. Engineering Physics by P K Palani Samy, Scitech Publications, 6th Edition

REFERENCES

1. Engineering Physics by M R Srinivasan, New age international,2014.
2. Engineering physics by M.N.Avadhanulu and P.G.Kshirsagar, S.Chand, New Delhi.
3. Engineering Physics RK GAUR & SL GUPTA, Dhanpat Rai Publication, 2008.
4. Basic Engineering Physics by Dr. P. Srinivasa Rao & Dr. K. Muralidhar, Himalaya Publishing House.

ISEMESTER

S211 - ELECTRICAL CIRCUITS AND NETWORKS-I

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about the

- Basic concepts of circuit analysis
- Network topology and analysis of magnetic circuits.
- Analysis of single phase ac circuits and resonant Circuits
- Network Theorems used for Circuit Analysis
- SPICE software for the simulation of Electrical Circuits

COURSE OUTCOMES

At the end of this course student will be able to

- Apply network reduction techniques for analysis of circuits.
- Analyse the magnetic circuits
- Analyse ac circuits along with resonance and locus diagrams.
- Apply the network theorems to practical Circuits.

UNIT – I

Electrical Circuit Fundamentals: Concepts of Charge, Current, Voltage, Power, Energy, Passive Elements, Active Elements, Resistance, Inductance, Capacitance Parameters, Ohm's Law, Independent and Dependent Voltage and Current Sources; Voltage-Current relationship for Passive Elements; Concept of Network and Circuit; Kirchhoff's Laws and their Applications to simple Circuits like Series, Parallel and Series Parallel Circuits; Voltage division method and Current division method; Star-to-Delta and Delta-to-Star transformation; Source transformation.

Analysis ofElectrical Circuits: Mesh Analysis, Nodal Analysis, Duality and Dual Networks.

UNIT – II

Network Topology: Definitions of Graph, Tree, Branch, Link, Chord, Twig; Cut-set and Tie-set Matrices for planar networks; Tie- Set and Cut-Set Analysis of Networks with Independent Voltage and Current Sources.

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction, Concept of Self and Mutual Inductance, Dot Convention, Coupled Circuits, Coefficient of Coupling, Composite Magnetic Circuit, Analysis of Series and Parallel Magnetic Circuits.

UNIT - III

Time and Frequency Domain: Concept of Time Domain, Importance of Frequency Domain, Laplace Transform and its Properties, Laplace Transform of various types of Signals, Inverse Laplace Transform (Basics required for electrical circuits).

AC Fundamentals: Average value, R.M.S value, form factor and Peak factor for different periodic wave forms, J-notation, Complex and Polar forms of representation, Phase and Phase difference, concept of reactance, impedance, susceptance and Admittance, Steady state analysis of R, L and C Circuits (in series, parallel and series parallel combinations) with sinusoidal excitation; Concept of power factor, Active, Reactive powers and Complex power, Power triangle.

UNIT – IV

Resonant circuits: Series resonant circuit and parallel resonant circuit, concept of band width and Q factor.

Network Theorems (both AC and DC networks): Superposition, Thevenin's, Norton's, Maximum Power Transfer, Reciprocity, Milliman's, Compensation, Tellegen's theorems, Solving the networks using these theorems.

UNIT - V

Transient Analysis (both AC and DC networks): Initial conditions of R-L-C elements, Transient response of Series R-L, R-C and R-L-C circuits, Solution using differential equation approach and Laplace transforms.

SPICE for Circuit Analysis: Description of circuit elements, nodes and sources, input and output variables, Modelling of the above elements, Types of DC analysis.

TEXT BOOKS

1. Charles K. Alexander and Matthew N.O.Sadiku, "Fundamentals of Electric Circuits", Mc Graw Hill Publishers.
2. Mohammad H.Rashid, Spice for circuits and electronics using PSPICE, Prentice Hall of India Publications, 2nd Edition.

REFERENCES

1. Joseph Edminister, "Electric Circuits" (Blue Pad), Schaum's Outlines, Tata McGraw Hill Publishers.
2. William Hayt and Jack E. Kimmerly, Engineering circuit analysis, Mc Graw Hill Publishers.
3. Clayton R.Paul, Fundalmentals of Electric Circuit Analysis, John Wiley&Sons.
4. Vanvalkenburg, Network Analysis, Prentice Hall of India Publishers.
5. Raymond A.decarlo and Pen-min-lin, Linear circuit analysis: Time domain, Phasor and Laplace transform approaches, Oxford University Press.

ISEMESTER

S170 - COMPUTER PROGRAMMING

(Common to all branches)

Course Educational Objectives:

The Students will learn

1. The basic elements C programming structures like data types, expressions, control statements, various I/O functions and how to solve simple mathematical problems using control structures.
2. Modular programming using functions.
3. The derived data types like arrays, strings, various operations and Memory management using pointers.
4. User defined structures and various operations on it.
5. The basics of files and its i/o operations.

Course Outcomes:

After undergoing the training in this course the students will acquire the ability to:

- Identify basic elements of C programming structures like datatypes, expressions, control statements, various I/O functions and Evaluation of simple mathematical problems using control structures.
- Implementation of derived data types like arrays, strings and various operations.
- Understanding of memory management using pointers and designing of modular programming.
- Construct user defined structures and implements various applications.
- Create text & binary type files and understanding of various file I/O operations.

Pre Requisite: The students should have basic knowledge in Maths & computers

UNIT - I

Algorithm / pseudo code, flowchart, example flow charts, structure of C program, identifiers, basic data types and sizes, Constants, variables, Input-output statements, A sample c program, operators: arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence of operators and order of evaluation. Conditional statements: if, if else, else if ladder and switch statements, continue, go to and labels. Loops: while, do-while and for statements, break, programming examples.

UNIT - II

Arrays- one dimensional arrays-concept, declaration, definition, accessing elements, storing elements, two dimensional and multi-dimensional arrays. **Character Strings:** declaration, initialization, reading, writing strings, arithmetic operations on characters, string handling functions programming examples.

UNIT – III

Pointers- concepts, declaring &initialization of pointer variables, pointer expressions, address arithmetic, pointers and arrays, pointers and character strings, pointers to pointers,Pre-processor Directives and macros.**Functions:** basics, category of functions, parameter passing techniques, recursive functions, Functions with arrays, storage classes-extern, auto, and register, static, scope rules, Standard library functions., dynamic memory management functions, command line arguments, c program examples.

UNIT - IV

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, C program examples.

UNIT - V

Files – concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/O operations, error handling, C program examples.

TEXT BOOKS

1. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education, 2nd Edition.
2. C and Data Structures ,N.B.Venkateswarlu and E.V.Prasad, 1st Edition.

REFERENCES

1. Programming in c –Reema Thareja, Oxford Publications.
2. Programming in c – Stephen G. Kochan, III Edition, Pearson Eductaion
3. Programming in c—Pradeep Dey, Oxford Publications.

ISEMESTER

L142 - ENGINEERING PHYSICS LAB

(Common to all branches)

Pre-requisite course: NONE

Course Educational Objectives:

In this course student will learn about

- The scientific method of experiments in the laboratory.
- The procedures and observational skills for appropriate use of simple and complex apparatus.
- Analytical techniques, statistical analysis and graphical analysis.
- The theoretical ideas and concepts covered in lecture by completing a host of experiments.
- The radius of curvature of a Plano-convex lens by forming Newton's rings.

Course Outcomes:

At the end of this course, student will be able to

CO1: Understand to calculate the radius of curvature of a plano-convex lens by forming Newton's Rings.

CO2: Understand the concept of diffraction and also find wavelengths of different spectral lines of the grating.

CO3: Estimate the wavelength of layer radiation.

CO4 : Study the magnetic field along the axis of a current carrying coil and to verify Biot –savart's law .

CO5 : Estimate the Refractions index of the given prism

CO6 : Find the thickness of a thin material using a wedge shaped film.

CO7 : Estimate the width of the slit by forming diffraction pattern.

CO8 : Understand the phenomenon of optical – activity

CO9 : Study the characteristics of LCR circuit

CO10: Understand the Phenomenon of resonance

CO11: Determine the rigidity modules of given material

CO12 : Understand the longitudinal and transverse vibrations of tuning fork.

LIST OF EXPERIMENTS (Any 8 Experiments)

1. Determine the Radius of Curvature of Plano - Convex lens by forming Newton's Rings.
2. Determine the Wavelengths of various spectral lines using grating with the normal incidence method.
3. Determination of wavelength of laser radiation.
4. Study the magnetic field along the axis of a current carrying coil and to verify Biot – Savart's law.
5. Determine the Refractive index of a given prism.
6. Determine the thickness of a thin material using wedge shaped film.
7. Determine the width of the slit by using laser source by forming diffraction pattern.
8. Determine the specific rotation of an optically active substance.
9. Study the characteristics of L.C.R Circuit.
10. Determine the frequency of AC supply by using Sonometer.
11. Determine the rigidity modulus of a given material using Torsional pendulum.
12. Determine the frequency of a vibrating bar or electrical tuning fork using Meldy's apparatus.

I SEMESTER

L143 - ENGINEERING WORKSHOP

(Common to EIE, AE, CE, ECE, EEE, ME)

COURSE EDUCATIONAL OBJECTIVES

- In this Lab, students will learn
- To develop the skill or craft in every trade they practice in the mechanical Engineering workshop.
- The terminology / specification and the purpose and usage of different tools used in different trades.

COURSE OUTCOMES

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

- Recognize the different tools with their specifications used in the Mechanical Engineering workshops while practicing the different trades.
- Use the tools perfectly and well informed how to be careful about every tool they use for the years to come in workshops.
- Learn the safety pre-cautions to be followed in the workshops, while working with the different tools.

At least **four trades** with **two exercises** from each trade:

1.Carpentry

2.Fitting

3.House – Wiring

4.Plumbing

5.Tin - Smithy

6.Black - Smithy

REFERENCE BOOK

P. Kannaiah, K.L. Narayana, Workshop manual, Scitech Publications, India Pvt Ltd

ISEMESTER

L126 - COMPUTER PROGRAMMING LAB

(Common to all branches)

COURSE EDUCATIONAL OBJECTIVES

The Students will learn

- basic programming concepts and constructs
- Program development using simple control statements for decision making and repetition: if…else and while Statements.
- Program development using control statements: for, do…while, switch, break, and continue statements.
- Problem development and design process using pseudo code.
- Program modularity using functions.
- Program development using arrays
- Program development using strings
- Problem development using pointers

COURSE OUTCOMES

At the end of the course, students are able to

- Understand the basic programming concepts.
- Understand the use of arrays to store lists and tables of values.
- Use pointers and Strings.
- **.**Understand the close relationships among pointers, arrays and strings.
- Divide a problem into its logical set of components.
- Understand how a good program design can reduce coding and debugging time.
- Design and code most mid-level problems from the start.

LIST OF LAB PROGRAMS

I. Write a program in 'C' language to cover the following problems.

a) Example program which shows the usage of various preliminary data types available in C Language.
b) Example program which shows the usage of various Operators available in C Language.
c) Example programs to illustrate the *order of evaluation*.

II) WRITE EXAMPLE PROGRAMS:

a) To check whether the given year is leap year (or) not

b) Roots of Quadratic Equation.
c) Finding smallest& biggest number from the given set of 4 numbers using 'if' statement.

d) Calculate the student grade in the examination – assume suitable constraints.

e) Prepare electricity bill for the consumed units – assume suitable constraints.
f) Converting given two digit number into words using switch statement
g) To illustrate the usage of 'goto' statement.

III) EXAMPLE PROGRAMS:

a) To Display first N natural numbers
b) To find whether the given number is Armstrong (or) not
c) To find reverse of the given number and to check whether it is palindrome (or) not.
d) To find whether given number is strong number (or) not.
e) To check whether given number is Prime (or) not
f) To display prime numbers with in the given range(Nesting of Loops).
g) To display the following structure(Nesting of Loops)

i)
```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

ii)
```
5 4 3 2
4 3 2 1
3 2 1
2 1
1
```

IV) Write example programs in C Language to perform following operations:
a) Finding the sum and average of given numbers using Arrays.
b) To display elements of array in reverse order
c) To search whether the given element is in the array (or) not using linear search & binary search.
d) Write a C program to perform the following operations
i) Addition, subtraction and multiplication of Matrices
ii) Transpose of given matrix
(The above operations are to be exercised using functions also by passing arguments)
e) Write a C program to find whether the given string is palindrome (or) not.
f) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.
g) Write an example program to illustrate the use of any 5 string handling functions.

V) a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.
b) Write an example program to describe the usage of *call by reference*.
c) Write a program to find sum of the elements of the array usingfunctions.

VI) Write example programs in C Language:
a) To find factorial of a given number using functions.
b) Swap two numbers using functions.
c) To find GCD of two numbers using recursion
d) Write a recursive function to solve Towers of Honai problem.
e) Write an example program to illustrate use of external & static storage classes.
f) Write an example program to illustrate the usage of command line arguments.
g) Program to illustrate the usage of dynamic memory management functions.

VII) a) Write an example program using structures to process the student record. Assume suitable fields for student structures (Different kinds of initialization of structure variables are to be exercised)
b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program).
c) Write a program to handle a structure variable using pointers and implement self referential structure(i.e. A structure variable having a pointer to itself)

VIII) Write an example program on file to perform following operations:
a) Accessing content from files and writing content in to it. (Exercise different file operation modes)
b) Copy the contents of one file into another (Exercise different file operation modes)

ISEMESTER

L123 - COMPUTER AIDED ENGINEERING DRAWING

(Common to EIE, CSE, ECE, EEE, IT)

COURSE EDUCATIONAL OBJECTIVES

The main objective of this course is

- To teach students the basic commands necessary for professional 2D drawing, design, and drafting using AutoCAD Essentials.
- To give an introduction to orthographic projections, and isometric drawings using AutoCAD
- To visualize the solids by developing the surfaces without any complexity.

COURSE OUTCOMES

After completion of this course the student is able to

- Use the AutoCAD basics in industries where the speed and accuracy can be achieved.
- Conceptualize his ideas and make design calculations and modifications easily.
- Create data bases and quality of designs for a manufacturing company in reality.
- Can create complex designs very effectively.
- Visualize the solids clearly without any complexity.

UNIT – I

COMPUTER AIDED DRAFTING

Introduction - Computer Aided drafting system – Advantages, Applications of Drafting Package – Advantages, Initial setup commands, utility commands, Drawing Aids, Entity Draw commands, Display commands, Edit Commands.

Lettering – Basic types of Dimensioning, Linear, Angular and Radial Dimensioning.

UNIT – II

PROJECTION OF POINTS & LINES

Orthographic Projections - Projection of points – Projection of straight lines – Various positions of straight lines w.r.t. reference planes, inclined to both planes.

UNIT – III

PROJECTION OF PLANES

Projection of Planes – Introduction, Planes Parallel to Reference Planes, Inclined to One Reference Plane & Perpendicular to Other, Planes Perpendicular to Both Reference Planes, Planes Inclined to Both Reference Planes.

UNIT – IV

PROJECTION OF SOLIDS

Types of solids, Polyhedra, solids of revolution, Projections of solids in simple position, Projections of solids with axis inclined to one reference plane & parallel to other.

UNIT – V

ISOMETRIC DRAWING

Theory of isometric Projection - Isometric view & Isometric Projection – Isometric Projection from Orthographic views for simple objects.

TEXT BOOKS

1. N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar publishers, 2012
2. Bethune, Engineering Graphics with Auto CAD, PHI Learning Private Limited, New Delhi, 2009.

IISEMESTER

S240 - ENGLISH – II

(Common to all branches)

Prerequisite: ENGLISH-I

Course Educational Objectives

In this course, the students will learn

1. English with emphasis on LSRW skills.
2. To make decisions, while thinking logically analyzing situations carefully.
3. To read speedily and meaningfully.
4. Both active and passive vocabulary.
5. To write letters and reports effectively in formal and professional situations.

Course Outcomes

After the completion of this course, prospective engineers will have the ability to

1. Use English language effectively.
2. Express right ideas in right context
3. Manage the situation and negotiate business with good English communication
4. Think and analyze the situations and make good presentations of their work and decisions
5. prepare themselves to face interviews and also to participate in group discussions

UNIT - I

Environment (Learning English)
The World of Figures and Physics – **Satyendranath Bose** (Master Minds)
Grammar: Correction of sentences
Analytical Writing: Report Writing

UNIT - II

Inspiration (Learning English)
The Institution Builders– **Santi Swarup Bhatnagar** (Masterminds)
Grammar: If-clause; Question tags
Vocabulary: Idioms and Phrases
Analytical Writing: Resume'; Statement of Purpose

UNIT - III

Human Interest (Learning English)
The institution builders – **Meghanadh Saha** (Master Minds)
Grammar: Direct & Indirect Speeches
Vocabulary: Phrasal Verbs
Analytical Writing: Memo Drafting

UNIT – IV

Media (Learning English)
The New Age – **Homi Jehangir Bhabha** (Master Minds)
Grammar: Concord
Vocabulary: Analogy
Analytical Writing: Information Transfer/ Data Interpretation (Tables, Pie charts, Bar graphs, Tree diagrams, Pictograms, etc.)

UNIT – V

The New Age – **Vikram Sarabhai** (Master Minds)
Grammar: Gerunds & Infinitives; Correction of Sentences
Vocabulary: Words often confused
Analytical writing – Comprehension, Expansions (of a given topic/ proverbs)

TEXT BOOKS

1. "Learning English", Orient Longman Private Limited.JNTU edition,2008
2. EnakshiChatterjee, "Masterminds", Orient Longman Private Limited ,Reprint-2002

REFERENCES

1. KoneruAruna, "Professional Communication", Tata McGraw-Hill, New Delhi, 2007.
2. Rizvi, "Effective Technical Communication", Tata McGraw-Hills, New Delhi, 2009.
3. Andrea J. Rutherford, "Basic Communication Skills for Technology", Pearson Education., 1st edition, 2009
4. Kaplan and Baron's, "GRE and TOEFL', Latest editions.2008

IISEMESTER

S299 - MATHEMATICS – II

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The methodology of interpolation and extrapolation to common problems using different formulae
- Solving Differential equations by using Numerical Methods
- The concept of special functions that can be solved by series solutions
- The basic concepts of Probability

COURSE OUTCOMES

At the end of this course student will be able to

- Apply the techniques of numerical interpolation and approximation of functions with ease
- Solve Ordinary Differential Equations with given initial conditions by using numerical techniques.
- Apply the knowledge of Bessel's and Legendre's functions in engineering arena
- Solve the mathematical models using probability

UNIT – I

Interpolation: Introduction, Errors in polynomial Interpolation

Finite Differences: Forward Differences, Backward Differences, Central Differences, Symbolic relations and separation of symbols, Newton's Formulae for Interpolation, Lagrange's Interpolation formula.

UNIT – II

Numerical Differentiation and Integration: Differentiation using Finite Differences, Trapezoidal rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule.

UNIT-III

Numerical Solution of Ordinary Differential Equations: Numerical Solution of Ordinary Differential equations, Solution by Taylor's Series, Picard's Method of Successive Approximations, Euler's Method, Runge- Kutta Methods.

Curve Fitting: Fitting a straight Line –Second Degree Curve-Exponential Curve by Method of Least Squares.

UNIT-IV

Series Solutions: Regular Point, Regular Singular Point, Frobenius Method,

Special Functions: Bessel Functions- Properties, Recurrence Relations, Orthogonality: Legendre Polynomials- Properties, Rodrigue's Formula, Recurrence Relations and Orthogonal Properties.

UNIT-V

Probability Theory: Concept of Probability, Experiment and Sample Space, Discrete and Continuous Sample Space, Event, Probability Axioms, Joint Probability, Conditional Probability, Independent Events and their properties, Bayes theorem, Theorem on Total Probability.

TEXT BOOKS

1. S. S. Sastry, "Introductory Methods of Numerical Analysis". Prentice Hall of India,5th Edition,2005.
2. Dr. B. V. Ramana, "Higher Engineering Mathematics", The McGraw Hill Companies, 1st Edition,2010.

REFERENCES

1. Dr. B.S. Grewal , "Higher Engineering Mathematics", Khanna Publishers, 42ndEdition,2012.
2. Steven .C. Chopra and Ra. P. Canale, "Numerical Methods for Engineers with programming and software application", The McGraw Hill Companies, 4th Edition,2002.
3. M. K. Jain, S. R. K. Iyengar, R.K. Jain, "Numerical Methods for Scientific and Engineering Computation", New Age International Publishers., 5th Edition,2007.
4. Peyton Z. Peebles Jr , Probability, Random Variables and Random Signal Principles, Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002

IISEMESTER

S232 - ENGINEERING CHEMISTRY

(Common to all branches)

Prerequisite: *None*

Course Educational Objectives:

Through this course the student will learn

1. The concept of water technology with special focus on hardness & softness of water, methods of softening and desalination of brackish water.
2. The concept of conventional and alternative fuels and working of petrol and diesel engines.
3. The concept of corrosion and control measures.
4. The concept of polymers and polymerization.
5. The concept of green chemistry and applications of liquid crystals.

Course Outcomes:

After completion of the course the students will acquire the ability to:

1. Analyze the quality of water and its maintenance for industrial purposes.
2. Analyze issues related to fuels and their synthesis and able to understand working of IC and Diesel engines.
3. Realize the principles of corrosion and make use of the principles for maintenance of various equipments more effectively.
4. Get hands on experience in various processes like polymerization, preparation, properties and applications of plastics and rubbers.
5. Realize the use of liquid crystals in various technological applications.

UNIT - I

WATER TECHNOLOGY: Sources of water and quality. Hardness of Water - Temporary and Permanent hardness. Units and their interrelation. Problems on Temporary and Permanent hardness.Disadvantages of hard water in various industries.

Boiler troubles – scale & sludge formation, Caustic Embrittlement, boiler corrosion, priming & foaming (carryover).

Internal Treatment–Colloidal Phosphate, Calgon, Carbonate, Sodium aluminate Conditioning of Water.

External Treatment - Lime-Soda Process, Zeolite process , Ion- Exchange Process merits and demerits. (Note-Problems on lime-soda process are not included)

Desalination of brackish water-Electrodialysis, reverse osmosis.

UNIT - II

Fuel Technology: Definition and classification of Fuels, merits and demerits of solid liquid and gaseous fuels.Gross and net calorific values – (definition only).

Solid fuels- coal - analysis, Proximate and ultimate analyses of coal – significances.

Liquid Fuels – petroleum-origin and refining of petroleum- cracking- fixed bed and moving bed methods, synthetic petrol – Bergius and Fischer Tropsch's methods.

Working of I.C and C.I engines –Knocking in I.C and C.I engines, antiknocking agents Octane number , Cetane number(Definitions only).

Gaseous fuels- Natural gas, CNG Advantages of CNG, Flue gas analysis – Orsat's apparatus.

UNIT - III

CORROSION: Definition, Examples.

Dry Corrosion(Direct Chemical corrosion), Types of dry corrosion-oxidative corrosion, Pilling Bed worth rule, corrosion by other gases, liquid metal corrosion.

Wet Corrosion (Electro Chemical corrosion) Mechanism- Oxygen absorption Hydrogen evolution type, Types of wet corrosion, Galvanic Corrosion, passivity, Galvanic Series Concentration Cell Corrosion, intergranular corrosion, stress corrosion, Soil corrosion.
Factors Influencing Corrosion-Nature of metal and nature of environment.
Control of Corrosion - Proper Design, Use of pure metals and metal alloys, Cathodic Protection - Sacrificial anode and Impressed Current, Modifying the Environment and use of Inhibitors.

UNIT - IV

Polymer Science and Technology: Definition, classification of polymers, Functionality, Types of polymerization-addition, condensation, copolymerization.
Plastics preparation, properties and engineering applications of PVC, Teflon, Bakelite,PMMA.
Conducting polymers: Polyacetylene, Polyaniline, conduction, doping, application.
Rubbers Natural rubber and it's processing, disadvantages of Natural rubber , Vulcanization and significance.
Elastomers- preparation, properties and engineering applications of Buna S, Buna N, Thiokol.
Fibers- preparation, properties and engineering applications of Polyester, fiber reinforced plastics (FRP).

UNIT – V

(a) **Green chemistry**-Goals and significance of green chemistry. Basic components (alternative starting materials, reagents, reaction conditions, final products) of green chemistry research.

(b) **Liquid crystals** –Classification of liquid crystals (Thermo tropic, lyotropic) and applications.

TEXT BOOKS

1. Jain & Jain, A text book of Engineering Chemistry by DhanpatRai Publishing Company, New Delhi (15th Edition) (2006).
2. Dr. S.S Dara, Dr.S.S Umare A Text book of Engineering Chemistry by S.Chand Publications, 12th Edition, 2010.
3 . ShashiChawla, A Text book of Engineering Chemistry by DhanpatRai Publishing Company, Third Edition, 2003.

REFERENCES

1. Dr. Y. BharathiKumari and Dr. JyotsnaCherukuri, A Text book of Engineering Chemistry by VGSPublications, First Edition, 2009
2. R.V. Gadag, A.Nityananda Shetty, I.K. International publishing house 1st edition 2006
3. Dr. M. R. Senapati, Advanced Engineering Chemistry by University Science Press (Impart from Laxmi Publications), 3rd Edition 2009.

IISEMESTER

S212 - ELECTRICLAL CIRCUITS AND NETWORKS-II

COURSE EDUCATIONAL OBJECTIVES

In this course, student will learn about

- Various parameters of two port networks.
- Different types of passive filters.
- Network synthesis.
- Different types of electrical Machines.

COURSE OUTCOMES

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

- Analyze different types of two-port networks.
- Design various passive filters.
- Synthesize different networks.
- understand the construction and operation of electrical machines

UNIT – I

Two-Port Networks : Z,Y, ABCD, h-parameters – Conversion of one parameter to another parameter–condition for reciprocity and symmetry–2 port network connections in series, parallel and cascaded, Ladder and Lattice networks.

Network Functions: Concept of Complex frequency, Transform Impedances, Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot.

UNIT – II

Network Synthesis: Hurwitz Polynomials, Positive Real Functions, definition and properties, Frequency Response of reactive one-ports, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

Synthesis of Reactive One Port by Foster 's method and Cauer Method, Synthesis of RL, RC and LC One Port networks by Foster method and Cauer Methods.

UNIT – III

Passive Filters: Low pass, High Pass, Band Pass, Band stop filters, Characteristics, design aspects, M-derived filters of L.P. and H.P, Composite filter.

UNIT – IV

Attenuators: Symmetrical and Asymmetrical attenuators, Design of various symmetrical attenuators.

Equalizers: Different types of Equalizers.

UNIT – V

Fundamentals of Electrical Machines: Principle of operation, construction, characteristics and types of Electrical Motors, Generators, Transformers (Basic Concepts only).

TEXT BOOKS

1. John D.Ryder, "Networks, Lines and Filters", Prentice Hall of India Publishers, 2nd Edition.
2. Smarajit ghosh, "Network Theory: Analysis and Synthesis", PHI Publishers, 1st Edition.
3. B.L.Thereja, Electrical Technology, Vol.2, S.Chand Publishers, 26thEdition, NewDelhi.

REFERENCES

1. C.L Wadhwa, “Network Analysis and Synthesis”, New Age International Publishers.
2. D.Roy Choudhary, “Networks and Systems”, New Age International Publishers.
3. Gopl G. Bhise,Prem R.Chadha,Durgesh C.Kulshresta, “Engineering Network analysis and Filter Design”, Umesh Publications, New Delhi.
4. U.A.Bakshi, A.V.Bakshi, Fundamentals of Network Analysis And Synthesis, Technical Publications, Pune.
5. Vasudev K. Aatre, Network Theory and Filter Design, John Wiley and Sons Inc.
6. G.K.Mithal, “Network Analysis”, Khanna Publishers, New Delhi.

IISEMESTER

S224 - ELECTRONIC DEVICES AND CIRCUITS

(Common to ECE, EIE, IT)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Concepts and analysis of semiconductors.
- Operation, characteristics and applications of different diodes.
- Different stages involved in the AC voltage to DC voltage conversion.
- Construction, Operation and characteristics of Transistors.
- Different types of biasing circuits of transistor amplifier, their merits and demerits.

COURSE OUTCOMES

At the end of this course student will be able to

- Understand the transport phenomena of carriers in a semiconductor.
- Know the operation of different diodes and able to apply in different applications.
- Design different filters for reducing ripple factor.
- Use transistor for different applications.
- Design the amplifiers using different biasing circuits.

UNIT-I

Semiconductor Physics: Charged particles, Energy band theory of crystals, Insulators, Conductors, Semiconductors, Mobility and Conductivity, Energy distribution of electronics, Electrons and Holes in an Intrinsic Semiconductors, Conductivity of a semiconductor, Carrier concentration in an intrinsic Semiconductors, Donor and Acceptor Impurities, Mass Action Law, Charge densities in semiconductor, Fermilevel in a semiconductor having impurities, Diffusion, Carrier Lifetime, Continuity Equation, Hall Effect.

UNIT-II

Junction Diode: Qualitative theory of PN Junction, Band Structure of an open circuited PN junction, Current components in a PN Diode, Qualitative theory of the PN diode currents-Diode current equation, Law of the junction, Forward currents, Reverse Saturation Current, PN Junction diode operation in Forward bias and Reverse bias, Volt Ampere Characteristics of Diode, Temperature dependence of Diode, Diode Resistance, Diode Capacitance-Transition Capacitance, Diffusion Capacitance and their derivations.

Special Diodes: Operation, characteristics and applications of Zener Diode, Tunnel Diode, Varactor Diode, Photo Diode, LED, Liquid crystal diode and Photo diode.

UNIT-III

Bipolar Junction Transistors: Introduction to Three terminal Devices, PNP and NPN Transistors, Transistor Current components-Emitter Efficiency, Transport Factor, Large Signal Current Gain; Input and Output characteristics of Transistor in Common Base, Common Emitter and Common Collector configurations, Relation between α and β, Base width modulation, Ebers-Moll Model.

Field Effect Transistors: Comparison between FET and BJT, JFET Construction, Operation, Classification, Drain and Transfer Characteristics of JFET, MOSFET Characteristics- Enhancement and Depletion Mode.

Optical and Power Electronic Devices: Photo Transistor, Silicon Controlled Rectifier, Unijunction Transistor, UJT relaxation oscillator.

UNIT-IV

BJT Biasing: Transistor Biasing and Stability- DC load line, Operating Point, AC load line, Thermal Instability, Stability factors S,S^{I},S^{II}, Bias Stabilization Techniques- Fixed Bias, Collector to Base Bias and Self Bias, Thermal Concepts- Thermal Runaway, Thermal Resistance, Thermal Stability, Condition to avoid Thermal Runaway, Bias Compensation Techniques- Diode Compensation for V_{BE}, Diode Compensation for I_{CO}.

FET Biasing: Different FET biasing methods.

UNIT-V

Rectifiers: Half Wave Rectifier, Full Wave Rectifier with center tap transformer, Full Wave Rectifier with Bridge circuit, derivation for DC, RMS Currents and Voltages, Ripple Factor, Rectifier Efficiency, Peak Inverse Voltage, Transformer Utilization Factor, Percentage of Regulation, Comparison of Rectifiers, Harmonic components in a Rectifier circuit.

Filters: Inductor Filter, Capacitor Filter, L-Section Filter, π-Section Filter, Multiple L-Section and Pi-Section Filters.

Regulators: Voltage Regulation using Zener diode, design of a Zener regulator.

TEXT BOOK

Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", Tata McGraw Hill, Publishers, New Delhi.

REFERENCES

1. R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, Pearson/Prentice Hall Publishers.
2. Thomas L.Floyd, Electronic Devices, Pearson Education Publishers.
3. Ben Streetman and Sanjay Banerjee , "Solid State Electronic Devices", Prentice Hall Publishers.
4. Allen Mottershed, "Electronic Devices and Circuits", PHI Publishers.
5. B.Visvesvara Rao etal., "Electronic Devices and Circuits", Pearson Education Publishers.
6. P.John Paul, "Electronic Devices and Circuits", New Age International Publishers.
7. GSN Raju,"Electronic Devices and Circuits", IK International Publishers, New Delhi.

IISEMESTER

L144 - ENGLISH COMMUNICATION LAB

(Common to all branches)

Prerequisite: English-I

Course Educational Objectives

In this course, the students will learn to

1. Better pronunciation through emphasis on word accent.
2. Use language effectively to face interviews, group discussions and public Speaking
3. Possess Positive attitude and inculcate group behavior
4. Negotiate well with inter personal skills and intra personal skills
5. Speak spontaneously on any topic given

Course Outcomes

After the completion of this course, students will have the ability to

1. Withstand the global competition in the job market with proficiency in English communication.
2. Articulate English with good pronunciation.
3. Face competitive exams like GRE, TOEFL, IELTS etc.
4. Face interviews and skillfully manage themselves in group discussions
5. Communicate with the people effectively.

The following course content is prescribed for English Language Communication Skills

Laboratory sessions:

1. Introduction to English Phonemes; Phonetic Transcription, Stress.
2. JAM
3. Role Play
4. Information Transfer
5. Group Discussions

SUGGESTED SOFTWARE

1. Digital Mentor: Globarena,Hyderabad,2005
2. Sky Pronunciation Suite: Young India Films, Chennai, 2009
3. Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley,USA,2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
5. Oxford Talking Dictionary, The Learning Company, USA, 2002
6. Learning to Speak English - 4 CDs. The Learning Company,USA,2002
7. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press, New Delhi, 2008

IISEMESTER

L140 - ENGINEERINIG CHEMISTRY LAB

(Common to all branches)

Prerequisite: None

Course Educational Objectives:

Through this course the student will learn

1. To analyze water for its quality and to determine the important parameters like alkalinity and hardness.
2. To distinguish types of titrations used in volumetric analysis.
3. To gain hands on experience in practical aspects of preparation of polymers.

Course Outcomes:

After undergoing the training in this course the students will acquire the ability to:

1. Assess quality of water based on the procedures given.
2. Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus**.**
3. Acquire practical knowledge related to preparation of polymers.
4. Exhibit skills in performing experiments based on theoretical fundamentals.

LIST OF EXPERIMENTS

Model experiment

1. Estimation of sodium hydroxide by using hydrochloric acid.

Water analysis

2. Determination of alkalinity of water sample
3. Determination of total Hardness of water by EDTA method
4. Determination of permanent hardness of water by EDTA method.
5. Determination of Dissolved Oxygen (D.O) content by Winkler's method

Preparation of polymers

6. Preparation of Urea formaldehyde resin.
7. Preparation of Phenol formaldehyde resin.

Redox titrations

8. Determination of amount of potassium dichromate in given solution by using sodium thiosulphate.
9. Determination of the amount of Oxalic acid and Sulphuric acid in 1 liter solution by using given standard Sodium Hydroxide and Potassium Permanganate solution.
10. Estimation of Mohr's salt by using potassium permanganate.
11. Estimation of Mohr's salt by using potassium dichromate.
12. Estimation of Mohr's salt by using Oxalic acid.

Estimation of Vitamin content

13. Estimation of Vitamin-C

Reference :

Lab Manual

IISEMESTER

L135 - ELECTRICLAL CIRCUITS AND NETWORKS LAB

LABORATORY EDUCATIONAL OBJECTIVES

In this Laboratory student will learn about

- Verifying Kirchoff's laws for different circuits.
- Verifying different Network theorems.
- Obtaining the frequency response for series and Parallel resonant circuits.
- Finding different parameters for two port network
- Obtaining the frequency response of various filters.

LABORATORY OUTCOMES

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

- Identify and apply the network reduction techniques based on the circuit requirement.
- Extend these techniques to solve different circuits.
- Understand and apply Differentiates theorems to different circuits.
- Analyze different types of Two-port networks.
- Design various passive filters.

LIST OF EXPERIMENTS

(The following experiments are to be simulated using PSPICE/MULTISIM software and verified by Bread board)

1. Verification of Kirchoff's laws for simple circuits
2. Verification of Voltage and Current Division for simple circuits
3. Series Resonance.
4. Parallel Resonance.
5. Verification of Superposition Theorem.
6. Verification of Thevenin's Theorem.
7. Verification of Norton's Theorem.
8. Verification of Reciprocity Theorem.
9. Verification of Maximum power transfer Theorem.
10. Two port network parameters – Z,Y Parameters.
11. Two port network parameters – h, ABCD Parameters.
12. Frequency response of Low Pass filter.
13. Frequency response of HighPass filter.
14. Frequency response of BandPass filter.
15. Frequency response of Band Stop filter.

IISEMESTER

L139 - ELECTRONIC DEVICES AND CIRCUITS LAB

(Common to ECE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Behavior of PN-junction under different biasing conditions.
- AC voltage to DC voltage conversion by using rectifiers and filters.
- Operation and characteristics of BJT and FET under different configurations.

COURSE OUTCOMES

At the end of this course student will be able to

- Know the switching behavior of the diode.
- Understand the importance of filter in AC voltage to DC voltage conversion.
- Operate BJT and FET under different configurations and understand how they work as an amplifier and switch.

LIST OF EXPERIMENTS

(The following experiments are to be simulated using PSPICE/MULTISIM/LABVIEW software and verified by Bread board)

1. Study of CRO.
2. PN Junction diode Characteristics.
3. Zener diode Characteristics.
4. Transistor Characteristics under CB Configuration.
5. Transistor Characteristics under CE Configuration.
6. Transistor Characteristics under CC Configuration.
7. Drain Characteristics of Field Effect Transistor.
8. Transfer Characteristics of Field Effect Transistor.
9. Uni-Junction Transistor Characteristics.
10. Half wave rectifier with and without inductive filter.
11. Half wave rectifier with and without capacitive filter.
12. Full wave rectifier with and without inductive filter.
13. Full wave rectifier with and without capacitive filter.

IIISEMESTER

S300 - MATHEMATICS – III

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The concept of complex variables, analyticity and its construction
- The concept of elementary complex functions and complex integration
- The concept of power series, singularities and poles
- The concept of residues of complex functions and evaluation of residues.
- Cartesian, Cylindrical and Spherical coordinate systems
- Various MATLAB functions and Commands

COURSE OUTCOMES

At the end of this course student will be able to

- Find the analytic function, given real or imaginary part by Milne Thomson's method.
- Find the principal values of complex elementary functions and perform contour integration
- Expand the analytic and non analytic functions in Taylor series and Laurent series respectively.
- Apply the knowledge of Residue theorem in evaluating in complex integration
- Apply the concepts of Vector calculus to Electromagnetic Fields
- Solve all the mathematical problems through MATLAB

UNIT - I

Complex Function Theory: Basic Definition,Continuity, Differentiability, Analyticity and Properties of Analytic Functions, Harmonic and Conjugate Harmonic Functions, Cauchy-Riemann Equations in Cartesian and Polar Coordinates, Milne Thompson Method.

UNIT - II

Elementary Functions: Exponential, Trigonometric, Hyperbolic and Logarithm Functions and Properties.

Complex Integration: Line Integral in Complex Plane, Cauchy's Integral Theorem, Cauchy's Integral Formula.

UNIT - III

Power Series: Region of Convergence, Taylor's Series and Laurent Series.

Residues: Evaluation of Residue, Residue Theorem, Evaluation of Integrals of type

(a) $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta,\sin\theta)d\theta$ (c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

UNIT - IV

Coordinate Systems: Cartesian, Circular Cylindrical and Spherical Coordinate Systems and their transformation.

Multiple Integrals: Double and Triple Integrals

Vector Calculus: Differential length, Differential Area, Differential Volume, Gradient of a scalar, Divergence of a vector, Curl of a vector, Laplacian of a scalar, Line integrals, Surface integrals, Volume Integrals, Divergence Theorem, Stokes Theorem and Green's Theorem

UNIT - V

MATLAB Fundamentals: Variables, Arrays and Array Operations, control statements, loops, functions, plots and Graphics, Trignometry and Complex Numbers, Mathematical Functions, Data Analysis, Strings, Time, Base Conversion and Bit Operation, Symbolic Processing, basics of various MATLAB Tool Boxes.

MATLAB Programming: Matlab programs for Matrices and Linear Algebra, Linear Systems, Algebraic and Transcendental Equations, Numerical Integration, Numerical solution ofOrdinary Differential Equations, Curve Fitting and Interpolation.

TEXT BOOKS

1. Higher Engineering Mathematics, B.S.Grewel, Khanna Publishers, 42nd Edition, 2012.
2. Dr. B. V. Ramana, "Higher Engineering Mathematics", The McGraw Hill Companies, 1st Edition 2010.
3. Rudra Pratap, "Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers", Oxford University Press.

REFERENCES

1. Advanced Engineering Mathematics, Irvin Kreyszig, John Wiley & Sons, 8th Edition, 2011.
2. Engineering Mathematics Volume -III T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company, 2012.
3. Matthew N. O. Sadiku, " Principles of Electro Magnetics", 4th Edition, Oxford Press.
4. Stephen J.Chapman, MATLAB Programming for Engineers, Cengage Learning Publishers, 2007.
5. Amos Gilat, "MATLAB:An introduction with Applications", John Wiley Publishers

IIISEMESTER

S126 - ANALOG ELECTRONIC CIRCUITS

(Common to ECE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Analysis of single stage and multistage amplifiers
- Frequency response of single stage and multistage amplifiers.
- Different power amplifiers and tuned amplifiers.
- Concept of negative feedback in amplifiers.
- Operation, types and stability of Oscillators.

COURSE OUTCOMES

At the end of this course student will be able to

- Design different single stage and multistage amplifiers.
- Understand the effect of capacitances on frequency response.
- Understand the applications of power and tuned amplifiers.
- Know the importance of negative feedback in amplifiers.
- Design Sinusoidal oscillator for different frequencies

UNIT – I

Small Signal Low Frequency Transistor Amplifiers: Hybrid parameter model of a Two Port Network, h parameter model for Transistor in CE, CB and CC Configurations, typical h parameter values, h parameter conversion from one configuration to another configuration, Analysis of CE, CB and CC Amplifiers using h parameter model, CE Amplifier with emitter resistance.

Transistor at High Frequencies: The hybrid π Common Emitter Transistor model; Hybrid π conductance in terms of low frequency h parameters- Transconductance, Input Impedance, Feedback conductance, Base spreading resistance, output conductance and hybrid π capacitances; The CE short circuit current gain obtained with the hybrid-π model- Bandwidth f_β and parameter f_T, Current gain with resistive load, Transistor amplifier response with source resistance-Gain Bandwidth product.

UNIT – II

Multistage Amplifiers: Cascade Amplifier (RC Coupled Amplifier), Cascode Amplifier, Darlington Pair and their analysis.

FET Amplifiers: Analysis of CG, CS, CD FET amplifiers at Low frequency and at High frequency.

Frequency Response of Amplifiers: Frequency response of Single stage and double stage BJT amplifiers, Determination of High and Low cut off frequencies, Bandwidth, Effect of coupling capacitor and emitter bypass capacitor on frequency response; Frequency response of Single stage and double stage FET amplifiers, Determination of High and Low cut off frequencies, Bandwidth.

UNIT – III

Power Amplifiers: Classification of large signal Amplifiers, Distortion in Amplifiers- Second harmonic Distortion and Higher order harmonic distortion, Class A power amplifier- Direct coupled and Transformer Coupled Class B power amplifier- Push Pull and Complementary Symmetry Class AB power amplifier, Class C power amplifier, Class D and S power Amplifiers.

Tuned amplifiers: Single tuned amplifier, Double tuned amplifier and their analysis, Stagger tuned amplifier.

UNIT – IV

Feedback Amplifiers: Open loop Amplifiers- Voltage Amplifier, Current Amplifier, Transresistance Amplifier and Transconductance Amplifier, Closed loop Amplifiers- Block Diagram, Concept of negative feedback, Concept of positive feedback; Characteristics of Negative feedback Amplifiers, Classification of Negative feedback Amplifiers-Voltage Series feedback Amplifier, Voltage Shunt feedback Amplifier, Current Series feedback Amplifier, Current Shunt feedback Amplifier and their analysis.

UNIT – V

Sinusoidal Oscillators: Barkhausen Criterion, Classification of Oscillators; Hartley Oscillator, Colpitts Oscillator; RC Phase shift Oscillator using BJT and JFET; Wein Bridge Oscillator, Crystal Oscillator, Frequency and Amplitude Stability of Oscillators.

TEXT BOOKS

1. Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", Tata McGraw Hill, Publishers, New Delhi, Fourth reprint 2011.
2. Donald A.Neamen, "Electronic Circuit Analysis and Design",Tata McGraw Hill Publishers, 2nd Edition.

REFERENCES

1. P.John Paul, "Electronic Devices and Circuits", New Age International Publishers
2. Adel S. Sedra and Kenneth Carless Smith, "Microelectronic Circuits", Oxford University Press, 5th Edition.
3. M.H.Rashid, "Microelectronic Circuits: Analysis and Design", PWS Publishing Company.
4. R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, Pearson education Publishers, 10th Edition.
5. T.F. Bogart Jr., J.S.Beasley and G.Rico, Electronic Devices and Circuits, Pearson education Publishers, Reprint 1999.
6. David A. Bell, Electronic Devices and Circuits, Oxford University Press.
7. B.Visvesvara Rao etal., "Electronic Circuit Analysis", Pearson Education Publishers.

IIISEMESTER

S189 - DIGITAL ELECTRONIC CIRCUITS

(Common to ECE, EEE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The basic concepts of number systems and Boolean algebra.
- logic gates and realization of Boolean expressions using logic gates
- Realization of combinational and sequential circuits using logic gates.
- Concepts of FiniteState Machines and ASM Charts

COURSE OUTCOMES

At the end of this course student will be able to

- Understand number systems, Boolean algebra and its application to design digital circuits.
- Minimize and Implement Boolean expressions using logic gates
- Design combinational and sequential circuits using logic gates
- Understand concepts of FSM and ASM charts

UNIT - I

Number Systems: Number system, complements, signed Binary numbers. Binary Arithmetic, Binary codes –BCD, Excess 3 code, Gray code, Error detecting and correcting code – Hamming code, conversion from one code to another.

Boolean Algebra: Boolean postulates –De-Morgan's Theorem, Principle of Duality, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS)- Minterm and Maxterm, Canonical forms – Conversion into canonical form–Karnaugh map Minimization (up to 5 variables)- Don't care conditions.

UNIT - II

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive –OR and Exclusive – NOR, positive logic and negative logic, Realization of Boolean Functions using logic gates (Multi level gate implementations- AND -OR, OR - AND, NAND -NAND, NOR -NOR, NAND-NOR & NOR -NAND realizations. AND, OR, NOT, NAND and NOR gates using Resistors, Diodes and Transistor.

UNIT - III

Combinational Logic Circuits: Design procedure, Adders and Subtractors – Serial adder/ Subtractor, Parallel adder/ Subtractor- Carry look ahead adder, BCD adder, Magnitude Comparator, Decoder, encoder, Multiplexer, Demultiplexer, Parity checker, code converters.

Memories- Read Only memory and types of ROM, Random access Memory and types of RAM; Programmable Logic Devices–Programmable Logic Array, Programmable Array Logic.Implementation of combinational logic using MUX, PROM, PAL and PLA.

UNIT - IV

Sequential Logic Circuits: Latches, Flip flops-SR, JK, T, D and Master slave – Characteristic and excitation tables, characteristic equations. Modes of triggering – Edge and Level Triggering, Realization of one flip flop using other flip flops, Registers and their operation, synchronous and Asynchronous counters, modulo – n counters, Race around condition, Hazards: Static ,Dynamic, Essential –Hazards elimination.

UNIT - V

Asynchronous Sequential Circuits: Sequence detector. Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines.

Algorothimic State Machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations.

TEXTBOOKS

1. Morris Mano, "Digital Design", PHI Publishers, 4th Edition.
2. Zvi Kohavi, Switching & Finite Automata theory, TMH Publishers, 2nd Edition.

REFERENCES

1. Charles H. Roth, "Fundamentals of Logic Design", Cengage learning Publishers.
2. M.Subramanyam, "Switching Theory and Logic Design", University Science Press Publishers.
3. John M. Yarbrough, "Digital Logic: Applications and Design", Thomson Publications.
4. Anandakumar, "Switching Theory and Logic Design", PHI Publishers.

IIISEMESTER

S361 - PULSE AND SWITCHING CIRCUITS

(Common to ECE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Concepts of linear and non linear wave shaping circuits.
- Switching characteristics of transistor.
- Analysis and design and of different Multivibrator circuits.
- Various methods of time base generators.
- Principle and operation of Sampling gates.

COURSE OUTCOMES

At the end of this course student will be able to

- Analyze RC, RL, RLC, clipper and clamper circuits.
- Understand Switching characteristics of transistor.
- Differentiate various types of Multivibrators and their applications in digital systems.
- Analyze the methods for generating time based sweep signals.
- Understand sampling gate operation and their applications.

Pre-requisite: Electronic Devices and Circuits

UNIT-I

Linear Wave Shaping Circuits: Low pass and High pass RC circuits and their response for sinusoidal, step, pulse, square and ramp inputs. RC circuit as differentiator, integrator and double differentiator, RL, RLC circuits and their response for step input.

UNIT-II

Non Linear Wave Shaping Circuits: Clipper circuits using Diode and Transistor, clipping at two independent levels, Zener Diode Clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, Clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem and practical clamping circuits.

UNIT-III

Switching Characteristics of Devices: Diode Modeling, Diode Switching Times, Transistor as a switch, Break down voltage considerations of transistor, saturation parameters of Transistor and their variation with temperature, Transistor switching times.

Multivibrators-I: Bistable Multivibrator-Fixed bias, self biased transistor binary, commutating capacitors, Principle of operation, analysis and design of Bistable Multivibrator.

UNIT-IV

Multivibrators-II: Monostable Multivibrator-Collector-coupled and Emitter-coupled Mono stable Multivibrator, Principle of operation, analysis and design of Monostable Multivibrator; Astable Multivibrator-Collector coupled and Emitter-coupled, Design of Astable Multivibrator; Schmitt trigger circuit-Principle of operation, analysis and design, calculation of UTP, LTP and applications.

UNIT-V

Time Base Generators: Features of Time Base Signals, methods of generating time based signals, RC ramp generator, constant current ramp generator, UJT saw tooth generator, Bootstrap ramp generator, Miller integrator ramp generator.

Sampling Gates: Operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, reduction of pedestal in gate circuits, applications of sampling gates.

TEXTBOOK

1. J.Millman and H.Taub, "Pulse, Digital and Switching Waveforms", McGraw-Hill Publishers, 2nd Edition.

REFERENCES

1. A. Anand Kumar, **"**Pulse and Digital Circuits", PHI Publishers, 2005.
2. K.Venkatarao, K.Rama Sudha and G.Manmadha rao, "Pulse and digital circuits", Pearson education Publishers.
3. V.U.Bakshi and A.P.Godse, **"**Pulse and Digital Circuits", Technical Publications, Pune.
4. J.B.Gupta, **"**Pulse and Digital Switching Circuits", SK.Kataria and Sons Publications,New Delhi.

IIISEMESTER

S428 - RANDOM VARIABLES AND STOCHASTIC PROCESSES

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Concept of random variables, various distributions and their characteristics.
- Multiple random variables and their features.
- Temporal and spectral characteristics of random process.
- Noise and their characteristics.

COURSE OUTCOMES

At the end of this course student will be able to

- Use the various standard distributions for analysis of random signals.
- Recognize the use of multidimensional random variables in signal processing applications.
- Estimate the time and spectral characteristics of random process.
- Identify the sources of noise and their characteristics in real time systems.

Pre-requisite: Probability, Sample space, Independent Events, Joint and Conditional Probability.

UNIT – I

The Random Variable: Concept of random variable, Condition for a function to be a random variable, Classification of a random variable, Cumulative distribution function and properties, Probability density function and properties, Different distributions-Binomial, Poisson, Uniform, Exponential, Rayleigh, Gaussian.

Operations on One Random Variable: Expectation, Moments, Moment about the origin, Central moments, Variance, Skew, Skewness, Chebychev's inequality, Markov's inequality, Characteristic function and properties, Moment generating function and properties, Transformations on random variable.

UNIT – II

Multiple Random Variables: Multiple random variable, Joint distribution function and properties, Marginal distribution function, Joint density function and properties, Marginal density function, Conditional distribution and density functions, statistical independence, Distribution and density of sum of random variables, Central Limit theorem.

Operations on Multiple Random Variables: Expected value of a function of random variables, Joint moment about the origin, Correlation, Joint central moments, Covariance, Correlation coefficient, Joint characteristic function and properties, Jointly Gaussian random variables- two and N random variables, Properties of Gaussian random variables.

UNIT – III

Stochastic Processes-Temporal Characteristics: Concept of stochastic processes, Classification of stochastic processes, Deterministic and Nondeterministic processes. Distribution and density of stochastic processes, Statistical independence processes, First-Order stationery processes, Second-Order and wide-Sense stationery processes, N-Order and Strict-Sense stationery processes. Time Averages and Ergodicity, Mean-Ergodic processes, Correlation Ergodic Processes. Correlation Functions- Autocorrelation function and properties, Cross-Correlation function and properties, Covariance function, Auto covariance function.

UNIT – IV

Stochastic Processes-Spectral Characteristics: Power spectral density of processes and properties, Bandwidth of power spectral density, Wiener-Khintchine relation, Cross power spectral density and properties, Relation between cross power spectral density and cross-correlation function,

Noise: Concept of noise, White noise, Band limited white noise, Colored noise.

UNIT – V

Linear Systems With Random Inputs: Concept of linear system, System response, Mean value of system response, Mean squared value of system response, Autocorrelation function of response, Cross correlation function of input and output, Power spectral density of response, Cross power spectral density of input and output, Noise Bandwidth, Band pass, Band limited and Narrowband processes.

TEXT BOOK

Peyton Z. Peebles, Probability, Random Variables and Random Signal Principles, Tata McGraw, Hill Publishers, New Delhi, 4th Edition.

REFERENCES

1. Taub and Schilling, Principles of Communication Systems,Second Edition, Tata McGraw-Hill, Publishers, New Delhi.
2. Wim C. Van Etten, Introduction to Random Signals and Noise, John Wiley and Sons Inc.
3. H.Stark and J.W. Woods, Probability and Random Processes with Applications to Signal Processing, Pearson Education Publishers.
4. Hwei Hsu, Probability, Random Variables and Random Processes, Schaum's Outline series, Tata McGraw-Hill Publishers, New Delhi.
5. Y Mallikarjuna Reddy, "Probabilty theory and Staochastic Processes", Universites Press (India), Pvt Ltd.

IIISEMESTER

S378 - SIGNALS AND SYSTEMS

(Common to ECE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Fundamental characteristics of signals and systems.
- Frequency domain representation of Signals using Fourier series and Fourier transform.
- Sampling processes and Reconstruction of signals.
- Properties of Systems and Filter Characteristics.
- Laplace Transform on various types of signals and systems.

COURSE OUTCOMES

At the end of this course student will be able to

- Differentiate various signals with their properties.
- Analyze the spectral characteristics of various signals.
- Understand the process of sampling and the effects of various sampling methods.
- Classify the Systems and observe the response of Linear Systems.
- Apply the Laplace Transforms for analysis of continuous time signals and systems.

Pre-requisite: Vector, Scalar, Approximation of a vector by another vector, Differentiation and Integration of signals.

UNIT – I

Signal Analysis: Concept of Signal, Classification of Signals-Continuous Time and Analog Signals, Discrete Time and Digital Signals; Representation of Signals- Impulse, Unit Step, Unit Ramp, Signum, Decaying Exponential, Raising Exponential, Double Exponential, Gate and Rectangular, Sinc and Sampling Signals; Operations on Signals– Time Shifting, Time Scaling, Time Reversal (Folding), Amplitude Scaling, Convolution; Graphical Method of Convolution, Properties of Signals- Even and Odd, Causal and Non Causal, Bounded and Unbounded, Periodic and Aperiodic, Energy and Power, Deterministic and Random Signals.

UNIT – II

Signal Approximation: Approximation of a Signal by another signal-Mean square error, Condition for orthogonal signals, Approximation of a Signal by a set of mutually orthogonal signals-Evaluation of Mean square error, Gibbs Phenomena, Orthogonality in complex signals- Approximation of a complex signal by another complex signal, Approximation of a complex signal by a set of mutually orthogonal complex signals.

Fourier Series: Concept of Fourier Series, Trigonometric Fourier Series, Exponential Fourier Series, Relations among coefficients of Trigonometric Fourier Series and Exponential Fourier Series, Representation of Periodic signal by Fourier series over the entire interval, Existence of Fourier Series, Symmetry conditions of Fourier Series, Parsevalls Theorem, Complex Fourier Spectrum-Line and Power Spectrum.

UNIT – III

Fourier Transforms: Need of Transform, Deriving Fourier Transform from Fourier Series, Existence of Fourier Transform, Properties of Fourier Transform- Symmetry, Linearity, Scaling, Time Reversal, Time Shifting, Frequency Shifting, Time Differentiation, Time Integration, Frequency Differentiation, Frequency Integration, Time Convolution, Frequency Convolution and Parsevalls Theorem; Fourier Transform of Aperiodic Signals, Fourier Transform of Periodic Signals.

Sampling Theorem: Representation of continuous time signals by its samples, Graphical and analytical proof of sampling theorem for Band Limited Signals, impulse sampling, Reconstruction of signal from its samples, effect of under sampling- Aliasing.

UNIT – IV

Signal Transmission Through Linear Systems: Definition of System, Classification of Systems, Properties of Systems- Linear and Non Linear, Time Invariant and Variant, Causal and Non Causal, Stable and Unstable; Signal and System Bandwidth, Response of Linear Systems-Transfer Function, Impulse Response, Response of Linear Systems with an arbitrary input, Distortion less Transmission through a system, Filter Characteristics of Linear System, Ideal Filter characteristics of LPF, HPF, BPF and BEF, Physically Realizable System and Poly-Wiener Criterion.

Correlation Functions and Spectral Densities: Autocorrelation Function and Properties, Energy Spectral Density, Power Spectral Density, Cross Correlation Function and Properties.

UNIT – V

Laplace Transforms: Concept of Laplace Transform on Non-Causal, Causal and Anti-Causal Signals, Relation between Laplace Transform and Fourier Transform, Existence of Laplace Transform; Properties of Laplace Transform- Linearity, Time Scaling, Time shifting, Shifting in S domain, Conjugate, Differentiation in time domain, Integration in time domain, Differentiation in S-domain, Integration in S-domain, Convolution in time domain, Convolution in S-domain, Initial value and Final value theorems. Laplace Transform of various classes of Signals, Concept of Region of Convergence and Properties, Inverse Laplace Transform using Partial Fractions Method. Applications of Laplace Transform- Causality of a System, Stability of a System, Solving of Differential Equations and Analysis of RLC Circuits.

TEXT BOOKS

1. A V Oppenheim, A S Wilsky and IT Young, Signals and Systems, PHI/Pearson publishers, 2nd Edition.
2. B P Lathi, Signals, Systems and Communications, BSP, 2003, 3rd Edition.

REFERENCES

1. Simon Haykin, Signals and Systems, John Wiley, 2004
2. HWEI P.HSU, Signals and Systems, Schaum's Outlines, Tata Mc Graw Hill, 2004.
3. Michel J. Robert, Fundamentals of Signals and Systems, McGraw Hill Publishers.
4. Narayana Iyer, Signals and Systems, Cengage Learning Publishers, 2011.
5. P. Ramesh Babu, Signals and Systems, Scitech Publications Pvt Ltd, Chennai, March 2013
6. A.Anand Kumar, Signals and Systems, 2nd Edition, PHI, 2012.
7. K.Raja Rajeshwari and B.Visveswararao, Signals and Systems, PHI Publishers.

IIISEMESTER

S243 - ENVIRONMENTAL STUDIES

(Common to all branches)

Prerequisite: None

Course Educational Objectives:

In this course the student will learn about

- Environmental issues related to local, regional and global levels.
- Concepts of ecosystems and threats to global biodiversity.
- Environmental pollution problems.
- Environmental issues in the society.
- Problems associated with over population and burden on environment.

Course Outcomes:

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

1. Evaluate local, regional and global environmental issues related to resources and management.
2. Understand the implications of the ecosystems and identifythe threats to global biodiversity
3. Realige the problems related to pollution of air, water and soil.
4. Investigate and solve social issues of the environment.
   - Create awareness on the concept of sustainable population growth**.**

UNIT – I

Natural Resources: Definition, Scope and importance of Environmental Studies – Need for Public Awareness. Renewable and non-renewable resources –

Natural resources and associated problems – Forest resources, Water resources, Mineral resources, Food resources and Energy resources.

UNIT - II

Ecosystems: Concept of an ecosystem - Structure and functions of an ecosystem - Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession, Food chains, Food webs and ecological pyramids.Bio-Geo Chemical Cycles.

Biodiversity and its conservation: **Introduction** – Definition & Levels of Measuring Biodiversity: Genetic, Species, Community and Ecosystem diversity.

Bio-geographical classification of India, India as a mega diversity nation, Values of Biodiversity: Direct and Indirect Values, Hot-spots of biodiversity, Threats to biodiversity, Man-wildlife conflicts, Endangered and endemic species of India. Conservation of biodiversity.

UNIT - III

Environmental Pollution: Definition, Sources, Effects and Control measures of

1. Air pollution
2. Water pollution
3. Soil pollution
4. Noise pollution
5. Radioactive Pollution

Solid waste Management: Sources of waste, Effects of improper handling of waste and measures to reduce the waste production and management methods of Municipal solid waste.

Disaster management: Floods, Earthquakes, Cyclones, Landslides and Tsunami.

UNIT - IV

Social Issues and the Environment: From Unsustainable to Sustainable development & Equitable use of resources for sustainable life style - Environment and human health - Resettlement and Rehabilitation of people, its problems and concern & Case Studies - Climate change: Global warming, Acid rains, Ozone layer depletion, Nuclear accidents and Holocaust & Case studies - Consumerism and waste products.

UNIT -V

Human Population and the Environment: Population growth & Variations among Nations, Population explosion – Family Welfare Program - Human Rights - Value Education - HIV/AIDS - Women and Child Welfare - Role of Information Technology in Environment and human health & Case Studies. Environmental legislation in India.

TEXT BOOKS

1 P.N.Palanisamy et al., "Environmental Science" 2nd edition, Dorling Kindersley (India) Pvt.Ltd. Licenses of Pearson Education in South Asia, 2013.

2 R. Rajagopalan, "Environmental Studies (From Crisis to Cure)", by Oxford University Press, 2011, Second Edition.

REFERENCE

1. M. Anji Reddy, "Textbook of Environmental Sciences and Technology" by BS Publications, 2011 Second Edition.

2. Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", by University Grants Commission, University Press (India) Private Limited, 2005. (2010 Reprinted).

IIISEMESTER

L107 - ANALOG ELECTRONIC CIRCUITS LAB

(Common to ECE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Frequency response of single stage and multi stage amplifiers.
- Frequency response of FET amplifier.
- How frequency response varies by applying negative feedback on amplifiers.
- Different frequency sinusoidal signal generation.

COURSE OUTCOMES

At the end of this course student will be able to

- Understand the effect of capacitors on frequency response of amplifier.
- Determine the parameters of FET amplifier.
- Know the effect of negative feedback in amplifiers.
- Generate Sinusoidal signals with different frequencies.

LIST OF EXPERIMENTS

(The following experiments are to be simulated using PSPICE/MULTISIM software and verified by Bread board)

1. Common Emitter Amplifier.
2. Common Collector Amplifier.
3. Single Stage FET Amplifier.
4. Two Stage BJT RC coupled Amplifier.
5. Two Stage FET Amplifier.
6. Class A Power amplifiers.
7. Class B Power amplifiers.
8. Class C Power amplifiers.
9. Voltage series Feedback amplifier
10. Current shunt Feedback amplifier
11. Hartley Oscillator
12. Colpitts Oscillator
13. RC phase shift oscillator using Transistors.
14. Wien bridge oscillator using Transistors.

IIISEMESTER

L174 - PULSE AND DIGITAL CIRCUITS LAB

(Common to ECE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this Laboratory student will learn about

- Linear and Non-linear wave shaping circuits.
- Switching characteristics and Switching Times of Transistor
- Analyze different type of Multivibrators
- Function of various logic gates.
- Different type of Flip-Flops and counters and their excitation.

COURSE OUTCOMES

At the end of this course student will be able to

- Analyze the response of linear and non-linear wave shaping circuits.
- Understand the Switching behaviour of Transistor
- Design various Multivibrator circuits for different applications.
- Represent basic logic gates using discrete components and implementation using universal gates.
- Design different types of Flip-Flops and counters.

LIST OF EXPERIMENTS

(Minimum 12 experiments to be conducted)

Part-1: Pulse Circuits

1. Linear Wave Shaping Circuits-Low Pass and High Pass
2. Non Linear Wave shaping Circuits - Clippers & Clampers
3. Switching behaviour of Transistor
4. Bistable Multivibrator
5. Monostable Multivibrator
6. Astable Multivibrator
7. Schmitt Trigger
8. UJT Relaxation Oscillator
9. Sampling gates

Part-2: Digital Circuits

1. Realization of Logic Gates Using Discrete Components
2. Implementation of Logic Gates with Universal Gates
3. Adder and Subtractor Circuits
4. SR and JK Flip Flops
5. Modulo- N Counter

IVSEMESTER

S125 - ANALOG COMMUNICATIONS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Principles of Amplitude Modulation Techniques.
- Various angle modulation concepts.
- Effects of Noise in communication systems.
- Classification and understanding of Transmitters and Receivers.
- Significance of sampling and its implications in pulse modulation.

COURSE OUTCOMES

At the end of this course student will be able to

- Identify the areas of Amplitude Modulation Techniques in real time applications.
- Understand the benefits of angle modulation.
- Gain knowledge about noise parameters and remedial measures for improvement.
- Analyze and differentiate various classes of Transmitters and Receivers.
- Discriminate various pulse modulation techniques.

Pre requisites: Signals, Fourier series, Fourier Transform of standard signals.

UNIT – I

Amplitude Modulation

Introduction to Communication System, need for modulation, Classification of modulation schemes; Amplitude modulation: Definition, time domain and frequency domain representation, Single tone amplitude modulation, modulation index, power relations in AM waves, Generation of AM waves: Square law modulation, Switching modulator, Detection of AM waves; Double side band suppressed carrier modulation: Definition, time domain and frequency domain representation, Generation of DSBSC waves, Coherent detection of DSBSC waves, Limitations of Coherent detection, Quadrature carrier multiplexing.

Single side band modulation: Definition, time domain and frequency domain representation of SSB waves, Generation of SSB waves, Coherent detection of SSB waves; Vestigial Sideband modulation: time domain and frequency domain description of VSB wave, generation of VSB modulated wave, Envelope detection of VSB wave plus carrier, Frequency division multiplexing.

UNIT – II

Angle modulation

Definition, types of angle modulation, Frequency modulation, phase modulation, time domain representation, single tone frequency modulation, Narrow band FM: time and frequency domain representation, Wide band FM: time and frequency domain representation, Transmission bandwidth of FM, Generation of FM: direct method, indirect method, Detection of FM waves: Frequency discrimination method, phase discrimination method, phase locked loop.

UNIT – III

Noise in Analog Communication Systems

Calculation of signal to noise ratio in AM, DSBSC, SSBSC systems, Noise in frequency modulated systems, threshold effect in FM systems, pre emphasis and de emphasis.

UNIT – IV

Radio Transmitters and Receivers

Radio Receivers: Classification of radio receivers, Types of radio receivers-Tuned Radio frequency receiver and its limitations, Super hetero dyne receiver , various sections present in super hetero dyne receiver-RF section , frequency changing and tracking , Concept of Intermediate frequency, Automatic gain control, FM receiver-various sections present in FM receivers , squelch circuit , amplitude limiting.

Radio Transmitters: Classification of radio transmitters, carrier frequency requirements, AM transmitter, effect of feedback on the performance of AM transmitters, FM transmitter-Direct method of FM transmission, indirect method of FM transmission.

UNIT – V

Pulse Analog Modulation

Need for pulse modulation, Types of pulse analog modulation; Pulse amplitude modulation-definition, generation of PAM waves, Ideal, natural and flat top sampling, Demodulation of PAM waves; Pulse width modulation-Definition, generation of PWM, Demodulation of PWM waves; Pulse position modulation-Definition, generation of PPM, Demodulation of PPM, Time division multiplexing, Frequency division multiplexing.

TEXT BOOKS

1. Simon Haykin, 'Communication Systems' ,John Wiley & sons,2/e 1983.
2. George Kennedy , "Electronic Communication Systems", Tata McGraw Hill Publishers, 3rd Edition.
3. Taub and Schilling, "Principles of Communication Systems",2nd Edition, Tata McGrawHill Publishers.

REFERENCES

1. V.Chandra Sekar, "Analog Communication", Oxford University Press.
2. G.K.Mithal, "Radio Engineering", Khanna Publishers, New Delhi.

IVSEMESTER

S128 - ANALOG INTEGRATED CIRCUITS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Transistor Current Sources and Differential amplifiers
- OP-AMP parameters, characteristics and its applications .
- Concepts of Active filters and the waveform generators.
- Operation and applications of IC 555 Timers and Phase Locked Loop.
- Different types of ADC and DAC Circuits.

COURSE OUTCOMES

At the end of this course student will be able to

- Design various Transistor Current Sources and Differential amplifiers
- Explore the Linear and Non Linear Applications of Op-Amp
- Design different types of Active filters and waveform generators
- Use the Timer circuits and Phase Locked Loop for various applications
- Use ADC and DAC Circuits in different applications

Pre Requisite: Circuit Theory and Analog Electronic Circuits

UNIT – I

Introduction: Integrated Circuit Definition, Meaning of MSI, LSI, VLSI, ULSI, Types of Integrated circuits and their features, differences between Analog IC and Digital IC.

Transistor Current Sources: Basic Current Source, Modified Basic Current Source, Widlar Current Source, Cascode Current Source, Wilson Current Source, their analysis.

Differential Amplifiers: Classifications of differential amplifiers, DC and AC analysis of all differential amplifier Configurations, specifications of differential amplifiers, FET differential amplifier, DC Coupling and Cascade Differential Amplifiers, Level translator, current mirror circuit.

UNIT – II

Operational Amplifiers: Op-amp Block Diagram, Package Types and temperature ranges, IC 741 op-amp and its features, Power supply requirement to operate Op-amp IC741, ideal and practical characteristics of Op-amp, DC and AC characteristics of Op-Amp, IC 741 Op-Amp specifications, Measurement of slew rate and CMRR.

Applications of OP Amps: Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, AC Voltage follower, Analog multiplier, Four Quadrant multiplier, squarer circuit, Analog divider, Square root circuit, V to I, I to V converters, Op-amp circuits using diodes, Sample and Hold circuit, Log and Anti log amplifiers and IC 1496.

UNIT – III

Op Amp Active Filters: Lowpass filters, High pass (1st order, 2nd order) filters, Band pass filters, Band reject filters and All pass filters using OP AMP.

Op Amp Waveform Generators: Triangular wave Generator, Square wave Generator, Comparator circuit, Regenerative comparator (schmitt trigger), Multivibrators (Astable and Monostable), IC Function Generator.

Op Amp Sine wave Oscillators: RC Phase shift Oscillator, Wien Bridge Oscillator using OP AMP.

UNIT – IV

555 Timer: Functional Diagram, Pin Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger.

Phase Locked Loops: IC 565 PLL Block Schematic, Principles and Description of individual Blocks, Applications of PLL, VCO - IC 566 its features,

IC Voltage Regulators: Fixed Voltage Regulators, IC723 General Purpose Regulator (Basic Low & High Voltage).

UNIT – V

Digital to Analog Converters: Weighted resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC

Analog to Digital Converters: Flash (Comparator) Type ADC, Counter Type ADC, Tracking Converter, Successive Approximation ADC, Charge Balancing ADC, Dual Slope ADC; Specifications of DAC and ADC.

TEXT BOOKS

1. M.H.Rashid, "Microelectronic Circuits: Analysis and Design", PWS Publishing Company, 2nd Edition.
2. Ramakanth A.Gayakwad, Op-Amps and Linear Integrated Circuits, PHI Publishers, 4th Edition.
3. George Clayton and Steve winder, Operational Amplifiers, Elsevier Publications, 4th Edition.

REFERENCES

1. D.Roy Choudhury, Linear Integrated Circuits, New Age International (P) Ltd.
2. R.F.Coughlin and Fredrick Driscoll, Operational Amplifiers and Linear Integrated Circuits, PHI Publishers
3. K.Lal Kishore, Operational Amplifiers and Linear Integrated Circuits, Pearson education Publishers
4. Sergio Franco, Design with Operational Amplifiers and Analog Integrated Circuits, McGraw Hill Publishers
5. J.B.Gupta, Linear Integrated Circuits, SK Kataria and Sons Publications, New Delhi

IVSEMESTER

S169 - COMPUTER ORGANIZATION

(Common to EIE, CSE, ECE, EEE, IT)

Course Educational Objectives:

- Students will be able to make use of the binary number system to translate values between the binary and decimal number systems, to perform basic arithmetic operations (i.e. addition, subtraction, multiplication, and division) and to construct machine code instructions.
- Students will be able to design logical expressions and corresponding integrated logic circuits for a variety of problems including the basic components of a CPU such as adders, multiplexers, the ALU, a register file, and memory cells.
- Students will be able to explain the fetch-execute cycle performed by the CPU and how the various components of the data path are used in this process.

Course outcomes:

The specific course outcomes supporting the program outcomes are:

- Able to understand register transfer, micro operations such as arithmetic logic ad shift.
- Able to analyze the basic concepts and elements of a computer system.
- Able to learn how to design a CPU.
- Able to perform arithmetic operations.
- Able to study memory and I/O management.

Pre requisite: Digital Logic Design

UNIT – I

Register Transfer and Micro Operations: Register Transfer language, Register Transfer Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions– Instruction cycle, Memory – Reference Instructions, Input – Output and Interrupt.

UNIT – II

Micro Programmed Control: Control Memory, Address Sequencing, Micro program example, Design of Control unit, hard wired control, Micro programmed control.

Central Processing Unit: STACK organization, Instruction formats, Addressing modes, DATA Transfer and Manipulation, Program control, Reduced Instruction Set computer.

UNIT – III

Pipelining and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC pipeline, Vector Processing.

Computer Arithmetic: Data Representation, Fixed Point Representation, Floating Point Representation, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT – IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory. Associative Memory, Cache Memory, Virtual Memory.

UNIT – V

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input –Output Processor, Serial communication.

TEXT BOOK

M.Morris Mano, "Computer Systems Architecture", Pearson Education publishers, 3rd Edition.

REFERENCES

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, "Computer Organization", Tata McGraw Hill publishers.
2. William Stallings, "Computer Organization and Architecture", Sixth Edition, Pearson/PHI publishers.
3. Andrew S. Tanenbaum, "Structured Computer Organization", Pearson/PHI publishers.
4. Sivaraama Dandamudi, "Fundamentals or Computer Organization and Design", Springer publishers.

IVSEMESTER

S174 - CONTROL SYSTEMS

(Common to ECE, EEE, ME)

Course Educational Objectives (CEOs):

In this course, students will learn about

Open loop and closed loop (feedback) systems, methods of representation of systems and to desire their transfer function models.

1. Time response of systems and steady state error analysis.
2. Basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
3. The concept of stability of control system and methods of stability analysis & different ways of designing compensation for a control system.
4. State Space Model, which can be used in Digital Control System.

Course Outcomes (COs):

After the completion of the course, students should be able to,

1. Identify basic elements of open loop and closed loop control systems & derive systems input output relations using differential equation(from physical systems), BDR & signal-flow graphs techniques.
2. Understanding of stability, transient, and steady-state behavior of linear dynamic systems.
3. Understand and explain the frequency response specifications and use them for various stability analysis(Bode plot, polar plot and Nyquist plots techniques).
4. Design & implement Lead, Lag & Lead-Lag compensators and P, PI, PID controllers to meet the desired specifications, which is required in the process control Industry.
5. Apply & develop State Space Model for MIMO, which can be applicable to digital control systems.

UNIT – I

INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems. Transfer Function of DC Servo motor - Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT – II

TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral, PID systems.

UNIT-III

FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications Polar Plots -Bode diagrams-Determination of Frequency domain specifications and Transfer function from the Bode Diagram-Phase margin and Gain margin- Nyquist Plots.

UNIT – IV

STABILITY ANALYSIS

The concept of stability – R-H stability criterion – qualitative stability and conditional stability – limitations of Routh's stability, The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci, Stability Analysis from Bode Plots -Nyquist Plots.Compensation techniques – Lag, Lead, Lead-Lag Compensator design in frequency Domain.

UNIT – V

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS

1. B. C. Kuo , "Automatic Control Systems" John wiley and son's ,8th edition, 2003..
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P) Limited Publishers,2nd edition.

REFERENCES

3. Katsuhiko Ogata , "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 3rd edition,1998.
4. Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi,
5. Richard C Dorf, Robert H Bishop, Modern control systems , 8th edition, Prentice Hal l(Pearson education, Inc.), New Delhi 2003.
6. Benzamin C. Kuo and Farid Golnaraghi, Automatic Control ystems, 8th Edition, John Wiley, New Delhi, 2003.

IVSEMESTER

S192 - DIGITAL SIGNAL PROCESSING

(Common to ECE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The basic signals and the operations on signals.
- Systems and its properties.
- DFT and FFT.
- The Z-Transforms & its applications.
- Stability and Causality of a System.
- IIR Digital Filter Design through various Approximation procedures.
- FIR Digital Filter Design through Window Techniques.

COURSE OUTCOMES

At the end of this course student will be able to

- Analysis the different types of signals.
- Gain the knowledge on Systems and properties.
- Get the idea about DFT and FFT.
- Design different Digital systems.
- Design the IIR Digital Filter through Approximation procedures.
- Design a FIR Digital Filter through Window Techniques.

Pre-requisite: Signals and Systems

UNIT – I

Discrete Time Signals: Elementary Discrete Time Signals- Impulse, Unit Stem, Unit Ramp, Rectangular, Decaying Exponential, Raising Exponential, Double Exponential; Representation of Discrete Time Signals- Graphical, Functional, Tabular and Sequence.

Discrete Time Systems: System Representation ThroughLCCDE, Impulse Response, Response of a System-Natural Response, Forced Response; Properties of Discrete Time Systems- Linear and Nonlinear, Shift Invariant and Variant, Causal and Non Causal, Stable and Unstable.

Discrete Time Fourier Transform: DTFT of a Sequence, Magnitude Spectrum and Phase Spectrum; DTFT of a System, Frequency Response, Magnitude Response and Phase Response; Properties of DTFT- Linear, Periodicity, Time Shifting, Frequency Shifting, Time Reversal, Conjugate and Parseval's Theorem.

UNIT – II

Z Transform: Z-Transform of Causal, Anti-Causal and Non-Causal Sequence. Region of Convergence and Properties; Properties of Z Transform- Linearity, Time Shifting, Time Reversal, Scaling in Z domain, Conjugate, Differentiation in Z domain, Time Convolution, Initial Value and Final Value Theorems; Z Transform of Various Classes of Signals; Inverse Z Transform Through Long Division, Partial Fractions and Residue Methods.

Realization of Discrete Systems: Direct Form-I, Direct Form-II or Canonic Form, Parallel Form and Cascade Form.

UNIT – III

Discrete Fourier Transform: Concept of DFT, Computation of DFT, Computation of IDFT, Relation between DTFT and DFT, Properties of Twiddle factor, Properties of DFT- Linear, Periodicity, Time Shifting, Frequency Shifting, Time Reversal, Conjugate, Parsevel's Theorem, Concept of Convolution, Linear Convolution, Circular Convolution, Linear Convolution through Circular Convolution, Response of the LSI System through Circular

Convolution, Circular Convolution through DFT and IDFT, Linear Convolution through DFT and IDFT.

Fast Fourier Transform: Need of FFT, Radix-2 Decimation in Time FFT Algorithm, Radix-2 Decimation in Frequency FFT Algorithm, Comparison between DIT and DIF Algorithms, Inverse FFT.

UNIT – IV

Filters: Concept of Filter, Characteristics of Filters, Classification of Filters- LPF, HPF, BPF, BEF; Analog and Digital Filters.

IIR Filter Design: Impulse Invariant Transformation - Aliasing Effect, Bilinear Transformation - Frequency Warping. Specifications of Low Pass Filter, Analog Butter Worth Filter, Design of Low Pass Digital Butterworth Filter, Analog Chebyshev Filter, Design of Low Pass Digital Chebyshev Filter, Analog Frequency Transformations.

UNIT – V

FIR Filter Design: Steps to design FIR Filters, Characteristics of FIR filters with linear Phase, Frequency Response Linear Phase FIR filters, Design of FIR filters- Fourier series method, Windowing Techniques-Rectangular Window, Hanning Window, Hamming Window, Blackman Window, Barlet/Triangular Window, Comparison of various Window Functions, Comparison between FIR and IIR Filters.

Signal Processing: Digital Signal Processing System, Advantages of DSP, Limitations of DSP, Applications of DSP.

TEXT BOOKS

1. Alan V Openheim, Ronald W. Schafer, Digital Signal Processing, PHI learning Pvt.Ltd, 1975, 11th Reprint.
2. John G. Proakis, Digital Signal Processing, Principles, Algorithms & Applications, Pearson education, Fourth edition , 2007

REFERENCES

1. Manson H Hayes, Digital Signal Processing, Schaum's Outlines, TMH Publications, 2004
2. Lonnine C. Ludeman, "Fundamentals of Digital Signal Processing", John Wiley & Sons Publications.
3. A.Nagoor Kani, "Digital Signal Processing", RBA Publications, Chennai.
4. P.Ramesh Babu, Digital Signal Processing, Scitech Publications Pvt Ltd, Chennai.
5. Ananda kumar, "Digital Signal Processing", PHI Publishers, New Delhi

IVSEMESTER

S223 - ELECTROMAGNETIC FIELDS AND WAVES

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Basic concepts of Electric and Magnetic fields
- Maxwell's equations and boundary conditions to the different material interfaces.
- Wave propagation characteristics for different media.
- Concept of Poynting theorem.

COURSE OUTCOMES

At the end of the course student should be able to

- Apply the basic concepts of Electric and Magnetic fields in static and time varying conditions.
- Apply Maxwell's equations to solve the equations of EM fields.
- Apply wave propagation characteristics and power calculations in applications like antennas.
- Derive the different Poynting vectors to obtain the power flow.

Pre-requisite: Vector Algebra, Coordinate Systems, Vector Calculus

UNIT – I

Electrostatics: Coulombs Law, Electric Field Intensity, Electric Field due to Continuous Charge Distributions- Line Charge, Surface Charge, Volume Charge. Electric Flux and Electric Flux Density, Relation between E and D, Gauss's Law and its Limitation, Applications of Gauss's Law, Electric Potential, Relation between E and V. Maxwell's Two Equations for Electrostatic Fields, Electric Dipole and Dipole Moment, Electrostatic Energy and Energy Density, Conduction and Convection Currents, Poissons's and Laplace's Equations. Capacitance- Parallel Plate Capacitor, Coaxial Capacitor and Spherical Capacitor.

UNIT – II

Magnetostatics:

Magnetic Field Intensity, Biot-Savart's Law, Ampere's Circuit Law, Applications of Ampere's Circuit Law, Magnetic Flux and Magnetic Flux Density, Maxwell's two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials. Force due to Magnetic Field- Force on a Charged Particle, Force on a Current Element, Force between Two Current Elements, Amperes Force Law, Concept of Inductance, Magnetic Energy and Energy Density.

UNIT – III

Maxwell's Equations: Introduction to Time Varying Fields, Continuity Equation, Relaxation Time, Faraday's Law, Inconsistency of Amperes Law, Displacement Current Density and Displacement Current, Differential and Integral Form of Four Maxwell's Equations. Boundary Conditions.

UNIT – IV

Electromagnetic Waves – I: Concept of Electromagnetic Wave, Waves in General- Wave Equations for Conducting Media, Wave Equations for Perfect Dielectric Media, Scalar Form of Wave Equations, Vector Form of Wave Equations, Uniform Plane Wave; Definitions- Propagation Constant, Attenuation Factor, Phase Constant, Intrinsic Impedance, Loss Tangent, Velocity and Wavelength of EM Wave; Wave Propagation in Lossy Dielectrics, Wave Propagation in Lossless Dielectrics, Wave Propagation in Free Space, Wave Propagation in Good Conductors- Skin Depth; Concept of Polarization- Linear Polarization, Circular Polarization, Elliptical Polarization.

UNIT – V

Electromagnetic Waves – II: Poynting Vector, Time Average Power, Total Power Crossing the Surface, Poynting Theorem, Power Loss in a Plane Conductor. Reflection of a Plane Wave at Normal Incidence (Dielectric-Dielectric & Dielectric-Conductor Interface)- Incident Wave, Reflected Wave, Transmitted Wave, Reflection Coefficient, Transmission Coefficient, Standing Wave, Standing Wave Ratio. Reflection of a Plane Wave at Oblique Incidence (Parallel and Perpendicular Polarization)- Reflection Coefficient, Transmission Coefficient, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance.

TEXT BOOKS

1. Matthew N.O.Sadiku, "Elements of Engineering Electromagnetics", Oxford University Press, 4th Edition.
2. William Hayt, "Engineering Electromagnetics", TMH Publishers,7th Edition.

REFERENCES

1. Jordan and Balmain, Electromagnetic fields and Radiating systems, Pearson education.
2. G.S.N Raju, ''EM Field Theory and Transmission Lines", Pearson Education Publishers.
3. G Sasibhushana Rao, "Electromagnetic field Theory and Transmission lines", Wiley India.

IVSEMESTER

S355 - PROFESSIONAL ETHICS AND HUMAN VALUES

(Common to all branches)

COURSE EDUCATIONAL OBJECTIVES:

- To create an awareness on engineering ethics and human values.
- To adumbrate the inevitability of different intellectual property rights like patents, copyrights, trademarks, and trade secret.
- To give an impetus on achieving higher positions in profession, with ethical and human values as a base and support for the growth.
- To explicate the professional and societal responsibilities of the engineers.
- To make the student realize the sensitiveness associated with experimentation process

COURSE OUTCOMES:

At the end of the course, the student

- Acquires the basic concepts of Professional ethics and human values & Students also gain the connotations of ethical theories.
- Knows the duties and rights towards the society in an engineering profession
- Would realize the importance and necessity of intellectual property rights.
- Can take all the necessary precautions while conducting the experiments, which may reduce the risk.
- Understands the importance of risk evacuation system in reality and takes the utmost responsibility while handling the risky situations.

UNIT - I

ETHICS

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 - II

HUMAN VALUES

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning - Civic Virtue – Respect for Others –Living Peacefully – Caring – Sharing - Honesty – Courage– Valuing Time - Cooperation – Commitment – Empathy – Self Confidence – Character – Spirituality

UNIT – III

ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation - Engineering Projects VS. Standard Experiments - Engineers as responsible experimenters – Codes of ethics - Industrial Standards - A balanced outlook on law- The challenger case study.

UNIT - IV

SAFETY, RESPONSIBILITIES AND RIGHTS

Safety and risk- Assessment of safety and risk- Risk benefit analysis and reducing risk- Three Mile Island and Chernobyl case study - 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

Multinational Corporation's -Environmental ethics-computer ethics -weapons development Engineers as managers - consulting engineers-engineers as expert witnesses and advisors Moral leadership - sample code of Ethics (Specific to a particular Engineering Discipline).

TEXT BOOKS

1. R.S.Nagarajan, a Textbook on "Professional Ethics and Human Values", New Age Publishers – 2006, 2nd Edition.
2. Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw Hill, New York 1996.

REFERENCES

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, " Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
2. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2004 (Indian Reprint now available)
3. 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).
4. John R Boatright, "Ethics and the conduct of business", Pearson Education, New Delhi,2003.
5. Edmund G Seebauer and Robert L Barry, "Fundamentals of ethics for scientists and engineers", Oxford University Press, Oxford, 2001.

IVSEMESTER

L108 - ANALOG INTEGRATED CIRCUITS LAB

COURSE EDUCATIONAL OBJECTIVES

In this Laboratory student will learn about

- Verification of the operation of different circuits using IC 741 Operational Amplifier
- Different circuits using IC 555 timer
- Voltage regulators using IC 723

COURSE OUTCOMES

At the end of this course, student will be able to

- Design the different circuits using IC 741 Operational Amplifier for various applications.
- Use the IC 555 timer for constructing the various circuits.
- Design the Voltage regulators using IC 723.

LIST OF EXPERIMENTS

(The following experiments are to be simulated using PSPICE/MULTISIM software and verified by Bread board)

1. Arithmetic circuits using Op AMP
2. Integrator and differentiator using OPAMP
3. Function Generator Using Op AMP
4. Low Pass and High Pass Filters using OP AMP
5. Band Pass Filter using OP AMP
6. Band Stop Filter using OP AMP
7. RC Phase shift Oscillator using OP AMP
8. Wien Bridge Oscillator using OP AMP
9. Monostable and Astable Multivibrators using IC 555
10. Voltage Controlled Oscillator
11. Phase Locked Loop
12. Voltage Regulator Using IC 723
13. Digital to Analog Converter using Op AMP

IVSEMESTER

L180 - SYSTEMS AND SIGNAL PROCESSING LAB

COURSE EDUCATIONAL OBJECTIVES

In this Laboratory student will learn about

- The generation of various signals, sequences and their operations using Mat lab functions.
- The system responses using linear convolution in time and spectral domain.
- The solution of LCCDE and system response using Z-transforms.
- The IIR filters using butter worth and Chebychev approximation.
- The FIR filters using various windows.

COURSE OUTCOMES

At the end of this course student will be able to

- Solve basic engineering problems involving signals.
- Gain the knowledge in various signal processing aspects.
- Know the operations, system responses for various inputs.
- Know the concept of circular convolution.
- Apply the designing methods of IIR filters in signal processing related fields.
- Know the designing of FIR filters.
- Gain the practical hands on experience by exposing the students to various DSP techniques.

LIST OF EXPERIMENTS

Part I: Experiments using MATLAB Software

(The following experiments are to be simulated using MATLAB/ SIMULINK Software)

1. Basic operations on Matrices.
2. (a) Generation of Various signals (b) Basic Operations on signals
3. (a) Linear Convolution (b) Linear and Convolution through DFT and IDFT.
4. (a) Circular Convolution (b) Circular Convolution through DFT and IDFT.
5. Computation of N-Point DFT and IDFT.
6. Solution of LCCDE and find the system response using Z-transform.
7. Power Spectral Density for sinusoidal signal.
8. Frequency response of analog low pass & high pass filter.
9. Design of IIR butter worth filters (LPF, HPF, BPF, and BSF).
10. Design of IIR Chebychev filters (LPF, HPF, BPF, and BSF).
11. Design of FIR filters using window techniques.
12. Design of Digital IIR filters using Bi-linear transformation.

Part II: Experiments using Code Composer Studio Simulation Soft ware

(The following experiments are to be simulated using Code Composer Studio Software)

13. Study of Basic Architectures of DSP Processor.
14. Linear Convolution.
15. Implementation of a FIR filter.
16. Implementation of an IIR filter.
17. Computation DFT through FFT.

VSEMESTER

S187 - DIGITAL COMMUNICATIONS

Course Educational Objectives

In this course, student will learn about

- Concepts of Pulse digital Modulation Techniques.
- Various Digital Modulation Techniques.
- Evaluation of performance measures for optimal reception of Digital Signals.
- Fundamentals of Information Theory and Source coding methods.
- Concepts of Linear Block Codes and Convolution Codes.

Course Outcomes

At the end of this course, student will be able to

- Comprehend various Pulse digital Modulation Techniques in communication related applications.
- Differentiate various Digital Modulation Techniques.
- Identify efficient modulation techniques for optimal reception.
- Grasp the concept of source coding in representation of binary data.
- Analyze the Convolution codes and Linear Block Codes.

Pre-requisite: Analog Communications.

UNIT – I

Pulse Digital Modulation: Advantages of Digital Communications, Elements of a Digital Communication System. Pulse digital modulation Systems:Sampling of signals, Quantization of signals- Quantization noise, Quantization error, Pulse code modulation-PCM System, Encoding, Regenerative repeaters, Decoding, reconstruction, Multiplexing of PCM Signals, Synchronization, Need for non uniform quantization, Companding-Block diagram, μ-law, A-law; Differential pulse code modulation-Transmitter, Receiver, Delta modulation-Transmitter, Receiver; Adaptive delta modulation-Transmitter, Receiver Block diagram, operation.

Noise in Pulse Code and Delta modulation Systems: PCM Transmission, Calculation of Quantization noise in PCM, Effect of Thermal noise in PCM output SNR in PCM, DM Transmission, Calculation of Quantization noise in DM, Effect of Thermal noise in DM, output SNR in DM, Comparison of PCM and DM.

UNIT – II

Digital Modulation Techniques: Introduction to digital modulation, Wave form representation of different digital modulation techniques, Phase shift Keying-Binary phase shift keying, Mathematical representation, Transmitter, Receiver, Differential PSK, Logical waveforms to represent DPSK, Differentially encoded PSK, Quadrature Phase shift Keying, Mathematical representation, Transmitter, Receiver, Frequency Shift Keying-Binary FSK, Mathematical representation, Transmitter, Receiver, Amplitude Shift Keying- Transmitter, Receiver, Band width requirements of Digital modulation schemes.

UNIT – III

Data Transmission: Base band signal Receiver, Peak Signal to RMS noise Output voltage Ratio, Optimum receiver for both baseband and pass band. Calculation of Optimum filter transfer function, Optimum filter Realization using matched filter, Probability of error for matched filter, optimum filter realization using correlator, Optimal reception using coherent detection of BPSK, probability of error calculation of BFSK, probability of error calculation of QPSK, Comparison of Digital modulation schemes .

UNIT – IV

Information Theory and Source Coding: Discrete message and information content, Concept of amount of information, average information, entropy, information rate, Mutual information and its properties, Source coding to increase average information per bit-Shannon-Fano coding, Huffman coding, Shannon's theorem, Capacity of Gaussian Channel, Band width-S/N trade off.

UNIT – V

Linear Block Codes and Convolution Codes: Introduction, matrix description of Linear Block codes , error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, encoding of convolution codes, time domain approach, transform domain approach, Graphical approach, state, tree and trellis diagram, decoding using Viterbi algorithm.

TEXT BOOKS

1. Simon Haykin, 'Digital Communications', John Wiley& sons, 2nd Edition.
2. Taub and Schilling, "Principles of Communication Systems", 3rd Edition, Tata McGrawHill Publishers.

REFERENCES

1. K.Sam Shanmugam, "Digital and Analog Communications", John Wiley & Sons Publishers .
2. V.Chandra Sekar, "Communication Systems", Oxford University Press.

VSEMESTER

S195 - DIGITAL SYSTEMS DESIGN USING VHDL

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Concepts of Transistor logic, CMOS logic families and their interfacing
- Concepts of VHDL for digital system design
- Combinational digital ICs , its applications and their modelling using VHDL
- Sequential digital ICs, its applications and their modelling using VHDL
- Different types of Memories, CPLD, FPGA architectures

COURSE OUTCOMES

At the end of this course student will be able to

- Understand Transistor logic, CMOS logic families and their interfacing
- Model Digital circuits using VHDL
- Design combinational logic circuits using digital ICs and model using VHDL
- Design sequential logic circuits using digital ICs and model using VHDL
- Implement Digital Systems using CPLD, FPGA

Pre requisite: Knowledge onBJTs, MOSFET, Digital electronic circuits.

UNIT – I

Bipolar Logic Families : Bipolar logic, Transistor logic-DTL,RTL, Low Power Schottky TTL NOR, Low Power Schottky TTL NAND, Emitter coupled logic-basic CML, 2 input OR/NOR gate, 10K ECL OR/NOR gate, Comparison of TTL logic families.

CMOS Logic Families : CMOS logic levels, CMOS inverter, NAND, NOR, AND, OR, AOI, OAI circuit diagrams using CMOS and function tables, CMOS steady state electrical behaviour, CMOS dynamic electrical behaviour, CMOS logic families- High Speed CMOS, Very High Speed CMOS, Fast CMOS TTL Compatiable.

Interfacing Bipolar and CMOS Logic families: CMOS/TTL interfacing, Low voltage TTL, Low voltage CMOS, Comparison of logic families, Specifications of standard 74XX and CMOS 40XX series ICs.

UNIT – II

VHDL Hardware Description Language: Design flow, program structure, types and constants, arrays, functions and procedures, libraries and packages with examples, Structural design elements, data flow design elements, behavioral design elements, time dimension and simulation, test benches, synthesis.

UNIT – III

Combinational Logic Design using VHDL: Adders and Subtractors, 74x283 4-bit adder, Combinational multiplier 8X8, Barrel shifter, comparators, 74x85 magnitude comparators, Airthmetic and Logic Unit, Multiplexers- 74x151 MUX, 74x157 MUX.

Decoders-74x139,74x138; Encoders-74x148 Priority encoder, Dual parity encoder, floating-point encoder; EX-OR gates and Parity circuits-74x280 9-bit parity generator; Three statedevices-74x245 octal three state transceiver.

UNIT – IV

Sequential Logic Design using VHDL: Latches and flip-flops-D flip flop74X74,JK flip flop74X109, switch -de bouncer, Registers-4-bit register 74x175, 8-bit latch 74x373; Counters- 74x163 4-bit binary counter,74X163 as modulo-11 counter, 74X163 as modulo-193 counter, 3-bit LFSR counters.

Shift registers-Universal shift register 74x194,serial in parallel out 8-bit shift register 74X164, parallel in serial out 8-bit shift register 74X166; Synchronous design methodology-structure, timing diagram, impediments to synchronous design.

UNIT – V

Memories: ROM- internal structure, 2D-decoding commercial types, timing and applications. Static RAM- Internal structure, SRAM timing, standard SRAM, synchronous SRAM, Dynamic RAM-Internal structure, timing, synchronous DRAM.

CPLDs, FPGAs: CPLD Xilinx XC9500-architecture, functional block, I/O block architecture, FPGA-Xilinx XC4000 configurable logic block, I/O block.

TEXT BOOKS

1. John F. Wakerly, Digital Design Principles and Practices, PHI/ Pearson Education Publishers, 3rd Edition.
2. Charles H. Roth Jr., Digital System Design Using VHDL, PWS Publications, USA, Reprint 2002.
3. Jan M. Rabaey, Anantha Chandrakasan, and Borivoje Nikolic, "Digital Integrated Circuits: A Design Perspective", Prentice Hall Publishers.

REFERENCES

1. K. C. Chang, Digital Systems Design with VHDL and Synthesis: An Integrated Approach, Wiley-IEEE Computer Society Press.
2. Alan B.Marcovitz, Introduction to Logic Design, Tata McGraw Hill Publishers.
3. Stephen Borwn and ZvonkoVramesic, Fundamentals of Digital Logic with VHDL Design, McGraw Hill Publishers.
4. J.Bhasker, VHDL Primer, Pearson Education/ PHI Publishers.
5. Shipra gupta and Neelu Chaudhary, "Digital Circuit System using VHDL", SK Kartaria and sons Publications, New Delhi.
6. Mark Zwolinski, "Digital System Design with VHDL", Pearson Education Publishers, 2004.

VSEMESTER

S160 - ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The basic characteristics of instruments, Voltmeters, Ammeters, and Ohmmeters.
- Various methods of signal generation.
- Methods to measure the amplitude of the harmonics.
- Working of CRO, Types, Probes, Measurement of phase and frequency.
- Measurement of Resistance, Inductance, Capacitance using bridges.
- Measurement of Quality factor, Frequency using bridges.
- Different types of transducers in detail.

COURSE OUTCOMES

At the end of this course student will be able to

- How to use basic instruments like Voltmeter, Ammeter, and Ohmmeter.
- How to use a signal/ function source effectively.
- Analyze spectrum of a signal using Wave, Spectrum analyzers.
- Usage of CRO efficiently.
- Mathematically understands the method to measure R, C, L, f, Q.
- Familiarity with the instruments used to measure physical parameters.

UNIT – I

Characteristics of Instruments: Static characteristics-Accuracy, Resolution, Precision, Expected Value, Error, Sensitivity; Dynamic characteristics-Speed of response, Fidelity, Lag, Dynamic error; Errors in Measurement-Absolute Error, Percentage of Error; Types of Errors-Gross errors, Systematic errors, Random Errors.

DC Voltmeters: PMMC Movement, Basic Meter as DC Voltmeter, Multirange Voltmeter, Extending Voltmeter ranges, Concept of loading and Sensitivity; Types of DC Voltmeters-Transistor Voltmeter, Chopper Type DC amplifier Voltmeter, Solid State Voltmeter, Basic Differential Voltmeter, Laboratory DC Standard Differential Voltmeter.

AC Voltmeters- Multirange AC Voltmeter, AC Voltmeter using half wave and full wave rectifiers, Average and Peak Responding Voltmeter‘s, True RMS Voltmeter; Digital Voltmeters-Ramp type, Dual slope integrating type, Integrating type, Stair case type, Successive Approximation type.

UNIT – II

Ammeters: DC Ammeter-Basic Meter as DC Ammeter, Multirange Ammeter, Aryton Shunt Ammeter, Extending Ammeter ranges; AC Ammeter- RF Ammeter using Thermocouple instruments.

Ohmmeters: Series and Shunt Type Ohmmeters;

Multimeters: Measurement of Voltage, Current, Resistance.

AC Bridges: Measurement of Inductance- Maxwells bridge, Anderson bridge, Hay, Measurement of Capacitance- Schering bridge, Wein Bridge; Measurement of Impedance-Kelvins bridge, Wheatstone Bridge; Measurement of Frequency, Wagner earth(ground) connection,Q-meter.

UNIT – III

Signal Generators: Standard Signal Generator, Modern Laboratory Signal Generator, AF Sine and Square wave Generator, Function Generator, Square and Pulse Generator, Random noise Generator, Sweep Generator, Arbitrary Waveform Generator, Video Pattern Generator.

Wave Analyzers: Frequency selective wave analyzer, Heterodyne wave analyzer, Distortion analyzer-Harmonic distortion analyzer, Inter-modulation Distortion Meter, Distortion factor meter, Spectrum analyzer, Digital FFT analyzer.

UNIT – IV

Oscilloscopes: Basic principle of operation CRT, CRT features, Block diagram of Oscilloscope, Vertical Amplifier: Block diagram of Vertical Amplifier, HorizontalDeflection System- Sweep/Time Base Generator, Triggered pulse circuit. Delay line, Sync Selector circuit, High Frequency CRT.

Dual Beam CRO, Dual Trace CRO, Measurement of Amplitude and Frequency; Sampling Oscilloscope, Analog Storage Oscilloscope, Digital Storage Oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO.

Probesfor CRO (Active and Passive)-Direct Probes (1:1), High impedance probe (10X), Active probe, current probe, High voltage probe, Differential probe; Attenuators-Uncompensated Attenuator, Simple compensated Attenuator.

UNIT – V

Transducers: Parameters of a transducer, advantages of transducers,Classification of transducers, Resistive transducer, Strain Gauge, Thermistor, Sensistor, Resistance thermometer Inductive transducer, LVDT, Capacitive transducer, Piezo electric Transducer, Photo electric Transducer, Temperature measurement Transducers-Thermocouple.

Displacement Measurement-Translational and Rotational displacement Transducers; Linear Velocity Measurement-Moving coil type and Moving magnet type; Angular velocity Measurement- DC Tachometer Generator, AC Tachometer Generator.

TEXT BOOK

1. H S Kalsi, Electronic Instrumentation,Tata Mc GrawHill Publishers, 3rd Edition.
2. David A. Bell, Electronic Instrumentation and Measurements, Oxford University Press, 2nd Edition.

REFERENCES

1. AK Sahwney, “A Course in Electrical & Electronic Measurements and Instrumentation”, Dhanpat Rai and Company, 2004.
2. Albert.D. Helfrick and Willam D. Cooper, Modern Electronic Instrumentation and Measurement Techniques – PHI.

VSEMESTER

S313 - MICROPROCESSORS AND MICROCONTROLLERS

(Common to ECE, EEE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- 8086 Microprocessor Architecture and Assembly Language Programming
- Memory Interfacing with 8086 Microprocessor
- Various interfacing peripherals with 8086 Microprocessor
- Concepts of Interrupts and Serial Communication
- 8051 Microcontroller Architecture and Assembly Language Programming

COURSE OUTCOMES

At the end of this course student will be able to

- Understand the architecture of 8086 and write Assembly Language Program using 8086 instructions.
- Interface memory with 8086 Microprocessor
- Interface various Peripherals with 8086 Microprocessor
- Use Interrupts to handle multiple I/O devices
- Understand the architecture of 8051 and write Assembly Language Program using 8051 instructions.

Pre requisite: Digital Circuits, Computer organization

UNIT – I

Microprocessor Architecture: Introduction to Microprocessors-Purpose of a Microprocessor, different types of Microprocessors, their features and their comparison; 8086 Microprocessor-Architecture and Pin diagram of 8086, Special functions of General purpose registers, 8086 flag register and function of 8086 Flags, Addressing modes of 8086.

Instruction Set: Instruction set of 8086, Assembly language programs involving logical, Branch and Call instructions, Sorting, Evaluation of Arithmetic Expressions, String manipulation, Assembler directives, simple programs, procedures, and macros.

UNIT – II

8086 Memory and I/O Interfacing: Minimum mode and maximum mode of operation, Timing diagram, Memory interfacing to 8086 (Static RAM & EPROM).

UNIT – III

Peripherals and Interfacing: Need for DMA. DMA data transfer Method, Interfacing with 8237/8257, 8255 PPI – various modes of operation and interfacing to 8086, Keyboard and Seven segment Displays, Stepper Motor and actuators, D/A and A/D converter interfacing.

UNIT – IV

Interrupts: Interrupt structure of 8086, Interrupt Vector table, Interrupt service routines, Introduction to DOS and BIOS interrupts, 8259 PIC Architecture and interfacing cascading of interrupt controller and its importance.

Data transfer: Serial data transfer schemes, RS 232C, TTL to RS 232C and RS232C to TTL conversion, 8251 USART architecture and interfacing.

UNIT – V

Microcontroller: 8051 Microcontroller Architecture, Register set of 8051,Instruction Set and Programs, Modes of timer operation, Serial port operation, Interrupt structure of 8051, Memory and I/O interfacing of 8051.

TEXT BOOK

1. A.K.Ray and K.M. Bhurchandi ,Advanced Microprocessor And Peripherals,2nd Edition TMH Publishers.
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.Mckinlay "Microcontrollers and Embedded System", Pearson Education Publishers, 2nd Edition.

REFERENCES

1. Douglas V. Hall, "Micro Processors & Interfacing", TMH, 2007.
2. Raj Kamal, Microcontrollers Architecture, Programming, Interfacing and System Design, Pearson Education Publishers.
3. J.K.Uffenbeck, "The 8088 and 8086 Micro Processors", PHI, 4th Edition, 2003.
4. Ajay Deshmukh, "Micro Controllers-Theory and Applications" , Tata McGraw Hill Publishers.
5. Kenneth J.Ayala, "The 8051 Micro Controller", Cenage Learning Publishers.

VSEMESTER

S398 - TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Fundamentals of different land telephones.
- Operation of various switches.
- Issues of Traffic engineering.
- Various parts in telephone networks.
- Basics of data communication networks.
- Principles of ISDN and modems

COURSE OUTCOMES

At the end of the course student should be able to

- Understand the components of land telephones.
- Understand the functionality of different switches.
- Identify the different parameters used in traffic engineering
- Differentiate types of Signaling systems commonly used.
- Understand the architecture of data network.
- Understand the operating principles of ISDN and modems.

UNIT –I

Introduction: Evaluation of Telecommunication, Simple Telephone Communication, Basics of switching Systems, Major telecommunications Networks.

Cross bar Switching: principal of Common Control, touch tone dial telephone, principles of cross bar switching, cross bar switch configuration, cross point technology, cross bar exchange organization.

Electronic Space Division Switching: Stored program control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced services, Two stage networks, Three stage Networks.

Time Division Switching: Basic time Division Space Switching, Basic time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching,

UNIT – II

Telephone Networks: Subscriber Loop System, Switching hierarchy and Routing, Transmission Plan, Numbering Plan, Charging Plan, Signaling Techniques, In Channel Signaling, Common Channel Signaling.

Traffic Engineering: Network Traffic Load and parameters, Grade of Service and blocking probability,

UNIT – III

Data Communication Networks: Introduction, network architecture, layered network architecture, protocols, data communications hardware, data communication circuits. Public switched data networks, connection oriented & connection less service, Circuit Switching, packet switching and virtual circuit switching concepts, OSI reference model, LAN, WAN, MAN & Internet, Repeaters, Bridges, Routers and gate ways.

UNIT – IV

Integrated Services Digital Network: Motivation for ISDN, New services, ISDN Protocol Architecture, Transmission Channels, User Network Interfaces, Signaling, Numbering and Addressing, Services Characterization, Interworking, ISDN Standards.

UNIT – V

Digital Subscriber Line: ADSL, Cable Modem, Traditional Cable Networks, HFC Networks, Sharing, CM & CMTS and DOCSIS, SONET- Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS I, Virtual Tributaries and Higher rate of service.

TEXT BOOKS

1. Viswanathan. T, "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.
2. Behrouz. A. Forouzan, "Data Communication and Networking", Fourth Edition, Tata McGraw-hill, New Delhi, 2006.

REFERENCES

1. J.E.Flood, Telecommunication Switching Traffic and Networks, Pearson Education.
2. L.S.Lawton, "Integrated Digital Networks, Galgotta Publication Pvt., Ltd., New Delhi, 1996.
3. Syed R. Ali, "Digital Switching Systems", McGraw-Hill Inc., New York, 1998

VSEMESTER

S411 - TRANSMISSION LINES AND WAVE GUIDES

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The basic transmission line parameters
- The theory of smith chart
- The different types of Wave guides and its modes of propagation
- Different types of cavity resonators
- The theory of Microstrip line and its quality factor calculation

COURSE OUTCOMES

At the end of this course student will be able to

- Student can design a transmission line chosen for specific application
- Use the Smith chart to find reflection coefficient, VSWR, impedance
- Differentiate various types of wave guides for different applications
- Gain the knowledge on cavity resonators
- Design a Microstrip line for given specifications

Pre requisite: Circuit theory, vector calculus, Electromagnetics.

UNIT – I

Transmission Lines-I: Types, Parameters, Transmission line equations, Primary and Secondary Constants, Expressions for Characteristic Impedance and Propagation Constant, Infinite Line Concepts, Lossless, Low loss, Distortionless Transmission lines, Loading of Lines and its types.

UNIT – II

Transmission Lines-II: Input Impedance relations, Reflection Coefficient, VSWR, Short Circuit and Open Circuit Lines, UHF Lines as Circuit elements, Matched Lines-$\lambda/4$, $\lambda/2$, $\lambda/8$ lines, Impedance Transformations , Power in a Transmission line, Smith Chart–Applications of the Smith Chart, Quarter wave transformer, single stub matching and double stub matching, Losses in Transmission lines.

UNIT – III

Guided Waves: Waves between parallel plates of perfect conductors, Transverse electric and transverse magnetic waves, characteristics of TE and TM Waves, Transverse Electromagnetic waves, Velocities of propagation, Attenuation of TE and TM waves in parallel plate guides,Wave impedances.

Rectangular Waveguides: Transverse Magnetic Waves in Rectangular Wave guides, Transverse Electric Waves in Rectangular Waveguides, Field Expressions in both cases, characteristics of TE and TM Waves -Cutoff wavelength, phase velocity, group velocity, guided wave length, free space wave length, Impossibility of TEM waves in waveguides, Dominant mode in rectangular waveguide, Attenuation of TE and TM modes in rectangular waveguides, Wave impedances for TE and TM cases, Excitation of modes.

UNIT – IV

Circular Wave Guides: Bessel functions, Solution of field equations in cylindrical co-ordinates, TM and TE waves in circular guides, Field Expressions in both cases, wave impedances and characteristic impedance, Dominant mode in circular waveguide, Excitation of modes.

Rectangular Cavity Resonators: Rectangular cavity resonators, Derivation of Field expressions, Q factor of a Rectangular Cavity resonator.

UNIT – V

Circular Cavity Resonators: Circular cavity resonators, Derivation of field expressions, Q factor of a Circular Cavity resonator, Re-entrant Cavities.

Microstrip Lines: Characteristic impedance of Microstrip lines, Effective Dielectric constant, Losses in Microstrip lines, related expressions, Quality factor of Microstrip lines.

TEXT BOOKS

1. Matthew N.O.Sadiku, "Elements of Engineering Electromagnetics", Oxford University Press, 4th Edition.
2. David M.Pozar, "Microwave Engineering", John Wiley and Sons Publishers, 3rd Edition.

REFERENCES

1. K.D Prasad, "Antennas and Wave Propagation", Satya Prakashan Publishers, NewDelhi.
2. G.S.N Raju," Electromagnetic Field Theory and Transmission Lines", Pearson Education Publishers.
3. M.L.Sisodia and G.S.Raghu Vamshi, Microwave Circuits and Passive Devices, Wiley Eastern Ltd Publishers/ New age International Publishers.
4. Umesh Sinha, "Transmission lines and networks", Satya Prakashan Publishers,NewDelhi.
5. G Sasibhushana Rao, "Electromagnetic field Theory and Transmission lines", Wiley India Publishers.

VSEMESTER

L105 - ANALOG AND DIGITAL COMMUNICATIONS LAB

COURSE EDUCATIONAL OBJECTIVES

In this laboratory, the student will be introduced about

- The fundamental practical aspects of analog & digital modulation
- The use of filters for improving the performance of Frequency modulation
- The use of non linear device for generating multiple frequency components
- The knowledge of spectral analysis of modulated signal
- Various pulse modulation schemes

COURSE OUTCOMES

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

- Get acquainted with calculation of depth of modulation and its impact
- Identify the role of message signal amplitude in changing a pulse waveform
- Know the conversion process of a continuous signal into discrete form
- Understand the coded representation of analog signal

LIST OF EXPERIMENTS

Part I: Analog Communications (Minimum six experiments to be conducted)

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Balanced modulator and Synchronous detector.
4. SSB modulation and Demodulation.
5. Pre-emphasis and de-emphasis.
6. Phase Locked Loop.
7. Spectral analysis of AM signal using spectrum analyzer.
8. Spectral analysis of FM signal using spectrum analyzer.
9. Characteristics of Mixer.

Part II: Digital Communications (Minimum six experiments to be conducted)

1. Pulse Amplitude Modulation and demodulation.
2. Pulse Width and Pulse Position Modulation and demodulation.
3. Verification of Sampling Theorem.
4. Time division multiplexing.
5. Pulse code modulation.
6. Amplitude shift keying.
7. Frequency and Phase shift keying.
8. Delta Modulation.

VSEMESTER

L161 - MICRO PROCESSOR & MICROCONTROLLER LAB

(Common to ECE, EEE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this Laboratory student will learn about

- Arithmetical programs like addition, subtraction ,multiplication division using 8086 Kit
- Logical programs like shift and rotate using 8086 Kit
- Assembly Language Programs by using MASM/TASM
- Usage of ADCs, DACs, Stepper motors, Keyboards and Displays etc
- Microcontroller programs and interfacing with 8051.

COURSE OUTCOMES

At the end of this course student will be able to

- Develop various Arithmetic operations in 8086.
- Develop various Logical operations in 8086.
- Differentiate Various Advantages of Microprocessor kits
- Interface Various Peripherals like 8255,8279,8251 etc to 8086
- Interface Various Devices like ADC,DAC, Stepper motor etc to 8086
- Develop Programs for Real time applications using 8051

LIST OF EXPERIMENTS

(Minimum 12 experiments has to be conducted)

Part I: 8086Programs

1. Data Transfer Operations (MOV & XCHG)
2. Arithmetical Operations (ADD,ADC,SUB,SBB,DAA,AAA)
3. Logical Operations (AND,OR,XOR,Shift, Rotate)
4. String Operations
5. Sorting (Ascending & Descending Order)
6. Code Conversion Programs
7. String Comparison (PASSWORD CHECKING)
8. Read a Character and Display using MASM
9. Reverse the String using MASM

Part II: 8086 Interfacing

10. Key board Interfacing
11. Display Interfacing
12. Stepper motor Interfacing
13. DAC Interfacing (Sine, Square, Saw tooth, Triangular)
14. ADC Interfacing
15. 8259 Interrupt Controller

Part III: 8051 Programs

16. Arithmetical Operations
17. Logical Operations
18. Bit manipulation Operations
19. Parallel Port
20. Timers and Interrupts

VISEMESTER

S131 - ANTENNAS AND WAVE PROPAGATION

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Radiation mechanism from antenna
- The fundamentals of antenna theory.
- Various antenna types including linear and planar micro strip configuration.
- Antenna measurements
- Various types of Radio wave propagation.

COURSE OUTCOMES

At the end of this course student will be able to

- Analyze a complete radio system, from the Transmitter to the Receiver end with reference to antenna.
- Understand the basics of antennas
- Use the various types of antennas in different applications
- Analyze antenna measurements to assess antenna's performance
- Understand the Radio wave propagation in atmosphere

Pre-requisite: Vector Calculus, Electromagnetic Field theory, Network theorems

UNIT – I

Radiation Fundamentals: Definition and function of Antenna, Radiation Mechanism, Potential functions-heuristic approach, Maxwell's equation approach, Potential functions for sinusoidal oscillations, Analysis of Radiation fields of a Alternating current element , Power radiated by current element, Radiation resistance of current element, Radiation from quarter wave Monopole and half wave dipole, Radiation pattern expressions of Center-fed vertical Dipole, Center-fed Horizontal Dipole.

Antenna Fundamentals: Introduction toIsotropic Radiators, Directional Antennas, Antenna Parameters**:** Radiation intensity, Radiation Pattern, Directive gain, Directivity, Radiation efficiency, Power gain, Beam Width, Beam area, effective aperture, effective length, Band Width, Relation between gain, effective length and radiation resistance, Net work Theorems and their application to Antennas.

UNIT – II

Antenna Array Analysis: Various forms of Antenna Arrays, Linear Array of Two Point Sources and N-Point Sources, Expression for electric field from two, three and N element arrays, Broad-side array and End-Fire array, Binomial array, Patterns of Array of Non Isotropic Radiators, Method of pattern multiplication, Methods of Excitation of Antennas.

Array Synthesis: Definition ofSynthesis, Different Synthesis Methods**:** Schelnuoff Polynomial Method, Fourier Transform Method, Woodward-Lawson Method, Dolph-Chebyshev Method.

UNIT – III

HF, VHF and UHF Antennas: Resonant Antennas, Non Resonant Antennas, Folded Dipole, Yagi-Uda Antenna, V-Antenna, Inverted V-Antenna, Rhombic Antenna, Loop Antenna, Helical Antenna, Log-Periodic Antenna.

UNIT – IV

Microwave Antennas: Corner Reflector, Parabolic Reflector Antennas, Feed System, Horn Antenna, Lens Antenna, Microstrip Antenna.

Antenna Measurements: Reciprocity in Antenna measurements – Near-field and Far-field – Measurements ranges - Measurement of different Antenna parameters- Directional pattern, Radiation resistance, Gain (Two Antenna, Three Antenna Methods), Directivity, Beam width, SLR, Polarization, Impedance, Radiation Efficiency, Aperture Efficiency.

UNIT – V

Wave Propagation: Frequency ranges and types of propagations

Ground Wave Propagation: Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth considerations.

Sky Wave Propagation: Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF & Skip Distance – Calculations for flat and spherical earth cases, Optimum Frequency, LUHF, Virtual Height, Ionospheric Abnormalities, Ionospheric Absorption.

Space Wave Propagation: Fundamental Equation for free space Propagation, Basic Transmission Loss Calculations. Space Wave Propagation Mechanism, LOS and Radio Horizon.

Tropospheric Wave Propagation: Radius of Curvature of path, Effective Earth's Radius, Effect of Earth's Curvature, Field Strength Calculations, Duct Propagation, Tropospheric Scattering.

TEXT BOOK

Constantine A.Balanis, "Antenna Theory: Analysis and Design", John Wiley &Sons Publishers, 2nd Edition.

REFERENCES

1. K.D.Prasad, "Antennas and Wave Propagation", Satya Prakashan Publishers, New Delhi.
2. John D.Kraus, "Antennas and Wave propagation", TMH Publishers.
3. Jordan and Balmain, Electromagnetic fields and Radiating systems, Pearson education
4. Pubishers.
5. G.S.N Raju, "Antennas and Wave Propagation", Pearson Education Pubishers.

VISEMESTER

S194 - DIGITAL SYSTEM DESIGN USING VERILOG

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The basic concepts of Verilog HDL to design Digital System
- Constructs of Behavioral Modeling
- Constructs of Data Flow and Switch level Modeling
- Concepts of Tasks, Functions and Compiler Directives
- Architectures of FPGA and CPLDs

COURSE OUTCOMES

At the end of this course student will be able to

- Understand Digital system Design flow using Verilog HDL
- Model Digital system at Behavioral level
- Model Digital System at Data flow level and Switch level
- Write Verilog Functions, Tasks, UDPs for Digital Modules
- Use CPLDs, FPGAs to implement Digital system using Verilog HDL

Pre requisite: Digital circuits, Computer Organization, Microprocessors and Micro-controllers

UNIT – I

Introduction to Verilog: Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface, Module, Simulation and Synthesis Tools, Test Benches.

Language Constructs and Conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks.

Gate Level Modeling: Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Additional Examples, Design of Flip-flops with Gate Primitives, Delays, Strengths and Contention resolution, Net types, Design of basic circuits.

UNIT – II

Behavioral Modeling: Introduction, Operations and Assignments, Functional Bifurcation, Initial Construct, Always Construct, Examples, Assignments with Delays, Wait construct, Multiple Always Blocks, Designs at Behavioral Level.

Blocking and Non blocking Assignments, case statement, Simulation Flow. If and if-else constructs, assign-deassign construct, repeat construct, for loop, the disable construct, while loop, forever loop, parallel blocks, force-release construct, Event.

UNIT – III

Modeling at Data Flow Level: Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

Switch level modeling: Introduction, Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets.

UNIT – IV

System Tasks, Functions, and Compiler Directives: Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, General Observations, Examples.

Functions, Tasks, and User-Defined Primitives: Introduction, Function, Tasks, User-Defined Primitives, FSM Design (Moore and Mealy Machines).

UNIT – V

Digital Design With SM Charts: State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Alternative realizations for SM Charts using Microprogramming, Linked State Machines.

Designing with Programmable Gate Arrays and Complex ProgrammableLogic Devices: Xilinx 3000 Series FPGAs, Designing with FPGAs, Using a One-Hot State Assignment, Altera Complex Programmable Logic Devices, Altera FLEX 10K Series CPLDs.

Verilog Models : UART Design, Design of Microcontroller CPU.

TEXT BOOKS

1. T.R. Padmanabhan and B. Bala Tripura Sundari, “Design through Verilog HDL”, Wiley IEEE Press.
2. Stephen. Brown and Zvonko Vranesic, “Fundamentals of Logic Design with Verilog”, Tata McGrawHill Publishers, 2nd Edition.

REFERENCES

1. Douglas J. Smith, HDL Chip Design, Doone Publications, USA.
2. Michael D.Ciletti, Advanced Digital Design with Verilog HDL,PHI Publishers.
3. J. Bhaskar, A Verilog Primier,BSP Publishers.
4. Bob zeidman, Verilog designers Library, Prentice Hall PTR Publishers.

VISEMESTER

S179 - DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The specification, representation, and implementation of Linear and non-linear Data Structures.
- Applications of Data Structures.
- Various Sorting and Searching Techniques.
- Get the knowledge about object oriented programming
- Acquiring the knowledge about Java Concepts
- Providing practical knowledge in OOPS Concepts through JAVA

COURSE OUTCOMES

At the end of this course student will be able to

- Decide the appropriate data type and data structures for a given problem.
- Write the algorithms for various operations on Queues, Stacks, Linked Lists, Sorting and Searching.
- Analyze the advantages of OOP
- Write programs in JAVA
- Reuse the existing classes using the concept of Inheritance
- Handle the exceptions that can rise at runtime

Pre requisite: C Programming

UNIT – I

Data Structures using C: Introduction to the Data structures, Linear and nonlinear, Searching& sorting techniques: Linear and Binary search, Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort.

UNIT – II

Stack and Queues: Definition, Representation, Operations on Stacks, Queues, Circular Queues and DE Queues.

Linked List: Single and Double Linked List – Implementation of various operations

UNIT – III

Introduction to Object Oriented Programming: OOP Paradigm, OOPS principles, Merits of OOP languages, Demerits of Procedure Oriented Programming Languages,

Introduction to Java: History of Java, Features of Java, Java Virtual Machine, Garbage collection, Why Java is important for Internet?, Programming concepts of basic Java, Identifiers and Keywords, Data types, Variables, Operators in Java, Expressions in Java, Control Structures.

UNIT – IV

Objects and Classes: Introducing classes, Methods, Access controls, Static data, Static methods, Pass by value, Pass by reference, Constructors, Finalization.

Inheritance: Sub classes, Super classes, types of inheritance, this, super, final with inheritance, Scope rules, Command line arguments, Abstract Classes, Interfaces, Inner classes.

Polymorphism: Concept of Polymorphism, Compile time Polymorphism: Method Overloading, Method overriding, Constructor overloading, Run time Polymorphism: Dynamic method dispatch.

UNIT – V

Packages: Packages, Package access, Importing packages and classes, User define packages, Class-path.

Exception Handling: Types of Exceptions, try, catch, finally, throw keywords, Handling User defined Exceptions.

Multithreading: Processes and threads, Thread states, Thread life cycle, Creating threads, Interrupting threads, Thread priorities, Synchronizing threads, Inter thread communication, Thread groups, Daemon threads.

TEXT BOOKS

1. Data Structures: A Pseudocode Approach, Richard F. Gilberg, Behrouz A. Forouzen, Cengage.
2. Data Structures: Algorithms and applications in JAVA,2/e, Sartaj Sahni, University Press, 2nd Edition.
3. Herbert Schildt," The Complete Reference Java J2SE", 7th Edition, TMH, New Delhi,2009.

REFERENCES

1. Jean Paul Trembly& Paul G.Sorenson, "Introduction to Data structures with applications", Second Edition, TMH.
2. Horowitz and Sahani , "Fundamentals of Data structures", Galgotia, 1st Edition,1999.
3. Cay Horstmann, John Wiley and Sons, "Big Java 2nd Edition", John Wiley and Sons, Pearson Edu,2006.
4. H.M.Dietel and P.J.Dietel," Java How to Program" , Sixth Edition, Pearson Education/PHI,2007.
5. Cay.S.Horstmann and Gary Cornell, "Core Java 2, Vol 1, Fundamentals, Seventh Edition, Pearson Education,2011.
6. R.Krishna Murthy-"Java and Internet Programming" Somasundaram, Jaico, "Java.
7. Y.Daniel Liang, "Introduction to Java programming", Pearson,2012.

VISEMESTER

S419 - VLSI DESIGN

(Common to ECE, EEE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- IC fabrication process and Electrical properties of MOSFET
- Concepts of Stick diagrams and layouts using MOS layers and design rules
- Concept of combinational and sequential Sub system design
- VLSI Design tools for CMOS System design
- CMOS testing techniques

COURSE OUTCOMES

At the end of this course student will be able to

- Understand IC fabrication process and properties of MOSFET
- Design Logic gates using Static CMOS, NMOS logic from schematic to layout
- Design Combinational and Sequential sub systems
- Use VLSI Design tools for CMOS based System Design
- Use testing techniques to detect various faults of CMOS based Systems

Pre requisite: MOS transistors, Digital Circuits, Computer organization

UNIT - I

IC fabrication Technology: Silicon semiconductor technology–wafer processing, oxidation, epitaxy, lithography, ion implantation, and diffusion, the silicon gate process; NMOS fabrication, CMOS fabrication, BI-CMOS technology, Comparison between CMOS and bipolar technologies.

Electrical properties of MOS circuits: saturated, non saturated regions, threshold voltage, body effect, trans conductance, output conductance, figure of merit, pass transistor, NMOS inverter, pull up to pull down ratio ,alternative forms of pull up, MOS transistor circuits, scaling factors of MOS devices, CMOS inverter, latch up in CMOS circuits.

UNIT – II

VLSI Circuit Design Process: Design flow, MOS layers, Stick diagrams- NMOS design style, CMOS design style, lambda- based design rules, design rules for contact cuts, CMOS lambda based design rules, layout diagrams for NMOS and CMOS inverters and logic gates. Concepts of sheet resistance and standard unit of capacitance, area capacitance, inverter delays, rise time, fall time estimation, cascaded inverters of drivers, wiring capacitance and choice of layers.

UNIT – III

Subsystem Design: Sub system design flow, Adders- single bit adder schematic, adder/ sub tractor, carry look ahead adder, carry save adders, 4x4 array multiplier, modified Booth's multiplier, serial/parallel multiplier, Shifters- design of 4x4 barrel shifter, Parity generator using XOR gates, XNOR based Comparator circuit, Zero/One Detectors, synchronous up/down counters, registers.

UNIT – IV

System Design and Design Methods: CMOS design methods, design strategies-structured design strategies, hierarchy, regularity, modularity, locality; Design methods-behavioural synthesis, RTL synthesis, logic optimization; Structural to layout synthesis–placement and routing, an automatic placement example, layout synthesis.

Design Tools: Design capture tools-HDL design, schematic design, layout design, floor planning, chip composition; Design Verification Tools-Simulation-circuit level, timing, logic

level, switch level, mixed mode simulators. Timing verifiers, network isomorphism, net list comparison, layout extraction, back annotation, design rule verification, pattern generation.

UNIT – V

CMOS Testing: Need for testing- functionality tests, manufacturing tests, a walk through the test process, Manufacturing Test Principles-fault models, observability, controllability, fault coverage , automatic test pattern generation(ATPG) , Fault Grading and fault simulation, delay fault testing, statistical fault analysis, fault sampling ,

Design Strategies for Test: Design for testability, Ad-Hoc testing, scan based test techniques, self test techniques, IDDQ testing, Chip level Test Techniques- regular logic arrays, memories, random logic. System-level Test Techniques-boundary scan, Layout design for improved testability.

TEXT BOOKS

1. Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, Essentials of VLSI circuits and systems, PHI Publishers, 2005.
2. Neil.H.E.Weste and Kamaran Eshraghian, Principles of CMOS VLSI Design (2/e), Pearson Education Publishers, 3rdEdition.

REFERENCES

1. John .P. Uyemura, Introduction to VLSI Circuits and Systems, JohnWiley Publishers.
2. Wayne Wolf, Modern VLSI Design (3/e), Pearson Education Publishers.
3. M.SZE, VLSI Technology,2nd Edition, TMH Publishers.

VISEMESTER

S190 - DIGITAL IMAGE PROCESSING

(Common to ECE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Sampling and quantization in spatial domain.
- 2D transforms and their properties.
- The enhancement techniques in Spatial domain and Frequency domain.
- The restoration techniques and color models in Color image processing.
- Image compression and segmentation techniques.

COURSE OUTCOMES

At the end of this course student will be able to

- Do Sampling and quantization for better resoultion of image.
- Extract various image feature using 2D transforms.
- Improve the quality of noised image by appling enhancement techniques.
- Restore the information from degraded image and improve colour resolution.
- Increase computation in time and recognise objects from the image.

Pre requisite: Digital Signal Processing

UNIT – I

Introduction: Introduction to 2D function, Define: Light, Luminance, Brightness and contrast, Definition of Digital Image, Fundamental Steps and Components of an Image Processing System, Applications of Image Processing, Structure of Human Eye, Image formation in the Eye, Concept of gray levels, Basic concept of Sampling and Quantization, Representing Digital Images, Spatial and intensity Resolution, Relationship between pixels: Neighbors of a Pixel, Adjacency, Connectivity, Regions and Boundaries, Distance Measures

UNIT – II

Image Transforms: Introduction to Image Transforms, Two-Dimensional Orthogonal and Unitary Transforms, Separable Unitary Transform, Properties of Unitary Transforms :Energy conservation and Rotation, Energy Compaction and Variances of Transform Coefficients, Basis Images, Two-Dimensional DFT and Properties, Cosine Transform and Properties, Hadamard Transform and Properties, Haar transform and Properties, Slant Transform and Properties.

UNIT – III

Image Enhancement in Spatial and Frequency Domain: Spatial domain Enhancement, Point processing, Intensity Transformation Functions, Image Negatives, Log Transformation, Power-Law(Gamma) Transformations, Piecewise-Linear Transformation Functions, Histogram Processing and its types, Filtering in Spatial domain Enhancement, Smoothing Spatial Filters, Order-Statistic (Nonlinear) Filters and Sharpening Spatial Filters: First-Order Derivative for Image Sharpening using Gradient, Second Derivative for Image Sharpening using Laplacian, Unsharp Masking and high boost Filtering. Filtering in Frequency domain Enhancement, Image Smoothing using Ideal Low Filters, Butterworth Low Filters, Gaussian Low Filters, Sharpening using Ideal High Filters, Butterworth High Filters, Gaussian High Filters, Laplacian in the Frequency Domain.

UNIT – IV

Image Restoration: Image Restoration Degradation model, Noise Models, Restoration in the Presence of Noise Only–Spatial Filtering, Mean Filters ,Least mean square filters, Order-Statistics Filters, Adaptive Filters, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering.

Color Image Processing: Color Fundamentals, Color Models, The RGB Model, The CMY and CMYK Color Models, The HSI Color Model, Pseudo color Image Processing, Intensity Slicing, Intensity to Color Transformations, Basics of Full-Color Image Processing, Color Transformation, Color Slicing, Tone and Color Corrections, Histogram Processing.

UNIT – V

Image Compression: Coding Redundancy, Spatial and Temporal Redundancy, Irrelevant Information, Measuring Image Information, Fidelity Criteria, Image Compression Models, Error-Free Compression: Huffman coding, Arithmetic Coding, LZW Coding, Run-Length Coding, Bit-plane coding, Lossless Predictive Coding, Lossy Compression: JPEG , Lossless Predictive Coding,

Image Segmentation: Detection of discontinuities, Detection of Isolated Points, Line Detection, Edge Models, Basic Edge Detection, More Advanced Technique for Edge detection, Edge Linking and Boundary Detection, Local Processing, Global Processing via the Hough Transform& Graph-Theoretic Techniques, Thresholding, Basic Global Thresholding, Otsu's Method, Image Smoothing to improve Global Thresholding, Region Growing, Region Splitting and Merging.

TEXT BOOK

R.C. Gonzalez and R.E. Woods, Digital Image processing –Addison Wesley/ Pearson education,3rdEdition, 2002.

REFERENCES

1. Anil K. Jain," Fundamentals of Digital image Processing',PHI publications
2. William J Prati, "Digital Image Processing", John Wiley & sons
3. Tinku Acharya, Ajoy K Ray, "Image Processing Principles and Applications, Wiley-Inter science.

VISEMESTER

S400 - TELEVISION AND VIDEO ENGINEERING

COURSE LEARNING OBJECTIVES

In this course student will be able to

- Learn the fundamentals of Television Picture formation, transmission, reception.
- Understand the Television broadcast fundamentals
- Learn about the principles of color video transmission.
- Learn about the latest Technologies like Digital Television, HDTV

COURSE OUTCOMES

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

- Study the video signal fundamentals
- Understand the issues related to propagation of TV signals, antennas.
- Know the working of TV Receiver and design principles.
- Understand the various video systems like VCR, Video disc systems CCTV
- Know the principles involved in the working of Latest Technologies like HDTV

UNIT – I

Television System Fundamentals: TV Transmitter, Receiver, Synchronization, Television Pictures- Geometric form and aspect ratio, Persistence of vision and Flicker, Image Continuity, Vertical resolution, The Kell factor Horizontal resolution and video bandwidth, The scanning process, Interlaced Scanning, Scanning sequence.

Composite Video Signal : Video signal dimension, Composite video signal, Horizontal and Vertical sync signals, Video modulation and Vestigial sideband signal, Sound modulation and the intercarrier system, reception of Vestigial sideband signal.

Colour Signal generation: Perception of brightness and colors, additive colour mixing, Chromaticity Diagram, video signals for colour, Formation of Chrominance signal, Colour TV signal transmission.

Picture signal Transmission: Positive and negative modulation, VSB transmission, sound signal Transmission, Standard channel Bandwidth, TV signal propagation.

UNIT – II

Television Equipment: TV Transmitters-TV broadcast channels, Design principles of TV transmitters, Block diagrams of TV Transmitters; TV Standards-Consolidated CCIIR System-B standard, NTSC color System, SECAM System, PAL system.

TV Cameras- Camera tube types, Silicon diode Array Vidicon, CCD Image scanners, Colour Camera; TV Picture Tube-Monochrome picture tube, PIN picture tube, TRINITRON picture tube.

Studio Equipment- Production control room facilities, Master control room Equipment;

TV Antenna systems-Antenna Requirements, TV transmission Antennas, Television Reception problems.

UNIT – III

Television Receiver

Receiver Functions and Subsystems-Monochrome Receiver-RF Tuner, IF subsystem, AGC, Video amplifier, FM Sound Detectors, Sound section, Sync separation and processing, Noise in sync pulses, Separation of frame and line Sync pluses, AFC, deflection circuits, Deflection Drive ICs scanning circuits, PAL-D;

Colour Receiver-Electronic Tuners, Digital tuning techniques, IF subsystem, Y-signal channel, chroma decoder, video and intercarrier sound signal detection, raster circuits; Colour TV display Tubes-Delta-gun, Precision-in-line and Trinitron Color Picture tubes, Remote control of TV Receivers, Receiver Antennas.

Flat panel Display TV receivers-LCD TV, LED TV, Plasma TV, and OLED TV

UNIT – IV

Video Systems: TV Applications:CCTV, Cable TV, Video games, Tele-Text broadcast receiver, Stereo sound in TV.

VCR and Video Disc Systems: video camera signal processing, video monitors, video cassette recorders, video disc systems, interactive video systems

UNIT – V

Advanced Television Systems: Cable Television and Direct Broadcast Satellite Systems:CATV Systems and channels, Scrambling and conditional access Systems, Direct Broadcasting Satellites, INSAT series, International Direct Broadcast Satellites.

Digital Television Technology: Digital Television signals, Transmission of Digital TV Signals, Bit-rate Reduction, Digital TV Receivers, Picture-in-Picture processor.

High Definition TV systems: HDTV standards and compatibility, The MUSE system, The HD-MAC family.

State of the art TV Systems:3D TV, Direct to Home Television, IP TV.

TEXT BOOKS

1. Television and Video Engineering - AM Dhake, 2nd Edition, TMH, 2003.
2. Modern Television Practice, Principles, Technologyand Servicing - RR.Gulati, New Age International Publishers 2004, 3rd Edition.

REFERENCES

1. R.R.Gulati, “Monocrome and Colour Television” New Age International Publishers,2003.
2. SP Bali, Colour Television, Theory and Practice, Tata McGrawHill Publishers.

VISEMESTER

S307 - MEDICAL ELECTRONICS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Anatomy and physiology concepts of human body.
- The methods of recording various biopotentials.
- Measurements of various physiological information from biomedical signals.
- The working principles of medical electronics equipments.
- The radiation for diagnostic and therapy.
- The technique of electrical safety in Hospitals

COURSE OUTCOMES

At the end of this course student will be able to

- Understand the function of human body.
- Measure active and resting potentials of cell bodies.
- Simulated various biomedical signals like ECG, EEG, EMG etc.
- Understand mechanism of medical electronics equipments.
- Understand the process of radiation for diagnostic and therapy.
- Design safety standards in Hospitals.

Pre requisite: Sensors & Signal Conditioning

UNIT - I

Anatomy and physiology: Elementary ideas of cell structure, Heart and circulatory system, Central nervous system, Muscle action, Respiratory system, Body temperature and reproduction system.

UNIT – II

Overview of Medical Electronic Equipments: Classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment, method of operation of these instruments.

Electrodes: Bio electrodes, Electrode tissue interface, contact impedance, Types of Electrodes, Bioelectric signals, Electrodes used for ECG, EEG, X-Ray and CT Scan.

UNIT – III

Transducers: Typical signals from physiological parameters, pressure transducer, flow transducer, temperature transducer, pulse sensor, respiration sensor, Bio Medical Recorders; Block diagram description and applications of ECG Machine, EEG Machine, EMG Machine.

UNIT – IV

Patient Monitoring Systems: Heart rate measurement, Pulse rate measurement, Respiration rate measurement, Blood pressure measurement, Principle of defibrillator and pace mark, Use of Microprocessor in patent monitoring.

UNIT – V

Safety Aspects of Medical Instruments: Gross current shock, Micro current shock, Special design from safety consideration, Safety standards.

TEXT BOOKS

1. R.S.Khandpur, HandBook of BioMedical Instrumentation, 2nd Edition.

2. Leslie Chromwell, Fred J. Weibell, Erich A. Pfeiffer, Bio Medical instrumentation & Measurements – 2nd edition, PHI publishers.

REFERENCES

1. Edward J. Bukstein, Sam and Co, Introduction to BioMedical Electronics, Inc, USA.
2. L.A.Geddes and L.E.Baker, Principles of Applied BioMedical Instrumentation
3. Armugam, Biomedical instrumentation, Anuradha Agencies.

VISEMESTER

S311 - MICRO ELECTRO MECHANICAL SYSTEMS

(Common to AE, ECE, EIE, ME)

COURSE EDUCATIONAL OBJECTIVES

The students completing this course are expected to understand

- Fundamentals of Micro-Electro-Mechanical-Systems and Microsystems and their examples.
- The benefits of miniaturization and the Advantages of MEMS devices
- Scaling Laws in Miniaturization, Scaling in geometry, electro statistics, electromagnetic, fluid mechanics and heat transfer.
- Fabrication process of MEMS, Bulk Micromachining: Etching-Isotropic and Anisotropic, Wet Etching and Dry Etching (Plasma, Deep reactive ion) Comparison, Surface Micromachining and LIGA Process.
- The application of mems in various fields, example Biomedical Sensors, Chemical sensors, Optical Sensors, Pressure Sensors, Thermal Sensors, Microgrippers, Micromotors, Microgears, Micropumps.

COURSE OUTCOMES

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

- Think in a unified way about interdisciplinary Microsystems.
- Understand the operation of a wide range of sensors and actuators appropriate for micro scale systems encompassing different energy domains.
- Explain the technological and economical requirements that can make a micro system a commercial success and list successful examples.
- Choose micro fabrication methods suited for the fabrication of a given micro system and explain how the various processes can be integrated.
- Evaluate and choose transduction principles (e.g., electrostatic or magnetic) for actuation in a micro system and perform analytical calculations for a simple actuator based on them.
- Describe, analyze and solve a concrete problem involving micro technology

UNIT – I

Overview of MEMS

MEMS and Microsystems definitions and examples, Difference between Microsystems and Microelectronics, Benefits of miniaturization, Applications: Industrial/automotives sensors, Medical systems, aircraft sensors, Structural health monitoring, Telecommunication etc, Materials for MEMS.

UNIT – II

Scaling Laws In Miniaturization

Introduction to Scaling, Scaling in Geometry, Scaling in Electrostatic forces.MEMS Design Considerations.

UNIT – III

Micro Fabrication –I

Introduction, Photolithography, Photo resists and Application, Light Sources, Photo resist Removal, Ion Implantation, Diffusion, Oxidation, Chemical Vapour Deposition (CVD), Sputtering, Deposition by Epitaxy, Etching.

UNIT – IV

Micro Fabrication – II

Bulk Micromachining: Etching-Isotropic and Anisotropic, Wet Etching and Dry Etching (Plasma, Deep reactive ion) Comparison.

Surface Micromachining: Process, associated Mechanical problems (Adhesion, Interfacial stresses, Stiction), LIGA process, MEMS Packaging.

UNIT – V

MEMS Devices and Structures

Micro sensors: Biomedical Sensors, Chemical sensors, Optical Sensors, Pressure Sensors, Thermal Sensors.

Micro actuation: Actuation using thermal forces, Piezoelectric crystals, Electrostatic forces, MEMS with micro actuators: Micro grippers, Micro motors, Micro gears, Micro pumps.

TEXT BOOK

Tai-Ran Hsu, MEMS & Microsystems Design and Manufacture, Tata McGraw Hill.

REFERENCES

1. Marc Madou , "Fundamentals of Micro Fabrication.", 3rdEdition, CRC Press
2. Mohamed Gad-el-Hak , "The MEMS Handbook" , CRC Press
3. G.K.Anantha Suresh , "Micro and Smart Systems.", Wiley India

VISEMESTER

S229 - EMBEDDED SYSTEMS DESIGN

(Common to ECE, EEE, EIE)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The basic concepts of Embedded systems and Real time systems
- The method of designing a real time systems
- Implement and test an embedded system
- Explain the presence of and describe the characteristics of latency in real-time systems.
- Summarize special concerns that real-time systems present and how these concerns are addressed

COURSE OUTCOMES

At the end of this course student will be able to

- Understand and design embedded systems and real-time systems
- Identify the unique characteristics of real-time systems
- Explain the general structure of a real-time system
- The unique design problems and challenges of real-time systems
- Apply real-time systems design techniques to various software programs.

Pre requisite: Microprocessors and Microcontroller 8051.

UNIT – I

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches.

UNIT – II

Embedded System Components: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS).

Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators,

Communication Interface: Onboard and External Communication Interfaces.

Buses: Serial communication using I^2C Bus, CAN Bus, USB and Parallel Buses (ISA,PCI, PCI/X)

UNIT – III

Device drivers and Interrupts: Interrupt service routines(Hardware and Software), Device drivers, Parallel port Device drivers, Serial port Device drivers, Device drivers for timing Devices, Context, Latency and Dead line.

UNIT – IV

Inter-Process Communication: Multiple processes, tasks, threads, shared memory, Inter-Process Communication (Semaphore, Message queue,Mail box),Message Passing, Remote Procedure Call and Sockets, Task communication and Synchronization.

UNIT – V

Real Time Operating Systems

Introduction to Operating Systems, Operating System Services, basics of RTOS and Embedded Operating Systems, the scheduler, objects, services, characteristics of RTOS.

TEXT BOOKS

1. Raj Kamal, "Embedded Systems Architecture, Programming and Design", Tata Mc Graw Hill Publishers, 2nd Edition.
2. Frank Vahid, Tony D. Givargis "Embedded System Design: A Unified Hardware/ Software Introduction ",Wiley India Edition, 2002.

REFERENCES

1. Peter Mervedel, "Embedded Systems Design",Springer Verlag Publications.
2. KVKK Prasad "Embedded / Real Time Systems", Dreamtech Press, 2005.
3. Jonathan W. Valvano, "Embedded Microcomputer Systems: Real time interfacing", Thomson Engineering Publications.
4. David E. Simon "An Embedded Software Primer", Pearson Edition Publications, 2005.
5. Sri Ram V Iyer, Pankaj Gupta "Embedded Real Time Systems Programming",TMH, 2004.

VISEMESTER

S222 - ELECTROMAGNETIC COMPATIBILITY

COURSE EDUCATIONAL OBJECTIVES

In this subject student will learn about

- Concepts and Sources of Electromagnetic interference
- Different types of Electromagnetic interference
- Methods of reducing the Electromagnetic interference or techniques for achieving Electromagnetic Compatibility
- EMC design techniques
- Different EMC standards and EMC measurements and testing.

COURSE OUTCOMES

At the end of this course student will be able to

- knowthevarious types of Electromagnetic interference
- understand the design process of a System which will reduce EMI
- Know different EMC standards

Pre requisite: Knowledge on Electromagnetic fields and Electronic circuit design.

UNIT – I

EMI Fundamentals: History and concept of EMI, Definitions of EMI/EMC, Electromagnetic environment, Practical experiences and concerns, frequency spectrum conservation, mechanisms of EMI generation, EMI testing, Methods of elimination of EMI and Biological effects of EMI.

Natural and manmade sources of EMI: Sources of Electromagnetic noise, typical noise paths, modes of noise coupling, designing for EM compatibility, lightening discharge, electro static discharge, Electromagnetic pulse.

UNIT – II

EMI from Apparatus and Circuits: Electromagnetic emissions, noise form relays and switches, non-linearities in circuits, passive inter modulation, transients in power supply lines, EMI from power electronic equipment, EMI as combination of radiation and conduction.

Open area test sites: OATS measurements, measurement precautions, Open area test site

UNIT – III

Radiated and ConductedInterference Measurements: Anechoic chamber, TEM cell, reverberating chamber, GTEM cell, comparison of test facilities. Characterization of conduction currents / voltages, conducted EM noise and power line, conducted EMI from equipment, immunity to conducted EMI

UNIT – IV

Grounding, shielding, bonding: Principles and types of grounding, shielding and bonding.

EMI filters: Characteristics of EMI filters and power line filter design.

UNIT – V

Cables, Connectors, and Components: EMI Suppression Cables, EMC Connectors, EMC Gaskets, Isolation Transformers, Opto-Isolators, EMC Accessories

Signal Integrity: Signal Integrity Problems, Signal Integrity Analysis, Signal Integrity Issues in design.

EMC Standards: National and International Standards for EMI/EMC, IEEE/ANSI Standards, CISPR/IEC Standards, FCC Regulations.

TEXT BOOKS

1. V.Prasad Kodali, Engineering Electromagnetic Compatibility, Wiley-IEEE Press.
2. Clayton.R. Pal, Introduction to Electromagnetic Compatibility, John Wiley and Sons, Newyork, 3rd Edition.

REFERENCES

1. Keiser, "Principles of Electromagnetic Compatibility", 3rd Edition, Artech House, 1994.
2. Henry W.Ott, "Electromagnetic Compatibility Engineering", John Wiley and Sons, Newyork.

VISEMESTER

S176 - DATA COMMUNICATIONS

COURSE EDUCATIONAL OBJECTIVES

In this Subject student will learn about

- Different Network models
- Flow and Control mechanisms
- Network routing algorithms
- Traffic control and congestion management
- Network security from different virus and Network administration

COURSE OUTCOMES

At the end of the course students will able to

- Understand the concepts of the OSI reference model, ATM and TCP-IP reference model.
- Understand the flow and control mechanisms in Network.
- Get complete knowledge on different routing algorithms in Network.
- Understand the traffic control and congestion management
- Get knowledge on Network administration and Network security

UNIT – I

NETWORK MODELS: Data communication Networks-LAN, MAN and WAN, Internet, Intranet and Extranets, Protocols and standards; OSI/ISO reference model- Layers in the OSI model; TCP/IP protocol suite, IP addressing, Broadband ISDN, ATM protocol reference model, ATM layers, SONET/SDH architecture- FDDI,DQDB, Structure of circuit and packet switches.

UNIT – II

DATA LINK CONTROL: Types of errors- Error detection and correction- Checksum- Framing- Flow control-Error control- Stop and wait protocol- Go-back N- Selective repeat protocols- HDLC-Random access protocols- Controlled access- Wired LANs- Ethernet- Fast Ethernet- Gigabit Ethernet- IEEE standards, IEEE 802.3, 802.4, 802.5 and 802.6- Wireless LANs- IEEE 802.11 and Bluetooth.

UNIT – III

NETWORK ROUTING ALGORITHMS: Logical addressing- IPv4 addresses- IPv6- Internet protocol- Transition from IPv4 to IPv6- Mapping logical to physical address- Mapping physical to logical address- ICMP-Direct Vs indirect delivery- Forwarding- Unicast and Multicast routing protocols- Routers and gateways.

UNIT – IV

CONGESTION AND TRAFFIC MANAGEMENT : Queuing analysis- Queuing models- Single server and multi server queues- Congestion control in data networks and internets- Effects of congestion- Congestion and control- Traffic management- Congestion control in packet networks- TCP flow control- TCP congestion control- Requirements for ATM traffic and congestion control- Performance of TCP over ATM.

UNIT – V

NETWORK SECURITY: Security issue- threats and responses- Preservation measures- Firewalls, Protection form spam, Home networks security, Intrusion detection systems, intrusion prevention systems- Legal implications- Next generation virus defence- wireless network security- Radiation- Wireless security features- WEP,WPA,TKIP- Defensive strategies- Network auditing and intrusion detection- Network administration.

TEXT BOOKS

1. Behrouz. A. Forouzan, "Data Communication and Networking", Fourth Edition, Tata McGraw- Hill, New Delhi, 2006.
2. William Stallings, "Data and Computer Communications", Pearson Education Publishers, 8th Edition.

REFERENCES

1. F. Halsall, Data Communications, Computer Networks and Open Systems, Pearson Education Publishers.
2. Andrew.S.Tanenbaum, "Computer Networks", Fourth Edition, PHI Learning Private Ltd, NewDelhi, 2008.
3. James F.Kurose and Keith W.ROSS, "Computer Networking: A Top-Down Approach featuring the Internet", Sixth Edition, Pearson Education Publishers.
4. Houston.H.Carr and Charles. A.Snyder, "Data Communications and Network security", Tata McGraw-Hill Publishers, New Delhi.

VISEMESTER

S363 - RADIO FREQUENCY INTEGRATED CIRCUITS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Design aspects of Passive and active RF components
- Issues of Highfrequencyamplifier Design
- Procedure of RF Power Amplifiers Design
- Design issues of Low Noise Amplifiers and Mixers
- RF Oscillators and Phase Locked Loops

COURSE OUTCOMES

At the end of this course student will be able to

- Design Passive and active RF components
- Design and analyze Highfrequencyamplifiers
- Understand the RF Power Amplifiers Design Procedure
- Design and analyze Low Noise Amplifiers and Mixers
- Design RF Oscillators and Phase Locked Loops

UNIT – I

Radio Frequency Design: Importance of Radiofrequency Design, Dimensions and Units, Frequency Spectrum, RF Behavior of Passive Components, Chip Components and Circuit Board Considerations.

Passive RF Components: Characteristics ofchip resistor,capacitorandinductors, Semiconductor realizationof resistors, capacitors,inductors,transformers, Design of Coaxial, Strip lineand microstripline.

Active RF Components: Semiconductor Basics, RF Diodes, Bipolar-Junction Transistor, RF Field Effect Transistors, High Electron Mobility Transistors.

Active RF Component Modeling: Diode Models, Transistor Models, Measurement of Active Devices Scattering Parameter, Device Characterization.

UNIT – II

MOSCharacteristics: MOSFET LongandShortchannel approximations,Transit Time effects.

Highfrequencyamplifier Design: Design of Series, shuntamplifiers,tunedamplifiers,neutralization, Cascaded Amplifier.

UNIT – III

RF Power Amplifiers: Class A,B,C,D,E,F Power amplifiers,Power amplifiercharacteristics, Design Procedures.

UNIT– IV

Low Noise Amplifiers: Noise definitions and noise models, two port noise parameters of MOSFET, LNA topologies, Bipolar LNAs, CMOS LNAs,noisematchandpowermatchdesignconsiderations,linearityandlargesignal performanceofLNAs.

Mixers: Mixerfundamentals,nonlinear systems as mixers,multiplierbased mixers,sub-samplingmixers, Bipolar mixers, CMOS mixers, Design of Mixers.

UNIT – V

Oscillators: Oscillators in the RF frequency range, Design of Colpittsoscillator,RingOscillators.

PhaseLockedLoops: VCOs, Introduction to PLL, Analysis and Design,noiseproperties of PLLs, phase detectors,loop filters, charge pumps, PLL design examples,Phasenoise introduction and detailed considerations, Effect of Phase noise in RF Communications, Phasenoise Mechanisms, Effect of Frequency Divison and Multiplication on Phasenoise, Oscillator pulling and pushing, RF Frequency Synthesizers and Frequency Dividers.

TEXTBOOKS

1. Thomas Lee, "The Design of Radio Frequency CMOS IntegratedCircuits", CambridgeUniversityPress, 2nd Edition.
2. ReinholdLudwig andPavelBretchko, "RFCircuitDesign **:** Theory and Applications", Pearson Education Publications.

REFERENCES

1. BehzadRazavi"RFMicroelectronics",JohnWiley,2006.
2. Donald O.Pederson and Kartikeya Mayaram, Analog Integrated Circuits for CommunicationPrinciples, Simulation and Design, Springer Publications.

VISEMESTER

L129 - DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LAB

LIST OF EXPERIMENTS

1. Implement the following searching Techniques

a) Linear search b) Binary search

2. Implement the following sorting Techniques
   a) Bubble sort b) Selection sort c) Insertion sort d) Quick sort e) Merge sort
3. Implement Stack using Arrays
4. Implement Queue using Arrays
5. Implement the Single Linked list with all operations?
6. Implement the Double Linked list with all operations?
7. Write a JAVA program to find the sum of individual digits of a positive integer.
8. Write a JAVA program to generate the first 'n' terms of the sequence. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are formed by adding the preceding two terms in the sequence.
9. Write a JAVA program to generate all the prime numbers between 1 and n. Where 'n' is a value supplied by the user.
10. Write a JAVA programs that use both recursive and non-recursive functions
    a) To find the factorial of a given integer.
    b) To find the GCD of two given integers.
    c) To find the n^{th} Fibonacci number.
11. Write a Java program to perform Matrix Multiplication?
12. Write a JAVA program to implement static data members and static member Functions
13. Write a Java program using constructors
14. Write a Java program for constructor overloading.
15. Write C++ programs that illustrate the usage of following forms of inheritance.
    a) Single Inheritance b) Multiple Inheritance
    c) Multi level Inheritance d) Hierarchical Inheritance
16. Write a Java program to implement Method over Loading and Method overriding?
17. Write a Java program by using this and super key word.
18. Write a Java program by using final variables and final methods.
19. Write a JAVA program that illustrates run time polymorphism by dynamic method dispatch.
20. Write a Java program using abstract class?
21. Write a Java program on demonstration of packages?
22. Write a Java program to find the sum of the numbers by using command, Line arguments?
23. (a) Write a Java program by using Exception handling Mechanism including, Finally block?

(b) Write a Java program to Handle User Defined Exceptions?

24. (a) Write a Java program to create Multithreads?

(b) Write a Java program on Thread Synchronization

25. Write a Java program to implement Inter thread communication?

VISEMESTER

L119 - COMMUNICATION AND PRESENTATION SKILLS LAB

(Common to all branches)

Prerequisite: English -I, English - II

Course Educational Objectives

In this course, the students will learn to

1. Gather information and to organize ideas relevantly and coherently
2. Participate in group discussions and debates, Face interviews
3. Write project/research reports/technical reports/ formal letters
4. Make oral presentations
5. Transfer information from non-verbal to verbal texts and vice versa

Course Outcomes

After the completion of this course, prospective engineers will have the ability to

1. Make power point presentations and oral presentations
2. Articulate English with good pronunciation
3. Face competitive exams like GRE, TOEFL, IELTS etc.
4. Face interviews and skillfully manage through group discussions
5. Negotiate skillfully for better placement

The following course content is prescribed for the Communication and presentations Lab

1. Vocabulary building – synonyms and antonyms, one-word substitutes, analogy, idioms and phrases, verbal & alphabet series.
2. Oral Presentations – JAM
3. Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
4. Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
5. Making power point presentations.
6. Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, practicing mock-interviews.
7. Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.
8. Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, and critical reading.

Minimum Requirement

The English Language Lab shall have two parts:

i. **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
ii. **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i. P – IV Processor
   1. Speed – 2.8 GHZ
   2. RAM – 512 MB Minimum
   3. Hard Disk – 80 GB

ii. Headphones of High quality

Suggested Software:

- Glob arena's software,2002
- Young India's Clarity software,2005

Books Recommended:

1. Stephen Bailey , "Academic Writing- A Practical guide for students", Rontledge Falmer, London&New York, 2004.
2. Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, "English Language Communication : A Reader cum Lab Manual, Anuradha Publications, Chennai, ,1st edition,2006
3. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice, New Age International (P) Ltd., Publishers, New Delhi,2007
4. Books on TOEFL/GRE/GMAT/CAT by Barron's/cup, ,15th edition,2010
5. IELTS series with CDs by Cambridge University Press.3rd Edition,2007

VIISEMESTER

S270 - INDUSTRIAL MANAGEMENT

(Common to CSE, ECE, EEE, EIE, IT, ME

Prerequisite: None

Course Educational Objectives (CEOs):

In this course student will learn about

1. The fundamental concepts and contributions of Management.
2. Human Resource Practices, Quality controls and Project Management which plays a vital role in the organization.
3. Study techniques for increased productivity.
4. Human Resource Management practices.
5. Various network analysis techniques.

Course Outcomes:

After completion of the course, students will be able to

1. Apply the conceptual knowledge of management and organization in work environment.
2. Take decisions relating to location of plant and layout of plant.
3. Conduct work study techniques for increased productivity and also able to control quality of products.
4. Manage human resources efficiently and effectively with best HR practices.

Plan and control projects through network analysis techniques.

UNIT – I

Introduction: Management - Definition, Nature, Importance of management Functions of Management - Taylor's scientific management theory, Fayal's principles of management, Contribution of Elton mayo, Maslow, Herzberg, Douglas MC Gregor, basic concepts of Organisation- Authority, Responsibility Delegation of Authority, Span of control, Departmentation and Decentralization - Organisation structures (Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization)

UNIT – II

Operations Management: Plant location, Factors influencing location, Principles and types of plant layouts - Methods of production (job, batch and mass production), Work study - Basic procedure involved in method study and Work measurement

UNIT – III

Q**uality and materials management**: Statistical quality control – Meaning- Variables and attributes - X chart, R Chart, C Chart, P Chart, (simple Problems) Acceptance sampling, Sampling plans, Deming's contribution to quality. Materials management – objectives, Need for inventory control, Purchase procedure, Store records, EOQ, ABC analysis, Stock levels

UNIT – IV

Human Resource management (HRM): Concepts of HRM, Basic functions of HR manager: Man power planning, Recruitment, Selection, Training and development, Placement, Wage and salary administration, Promotion, Transfers Separation, performance appraisal, Job evaluation and merit rating.

UNIT – V

Project management: Early techniques in project management - Network analysis: Programme evaluation and review technique (PERT), Critical path method (CPM), Identifying critical path, Probability of completing project within given time, Project cost analysis, project crashing (simple problems)

TEXT BOOKS

Dr. A.R.Aryasri, Management Science, TMH, 4th edition, 2009

REFERENCES

1. Koontz & weihrich – Essentials of management, TMH, 8th edition, 2010
2. Stoner, Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004
3. O.P. Khana, Industrial engineering and Management
4. L.S.Srinath, PERT &CPM .

VIISEMESTER

S314 - MICROWAVE ENGINEERING

COURSE EDUCATIONAL OBJECTIVES

In this course, student will learn about

- Concepts of microwaves.
- Operation of Microwave tubes
- Different Microwave solid state devices
- Working principle and Scattering matrix of different Waveguide components
- Microwave test bench setup for Microwave measurements.

COURSE OUTCOMES

At the end of this course student will be able to

- Know about the Microwave spectrum and applications of microwaves.
- Understand the operation and use of Microwave tubes.
- Understand the applications of semiconductor microwave devices.
- Derive the S-parameters of waveguide components
- Use a Microwave bench setup to measure the various microwave parameters.

Pre-requisite: Electromagnetics

UNIT – I

Microwave Tubes-I: Definition of Microwave, Microwave frequency bands, Applications of Microwaves; Limitations and Losses of conventional tubes at microwave frequencies; Microwave tubes-O type and M type classifications; Two Cavity Klystron – Structure, Velocity Modulation Process and Applegate Diagram, Bunching Process, Expressions for o/p Power and Efficiency; Reflex Klystron– Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance, Oscillating Modes and o/p Characteristics.

UNIT – II

Microwave Tubes-II: Helix TWT:Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process, Axial Electric Field, Convection Current, Propagation Constants, Gain Considerations; M-type tubes**:** Introduction, Cross-field effects, Different Types of Magnetrons, 8-Cavity Cylindrical Travelling Wave Magnetron-Hull Cut-off and Hartee Conditions, Modes of Resonance and PI-Mode Operation, o/p characteristics, Frequency Pulling and Frequency Pushing, Strapping.

UNIT – III

Microwave Solid State Devices: Classification, Applications of Microwave Solid State Devices; Transferred Electron Devices:Introduction, Gunn Diode – Principle, Two Valley Model Theory, RWH Theory, Characteristics, Modes of Operation.

Avalanche Transit Time Devices: Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics, related expressions; PIN Diode, Crystal Diode.

UNIT – IV

Waveguide Components-I: Waveguide Multiport Junctions-Working principle of E plane Tee and H plane, Magic Tee, Hybrid Ring, Directional Couplers-2 Hole, Bethe Hole types; Scattering Matrix- S-parameters, Properties of S Matrix, S Matrix Calculations for E plane Tee and H plane Tee, Magic Tee, Directional Coupler.

UNIT – V

Waveguide Components-II: Coupling Mechanisms–Probe, Loop, Aperture types; Waveguide Discontinuities-Waveguide irises, Tuning Screws and Posts, Matched Loads; Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types; Ferrite Components-Ferrites, Composition and Characteristics of Ferrites, Faraday Rotation, principle of Gyrator, Isolator, Circulators.

Microwave Measurements

Description of Microwave Bench, different blocks and their features, Precautions, Measurement of Attenuation, Frequency, VSWR, Cavity Q, Impedance, Power.

TEXT BOOKS

1. Samuel Y. Liao, "Microwave Devices and Circuits", PHI Publishers, 3rd Edition, 2003.
2. David M.Pozar, "Microwave Engineering", John Wiley Publishers,4th Edition, 2012.

REFERENCES

1. Peter Rizzi, "Microwave Engineering: Passive Circuits", Prentice-Hall Publishers.
2. G.S.N.Raju,"Microwave Engineering", IK International Publishers, New Delhi
3. Gottapu Sasibhushana Rao, Microwave and Radar Engineering, Pearson education publishers.

VIISEMESTER

S330 - OPTICAL COMMUNICATIONS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Basic Optical Laws, Step-Index and Graded-Index Fibers
- various Signal degradations like Signal attenuation and Signal distortion
- characteristics of Light sources and photo detectors
- Optical receiver operation
- Link power budget, Rise time budget and Wavelength division multiplexing

COURSE OUTCOMES

At the end of this course student will be able to

- Understand the Basic Optical Laws and Compute the Critical angle, number of modes supported by the Step-Index and Graded-Index Fibers.
- Differentiate various types of Signal attenuation and Signal distortion effects on Optical signal Transmission
- Understand the Operation and Applications of Light sources and photo detectors
- Estimate Optical receiver performance.
- Design an Optical System with Link power budget, Rise time budget and Wavelength division multiplexing.

Prerequisites: Snell's law, Refractive index, Energy Bands, Multiplexing Techniques**.**

UNIT – I

Overview of Optical Fiber Communications: The general System, Advantages of Optical Fiber Communications, The Evolution Of Fiber Optic Systems, Elements of an Optical Fiber Transmission Link, Basic Optical Laws and Definitions, Critical Angle, Total internal Reflection, Optical Fiber Modes and Configurations, Fiber-Types, Step Index Fiber Structure, Graded Index Fiber Structure, Ray Optics Representation, Acceptance Angle, Numerical Aperture, Skew Rays, Mode Theory for Circular Waveguides, Overview of Modes, Summary of Key Modal Concepts, Single-Mode Fibers, Cutoff Wavelength, Mode-Field Diameter.

UNIT – II

Signal Degradation in Optical Fibers: Fiber Materials, Glass Fibers, Active Glass Fibers, Plastic Optical Fibers, Attenuation, Attenuation Units, Absorption, Scattering Losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Waveguides, Information Capacity determination, Group Delay, Material Dispersion, Polarization-Mode Dispersion, Intermodal Distortion, Pulse Broadening in Graded-Index Waveguides, Mode Coupling, Design Optimization Of Single-Mode Fibers, Refractive-Index Profiles, Cutoff Wavelength.

UNIT – III

Optical Sources: Light Emitting Diodes, LED Structures, Light Source Materials, Quantum Efficiency and LED Power, Modulation of an LED, LASER Diodes, Laser Diode Modes and Threshold Conditions, Semiconductor Laser Diodes, Fabry Perot Lasers, Distributed Feedback (DFB) Lasers, Laser diode rate equations, External quantum efficiency, resonant frequencies, Reliability Considerations, Power Launching and Coupling, Source to fiber power launching, Source Output Pattern, Power-Coupling Calculation,Lensing Schemes for Coupling improvement, Laser Diode-to-Fiber Coupling.

UNIT – IV

Optical Receivers: Photo detectors, Physical Principles of Photodiodes, The pin Photo detector, Avalanche Photo diodes, Detector Response time, Response time, Temperature effect on Avalanche gain, Comparison of Photo detectors. Optical receiver operation, Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, The Quantum limit, Analog Receivers.

UNIT – V

Digital Transmission Systems: Point to point links, systems considerations, Link Power budget, Rise time budget, Line coding, NRZ Codes, RZ Codes.WDM Features, Operational principles of WDM, SONET/SDH Networks.

TEXT BOOKS

1. Gerd Keiser,Optical Fiber Communications, Mc Graw-Hill International edition, 4th Edition, 2008.
2. John M. Senior, Optical Fiber Communications, PHI, 2nd Edition, 2002.

RERFERENCES

1. Govind P. Agarwal,Fiber Optic Communication Systems, John Wiley, 3rd Edition, 2004.
2. S.C.Gupta,Text Book on Optical Fiber Communication and its Applications, PHI, 2005.
3. Joseph C. Palais,Fiber Optic Communications, Pearson Education, 4th Edition, 2004.

VIISEMESTER

S155 - CELLULAR AND MOBILE COMMUNICATIONS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Limitations of conventional communication systems
- Various issues related to design of cellular system
- Formation of a propagation model and various factors involved in it
- Usage of various antennas for effective utilization of available channels
- Spectrum allocation to cellular systems and its management

COURSE OUTCOMES

At the end of this course student will be able to

- The way channel allocation is done based on traffic
- Understand impact of various propagation conditions on the performance cellular systems
- Gain knowledge about channel assignment algorithms
- Acquaint with modern cellular systems

Prerequisites: Fundamentals of antennas**.**

UNIT – I

INTRODUCTION TO CELLULAR SYSTEMS: Basic Analog and Digital Cellular systems, Components of a Cellular system, Operation of cellular systems, How a Cellular Telephone call is made, Operational channels, Performance criteria.

ELEMENTS OF CELLULAR SYSTEMS DESIGN: Hexagonal shaped cells, Frequency Reuse, Frequency Reuse distance, Concept of frequency Reuse channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, Cell splitting.

CELL SITE ANTENNAS AND MOBILE ANTENNAS: Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, Minimum separation of cell site receiving antennas, Mobile high gain antennas.

UNIT – II

MOBILE RADIO PROPAGATION I : Free space propagation Model, Basic propagation mechanisms, Ground Reflection (2-ray) Model , Knife-edge Diffraction Model, Link budget design using Path Loss Models, outdoor Propagation models, Indoor Propagation models,

MOBILE RADIO PROPAGATION II : Small scale multipath propagation, Impulse Response Model of a Multipath Channel,Small-Scale Multipath Measurements,Types of small-scale fading, Parameters of Mobile Multipath Channels,Statistical models for multipath propagation.

UNIT – III

CO-CHANNEL INTERFERENCE: Introduction to Co-Channel Interference, real time Co-Channel interference, Determination of Co-Channel interference area, Design of Omni directional Antenna system, Design of directional Antenna system,Lowering the antenna height, Reduction of cochannel interference by means of a notch in the tilted antenna pattern,umbrella pattern,parasitic elements.

NON CO-CHANNEL INTERFERENCE: Adjacent channel interference, Near end to Far end interference, Interference between systems, Long distance interference, UHF TV interference.

UNIT – IV

FREQUENCY MANAGEMENT ISSUES: Numbering and grouping, setup channels, access channels and paging channels.

CHANNEL ASSIGNMENT METHODS: channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

HANDOFFS AND DROPPED CALLS: Types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff, Intersystem handoff, dropped call rates and their evaluation.

UNIT – V

MULTIPLE ACCESS TECHNIQUES: Frequency Division Multiple Access: Principle of operation, Number of channels, Advantages and Disadvantages, Applications; Time Division Multiple Access: Principle of operation, Number of channels, Frame structure, Efficiency, Advantages and Disadvantages, Applications; Code Division Multiple Access: Principle of operation, Types of codes used in CDMA, Advantages and
Disadvantages, Handoffs in CDMA, Near-far Problem, Call processing in CDMA Mobile phones; Space Division Multiple Access: Principle of operation and Advantages; Comparison of performances of multiple access techniques SDMA,TDMA,FDMA,CDMA.

DIGITAL CELLULAR SYSTEMS: 2G Systems-Global System for Mobile: Important features of GSM, advatntages of GSM over analog system, architecture of GSM, different subsystems of the GSM, Layer modelling of GSM, frame structure of GSM, GSM Channels and Channel Modes, Tele services, Data services, supplementary services of GSM, concepts related to Multiple acess scheme of GSM, operation of GSM; **B2GSystems-**General Packet Radio Service; GPRS network structure, Layers, GPRS mobiles, GPRS coding, GPRS physical channel, Channel allocation, Logical channels, GPRS operation;**3G Systems-** Universal Mobile Telecommunications System; Wideband CDMA; CDMA 2000.

TEXTBOOKS

1. Mobile Cellular Telecommunications by William.C.Y. Lee, Tata McGraw Hill, 2nd Edition,1995.
2. Wireless Communications by Theodore. S. Rappaport, Pearson education, 2nd Edition, 2002.

REFERENCES

1. Cellular Communications Explained From Basics to 3G by Ian Poole, Elsevier Ltd,2006.
2. Wireless and Cellular Telecommunications by William.C.Y. Lee, McGraw Hill, 3rd Edition, 2006.
3. Mobile Cellular Communication by G Sasibhushana Rao, Pearson Education, 1st Edition,2012.

VIISEMESTER

S318 - NANO ELECTRONICS

COURSE EDUCATIONAL OBJECTIVES

In this course, students will learn about the

- Concepts of quantum well, quantum transport and tunnelling effects behind the fabrication of Nanoelectronics devices.
- Evolution of CMOS technology for logic devices.
- Importance of carbon nano tubes in Nanoelectronics to overcome the existing fundamental limits of miniaturization.
- Impact of Nanoelectronics onto information technology and communication.

COURSE OUTCOMES

At the end of this course student will be able to

- Comprehend the integration of advanced Nanoelectronics devices and technologies, using various fabrication techniques and their relevant technical issues.
- Understand the advanced approaches to beyond-CMOS and more-than-Moore's law and to their integration with Nano-CMOS.
- Figure out the design, modelling and simulation for advanced nano-electronics technologies using carbon nano tubes for higher levels of integration and miniaturization with low cost.
  Realise the modelling for new materials, processes in Nanoelectronics devices for different applications.

UNIT – I

Technology and Analysis: Thin Film Deposition Methods, Lithography, Material Removing Technologies, Etching and Chemical, Mechanical Processing, Optical microscopes for Nano technology, Scanning Probe Techniques.

UNIT – II

Logic Devices: Limitations of the Minimum Applicable Channel Length, Low-Temperature Behaviour, High-K Materials for CMOS gate oxide applications, Silicon MOSFETS, Evaluation and Future Prospects, Super Conductor Digital Electronics, Carbon Nano Tubes for Data Processing.

UNIT – III

Carbon Nano Structures: Carbon Clusters, Carbon Nano tubes, Fabrication, Electrical, Mechanical and Vibrational Properties, Applications of Carbon Nano Tubes.

UNIT – IV

Random access memories and mass storage devices: High Permittivity Materials for DRAMs, Ferro Electric Random Access Memories, Magneto-
Resistive RAM, Hard Disk Drives, Magneto Optical Disks

UNIT – V

Data transmission, Interfaces and Displays: Photonic Networks, Microwave Communication Systems, Liquid Crystal Displays, Organic Light Emitting Diodes.

TEXTBOOKS

1. Rainer Waser, "Nano Electronics and Information Technology", Wiley VCH, April 2003.
2. WR Fahrner,Nano Technology and Nano Electronics – Materials, devices and measurement Techniques, Springer Publishers, 2005.

REFERENCES

1. Charles Poole, "Introduction to Nano Technology", Wiley Interscience, May 2003
2. Quantum Transport: Atom to Transistor, S. Datta, Cambridge University Press, 2005, ISBN No. 0-521-63145-9.
3. M.Meyyappan,Carbon Nanotubes:Science and applications,CRC Press.
4. Segey Edward Lyshevski, Fundamentals of Nano and Micro Engineering,CRC Press.

VIISEMESTER

S356 - PROGRAMMABLE LOGIC DEVICES

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Programmable logic devices and Memories.
- Architectures of Xilinx Complex programmable logic device families.
- FPGAProgramming Technologies, Architectures, Interconnects, I/O blocks.
- ASIC Design flow, Library cell design, Library architecture.
- Programmable ASIC, ASIC logic cells, ASIC I/O cells.

COURSE OUTCOMES

At the end of this course student will be able to

- Use programmable logic devices to implement Digital Design.
- Know when and how to use CPLDs to implement Digital System.
- Understand how to select FPGAs based on Programming Technologies.
- Use ASIC Library Cells to Design Different ASICs.
- Use programmable ASIC, ASIC logic cells, ASIC I/O cells for implementation of different applications.

UNIT – I

Introduction to Programable Logic Devices: Read Only Memories and its types, Random access memories and its types, Programmable Logic Arrays, Programmable Array Logic.

Complex Programable Logic Devices: Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT – II

FIELD Programable Gate Arrays: Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, and Applications of FPGAs.

UNIT – III

Introduction to ASICS: Types of ASICs, Design flow, ASIC Cell Library.

CMOS Logic: CMOS transistors, CMOS Design Rules, Combinational Logic Cell, Sequential logic cell, Data path logic cell, I/O Cells, Cell Compilers.

UNIT – IV

ASIC Library Design: Transistors as Resistors, Transistor Parasitic Capacitance, Logical effort, Library cell design, Library architecture, Gate Array Design, Standard Cell Design, Data path Cell Design.

Programmable ASICs: Anti fuse, Static RAM, EPROM and EEPROM technology.

UNIT – V

Programmable ASIC Logic Cells: Actel ACT, Xilinx, LCA, Altera FLEX, Altera MAX.

Programmable ASIC I/O Cells: DC and AC inputs and outputs, Clock input, Power inputs, Xilinx I/O blocks, Other I/O Cells.

TEXT BOOKS

1. M.J.S .Smith, "Application Specific Integrated Circuits, Pearson Education Publications, 1997.
2. Stephen M. Trimberger, Field Programmable Gate Array Technology, Springer Publications, 1994.

REFERENCE

1. Charles H. Roth Jr, Lizy Kurian John, Digital Systems Design, Cengage Learning Publications.
2. Wayne Wolf, FPGA-Based System Design, Prentice Hall PTR Publications.
3. L.J.Herbst, “Integrated circuit Engineering”, Oxford University Press, 1996.

VIISEMESTER

S193 - DIGITAL SIGNAL PROCESSORS

COURSE EDUCATIONAL OBJECTIVES

In this course, students will learn about

- Introduction to Digital signal processor system and various design issues.
- Architecture, Addressing modes and instruction set for both fixed point and floating point digital signal processors.
- Significance of FIR and IIR algorithms using digital signal processors.
- Importance of FFT algorithms using digital signal processors.
- Interfacing techniques to memory and other peripherals by using digital signal processing devices.

COURSE OUTCOMES

At the end of this course student will be able to

- Gain knowledge in basics of digital signals and digital signal processor system design issues.
- Learn the difference between fixed and floating point digital signal processors.
- Realize FIR and IIR algorithms using digital signal processors
- Implement FFT algorithms using digital signal processors.
- Understand the interfacing and implement it using digital signal processor devices.

Pre requisite: Signals and Systems, Digital Signal Processing, Micro Processors

UNIT – I

Digital Signals: Review ofDigital signals and operations, Z-transform, LTI Systems, Digital Filters, Discrete Time Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform.

Introduction to Digital Signal Processing Systems: A typical Digital Signal Processing System, Different types of Digital signal Processors (TMS Processors), Digital signal Processor architectures, Software developments, Hardware issues, System Considerations.

Implementation Issues: Fixed Point, Floating Point Arithmetic, Finite word length effects in DSP systems, Programming issues, Real time implementation considerations, Hardware interfacing.

Computational Accuracy in DSP Implementations: Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors.

UNIT – II

Fixed-Point Digital Signal Processors: Introduction; Architecture, Addressing modes, Instruction set, Programming issues of TMS320C2000, TMS320C54X, TMS320C55X, TMS320C62X, TMS320C64X Processors.

Floating-Point Digital Signal Processors: Introduction; Architecture, Addressing modes, Instruction set, Programming issues of TMS320C3X, TMS320C67X Processors.

UNIT – III

FIR Filtering using Digital Signal Processors: Finite-Impulse Response Filters, Design of FIR Filtering using MAT LAB**,** Fixed point Implementations, Floating-point Implementations, Applications.

IIR Filtering using Digital Signal Processors: Infinite-Impulse Response Filters, Design and Implementation of IIR Filters, Design of IIR Filters Using MATLAB, Fixed-Point Implementations, Floating-Point Implementations, Applications.

UNIT – IV

Fast Fourier Transforms using Digital Signal Processors: Introduction to the Discrete Fourier Transform, Fast Fourier Transform Algorithms, Analysis and Implementation Using MATLAB and C, Implementation considerations, Fixed-Point Implementations, Floating-Point Implementations, Applications.

UNIT – V

Interfacing Memory and I/O Peripherals to Programmable DSP devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

Interfacing Serial converters to Programmable DSP devices: Synchronous Serial Interface, Multichannel buffered serial port (McBSP), McBSP Programming, CODEC interface circuit, CODEC programming, CODEC-DSP interface example.

TEXT BOOKS

1. Sen M.Kuo and Woon-Seng S.Gan, "Digital Signal Processors Architectures, Implementations and Applications", Pearson education Publishers, 1st Edition, 2004.
2. Avatar Singh and S. Srinivasan, Digital Signal Processing, Thomson Publications, 2004.

REFERENCES

1. B.Venkata Ramani and M.Bhaskar, Digital Signal Processors, Architecture, Programming and Applications, Tata MC GrawHill Publishers.
2. Phil Lapsley, Jeff Bier, Amit Shoham, Edward Lee, "DSP Processor Fundamentals, Architectures and Features" ,WILEY-INDIA, 1996.
3. Jonathan Stein, Digital Signal Processing, John Wiley, 2005

VIISEMESTER

S389 - SPREAD SPECTRUM COMMUNICATIONS

COURSE EDUCATIONAL OBJECTIVES

- Understand the concepts of spread spectrum communication techniques in wireless systems
- Describe the principles of CDMA, detection schemes and interference cancellation techniques of CDMA.
- Understand the fundamental concepts of Software Defined Radio develop SDR based end-to-end Communication.

COURSE OUTCOMES

After completing this course the student will be able to

- Apply fundamental knowledge of spread spectrum communication to provide initial synchronization of a receiver with spreading codes.
- Based on knowledge of CDMA, analyze the performance of detection schemes and interference cancellation techniques.
- Analyze the performance of spread spectrums in jamming environments.
- Apply the fundamental knowledge of Software Defined Radio, design SDR and establish SDR based end-to-end communication.

UNIT - I

Introduction: Fundamental concepts of spread spectrum systems, Origins of SS communications, Advantages of Spectrum spreading, types of techniques used for spread spectrum, Pseudo noise sequences, direct sequence spread spectrum, frequency hop spread spectrum, Hybrid direct sequence frequency hop spread spectrum, code division multiple access.

Linear Feedback shift register sequence generation – M sequence and their statistical properties. Introduction to Non-linear sequences – Gold codes; Kasami sequences & chaotic sequences. Binary shift register sequences for spread spectrum systems: Introduction, Definitions, Mathematical back ground and sequence generator fundamentals, maximal length sequences.

UNIT - II

Direct Sequence Spread Spectrum System: Coherent direct sequence systems -Model of a DS/BPSK system, Chernoff bound – Performance of encoded DS/BPSK – Constant power and pulse jammer. Coded DS/BPSK Performance for known and unknown channel states.

UNIT - III

Frequency Hopping SS System: Non-coherent FH system model – Uncoded FH/BFSK performance under constant power broadband jammer – Partial band noise jammer – Multitone jammer. Coded FH/BFSK performance for partial and multitone jammer.Performance of FH/MDPSK in the presence of partial band mutitone jamming.

UNIT - IV

Synchronization of SS Receivers: Acquisition and tracking in DS SS receivers and FH SS receivers – Sequential estimation – Matched filter techniques of acquisition and tracking – Delay locked loop – Tau-Dither loop.

UNIT - V

Applications: Space systems – Satellite communication. Anti jam military communication-Low probability of intercept communication-Mobile communications.

Software Defined Radio: Software Defined Radio concepts and history, Characteristics and Benefits of SDR, SDR Forum, Design principles of Software Defined Radio, Ideal SDR architecture, SDR Based End-to-End Communication.

TEXT BOOKS

1. Introduction to spread spectrum communication - Rodger Eziemer, Roger L.Peterson and David E Borth–Pearson, 1st Edition,1995.
2. Software Defined Radio, Architectures, Systems and Functions -Dillinger, Madani, Alonistioti(Eds.), Wiley, 2003.

REFERENCES

1. R.C. Dixon, "Spread spectrum systems", John Wiley, 1984.
2. M.K.Simon, J.K.Omura, R.A.Scholtz and B.K.Levitt, Spread Spectrum CommunicationsHandbook. McGraw Hill, 1994
3. G.R.Cooper and, CD.Mc.Gillem, "Modern communications and spread spectrum", McGraw Hill, 1986.
4. R. L. Peterson, R. E. Ziemer, and D. E. Borth, Introduction to Spread Spectrum Communications. Prentice Hall International Editions, 1995.
5. Jeffrey H.Reed, A Modern Approach to Radio Engineering ,Software Radio, Prentice Hall PTR, May 2002.
6. Andrew J. Viterbi, CDMA: Principles of Spread Spectrum Communication , Addison-Wesley Publishers.

VIISEMESTER

S173 - CONSUMER ELECTRONICS

COURSE EDUCATIONAL OBJECTIVES

In this subject student will learn about

- Operation and types of Loud speakers and Microphones
- Audio Tape recorders and noise reduction Technology
- Basic Television components and its operation
- Video cassette recording and circuitry
- Different home and office appliances.

COURSE OUTCOMES

At the end of this course student will be able to

- Use loud speakers and Microphones for the Public addressing system.
- Record data in Audio Tape recorders in different environment.
- Analyze the Television components and working principle
- Understand the working of Optical recording and Video cassette recording circuitry.
- Use different home and office appliances like Washing machines, Xerox machine.

UNIT - I

Loudspeakers and Microphones: Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT - II

Audio Tape Recorders: Magnetic bias principle, Erase principle, Noise reduction principle, Tape recorder analysis, other noise-reduction technologies.

UNIT - III

Television systems: Components of a TV system – interlacing –composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT - IV

Optical Recording and Reproduction: Audio Disc – Processing of the Audio signal –read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats-recording systems– Playback Systems, CD player, CD-ROM, Digital Audio tape.

Video Cassette Recorders: Comparison to audio tape recording, Encoding, The conceptual VCR, Nonidealities and their solutions, Remaining VCR Circuitry, a real VCR, special effects, enhancements

UNIT - V

Home Appliances: Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

Electrical Appliances: Working principle of Inverter, UPS, Electric Cooker, Water heater, Lift, generator, Motor.

Office Appliances: Working principle of Xerox machine, Laser Printer, Scanner, Electronic Voting Machine.

TEXT BOOK

S.P.Bali, “Consumer Electronics”, Pearson Education, 2005.

REFERENCES

Philip Hoff, “Consumer Electronics for Engineers”, Cambridge University Press ISBN 9780521582070

VIISEMESTER

S168 - COMPUTER NETWORKS

(Common to EIE, CSE, ECE, EEE, IT)

COURSE EDUCATIONAL OBJECTIVES

- To learn about the concepts related to computer networks and the OSI Model
- To learn about the details of all the layers and their issues

COURSE OUTCOMES

At the end of the course students can able to

- Know the importance of the OSI Model
- Solve the problems related to networking
- Gain the knowledge on all the layers of the OSI Model

UNIT - I

Introduction: Use of Computer Networks- Network Hardware- Network software-Reference models Example Networks- Network Standardization. Physical Layer: The theoretical basis for Data communication- Guided Transmission Media.

UNIT - II

Data link layer: design issues- framing, error detection and correction, CRC, Elementary data link protocols- Simplex, Stop&Wait protocols, Sliding window protocols-one-bit,go-back-n,selective repeat. Medium Access Control Sub layer: Channel allocation problem- multiple access protocols-ALOHA,CSMA protocols, token bus,token ring, Ethernet, Collision free protocols, Data link layer switching, Bridges, Bridge learning algorithms,bridges from 802.x to 802.y, Local internetworking,spaning Tree bridges, Remote bridges.

UNIT – III

Network layer: Network layer design issues- Routing algorithms- Shortest path, Flooding, Distance vector routing, Link State routing , Hierarchical Routing, Broadcast routing & Multicast Routing,ICMP,ARP,RARP,BOOTP,DHCP, Congestion control algorithms- Leaky Bucket, Toke Bucket,Quality of service, Internetworking- network layer in the Internet.

UNIT - IV

Transport layer: Transport service- Elements of transport protocols- Internet transport protocols: TCP & UDP, Flow control-Segments, TCP Timers.

UNIT - V

Application Layer: Domain Name System- Electronic Mail -the World Wide Web, Network Security.

TEXT BOOK

Andrews S. Tanenbaum; “Computer Networks”; Fourth Edition, PHI, 2002.

REFERENCES

1. William Stallings; “Data and Computer Communications”; seventh Edition, Pearson Education.
2. Behrouz A .Fourouzan; “TCP/IP Protocol Suite“; Fourth Edition, Tata-McGraw Hill.
3. James F.Kurose, Keith W.ROSS; “Computer Networking - A Top-Down Approach featuring the Internet”; Pearson Education.

VIISEMESTER

S322 - NEURAL NETWORKS AND FUZZY LOGIC

(Common to CSE, ECE)

COURSE EDUCATIONAL OBJECTIVES

- This course imparts the concepts of Neural Networks and Fuzzy Logic.

COURSE OUTCOMES

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

- Understand the concepts of Neural Networks.
- Understand the concepts of Fuzzy Logic.
- Apply these concepts to communication and signal processing problems.

UNIT -I

Introduction to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Essentials of Artificial Neural Networks: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN-Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules

UNIT -II

Single Layer Feed Forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category Training Algorithms, Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications

Multilayer Feed Forward Neural Networks: Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT -III

Associative Memories: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem.

Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis

UNIT – IV

Classical Sets & Fuzzy Sets: Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership,Uncertainty, Operations, Properties, fuzzy relations, cardinalities, membership functions.

UNIT – V

Fuzzy Logic System Components: Introduction, Fuzifications, Membership Value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

TEXT BOOKS

1. S.N.Sivanandam, S.Sumthai, S.N.Deepa, "Introduction to Neural Networks using MATLAB 6.0", Tata McGraw Hill Publications, India, 2005.
2. S.N.Sivanandam, S.Sumthai, S.N.Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer Verlag Publishers Ltd, Germany,2007.

REFERENCES

1. S.N.Sivanandam, S.N.Deepa, "Principles of Soft Computing", Wiley India Ltd, India, 2007.
2. Simon Haykin," Neural Networks - A comprehensive foundation ", Pearson Education, 2001.
3. James A Freeman and Davis Skapura, Neural Networks, Pearson Education, 2002

VIISEMESTER

S327 - OPERATING SYSTEMS

(Common to CSE, ECE, IT)

Course Educational Objectives:

- The main objective of the course is to provide basic knowledge of computer operating system structure and functioning.
- Students able to understand how Operating Systems evolved with advent of computer architecture.
- Comprehend the different CPU scheduling algorithms, page replacement algorithms and identify best one.
- Able to understand and find the best mechanism for handling deadlocks. Also understand File and directory management.

Course Outcomes

After successful completion of this course student shall able to,

- Understand the Operating System (OS) in different viewpoints. Learn the basic reasons for necessity of an OS in our computer and what necessary services it provides to the computer users. Also know the primary concepts of different operating systems structure.
- Understand the concept of process management, CPU scheduling algorithms and able to identify which CPU scheduling algorithm is efficient.
- Understand the importance of synchronization and how to handle deadlocks.
- Know how memory management strategies such as paging and segmentation. Appreciate concepts of virtual memory, demand paging and page replacement algorithms.
- Comprehend and analyze the importance of different file structures that are used in file storage system.
- Learn the basic concepts of directory implementation, free-space management and file recovery.

Pre requisite: Knowledge of system and its resources fur running a process.

UNIT - I

Introduction Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security , Distributed Systems, Special-Purpose Systems .**Operating-System Structures-** Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs , Operating-System Design and Implementation, Operating-System Structure, Virtual Machines, Operating-System Generation, System Boot.

UNIT - II

Processes-Concept, Process Scheduling, Operations on Processes, Inter-process Communication, Examples of IPC Systems, Communication in Client-Server Systems **Multithreaded Programming**- Multithreading Models, Thread Libraries, Threading Issues. **Process Scheduling**-Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling.

UNIT - III

Synchronization-The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples, and Atomic Transactions. **Deadlocks**- System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention. Deadlock Avoidance, Deadlock Detection. Recovery from deadlock.

UNIT - IV

Memory Management Strategies- Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation. **Virtual Memory Management**- Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory.

UNIT - V

File-System - The Concept of a File, Access Methods, Directory Structure, File-System Mounting, File Sharing, Protection. **Implementing File system**- File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery.

TEXT BOOK

Silberschatz& Galvin, 'Operating System Concepts', 7th edition, Wiley, 2004.

REFERENCES

1. William Stallings-"Operating Systems"- 5th Edition - PHI
2. Charles Crowley, 'Operating Systems: A Design-Oriented Approach', Tata McGraw Hill Co., 1998 edition.
3. Andrew S.Tanenbaum, 'Modern Operating Systems', 2nd edition,1995, PHI.

VIISEMESTER

L132 - DIGITAL SYSTEMS DESIGN LAB

COURSE EDUCATIONAL OBJECTIVES

In this Laboratory student will learn about

- Modeling of CMOS circuits
- Various Digital modules modeling using VHDL/Verilog
- Modeling Complex Digital Controllers using VHDL/Verilog.

COURSE OUTCOMES

At the end of this course student will be able to

- Design CMOS Logic gates using PSPICE/Multisim
- Write VHDL/Verilog programs for digitalmodules and simulate them.
- Verify Implementation of Digital design on Advanced FPGA boards.

List of experiments: (Minimum 14 experiments to be conducted)

(The following experiments are to be simulated using PSPICE/Multisim,VHDL and Verilog Softwares)

1. NMOS and PMOS Characteristics.
2. MOS Inverter DC Characteristics, AC Characteristics, Transient Analysis.
3. INVERTER, NAND, NOR, EXOR, EXNOR using CMOS Logic
4. Adders (Half and Full adders, Serial Binary Adder, Multi Precision Adder, CarryLook Ahead Adder)
5. Flip Flops
6. Decade Counter
7. Shift Register
8. 3X8 Decoder
9. 4-BIT Magnitude Comparator
10. 8X1 Multiplexer and 1X4 Demultiplexer
11. Up/Down Counter
12. Multiplier
13. ALU Design
14. Mealy Machine modeling
15. Moore Machine modeling
16. Stepper motor Controller
17. LCD Controller
18. GCD Processor
19. VGA Controller
20. Picoblaze(8-bit RISC Core) and Microblaze(32-bit RISC Core) based design

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L163 - MICROWAVE AND OPTICAL COMMUNICATIONS LAB

COURSE EDUCATIONAL OBJECTIVES

In this Laboratory student will learn about the

- Measurement of wave guide parameters like Attenuation,VSWR, Impedance and frequency.
- Characteristics of Reflex klystron, Gunn Diode
- Scattering parameters of directional coupler, circulator and magic tee.
- Characterization of LED, laser diode, and Optical fiber
- Losses in Optical fiber.

COURSE OUTCOMES

At the end of this lab, student be able to

- Measure the wave guide parameters required for different applications.
- Understand the operation of Reflex klystron and Gunn Diode from the Characteristics.
- Analyze various characteristics of microwave junctions and design of microwave communication links
- Analyze various characteristics of LED, laser diode, and Optical fiber and design of fiber optical analog and digital link.
- Understand the Practical problems and their remedies due to loses in Optical fiber.

LIST OF EXPERIMENTS

(Minimum 12 experiments has to be conducted)

Part – 1 : Microwave Communications

1. Reflex Klystron Characteristics.
2. Attenuation Measurement.
3. VSWR Measurement.
4. Impedance and Frequency Measurement.
5. Directional Coupler Characteristics.
6. Scattering parameters of Circulator.
7. Scattering parameters of Magic Tee.
8. Gunn Diode Characteristics.

Part – 2 :Optical Communications

1. LED Characteristics.
2. Laser Diode Characteristics.
3. Measurement of Data rate for Digital Optical link.
4. Measurement of Numerical Aperture of Optical fibre.
5. Measurement of losses for Analog Optical link.

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S362 - RADAR SYSTEMS

COURSE EDUCATIONAL OBJECTIVES

In this subject student will learn about the

- Fundamentals of Radar system
- Operation, applications, advantages of the CW Radar and FM CW Radar.
- Concepts of MTI and Pulse Doppler Radar.
- Concepts of Tracking Radar
- Detection of Radar signals in the presence of noise
- Radar subsystems like Phased array antennas, Duplexers, Radar Displays

COURSE OUTCOMES

At the end of this course student will be able to

- Understand the concepts of Radar system
- Differentiate the CW Radar and FM CW Radar for the measurement of Speed and Distance
- Understand the role of MTI Radar and Pulse Doppler Radar for the removal of the Clutter
- Learn the applications of Tracking Radar
- Understand the SNR reduction in a Radar System
- Understand the function of different Radar subsystems

UNIT - I

RADAR FUNDAMENTALS: Radar range, Maximum Unambiguous Range, Multiple time around echo, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies, Radar Applications, Prediction of Radar Range Performance, Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere),Transmitter Power, PRF and Range Ambiguities, System Losses.

UNIT - II

Continuous Wave and Frequency Modulated Continuous Wave Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Multiple Frequency CW Radar.

UNIT - III

MTI AND PULSE DOPPLER RADAR: Introduction, Principle, MTI Radar with – Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance. Non-coherent MTI, MTI versus Pulse Doppler Radar.

UNIT - IV

TRACKING RADAR : Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse. Target Reflection Characteristics and Angular Accuracy. Tracking in Range, Acquisition and Scanning Patterns. Comparison of Trackers.

DETECTION OF RADAR SIGNALS: Introduction, Matched Filter Receiver Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

UNIT - V

RADAR EQUIPMENT: Radar receivers-Noise Figure and Noise Temperature, Derivation for expressions; Radar displays-Different types, significance; Radar duplexers-Branch type and Balanced type, Circulators as Duplexers; Radar antennas-Basic Concepts, Radiation Pattern, Beam steering and Beam width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations.

TEXT BOOK

Merrill I. Skolnik ,"Introduction to Radar Systems" ,Second edition, McGraw-Hill, 1981.

REFERENCES

1. GSN Raju, "Radar Engineering and Navigationals aids", IK International Publishers, New Delhi.
2. Gottapu Sasibhushana Rao, Microwave and Radar Engineering, Pearson Education publishers.

VIIISEMESTER

S375 - SATELLITE COMMUNICATIONS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The basic concepts of microwave space communication using satellites.
- The dynamics of orbital mechanics and the concept of launching.
- The uplink and downlink aspect of a satellite and satellite sub systems.
- The earth station sub system and various interfering factors affecting communication.
- Various multiple access techniques used.
- Various real time applications using satellites.

COURSE OUTCOMES

At the end of this course student will be able to

- Solve the orbital model and determine the parameters related to satellites.
- Understand the role of launching in spacecrafts using launch vehicles.
- Differentiate the various aspects of space segment and earth segment.
- Analyze the different multiple access methods and their channel assignment criteria.
- Gain knowledge of various propagation losses affecting satellite signals and rectify them.
- Know about current applications of satellites in existing and emerging fields.

Pre Requisites: Background of satellite communications, Microwave frequency allocation bands and services. Concept of space orbits and their classification based on shape, altitude and planes.

UNIT-I

Orbital Dynamics and Launching: Kepler's three laws of planetary motion. Definition of terms for earth orbiting satellites-apogee, perigee, line of apsides, sub satellite path and point, descending node, ascending node, line of nodes, prograde and retrograde orbits, argument of perigee, right ascension of ascending node, time of perigee. Orbital Elements. Orbital perturbations-need for station keeping. Non geostationary orbits and geostationary orbits.Sun transit outage effect. Look angle determination-elevation angle and azimuth angle calculation. Types of launch vehicles-ELV &RLV.Launching of geostationary satellites.Related problems.

UNIT-II

Space Segment and Link Design: Introduction to space segment. Power supply. Attitude and orbital control-spinning satellite stabilization and momentum wheel stabilization. Station keeping.Thermal control.TT&C system.Transponders-wideband receiver-input demultiplexer -power amplifier.Antenna communication subsystem. Space link and Equivalent/effective Isotropic Radiated Power(EIRP).Transmission losses. Link power budget equation-system noise and noise temperature. Satellite up link and down link design with example of 6/4 and 14/11 GHz band system.C/N ratio and G/T ratio calculation.Related problems.

UNIT-III

Satellite Multiple Access : Introduction to multiple access. Single access. Pre-assigned FDMA and demand assigned FDMA.SPADE system. Bandwidth and power limited TWT amplifier operation. FDMA downlink analysis. TDMA-Frame structure. Reference bursts-preamble and post amble. Carrier recovery and network synchronization in TDMA. Preassigned and demand assigned TDMA. Satellite switched TDMA. Salient features of CDMA-Merits and demerits. Related problems.

UNIT-IV

Radio wave propagation and Earth Segment: Introduction to atmospheric losses. Ionospheric effects and rain attenuation.Polarisation-antenna polarization and polarisation of satellite signals. Cross polarization discrimination. Ionospheric depolarisation(qualitative treatment).Concept of Earth segment-Receive only Home TV system, Master Antenna TV system(MATV).Community Antenna TV system(CATV).Transmit -Receive Earth Stations.

UNIT-V

Satellite specialized applications: Brief development of INTELSAT series and applications. Direct broadcast satellites(DBS/DTH)-Home receiver block(Indoor & Outdoor Unit).MSAT-VSAT-RADARSAT.GPS(Global Positioning System)location principle and navigation, Further applications.

TEXT BOOKS

1. Dennis Roddy ,'Satellite Communications', Tata McGraw Hills,4/e, 2009.
2. Trimothy Pratt,Charles Bostian, J Allnut ,'Satellite Communication' ,John Wiley & Sons,2/e,2003.

REFERENCES

1. M.Richharia, 'Satellite Communications Systems: Design principles',BS Publications,2/e, 2003.
2. D.C Agarwal ,'Satellite Communications', Khanna Publications,5/e,2006.

VIIISEMESTER

S316 - MOBILE COMPUTING

(Common to CSE, ECE, IT)

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Learn about the layered protocol architecture of wireless network.
- Learn about the different types of WLANs and
- Learn about GSM and its evolution from telecommunication to wireless communication.
- Learn about the Wireless Medium Access Control Protocols and Differentiate the network and transport protocols used in wired and wireless networks.
- Learn about Database Issues and Data Dissemination and Synchronization and understand the different Routing Protocols used in MANETs.

COURSE OUTCOMES

After completion of this course, students should be able to

- Learn the different wireless communication technologies, understand the protocols used in the layered architecture
- define WLAN and different WLAN transmission technologies
- distinguish different types of WLANs
- understand different Wireless Medium Access Control Protocols
- understand Mobile Network and Transport Layer Protocols
- understand database issues and data dissemination and synchronization methods
- understand different routing algorithms used in Mobile Ad hoc Networks.

UNIT - I

Introduction to Mobile Computing : Mobile Computing (MC) : Introduction to MC, novel applications, limitations, and architecture.

GSM : Mobile services, System architecture, Protocols, Localization and calling, Handover, Security, and New data services.

(Wireless) Medium Access Control : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT - II

Mobile Network Layer : Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunnelling and encapsulation, optimizations).

Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT - III

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

Ad Hoc Wireless networks: Introduction, Issues in Ad Hoc Wireless networks, Routing Protocols: Table Driven**:** DSDV, WRP, On Demand: AODV, DSR.

UNIT –IV

Introduction to Android: What is Android? Setting up development environment, Dalvik Virtual Machine & .apk file extension**,** Fundamentals: Basic Building blocks Activities,Services,Broadcast Receivers & Content providers, UI Components - Views & notifications, Components for communication -Intents & Intent Filters, Android API levels (versions & version names).

Application Structure (in detail)

AndroidManifest.xml, uses-permission & uses-sdk, Resources & R.java, Assets, Layouts & Drawable Resources, Activities and Activity lifecycle, First sample Application.

UNIT –V

Protocols and Tools : VOIP(what is voip? voip issues, voip architectures, voip protocol stack),Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management), IOS: What is ios? history, features, applications.

TEXT BOOKS

1. Jochen Schiller,"Mobile Communications",*Addison-Wesley*. (Chapters 4,7,9,10,11), second edition, 2004.
2. C. Siva Ram Murthy, B.S. Manoj, " Ad Hoc Wireless Networks: Architectures and Protocols", Pearson Education, 2004
3. Android for Programmers : An App-Driven Approach 1st Edition, 2008
4. Voice Over IP Fundamentals, 2nd Edition,Cisco Press; Cisco Press, 2006.

REFERENCES

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications withUML and XML", Cambridge University Press,October 2004,
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
3. Stefano Basagni, Marco Conti, Silvia Giordano, Ivan Stojmenović, "Mobile ad hoc networking", IEEE Press, Wiley InterScience, 2004.

VIIISEMESTER

S366 - REAL TIME OPERATING SYSTEMS

COURSE EDUCATIONAL OBJECTIVES

In this course, student will learn about

- Concepts of Operating Systems and Embedded Operating Systems.
- Real Time Operating Systems
- Objects, Services and I/O
- Exceptions, Interrupts and Timers
- RTOS Programming Tools and Case Studies

COURSE OUTCOMES

After going through this course, the student will be able to

- Understand the basics of embedded systems and the interface issues related to it.
- learn the different techniques on embedded systems
- Understand the real time models, languages and operating systems
- Analyze real time examples

UNIT – I

Introduction: Introduction to Operating Systems, Operating System Services, basics of RTOS and Embedded Operating Systems.

Introduction to UNIX and LINUX, Overview of Commands, File I/O (open, create, close, lseek, read,write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT – II

Real Time Operating Systems: Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, Task States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency.

Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use .

UNIT – III

Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/OConcepts, I/O Subsystem.

UNIT – IV

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT – V

RTOS Programming Tools and Case Studies: RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

TEXT BOOKS

1. Qing Li, Real Time Concepts for Embedded Systems, Elsevier, 2011
2. Rajkamal, Embedded Systems Architecture, Programming and Design TMH, 2nd Edition, 2008.

REFERENCES

1. Jane W.S.Liu, Real-Time Systems, Prentice Hall Publishers,2000.
2. Dr. Craig, Embedded Linux: Hardware, Software and Interfacing,Hollabaugh.

VIIISEMESTER

S426 - WIRELESS SENSOR NETWORKS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- Characteristics and applications of wireless sensor networks.
- Architecture and protocols of wireless sensor network.
- Controlling, Clustering and positioning of wireless sensor networks.
- Operating systems and Hardware required for wireless sensor networks.

COURSE OUTCOMES

At the end of this course student will be able to

- Understand different applications of wireless sensor networks.
- Use different communication protocols in real time applications.
- Establish Wireless sensor networks.
- Apply the knowledge of platforms and tools for the operation of Wireless sensor networks.

UNIT-I

Overview of wireless sensor networks: Challenges for Wireless Sensor Networks-Characteristics requirements-required mechanisms, Difference between mobile ad-hoc and sensor networks, Applications of sensor networks- Enabling Technologies for Wireless Sensor Networks.

UNIT-II

Architectures : Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT-III

Networking Sensors: Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT-IV

Infrastructure Establishment: Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT-V

Sensor Network Platforms and Tools : Operating Systems for Wireless Sensor Networks, Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

TEXT BOOK

Holger Karl & Andreas Willig, Protocols And Architectures for Wireless Sensor Networks , John Wiley & Sons, 2005.

REFERENCES

1. Feng Zhao & Leonidas J.Guibas ,Wireless Sensor Networks:An Information Processing Approach, Elsevier, 2004.
2. Kazem Sohraby, Daniel Minoli, & Taieb Znati, Wireless Sensor Networks:Technology Protocols, and Applications, John Wiley&Sons,2007.
3. Anna Hac, Wireless Sensor Network Designs, John Wiley & Sons, 2003.

VIIISEMESTER

S140 - AUTOMOBILE ELECTRONICS

COURSE EDUCATIONAL OBJECTIVES

In this course student will learn about

- The Characteristics of Batteries and Lighting system.
- The Construction and maintenance of starter motor.
- The Concepts of charging system.
- The Fundamentals of Automotive Electronics.
- Function and construction of various sensors and Activators.

COURSE OUTCOMES

At the end of this course student will be able to

- Use different batteries and lights for different applications.
- Know the maintenance of starting system.
- Apply the regulators concept to real applications.
- Apply fundamentals to different applications.
- Know the various sensors and Activators.

UNIT – I

BATTERIES AND ACCESSORIES: Principle and construction of lead acid battery, characteristics of battery, rating capacity and efficiency of batteries, various tests on batteries, maintenance and charging. Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods-Horn,wiper system and trafficator.

UNIT – II

STARTING SYSTEM: Condition at starting, behavior of starter during starting, series motor and its characteristics, principle and construction of starter motor, working of different starter drive units, care and maintenances of starter motor, starter switches.

UNIT – III

CHARGING SYSTEM: Generation of direct current, shunt generator characteristics, armature reaction, third brush regulation, cutout. Voltage and current regulators, compensated voltage regulator, alternators principle and constructional aspects and bridge rectifiers, new developments.

UNIT – IV

FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS: Current trends in automotive electronic engine management system, electro magnetic interference suppression,electromagnetic compatibility, electronic dashboard instruments,onboard diagnostic system, security and warning system.

UNIT – V

SENSORS AND ACTIVATORS: Types of sensors: sensor for speed, throttle position, exhaust oxygen level, manifold pressure, crankshaft position, coolant temperature, exhaust temperature, air mass flow for engine application. Solenoids, stepper motors, relay.

TEXT BOOKS

1. Young A.P. and Griffiths. L, “Automotive Electrical Equipment”, ELBS & New Press, 1999.
2. William B.Riddens “Understanding Automotive Electronics”, Butter worth Heinemann Woburn, 5th Edition.

REFERENCES

1. Bechhold “Understanding Automotive Electronics”, SAE, 1998.
   Crouse, W.H “Automobile Electrical Equipment”, McGraw-Hill Publishers.
2. Judge A.W “Modern Electrical Equipment of Automobiles”, Chapman & Hall Publishers, London.
3. Kholi.P.L “Automotive Electrical Equipment”, Tata McGraw-Hill Publishers,New Delhi.
   Robert Bosch “Automotive Hand Book”, SAE
4. Ganesan.V. “Internal Combustion Engines”, Tata McGraw-Hill Publishers, New Delhi.

VIIISEMESTER

S246 - EVOLUTIONARY COMPUTING TECHNIQUES

COURSE EDUCATIONAL OBJECTIVES

In this course, student will learn about the

- Concepts of Genetic algorithm and its classification
- Particle swarm optimization algorithm and its variations
- Characteristics and applications of the Ant colony optimization algorithm
- Bacterial foraging optimization algorithm variations and Artificial Immune System
- Simulated annealing algorithm and Linear Classifier Systems
- Concepts of different Search methods

COURSE OUTCOMES

At the end of this course student will be able to

- Solve a problem using the Genetic algorithm concepts
- Identify the differences of the variations of Particle swarm optimization algorithm
- Understand the Ant colony optimization algorithm applications
- Know about the variations of BFO algorithm and importance of Artificial Immune System
- Identify the applications of Simulated annealing algorithm and Linear Classifier Systems
- Understand the importance of Harmony Search method and Tabu search method

UNIT - I

Features, advantages and applications of Evolutionary computation. Different types of Evolutionary Computing Techniques.

Evolutionary Algorithms: Genetic algorithms: Biological background, Search space, working principle; Terminologies and operators of GA- Genes, Fitness, population, Data structures, search strategies, Representation of individuals, Encoding techniques, Selection-Roulette-wheel, Boltzmann, Tournament, Rank and Steady-state, Elitism, Crossover-single-pint, two-point, multi-point, uniform, matrix and cross over rate, Mutation- concept of mutation, mutation rate; Classification of GA- Parallel GA, Distributed GA, Hybrid GA, Adaptive GA, Fast messy GA, Independent sampling GA; Evolution strategies; Evolutionary programming; Genetic programming.

UNIT - II

Particle Swarm Optimization: Basic principle, algorithm, flowchart. Variations of PSO: weighted, repulsive, stretched, comprehensive learning, combined effect PSO and clonal PSO, Comparison between PSO and GA, Applications of PSO.

Ant Colony Optimization: Biological Inspiration, Similarities and Differences between Real Ants and Artificial Ants, Characteristics of Ant Colony Optimization, Ant Colony Optimization Algorithms, Applications of Ant Colony Optimization.

UNIT - III

Bacterial Foraging Optimization: Forging theory, social foraging, foraging behaviour of E. coli bacteria, BFO algorithm, chemotatic, swarming, reproduction and elimination and dispersal. Variations of BFO- fuzzy BFO and Adaptive BFO.

Artificial Immune System: overview, central and peripheral immune systems, immune network, clonal selection and its mathematical modeling, beyond clonal selection, danger theory, negative selection.

UNIT - IV

Simulated Annealing: Introduction, Methodology, advantages.

Learning Classifier Systems: General background, Holland's Learning Classifier System, Zeroth level Classifier System, Wilson's ZCS, Wilson's XCS.

UNIT - V

Tabu Search: Introduction, Methodology,advantages.

Harmony Search: Introduction, Methodology, advantages.

TEXT BOOKS

1. S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic Algorithms", Springer Publishers, 2008.
2. Jason Brownlee, "Clever Algorithms: Nature-Inspired Programming Recipes", Lulu.com website, 1st Edition, 2012.
3. Xinjie yu and Mitsuo Gen, "Introduction to Evolutionary algorithms", Springer Publishers, 2010.

REFERENCES

1. Dan Simon, "Evolutionary optimization algorithms", John Wiley Publications.
2. A.E.Eiben and J.E.Smith, Introduction to Evolutionary Computing, Springer Publishers.
3. E.Bonabeau, M.Dorigo and G.Theraulaz, Swarm Intelligence, Oxford University Press, New York.
4. R.C.Eberhart, Y.Shi and J.Kennedy, "Swarm Intelligence", Morgan Kaufmann Publishers.
5. D.Dasgupta, Artificial Immune Systems and their applications, Springer Publishers.
6. P.Venkataraman, Applied Optimization with MATLAB Programming, John Wiley Publications.
7. T.Baeck, D.B.Fogel, and Z.Michalewicz (eds.), Handbook on Evolutionary Computation, CRC Press, 1997.

VIIISEMESTER

S371 - ROBOT ENGINEERING

COURSE EDUCATIONAL OBJECTIVES

In this subject, student will learn about

- Robot fundamentals and Robot subsystems
- Concepts of Robot kinematics and dynamics
- Robot control and trajectory planning
- Concepts related to Robot vision
- Concepts related to Vision based control and Mobile Robots

COURSE OUTCOMES

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

- Architecture and subsystems of Robot
- Importance of Kinematics and Dynamics of a Robot
- Robot control mechanism and different aspects of trajectory planning
- Robot vision system and the various mechanisms related to it.
- Features and applications of Mobile robots

UNIT - I

Robot Fundamentals: Robot subsystems, Classification of Robots, Robot motions, degree of freedom, Specifications of robots, Anatomy and structural design of Robot (Robot Architecture).

Robot Actuators: Pneumatic Actuators, Hydraulic Actuators, Electric Actuators, Selection of Motors.

Robot Sensors: Sensor Classification,Internal Sensors, External Sensors, Vision System, Sensor Selection.

UNIT – II

Robot Kinematics: Forward Position Analysis, Inverse Position Analysis, Velocity Analysis- Jacobian Matrix, Link Velocities, Jacobian Computation, Jacobian Using the DeNOC, Singularity, Acceleration Analysis.

Robot Statics: Forces and Moment Balance, Recursive Calculation, Equivalent Joint Torques, Role of Jacobian in Statics, Force Ellipsoid.

Robot Dynamics: Inertia Properties, Euler–Lagrange Formulation, Newton-Euler Formulation, Recursive Newton-Euler Algorithm, Dynamics Algorithms.

UNIT – III

Robot Control: Control Techniques, Second-Order Linear Systems, Feedback Control, Performance of Feedback Control Systems, Robotic Joint, Joint Controller, Non-linear Trajectory Control, State-space Representation and Control, Stability.

Motion Planning (Trajectory Planning): Joint Space Planning, Cartesian Space Planning, Position and Orientation Trajectories, Point-to-Point Planning.

UNIT – IV

Computer Vision: Image Formation:Perspective Transform-Lens Distortion; Camera Calibration-Homogeneous Transformation Approach, Decomposing the Camera Calibration Matrix, Pose Estimation, Camera Calibration Toolbox; Non-Perspective Imaging Models-Fisheye Lens Camera, Catadioptric Camera, Spherical Camera; Unified Imaging-Mapping Wide-Angle Images to the Sphere, Synthetic Perspective Images.

Image Feature Extraction:Region Features-Classification, Representation, Description, Recap; Line Features, Point Features-Classical Corner Detectors, Scale-Space Corner Detectors.

UNIT – V

Vision based Control: Position-Based Visual Servoing; Image-Based Visual Servoing, Camera and Image Motion, Controlling Feature Motion, Depth, Performance Issues; Using Other Image Features-Line Features, Circle Features.

Mobile Robots: Importance of Mobile Robots, types of Mobile Robots;Robot locomotion-types of locomotion, hopping robots, legged robots, wheeled robots, stability,maneuverability, controllability,Car-like Mobile Robots, Flying Robots.

TEXT BOOKS

1. S.K.Saha, Introduction to Robotics, Tata McGraw-Hill Publishers, 2008.
2. Peter Corke, "Robotics, Vision and Control: Fundamental Algorithms in MATLAB",Springer Tracts in Advanced Robotics, 2011.
3. Saeed.B.Niku, "Introduction to Robotics: Analysis, Control, Applications", John Wiley Publishers, 2001.

REFERENCES

1. K.S.Fu, R.C Gonzalez and C.S.G.Lee, "Robotics control Sensing vision and Intelligence", Tata Mc Graw Hill Publishers.
2. R.K.Mittal and IJ Nagrath, Robotics and control, Tata Mc Graw Hill publishers, New Delhi.
3. Robert J.Schilling, "Fundamentals of Robotics: Analysis and control", PHI Publishers,New Delhi.
4. R. Siegwart, I. R. Nourbakhsh, "Introduction to Autonomous Mobile Robots", MIT Press, USA.
5. Mark W. Spong, Seth Hutchinson andM.Vidyasagar, "Robot Modeling and Control", John Wiley Publications.

VIIISEMESTER

S425 - WEB TECHNOLOGIES

(Common to CSE, ECE, IT)

COURSE EDUCATIONAL OBJECTIVES

- Giving the students the insights of the Internet programming and how to design and implement complete applications over the web.
- It covers the notions of Web servers and Web Application Servers, Design Methodologies with concentration on Object-Oriented concepts, Client-Side
- Programming, Server-Side Programming, Active Server Pages, Database Connectivity to web applications, Adding Dynamic content to web applications,
- Programming Common Gateway Interfaces, Programming the User Interface for the web applications.
- It also concentrates on the usage of recent platforms used in developing web applications such as the .Net environment like C#, XML, and ASP.Net.

COURSE OUTCOMES

Upon completion of this course, students should be able to:

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Styles sheets.
- Build dynamic web pages using JavaScript (client side programming). .
- Create XML documents.
- Create XML Schema.
- Build and consume web services.

UNIT – I

HTML Common tags

List, Tables, images, links, forms, Frames; Cascading Style sheets; Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script

UNIT – II

Extensible Markup Language

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX. **Java Beans**: Introduction to Java Beans, Advantages of Java Beans, Persistence, Java Beans API, Introduction to EJB's.

UNIT – III

Servlets

Introduction to Servelets: Lifecycle of a Serverlet, The Servelet API, The javax.servelet Package, Servelet parameters, Initialization parameters. The javax.servlet HTTP package, Http Request & Responses, Cookies- Session Tracking, accessing database from servlet

UNIT – IV

Introduction to JSP:

Introduction to JSP, Components of JSP, Implicit objects. Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data between JSP, accessing database from jsp page

UNIT – V

Introducing Swing:– Introduction,keyfeatures of swings, limitations of AWT, components &containers,swing packages,creating swing applet- JApplet class, JFrame and JComponent, Labels, text fields, buttons – The JButton class, Tabbed Panes, Scroll Panes, Trees, and Tables.

Struts Framework: Introduction to Struts, Overview of MVC Design Pattern, Struts main Components, Controller components (Action Servlet, Request Processor, Action, Action Mapping, Action Form Beans, Struts Configuration files).

TEXT BOOK

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech.(UNITS-1,2,3,4), 2002.
2. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly (UNIT-5), 1st Edition,2005.

REFERENCES

1. Programming world wide web-Sebesta, Pearson
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty - Hall and Larry Brown Pearson
3. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
4. Programming world wide web-Sebesta,Pearson Java Server Pages, Pekowsky, Pearson.