COURSE STRUCTURE

AND

DETAILED SYLLABUS

II, III & IV-B.TECH-I&II-SEMESTER

R15

ELECTRONICS AND COMMUNICATION ENGINEERING

FOR

B.TECH FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2015-2016)

ANURAG GROUP OF INSTITUTIONS

AUTONOMOUS

VENKATAPUR, GHATKESAR, HYDERABAD – 500 088. TELANGANA SATATE.

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II YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	CATEGORY	SUBJECT	L	T/P/D	C
A53008	BS	Mathematics –IV	4	0	4
A53009	PC	Switching Theory and Logic Design	3	0	3
A53020	HS	Management Science	3	0	3
A53021	PC	Electronic Circuit Analysis	4	0	4
A53022	BS	Probability Theory & Stochastic Process	3	1	3
A53023	ES	Signals and Systems	3	1	3
A53017	MC	Environmental studies	2	-	0
A53207	PC	Electronic Circuits Analysis Lab	-	3	2
A53208	PC	Basic Simulation Lab	-	3	2
Total			**22**	**8**	**24**

II YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	CATEGORY	SUBJECT	L	T/P/D	C
A54019	PC	Structured Digital System Design	4	0	4
A54020	ES	Principles of Electrical Engineering	**3**	**1**	**3**
A54021	PC	Pulse and Digital Circuits	4	0	4
A54022	ES	Electromagnetic Theory and Transmission Lines	4	0	4
A54023	ES	Electronic Measurements & Instrumentation	3	0	3
A54018	MC	Gender Sensitization	2	-	0
A54209	PC	Pulse Digital Circuits Lab	-	3	2
A54210	PC	Basic Circuits Simulation Lab	-	3	2
A54211	ES	Principles of Electrical Engineering Lab	-	3	2
Total			**20**	**10**	**24**

III YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	CATEGORY	Subject	L	T/P/D	C
A55031 A55032 A55033	PE	**Professional Elective-1** Computer architecture Object Oriented Programming Through Java Transducers & signal conditioning	4	0	4
A55034	PC	Analog Communications	3	0	3
A55035	PC	IC Applications	3	0	3
A55036 A55037 A55038	PE	**Professional Elective –2** Computer Networks Relational Data Base Management System Telecommunication switching systems	4	0	4
A55039	PC	Microprocessors & applications	4	0	4
A55022	MC	English for Life Skills	-	2	0
A55208	PC	IC Applications Lab	-	3	2
A55209	PC	Analog Communications Lab	-	3	2
A55210	PC	Microprocessors and applications Lab	-	3	2
	TOTAL		**18**	**11**	**24**

III YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	CATEGORY	Subject	L	T/P/D	C
A56034	PC	Antennas and Wave Propagation	3	0	3
A56035 A56036 A56037	PE	**Professional Elective-3** Optical Communication Digital Signal Processors & Architectures Data Acquisition System	**3**	**0**	**3**
A56038	PC	Microcontroller & Embedded Systems	3	1	3
A56020	PC	Digital Signal Processing	3	1	3
A56039	PC	Digital Communications	3	1	3
A56040 A56041 A56042	PE	**Professional Elective-4** Satellite communication Analog IC Design Digital Image Processing	3	0	3
A56011	MC	Logical Reasoning & Quantitative Aptitude	-	-	0
A56207	PC	Microcontroller & Embedded Systems Lab	-	3	2
A56208	PC	Digital Signal Processing Lab	-	3	2
A56209	HS	Advanced English Communication Skills Lab	-	3	2
	TOTAL		**18**	**12**	**24**

IV YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	CATEGORY	SUBJECT	L	T/P/D	C
A57037	PC	Microwave & Radar Engineering	3	1	3
A57022	PC	VLSI System Design	3	1	3
A57038 A57039 A57040	OE	**OPEN ELECTIVE-I** Entrepreneurship Development Cloud computing & IOT Software Engineering	3	1	3
A57041 A57042 A57043	PE	**Professional Elective-5** Cellular Mobile Communications Avionics & Navigational Aids Operating Systems	3	1	3
A57044	PC	Linear Control Systems	3	1	3
A57045 A57046 A57047	PE	**Professional Elective-6** Mixed Signal Design RF Circuit Design Real Time Operating Systems	3	1	3
A57210	PC	Microwave Engineering and Digital Communication Lab	-	3	2
A57211	PC	VLSI system design Lab	-	3	2
A57212	PW	Industry Oriented Mini Project	0	0	2
		TOTAL	**18**	**12**	**24**

IV YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	CATEGORY	SUBJECT	L	T/P/D	C
A58017 A58009 A58008	**OE**	**OPEN ELECTIVE-II** Power electronics Project Management Disaster Management	**3**	**1**	**3**
A58018 A58019 A58020	**OE**	**OPEN ELECTIVE-III** Engineering Systems Modeling & Simulation Fuzzy & Neural Networks Big Data Analytics	**3**	**1**	**3**
A58210	PW	Seminar	0	6	3
A58211	PW	Comprehensive viva	0	0	3
A58212	PW	Major Project	0	15	12
		Total	**6**	**23**	**24**

Note: All End Examinations (Theory and Practical) are of three hours duration.

T – Tutorial **P – Practical** **D – Drawing**

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II-Year B.Tech-ECE - I-Semester	**L**	**T/P/D**	**C**
	4	**0**	**4**

(A53008) MATHEMATICS-IV

Prerequisite: Nil

Course Objectives:

1. **Analyze** the characteristics and properties of Fourier transforms
2. To introduce the basic theory of functions of a complex variable and complex analysis methods.
3. To find the limits of functions and determine continuity of functions and use power series and line integrals to construct differentiable functions.
4. To find Laurent series about isolated singularities and determine residues and use the residue theorem to compute several kinds of real integrals.
5. To use conformal mapping to solve the Dirichlet problem in region.

UNIT-I: Fourier Transformations

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties –inverse transforms – Convolution theorem – Finite Fourier transforms.

UNIT-II: Functions of a complex variable

Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method. Elementary functions: Exponential, trigonometric, hyperbolic functions and their properties – General power Z (c is complex), principal value.

UNIT-III: Complex Integration and Complex Power series

Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point –Isolated singular point – pole of order m – essential singularity.

UNIT-IV: Contour Integration

Residue – Evaluation of residue by formula and by Laurent series - Residue theorem. Evaluation of integrals of the type

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

(c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$ (d) Integrals by indentation.

UNIT-V: Conformal mapping

Transformation by $e^Z, \ln Z, Z^2, Z^n$ (n positive integer), Sin z, cos z, z + a/z. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points .

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Determine Fourier transform, Fourier sine and cosine transform of a function
2. Apply complex analysis in the study of mechanics of solids and liquids, thermodynamics, electrical fields etc
3. Apply Taylor's and Laurent series in evaluation of both real and complex integrals in summation of series.
4. Apply Residue theorem which is an elegant theorem in complex integration and useful in evaluating complicated real integrals.
5. Apply conformal mapping in solving boundary value problems in two dimensional potential theories by transforming a complicated region to simpler region as it preserves solutions of two dimensional Laplace equations.
6. Develop alternative ways to solve a problem and systematic approach of a solution for a real time applications.

TEXT BOOKS

1. A text Book of Engineering Mathematics, Vol-III T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. A text Book of Engineering Mathematics, C. Sankaraiah, V. G. S. Book Links.
5. A text Book of Engineering Mathematics, P. Nageshwara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

REFERENCE BOOKS:

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thamson Book Collection.
4. Shahanaz Bathul (2010), Engineering Mathematics - III, 2nd Edition, Hyderabad, PHI Learning Private Limited.
5. Schaum's outline series on Complex Anlysis.
6. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

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II Year B.Tech, ECE.-I Sem	**L**	**T/P/D**	**C**
	3	0/ - /-	3

(A53009) SWITCHING THEORY AND LOGIC DESIGN

Prerequisite: ELECTRONICS DEVICES & CIRCUITS

Course Objectives:
This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits.
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

UNIT-1: NUMBER SYSTEMS AND CODES:
Review of number systems binary arithmetic, binary weighted and non-weighted codes. Error detecting and error correcting codes.

BOOLEAN ALGEBRA:
Postulates and theorems: representation of switching functions, SOP and POS forms Karnaugh Map representations, minimization using K Maps.

UNIT- II: DESIGN OF COMBINATIONAL CIRCUITS:
Tabular minimization – design of single output and multi output functions design using conventional AND, OR, NOT, NAND, NOR & EX-OR gates. Design using MSI & LSI devices, digital multiplexer/selector, decode demultiplexer, design of 4 bit adder, carry look-ahead adder, magnitude comparator, BCD converter. Logic implementations using ROM, PAL & PLA.

Unit-III: INTRODUCTION TO SEQUENTIAL CIRCUITS:
Combinational versus sequential circuits, asynchronous versus synchronous circuits, state table and state diagram, state assignment, memory elements and their excitation functions, T flip flop, RS flip flop, JK flip flop and their excitation requirements. Design of synchronous sequential circuits like sequence detectors and binary counters.

UNIT-IV: CAPABILITIES AND MINIZATION OF SEQUENTIAL MACHINES:
Melay and Moore machines, capabilities and limitations of finite state machine, state equivalence and machine minimization.

UNIT-V: ALGORITHIMIC STATE MACHINES:
ASM chart, timing considerations, control implementation, design with multiplexers and PLA control. Introduction to unate functions and threshold logic.

Text Books:
1. Switching And Finite Automata Theory – By Zvi Kohavi, TMH Edition.
2. Digital Logic Computer Design – By M. Morris Mano, PHI.
3. Digital Logic Design Principles – By Norman Balbamian and Breadly, John Wiley

References:
1. Introduction to Switching Theory and Logic Design- By F. J. Hill and Peterson, John Wiley Publications.
2. Digital Logic – Applications & Design – By- John M. Yarbroough, Vikas Publications, 1997.
3. Digital System Design – By R. P. Jain TMH.
4. Digital Systems Principles, Applications– By Ronald J. Tocci, Pearson Education/Phil

Course Outcomes:
Upon completion of the course, students should possess the following skills:

- Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Be able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
- Be able to design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

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II Year B.Tech, ECE.-I Sem	**L**	**T/P**	**C**
	3	**0**	**3**

(A53020)**MANAGEMENT SCIENCE**

Course Objective: The objective of this course is to lay a foundation to students in the important management principles and concepts to help them understand and develop managerial skills.

Unit-I

Introduction to Management: Nature and importance of management, Functions of Management, Taylor's Scientific Management Theory, Fayol's principles of management, Maslow's theory of Human Needs, Douglas Mc Gregor's Theory X and Theory Y, Herzberg's Two factor Theory of Motivation. Systems Approach to Management, Leadership Styles, Social Responsibilities of Manager, Organization levels and types of organization structures.

Unit-II

A) Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass production), Work Study - Basic procedure involved in Method Study and Work measurement- Statistical Quality Control - X chart, R chart, C chart, P chart, (simple problems), Acceptance Sampling, Deming's contribution to quality.
B) Materials Management: Objectives, Need for inventory control, EOQ, ABC Analysis, Purchase procedure, Stores management and Stores records, Supply chain management.

Unit –III

A) Human Resources Management (HRM): Evolution of HRM, Concepts of HRM, Basic functions of HR Manager - Manpower Planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.
B) Marketing: Functions of Marketing, Marketing Mix, Marketing strategies based on Product Life cycle, Channels of distribution.

Unit –IV

Project Management(PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method(CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing.(Simple problems)

Unit –V

Strategic & Contemporary Management Practices: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of corporate planning process, Environmental Scanning, SWOT analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Basic concepts of Just-In-Time(JIT) system, Total Quality Management(TQM), Six Sigma and Capability Maturity Model(CMM) levels, Value chain Analysis.

Text books:

1. Aryasri, Management Science, TMH, New Delhi, 2009

REFERENCES:

1. Kotler Philip and Keller Kevin Lane, Marketing Management, Pearson, 2012.
2. Koontz and Weihrich, Essentials of Management, McGraw Hill, 2012.
3. Thomas N. Duening and John M. Ivancevich Management, Principles and Guidelines, Biztantra, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2012.
5. Samuel C. Certo, Modern Management, 2012.
6. Schermerhorn, Capling, Poole and Wiesner, Management, Wiley, 2012.
7. Parnell, Strategic Management, Cengage, 2012.
8. Lawrence R Jauch, R. Gupta and William F. Glueck: Business Policy and Strategic Management Science, McGraw Hill, 2012.

Course Outcomes:

1. The functions of management, objectives, goals, mission, vision
2. Organization and different types of organization.
3. Plant layouts, plant location, productivity, and types
4. Work study, work measurement, methods of work study
5. Statistical control and different types of control charts.
6. Inventory control, methods of inventory.
7. Marketing functions, product life cycle.
8. Human resource management, man power planning..

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II Year B.Tech, ECE.-I Sem	L	T/P/D	C
	4	-/ - /-	4

(A53021) ELECTRONIC CIRCUIT ANALYSIS

Prerequisite: ELECTRONIC DEVICES & CIRCUITS

Course Objectives

- To explain the operation, design and Analysis of multistage amplifiers using BJT and MOSFET.
- To analyze large signal and tuned amplifiers.
- To analyze different oscillators

Unit-I : **SINGLE STAGE AMPLIFIERS :**
Classification Of Amplifiers, Distortion In Amplifiers, Analysis Of CB, CE And CC Configurations Using Simplified (Approximate) Hybrid Model, Millers Theorem And Its Dual, Analysis Of CE Amplifier With Emitter Resistor, Design Of Single Stage Rc Coupled Amplifier Using BJT.

Unit-II : **BJT AMPLIFIERS - FREQUENCY RESPONSE:**
Logarithms, Decibels, General Frequency Considerations- Frequency Response Of BJT Amplifiers, Analysis At Low And High Frequencies, Effect Of Coupling and Bypass Capacitors, Hybrid Pi Model For CE Transistor, CE Short Circuit Current Gain, Current Gain With Resistive Load, Single Stage CE Transistor Amplifier Response, Alpha, Beta Cut-Off Frequencies, Gain Bandwidth Product , Emitter Follower At High Frequencies

Unit-III : **MULTI STAGE AMPLIFIERS:**
Analysis Of Cascaded RC Coupled BJT Amplifiers, Cascode Amplifiers, Darlington Pair, Different Coupling Schemes Used In Amplifiers- RC Coupled Amplifiers, Transformer Coupled Amplifiers And Direct Coupled Amplifiers.

Unit – IV: LARGE SIGNAL AMPLIFIERS:
Classification, Class A Large Signal Amplifiers, Transformer Coupled Class A Audio Power Amplifiers, Efficiency of Class A Amplifier, Class B Amplifier, Efficiency of Class B Amplifier, Class B Push-Pull Amplifier, Complementary Symmetry Class B Push-Pull Amplifier, Distortion In Power Amplifiers, Thermal Stability And Heat Sinks

Unit –V: TUNED AMPLIFIERS:
Introduction- Factor, Small Signal Tuned Amplifiers, Effect Of Cascading Single Tuned & Double Tuned Amplifier on Bandwidth, Stagger Tuned Amplifiers, Stability Of Tuned Amplifiers

TEXT BOOKS:

1. Integrated electronic- jacob millman &christor c halkias, 1991 ed.,2008, tmh
2. Electronic devices and circuits - -s.salivahana, n. Suresh kumar, a vallavaraj, 2ed.,
3. design of analog cmos integrated circuits – behzad razavi, 2008, tmh.

References:

1. Introductory electronic devices and circuits- robert t. Paynter, 7ed.,2009, pel.
2. Electronic circuit analysis- k.lal kishore , 2004, bsp.
3. Electronic devices & circuit –david a bell-5ed,. Oxford university press.

Course Outcomes

- Apply the knowledge of BJTs and MOSFETs to design practical amplifier circuits.
- Design electronic sub systems such as feedback amplifiers, oscillators and power amplifiers to meet the required specifications.
- Apply the knowledge of Tuned amplifiers to design practical amplifier circuits.

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II Year B.Tech, ECE.-I Sem

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(A53022) PROBABILITY THEORY AND STOCHASTIC PROCESS

Prerequisite: MATHEMATICS-IV

Course Objectives:

- To provide mathematical background and sufficient experience so that the student can read, write, and understand sentences in the language of probability theory, as well as solve probabilistic problems in signal processing and Communication Engineering.
- To introduce students to the basic methodology of "probabilistic thinking" and to apply it to problems;
- To understand basic concepts of probability theory and random variables, how to deal with multiple random variables, Conditional probability and conditional expectation, joint distribution and independence, mean square estimation.
- To understand the difference between time averages and statistical averages Analysis of random process and application to the signal processing in the communication system.To teach students how to apply sums and integrals to compute probabilities, means, and expectations.

UNIT- I : PROBABILITY

Probability Introduced through Sets and Relative Frequency, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events

UNIT II : RANDOM VARIABLE AND OPERATIONS ON ONE RANDOM VARIABLE RANDOM VARIABLE : Definition of a Random Variable, Types of Random Variables, Conditions for a Function to be a Random Variable, Distribution and Density functions, and their Properties- Binomial, Poisson, Uniform ,Gaussian, Conditional Distribution, Conditional Density, Properties.

OPERATION ON ONE RANDOM VARIABLE : Introduction, Expected Value of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

UNIT III: MULTIPLE RANDOM VARIABLES AND OPERATIONS ON MULTIPLE RANDOM VARIABLES MULTIPLE RANDOM VARIABLES:

Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions and its Properties, Conditional Distribution and Density , Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions.

OPERATIONS ON MULTIPLE RANDOM VARIABLES:
Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV: STOCHASTIC PROCESSES- TEMPORAL CHARACTERISTICS:
The Stochastic Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-Order and Wide-Sense Stationary, Nth Order and Strict-Sense Stationary, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance and Its Properties, Gaussian Random Processes, Poisson Random Process.

UNIT V: RANDOM PROCESSES – SPECTRAL CHARACTERISTICS:
Power Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

TEXT BOOKS

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.TMH.
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.

REFERENCES

1. Probability and random processes with stochastic processes- Mallikarjuna Reddy Cengae Learning
2. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Probability Methods of Signal and System Analysis. George R. Cooper, Clave D. MC Gillem, Oxford, 3rd Edition, 1999.
4. Statistical Theory of Communication - S.P. Eugene Xavier, New Age Publications, 2003.

Course Outcomes:
Upon completion of the subject, students will be able to compute:
Simple probabilities using an appropriate sample space.Simple probabilities and expectations from probability density functions (pdfs) Likelihood ratio tests from pdfs for statistical engineering problems.
Least -square & maximum likelihood estimators for engineering problems. Mean and covariance functions for simple random processes.

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II Year B.Tech, ECE.-I Sem	**L**	**T/P/D**	**C**
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(A53023)SIGNALS AND SYSTEMS

Prerequisite: MATHEMATICS

Course Objectives:

This is a core subject, basic knowledge of which is required by all the engineers.
This course focuses on:
In-depth knowledge about signals, systems and analysis of the same using various transforms.

UNIT-I: Signal Analysis and Fourier Series:
Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.
Fourier Series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

UNIT-II: Fourier Transforms and Sampling
Fourier Transforms: Deriving Fourier Transform from Fourier Series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.
Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Types of Sampling -Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-III: Signal Transmission Through Linear Systems: Linear System, Impulse response, Response of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI system, Filter characteristics of Linear Systems, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and Rise time.

UNIT-IV: Convolution and Correlation of Signals: Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem, Power density spectrum, Relation between Auto Correlation function and Energy/Power spectral density function.

UNIT-V: Laplace Transforms and Z-Transforms

Laplace Transforms: Review of Laplace Transforms (L.T), Partial fraction expansion, Inverse LaplaceTransform, Concept of Region of Convergence (ROC) for Laplace Transforms, Constraints on ROC for various classes of signals, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Z–Transforms: Fundamental difference between Continuous and Discrete time signals, Discrete time signal representation using Complex exponential and Sinusoidal components, Periodicity of Discrete time signal using complex exponential signal, Concept of Z-Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

REFERENCES

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
3. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education.3rd Edition, 2004.Publications, 2nd Edition, 2005.

Course Outcomes:

Upon completing this course the student will be able to:

- Represent any arbitrary signals in terms of complete sets of orthogonal functions and understands the principles of impulse functions, step function and signum function.
- Express periodic signals in terms of Fourier series and express the spectrum and express the arbitrary signal (discrete) as Fourier transform to draw the spectrum.
- Understands the principle of linear system, filter characteristics of a system and its band width, the concepts of auto correlation and cross correlation and power Density Spectrum.
- Can design a system for sampling a signal.
- For a given system, response can be obtained using Laplace transform, properties and ROC of L.T. Study the continuous and discrete signal relation and relation between F.T., L.T. & Z.T, properties, ROC of Z Transform.

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II Year B.Tech, ECE.-I Sem	**L**	**T/P/D**	**C**
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(A53207) ELECTRONIC CIRCUIT ANALYSIS LAB

List of Experiments (12 Experiments to be done):

v) Design and Simulation in Simulation Laboratory using any Simulation Software. (Any 6 Experiments):

1. Common Emitter Amplifier.
2. Common Source Amplifier.
3. Two Stage RC Coupled Amplifier.
4. Current shunt and Voltage Series Feedback Amplifier.
5. Cascode Amplifier.
6. Wien Bridge Oscillator using Transistors.
7. RC Phase Shift Oscillator using Transistors.
8. Class A Power Amplifier (transformer less).
9. Class B Complementary Symmetry Amplifier.
10. Common Base (BJT) / Common Gate (JFET) Amplifier.

II. Testing in the Hardware Laboratory (6 Experiments)

A) Any Three circuits simulated in simulation laboratory
B) Any Three of the following

2. Class A Power Amplifier (with transformer load)
3. Class C Power Amplifier.
4. Single Tuned Voltage Amplifier.
5. Hartley & Colpitt's Oscillators.
6. Darlington Pair.
7. MOS Amplifier.

Equipments required for Laboratories:

1. For software simulation of Electronic circuits.
   - v) Computer System with latest specifications.
   - ii) Connected in LAN (Optional)
   - iii) Operating system (Windows XP)
   - iv) Suitable Simulations Software.

2. For Hardware simulations of Electronic Circuits
   - i) Regulated Power Supply (0-30V)
   - ii) CRO's
   - iii) Function Generators
   - iv) Multimeters
   - v) Components.

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(A53208) BASIC SIMULATION LAB

List of Experiments (12 Experiments to be done):

Write programs in MATLAB or equivalent software and to simulate the following functions

1. Basic operation on matrices.
2. Generation on various signals and Sequences(periodic),such as unit impulse, unit step, square, sawtooth, triangular, sinusoidal, ramp, sinc.
3. Operation on signal and sequence such as addition, multiplication scaling, folding , computation of energy and average power.

4. Finding the even and odd parts of signals/sequence and real and imaginary part of signals.

5. Convolution between signals and sequences.

6. Auto correlation and cross correlation between signals and sequences.

7. Verification of linearity and time invariance properties of a given continues /discrete system.

8. Computation of unit sample, unit step and sinusoidal response of the given LTI system and verifying its physical Realization and stability properties.

9. Gibbs phenomenon.

10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.

11. Waveform synthesis using Laplace transform.

12. Locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane for the given transfer function.

13. Generation of Gaussian Noise (real and complex), computation of its mean, M.S. Value and its skew, kurtosis, and PSD, probability distribution function.

14. Sampling theorem verification.

15. Removal of noise by auto correlation/ cross correlation.

16. Extraction of periodic signal masked by noise using correlation.

17. Verification of Weiner-Khinchine relations.

18. Checking a random process for stationarity in wide sense.

Equipments required for Laboratories:
For the basic simulation lab .
i) Computer System with latest specifications.
ii) Connected in LAN (Optional)

iii) Operating system (Windows XP or higher)
iv) MATLAB or equivalent software

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(A53017) **ENVIRONMENTAL STUDIES**

Course Objectives:

- To introduce the knowledge about Environment.
- To introduce students to the concepts of pollution, Biodiversity
- To develop an awareness about global Environmental problems.
- To learn to protect environment, legal issues, Sustainable development

UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:
Definition, Scope and Importance – Need for Public Awareness.

(a) ECOSYSTEMS: Concept of an ecosystem – Classification, structure and function of different Ecosystems - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids.

(b) BIODIVERSITY AND ITS CONSERVATION: Introduction - Definition: genetic, species and ecosystem diversity. – Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. ICUN categories of biodiversity and RED DATA book - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – II: NATURAL RESOURCES:
Renewable and non-renewable – Natural resources and associated problems: Forest resources – Use and over – exploitation, deforestation,– Timber extraction, mining, dams and other effects on forest and tribal people: Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources: Equitable use of resources for sustainable lifestyles.

UNIT – III:

(a) ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of different kinds of pollution (Air, Water , Soil , Marine , Noise , Thermal, Nuclear, e –Waste)

(b) SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development –Urban Problems related to energy -Water conservation, rain water harvesting, and watershed management. -Climate change, global warming, ozone layer depletion, nuclear accidents and holocaust.

UNIT – IV:

(a) WASTE MANAGEMENT TECHNOLOGY: Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides. Waste water and sewage treatment technology: primary, secondary and tertiary treatments. Bioremediation, Phyto-remediation, ZLD (zero liquid discharge), membrane technology. Application of GIS and GPS system in environmental science.

(b) ENVIRONMENTAL POLICY, RULES AND REGULATIONS. EIA (Environmental Impact Assessment) & EMP (ENVIRONMENTAL Management Plan) – Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act -Wildlife Protection Act –Forest Conservation Act.-Public awareness. Global environmental problems and global efforts.

UNIT – V:

(a) TOWARDS SUSTAINABLE FUTURE: concept of sustainable development, threats of sustainability, population and its explosion, over exploitation of resources, strategies for achieving sustainable development. Environmental education, Conservation of resources. Urban sprawl, sustainable cities and sustainable communities, human health. Role of IT in environment, environmental ethics, concept of green building, Basic principles of Green engineering, clean development mechanism (CDM), Low carbon life cycle, Polluters-pay principle.

(b) FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/ mountain Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds, Visit to effluent treatment plant/sewage treatment plant Study of simple eco systems pond, river, hill slopes, etc.

TEXT BOOK:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, University Press.
2. Environmental studies, From Crisis to cure by R.Rajagopalan, 2005

REFERENCES:

1. Environmental Science: towards a sustainable future by Richard T.Wright.2008 PHL Learning Private Ltd .New Delhi
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P.Ela.2008 PHI Learning Pvt. Ltd.

Course Outcomes:

- Conservation of natural resources
- Understand Requirement to conserve environment.
- Understand the National and international efforts to save globe.
- Know importance of sustainable development

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(A54019) STRUCTURED DIGITAL SYSTEM DESIGN

Prerequisite: Switching Theory and Logic Design

Course objectives

- To understand the concepts of HDL, levels of design description, structural, dataflow and behavioral model. Students learn how to design and optimize logic, memory and interconnect structure at the gate, transistor and wire level.
- To design combinational circuits using verilog HDL and implementation of combinational circuits using FPGA
- To analyze the operation of sequential circuits built with various flip-flops. Students understand the fundamental concept of state diagrams. To design the sequential circuits using verilog HDL.
- Students will apply the concept of system controller with different combinational & sequential components. To understand and use a hierarchal approach to the design of complicated system.

UNIT-I: INTRODUCTION TO VERILOG HDL:
Verilog as HDL, Levels of Design Description, Simulation & Synthesis, Language Constructions. Gate Level Modeling: AND, OR, INVERTER and Other Gate Primitives.

UNIT-II: DESIGN OF COMBINATIONAL CIRCUITS:
Introduction, Examples of Useful Digital Circuits, Arithmetic Circuits, Comparators, Multiplexers, Code Converters, EXOR and AOI Gates, Wired Logic, Tristate Bus Systems Design Using Verilog HDL, Implementation on FPGA .

UNIT-III: SEQUENTIAL ANALYSIS AND DESIGN:
Fundamentals of Sequential Machines, State Diagrams, Design Steps for Traditional Synchronous Sequential Circuits, Flip-Flops: RS, JK, T & D. Counters: Single Mode Counters, Multi Mode Counters, Ripple Counters, Ring Counters, Shift Registers Implementation Using Verilog HDL.

UNIT-IV: INTRODUCTION TO SYSTEM CONTROLLER DESIGN:
System Controllers, Controller Design Phases & System Documentation, Defining the Purpose and Role of the System, Timing and Frequency Considerations, Using MSI Decoder in System Controllers, Using MSI Multiplexer in System Controllers, Read Only Memories(ROM), ROM's & PROM's Applications, PLA's Using FPGA & Applications of PLA & FPGA.

UNIT-V: ASYNCHRONOUS FINITE STATE MACHINES:
Introduction, Asynchronous Circuits, Scope, Asynchronous Analysis, The Design of Asynchronous Machines, Cycles and Races, Plotting and Reading the Excitation Map, Hazards, Essential Hazards, The Map-Entered-Variable Approaches to Asynchronous Design, A Contemporary Approach to Asynchronous Design, Hazards in Circuits Developed By MEV Method, Worked Examples.

TEXT BOOKS:

1. Fundamentals Of Logic Design-Charles H. Roth, Jr. – 5th Edition,
2. An Engineering Approach To Digital Design- William I. Fletcher- Phi Publications
3. Design through Verilog HDL- T. R. Padmanabhan, B. Bala Tripura Sundari. Wiley, 2009,

REFERENCES:

1. Switching And Finite Automata Theory – Z. Kohavi , 2nd Ed., 2001, Tmh
2. Digital Design – Morris Mano, M.D.Ciletti, 4th Edition, Phi.
3. Digital Circuits And Logic Design – Samuel C. Lee , Phi.

Course outcomes:

- Students must be able to make VHDL implementation on structured design of combinational and synchronous sequential circuits.
- Knowledge of mathematics through discrete mathematics and logic, basic sciences and computer sciences.
- Apply algorithmic state machines approach for large size digital system design and students will acquire the concepts of data paths, control paths, micro operations and building blocks of digital system.
- Use the technique skills and modern engineering tools necessary for engineering practice.
- To identify a paper related to the application of digital systems, read and summarize the paper.
- To articulate how modern microelectronics has improved society.

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(A54020) PRINCIPLES OF ELECTRICAL ENGINEERING

Prerequisite: ELECTRICAL CIRCUITS

Course Objectives:

- To analyze transient response of circuits with dc excitation.
- To understand two port network parameters, filters and attenuators.
- To know about performance of DC machines.
- To understand the operation of transformers and AC machines.

UNIT-I D.C TRANSIENT ANALYSIS:
Transient response of R-L, R-C, R-L-C circuits (series and parallel) for D.C excitation- Initial conditions- Solution method using differential equation approach and Laplace transform method.

UNIT-II TWO PORT NETWORKS:
Z, Y, ABCD and Hybrid parameters, conversion of one parameter to another, conditions for reciprocity and symmetry, interconnection of two port networks in series, parallel and Cascaded, illustrative problems.

UNIT-III FILTERS AND ATTENUATORS:
Classification of filters, filter networks, classification of pass Band and stop Band, characteristic impedance in the pass and stop bands, constant K low pass filter, high pass filter, band pass filter, band Elimination filter, illustrative problems. Symmetrical attenuators-T-type attenuators, π type attenuators, bridged T-type attenuators. Lattice attenuators.

UNIT-IV D.C. Generators & D.C. Motors:
Principle of operation of DC machines, E.M.F Equation, types of generator, magnetization and load characteristics of DC generators**.** Illustrative problems.

D.C Motors – types of DC motors, characteristics of DC motors, losses and efficiency ,Swinburne's test, speed control of D.C. Motor, armature voltage and flux voltage control methods. Illustrative problems.

UNIT –V TRANSFORMERS AND THEIR PERFORMANCE:
Principle of operation of Single phase transformer, types, constructional features, phasor diagram on no-load and load equivalent circuit, losses and efficiency of transformer and regulation, EMF equation- O.C & S.C tests, simple problems, introduction to single phase induction motor-split phase IM, capacitor motors, AC servomotors.

TEXT BOOKS:

1. Circuits & Networks - *A.Sudhakar* and *Shyammohan S.Palli*, Tata McGraw-Hill.
2. Introduction To Electrical Engineering - *M.S Naidu* and *S. Kamakshiah*,TMH.
3. Principle of Electrical Engineering - *V.K. Mehtha*,,S.Chand Publications.
4. Basic Electrical Engineering – *B.L. Theraja and A.K. Theraja,* S.Chand Publications.

REFERENCES:

1. Networks, lines and fields - *John.D.Ryder*, 2nd edition, PHI, 2008.
2. Engineering circuit analysis -*W.H.Hayt and J.E.Kemmerly and S.M.Durbin*, TMH, 6th edition, 2008,.
3. Network analysis and synthesis - C.L.Wadhwa, 3rd edition, New Age International Publishers,2007.
4. Network analysis - *N.C.Jagan and C.Lakshmi Narayana*, BSP, 2006

Course Outcomes :

- Analyze transient response of circuits
- Evaluate two port parameters and design simple filters
- Appreciate the working of DC machines
- Understand the operation of transformers and AC machines.

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(A54021) PULSE AND DIGITAL CIRCUITS

Prerequisite: ELECTRONIC DEVICES & CIRCUITS

Course Objectives

- To provide knowledge of Pulse and Wave shaping circuits.
- To analyze and design BJT switching circuits
- Analyze and Design the Sweep generators for various applications.
- To Analyze and Design of the logic gates using discrete components.

UNIT I: LINEAR WAVE SHAPING:
High pass, Low pass RC circuits and their responses for sinusoidal, step voltage, pulse, square wave and ramp inputs. High pass RC networks as Differentiator, Low pass RC as an Integrator, Attenuators and their applications in CRO probe. RL and RLC circuit their response for step input, Ringing circuit.

UNIT II: NON-LINEAR WAVE SHAPING:
Diode clippers, Transistor clippers, Clipping at two independent levels, Emitter coupled clipper, Diode comparators, Diode differentiator.
Applications of Voltage comparators, Clamping operation, Clamping circuits using Diodes with different inputs, Clamping circuit theorem, Practical clamping circuits, Effect of Diode characteristics on clamping voltage.

SWITCHING CHARACTERISTICS OF DEVICES:
Diode as a switch, Piecewise Linear Diode Characteristics, Transistor as a switch, Breakdown voltage consideration of transistors, Saturation parameters of transistors and their variation with temperature. Design of a transistor switch, Transistor- switching times.

UNIT III: MULTIVIBRATORS:
Analysis and Design of Bistable, Monostable and Astable Multivibrator using Transistors, Schmitt trigger using transistors

UNIT IV: TIME BASE GENERATORS:
General features of Time Base Signal, Methods of Generating a Time Base Waveform, Voltage sweeps, Bootstrap and Miller circuits, Linear current sweep, and Application in T.V. synchronization.

SYNCHRONISATION AND FREQUENCY DIVISION:
Principles of Synchronization, Synchronization of Astable Multivibrator, Phase Delay and phase Jitters, Synchronization of sweep circuits with symmetrical signals.

UNIT V: SAMPLING GATES:
Basic Operating Principles of Sampling Gates, Unidirectional and Bi-directional sampling gates, Application of Sampling Gates.

BLOCKING OSCILLATORS:
Mono Stable Blocking Oscillator (Base timing & Emitter timing). Astable blocking Oscillator (Diode Controlled), Applications of Blocking Oscillators.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, and Mothiki S.Prakash Rao, 2ed., 2008, TMH..
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002

REFERENCES:

1. Pulse and Digital Circuits-A. Anand Kumar, PHI, 2005.
2. Wave Generation and Shaping - L. Strauss.
3. Fundamentals of Pulse and Digital Circuits – Ronald J. Tocci, 3ed., 2008.
4. Pulse and Digital Circuits – Motheki S.Prakash Rao, 2006, TMH.

Course Outcomes

- Design linear and non-linear wave shaping circuits.
- Apply the fundamental concepts of wave shaping circuits for various switching and logic circuits
- Design the time base circuits for various applications

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(A54022) **ELECTROMAGNETIC THEORY AND TRANSMISSION LINES**

Prerequisite: PHYSICS

Course Objectives:

- To provide the basic concepts of Electric and Magnetic fields.
- To understand the Maxwell's equations and applying boundary conditions to the different material interfaces.
- To conceptualize the wave propagation characteristics for different media.
- To learn the basic parameters of Transmission lines.

UNIT – I: ELECTROSTATICS:

Coulomb's Law , Electric Field Intensity- Fields Due to Continuous Charge Distributions, Electric Flux Density, Gauss Law and Applications , Electric Potential, Relations Between E and V , Maxwell's Two Equations for Electrostatic Fields, Energy Density , Illustrative Problems.

Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics , Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT – II: MAGNETOSTATICS:

Biot-Savart's Law , Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces Due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

UNIT –III: MAXWELL'S EQUATIONS (Time Varying Fields) :

Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

UNIT-IV: EM WAVE CHARACTERISTICS:

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves-Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors and Dielectrics- Characterization, Wave Propagation in Good Dielectrics and Good Conductors , Polarization, Reflection and Refraction of Plane Waves –Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem-Applications, Power Loss in a Plane Conductor, Illustrative Problems.

UNIT-V: TRANSMISSION LINES:

Transmission Lines – I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading, Illustrative Problems.

Transmission Lines – II : Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Lines as Circuit Elements: $\lambda/4$,$\lambda/2$, $\lambda/8$ Lines – Impedance Transformations, Significance of Z_{min} and Z_{max} Smith Chart – Configuration and Applications, Single and Double Stub Matching, Illustrative Problems.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 4th ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech.India Publications), New Delhi, 2001.

REFERENCES:

1. Engineering Electromagnetic – Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005.
2. Networks, Lines and Fields – John D. Ryder, PHI, 2nd ed.,1999.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
4. Electromagnetic Field Theory and Transmission Lines – G.S.N. Raju, Pearson Edn. Pte. Ltd., 2005.

Course Outcomes:

After going through this course the student will be able to

- Apply the basic concepts of Electric and Magnetic fields in static and time varying conditions.
- Apply Maxwell's equations to solve equations of EM fields.
- Apply wave propagation characteristics and power calculations in applications like antennas.
- Design a loss/distortion less transmission system.

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(A54023) **ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**

COURSE OBJECTIVES
The student will be able to

- Develop an awareness to various electronic measurement Concepts
- Explain the operation and design of different electronic instruments
- Compare different ADC and DAC techniques and explain various circuits for conversion.
- Familiarize with different types of transducers.

UNIT-I

Block Schematics of Measuring Systems, Performance Characteristics: Static Characteristics-Accuracy, Resolution, Precision, Gauss Error, Types of Errors. Dynamic Characteristics – Repeatability, Reproducibility, Fidelity, Lag, Root Sum Squares formula.
Analog Measuring Instruments: D' Arsonval Movement, DC Voltmeters and Ammeter, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Low Current Ammeter, Pico ammeter. Specifications of Instruments.
Digital Measuring Instruments: AC, DC Meters. Digital Voltmeters: Ramp Type, Staircase Ramp, Dual slope Integrating type, Successive Approximation Type, Auto ranging, Digit display.High Resistance Measurements.Applications

UNIT-II
Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Delay lines, High Frequency CRO Considerations.Applications, Specifications.
Special purpose oscilloscopes: Dual Trace, Dual Beam CROs, Sampling oscilloscopes. Storage oscilloscopes.Digital Storage CROs, Frequency Measurement.Period Measurement. Lissajous Figures, CRO Probes. Errors in Time/Frequency measurements, universal counters. Extension of range; Recorders: Strip-Chart,X-Y, Oscillographic recorders.

UNIT-III
Signal Generators: AF RF Signal Generators, sine and Square wave Generators. Function Generators: Arbitrary waveform Generator, Sweep frequency Generators, Video signal Generators, Specifications.
Signal Analyzers: AF, HF Wave Analyzers, Heterodyne wave Analyzers, Harmonic Distortion, Spectrum Analyzers, Power Analyzers, Oscillators.

UNIT-IV

Measurements using DC and AC Bridges: Wheat stone Bridge, Kelvin Bridge. AC Bridges. Maxwell, Hay, Schering, Wien, Anderson Bridges, Resonance Bridge, Similar Angle Bridge, Wagner& ground connection, Twin T, Bridged T Networks, Detectors.

UNIT –V

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity. Force, Pressure - High Pressure.Vacuum level, Temperature -Measurements, Data Acquisition Systems.

Transducers: Classification, Strain gauges. Bonded, unbounded: Force and Displacement Tranducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Themocouples, Synchros. Special Resistance Thermometers, Digital Temperature sensing system. Piezoelectric Transducers, Variable Capacitance Transducers. Magneto strictive Transducers, MEMS.

TEXT BOOKS:

I. Electronic Measurements and Insturmentation- K. Lal Kishore, Pearson Education 2010.
2. Electronic Instrumentation: H.S.Kalsi - TMH. Z'a Edition 2004.

REFERENCE BOOKS:

I. Electronic Instrumentation and Measurements - David A. Bell. Oxford Univ. Press, l997.
2. Modern Electronic Instrumentation and Measurment Techniques:A.D. Helbincs. W.D. Cooper: PHI 56 Edition 2003.
3. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage TMH Reprint 2009.
4. Industrial Instrumentation: T.R. Padmanabham Springer 2009.

COURSE OUTCOMES

After going through this course the student will be able to

- Apply measurement and instrumentation systems for electrical, electronics and computer engineering.
- Know the characteristics of different instrumentation systems.
- Use transducers in real-time applications.

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(A54209) PULSE AND DIGITAL CIRCUITS LAB

Minimum Twelve experiments to be conducted:

1. Linear wave shaping.
2. Non Linear wave shaping- Clippers.
3. Non Linear wave shaping –Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & some applications.
6. Study of Flip- Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap Sweep Circuit.

Equipment required for Laboratories:

1. Regulated Power Supply - 0-30 V
2. CRO - 0-20 M Hz
3. Function Generators - 0- 1 M Hz
4. Components
5. Multi Meters

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(A54210) BASIC CIRCUITS SIMULATION LAB

Minimum Twelve Experiments to be conducted

Simulate the following circuits using Verilog and verify by realization on FPGA

1. Realize all the Logic Gates.
2. Realize an A-o-I (AW-OR-Inverter)
3. Design of 2- to -4 Decoder.
4. Design of 8- to -3 Encoder.
5. Design of 4 bit comparator.
6. Design of 8-to-1 multiplexer.
7. Design of full Adder.
8. Design of 1-to-8 Demultiplexer.
9. Design of Flip-Flops: SR,JK.
10. Design of Flip-Flops: D,T.
11. Design an 10 bit shift register .
12. Design of 4-Bit Binary counter.
13. FSM Design of 4-Bit Binary counter.
14. Design of a Sequence detector.
15. Design of Random Access memory.

Equipment Required:

1. FPGA Trainer Boards

2. Software HDL verilog(Xilinx).

3.Computer System With latest Specifications.

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(A54211) Principles of Electrical Engineering Lab

PART-A:

1) Verification of Kirchhoff's voltage law and Kirchhoff's current law.
2) Series and Parallel Resonance.
3) Time response of first order RL/RC network for periodic non-sinusoidal inputs. Time constant and steady state error determination.
4) Two port networks parameters- Z and Y Parameters.
5) Two port networks parameters- A, B, C, D and H- Parameters.
6) Verification of Superposition and Reciprocity theorem.
7) Verification of Maximum Power Transfer Theorem.
8) Experimental determination of Thevenin's and Norton's equivalent circuits.
9) Constant-K low Pass Filter and High Pass Filter- Design and Test.

PART-B:

1) Magnetization characteristics of DC shunt generator. Determination of critical field resistance.
2) Swinburne's test on DC shunt machine. Predetermination of efficiency at various loads as motor and generator.
3) Brake test on DC shunt motor. Determination of performance characteristics.
4) OC &SC tests on single phase transformer.
5) Speed Control on DC Shunt motor.

NOTE:

- PSPICE or equivalent Software Package is necessary.
- Eight experiments are to be conducted from PART-A and any Two from PART-B

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(A54018)**GENDER SENSITIZATION**
(An activity-based course)

Course Objectives:

- To develop students sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

UNIT-I

UNDERSTANDING GENDER:

Gender: Why should we study it? (Towards a world of equals: Unit-1)

Socialization: Making Women, Making Men (Towards a world of equals: Unit-2)

Introduction, Preparing for womanhood. Growing up male. First lesson in caste. Different Masculinities.

Just Relationships: Being Together as Equals (Towards a world of equals: Unit-12)

Mary Kom and Onler. Love and acid just do not mix. Love Letters. Mothers and Fathers. Further reading: Rosa Parks-The Brae Heart.

UNIT-II

GENDER AND BIOLOGY:

Missing Women: Sex Selection and its Consequences (Towards a world of equals: Unit-4)

Declining Sex Ration. Demographic Consequences.

Gender Spectrum: Beyond The Binary (Towards a world of equals: Unit-10)

Two or many? Struggles with Discrimination.

Additional Reading: Our Bodies, Our Health (Towards a world of equals: Unit-13)

UNIT-III

GENDER AND LABOUR:

Housework: The invisible Labour (Towards a world of equals: Unit-3)

"May Mother doesn't work". "Share the Load".

Women's work: its politics and economics (Towards a world of equals: Unit-7)

Fact and Fiction. Unrecognized and unaccounted work. Further Reading: Wages and Conditions of Work.

UNIT-IV

ISSUES OF VIOLENCE:

Sexual Harassment: Say No! (Towards a world of equals: Unit-6)

Sexual Harassment, not Eve-teasing-coping with everyday Harassment-Further Reading: "Chupulu".

Domestic Violence: Speaking out (Towards a world of equals: Unit-8)
Is Home a Safe Place? – When Women Unite [Film]. Rebuilding Lives. Further Reading: New Forums for Justice.
Thinking about sexual Violence (Towards a world of equals: Unit-11)
Blaming the Victim- "I Fought for my life….." – Further reading: The Caste Face of Violence.

UNIT-V
GENDER STUDIES:
Knowledge: Through the lens of gender (Towards a world of equals: Unit-5)
Point of View. Gender and the Structure of Knowledge. Further Reading: unacknowledged Women artists of Telangana.
Whose History? Questions for Historians and others (Towards a world of equals: Unit-9)
Reclaiming a past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

Essential Reading: All the Units in the Textbook, " Towards a world of Equals; A Bilingual Textbook on Gender" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasantha, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.
Note: Since it is interdisciplinary Course, Resource Persons can be drawn from the fields of english Literature or Sociology or Political Science or any other qualified faculty who has exertise in this field.

Reference Books:

1. Sen, Amartya, "More than One Million Women are Missing." New York Review of Books 37.20 (20 December 1990). Print. 'We Were Making Hisoty…' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.
2. Tripti Lahiri. "By the Numbers: Where Indian Women Work." Women's Studies Journal (14 November 2012) Available online at:http://blogs.wsj.com/ India real time/2012/11/14/by-the-numbers-where-Indian-women-work/>
3. K.Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2, Telugu and Kannada http://harpercollings.co.in/BookDetail.asp?Book Code=3732
4. Vimala. "Vantilliu (The Kitchen)". Women Writing in India: 600 Bc To the Present, Volume It: The 20th Century, Ed. Susie Tharu and K.Lalitha. Delhi: Oxford University Press, 1995. 599-601.
5. Shatrunghna, Veena et al. Women's Work and its impact on Child Health and Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research, 1993.
6. Stree Shakti Sanghatana. "We Were Making History…' Life Stories of Women in the Telangana People's Struggle, New Delhi: Kali for Women, 1989.
7. Menon, Nivedita, Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012

8. Jayaprabha, A. “Chupulu (Stares)”. Women Writing in India: 600BC to the Present. Volume II: The 20th Century Ed. Susie Tharu and K.Lalita, Delhi: Oxfor Univerity Press. 1995, 596-597.
9. Javeed. Shayan and Anupam Manuhaar. “Women and Wage Discrimination in India: A Critical Analysis.” International Journal of Humanities and Social Science Invention 2,.4 (2013).
10. Gautam, Liela and Gita Ramaswamy. “A ‘conversation’ between a Daughter and a Mother.” Broadsheet on Contemporary Politics. Special Issue on Sexuality and Harassment: Gender Politics on Campus Today. Ed. Madhumeeta Sinha and Asma Rasheed. Hyderabad: Anveshi Research Center for Women’s Studies, 2014.
11. Abdulali Sohaila. “I Fought For My Life… and Won.” Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
12. Jeganathan pradeep, Partha Chatterjee (Ed). “Community, Gender and Violence Subaltern Studies XI”. Permanent Black Ravi Dayal Publishers, New Delhi, 2000.
13. K.Kapadia. The Violence of Development: The Politics of Identity, Gener and Social Inequalities in India. London: Zed Books, 2002.
14. S.Benhabib. Situating the Self: Gender, Community, and Postmodernism in Contemporary Ethics, London: Routledge, 1992.
15. Virginia Woolf. A Room of One’s Own, Oxford: Black Swan, 1992.
16. T.Banuri and M. Mahmood, Just Development Beyond Adjustment with a Human Face, Karachi: Oxford University Press, 1997.

Course Out Comes:

- Students will have developed a better understanding of important issues related to gender in contemporary india.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as new laws that provide protection and relief to women, the text book will empower students to understand and respond to gender violence.

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(A55031) COMPUTER ARCHITECTURE
(P.ELECTIVE -I)

Prerequisite: Switching Theory and Logic Design

Course Objectives:

1. Understand instruction format, life cycle and CPU Architecture and Organization
2. Understand different types of I/O interfaces .
3. Familiar with the concepts of pipelining techniques.

UNIT I:

Introduction to number system-binary, octal, hexa decimal, other base system, conversion from one number system to other system, range of numbers, addition on number systems,1's and 2's complement and (r-1)'s,r's complement, floating point representation. Logic gates, Boolean algebra, error detecting, error correcting codes

UNIT II:

Introduction to Combinational circuits and sequential circuits-RS,JK,D and T flipflops,practical applications of sequential circuits, design of counters, up down counters, definition and practical use of decoders, encoders,Multiplexers,DEMultiplexers.

UNIT III:

Multiplication and Division algorithms, Instruction formats-one address, two address, three addresses and zero address instructions, basic computer organizations

UNIT IV:

Types of main memory, types of ROM,use of cache memory, calculation of number of address lines and data lines for a given size of memory. Types of REG flag reg,memory hierarchy, auxiliary and content addressable memory, I/O devices

UNIT V:

Input-Output Organization, I/O Programming Model, I/O scheme, Peripheral devices, I/O Interface, Asynchronous data transfer modes, Priority Interrupt Direct Memory Access, Input-Output Processor. Introduction to serial communication.

Text Books:

1. Computer System Architecture-M. Moris mano,3rd edition, person/PHI

2. Computer Organization-Carl Hamachar,Zvonks Varanasic,SafeaZky,5th Edition,McGrawHill

References:

1. Computer Organization and architechture-william stallings6th edition pearson.
2. Fundamentals logic design ,roth,5th edition Thomson.
3. COMPUTER ARCHITECHTURE AND ORGANIZATION -an integrated approach, miles murdocca,Vincent heuring,second edition,wiley india.

Course Outcomes: Students will be able to :

1. Understand the basic organization of computer and different instruction formats and addressing modes.
2. Analyze the concept of pipelining.
3. Understand and analyze various issues related to memory hierarchy.
4. Evaluate various modes of data transfer between CPU and I/O devices.

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(A55032) **OBJECT ORIENTED PROGRAMING THROUGH JAVA**
(P.Elective-1)

Prerequisites: CDS

COURSE OBJECTIVES:
The student will be able to

- Learn important concepts of object oriented programming like object and class, Encapsulation, inheritance and polymorphism
- Learn how to Write the simple java programs using the variables, operators, control structures, functions and I/O objects scanner like etc..
- Learn how to Use advance features like exception, swings and awt to make programs supporting reusability and sophistication
- Learn how to Develop the applications using object oriented programming through java.

UNIT I :
Object oriented thinking – need for oop paradigm- Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, coping with complexity, abstraction mechanisms. Java Basic History of Java Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II :
Inheritance – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Packages and Interfaces : Defining, Creating and Accessing a Package, Understanding CLASSPATH importing packages, differences between classes and interfaces, defining an interface, implementing interface applying interfaces, variables in interface and extending interfaces. Exploring java.io.

UNIT III :
Exception handing – Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.
String handling, Exploringjava.util

Multithreading- Difference between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations, generics.

UNIT IV :

Event Handling : Event, Event sources, Event classes, Event Listeners, Delegation event model, hand ling mouse and keyboard events, adapter classes.

The AWT class hierarchy, user interface components- labels, buttion, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, mnubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT V :

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS :

1. Java; the complete reference, 7th edition, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, pearsoneduction.

REFERENCES :

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch. John wiley& sons.
2. An Introduction to OOP, third edition, T.Buddpearson education.
3. Introduction to Java programming, Y. Daniel Liang, pearson education.

COURSE OUTCOMES:

After going through this course the student will be able to

- Understand OOP concepts and basics of java programming
- Apply OOP and java programming in problem solving

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(A55033) Transducers and Signal Conditioning
(P.Elective-1)

Prerequisite: EMI

COURSE OBJECTIVES:

To introduce the basics of measurements, sensors and signal conditioning circuits.

UNIT-I Introduction:
Measurement systems, Basic electronic measuring system, Transduction principles, Classification of transducers, General transducers characteristics, Criteria for transducer selection.

UNIT-IIResistive Transducers: Principles of operation, construction, theory, advantages and disadvantages, applications of Potentiometers, strain gauges, (metallic and semi-conductor type), Resistance Thermometer, Thermistors.
Inductive Transducers: Types of Inductive transducer, Principles of operation, construction, Advantages & disadvantages and applications. Various variable Inductive Transducers, LVDT (Linear variable differential transformer).

UNIT-III Capacitive Transducers: Types of capacitive transducer, Principles of operation, construction, theory, advantages and disadvantages and applications, of capacitive transducers based upon familiar equation of capacitance.
Elastic Transducers: Spring bellows, diaphragm, bourdon tube – their special features and application.

UNIT-IV Active Transducers: Principle of operation, construction, theory, advantages and disadvantages and applications of following transducers: Thermocouple, Piezo-electric transducer, Magneto-strictive transducer, Hall effect transducer, Photo-voltaic transducer and Electrochemical transducer.
Other Transducers: Optical transducers: photo-emissive, photo-conductive and Photo-voltaic cells, Digital Transducers: Optical encoder, Shaft encoder. Feedback fundamentals, introduction to Inverse transducer. IC sensors for temperature and pressure – Introduction to fiber optic and intelligent sensors.

UNIT-V Signal Conditioning: Concept of signal conditioning, Introduction to AC/DC Bridges. Op-amp circuits used in instrumentation, Instrumentation amplifiers, analogue-digital sampling, introduction to A/D and D/A conversion, signal filtering, averaging, correlation, Interference, grounding , and shielding.

Text Books:

1. Mechanical measurements and instrumentation, A.K.Sawhney, Dhanpat Rai and sons
2. Industrial instrumentation, D.Patranabis, TMH
3. Measurement systems – application and design, E.O. Doeblin, McGraw Hill

Reference:

1.Practical Instrument Transducers, F.G. Oliver, Pitman Publishing Co.
2. Transducers Engg. S. Rangathan, Allied Publishers
3. Murty D V S, "Transducers & Instrumentation", PHI, New Delhi (2000)
4. Sawhney A K, "Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai and Sons,New Delhi (2000).
5. Kalsi H S, "Electronic Instrumentation " Tata McGraw Hill, New Delhi, 4th Ed. (2001).
6. Patranabis D, "Sensors and Transducers", PHI, New Delhi (2003).

Course Outcomes:

- Be able to describe and model different electrical transducers
- Elucidate the concepts of various sensors/transducers
- Design an optimum amplifier for a transducer
- Design signal conditioning circuits for limiting, filtering, and waveform shaping
- Specify the performance required from A/D and D/A converters in a design.

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(A55034) **ANALOG COMMUNICATIONS**

Prerequisite: Signals and Systems

COURSE OBJECTIVES
The student will be able

- To know the need for modulation in radio communication system.
- To learn about various Analog and Pulse modulation techniques like Amplitude Modulation, Frequency Modulation, Phase Modulation, Pulse Amplitude Modulation, Pulse Position Modulation and Pulse Width Modulation.
- To know about the transmitters, receivers of Analog Modulation.
- To analyze the noise performance of Analog Modulation systems.

UNIT I: **INTRODUCTION**: Introduction to communication system and modulation techniques: AM,FM,PM and pulse modulation. Amplitude Modulation: Definition, Time domain and frequency domain description, power relations in AM waves. Generation of AM waves: square law Modulator, Switching modulator. AM Transmitters: AM transmitter block diagram and explanation of each block. Detection of AM Waves: Square law detector, Envelope detector. AM Receiver Types: Tuned radio frequency receiver, super heterodyne receiver. RF section and Characteristics: Frequency changing and tracking, Intermediate frequency, AGC.

UNIT II: **DSB MODULATION**: Double side band suppressed carrier modulators. time domain and frequency domain description. Generation of DSBSC Waves: Balanced Modulators, Ring Modulator. Demodulation of DSB-SC Waves: Coherent detection, COSTAS Loop.

UNIT III: **SSB MODULATION**:
Frequency domain description. Time domain description. Frequency discrimination method for generation of AM SSB Modulated Waves. Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves. Vestigial side band modulation: Frequency description. Generation of VSB Modulated wave, Time domain description. Demodulation of VSB-SC Waves: Envelope detection of a VSB Wave pulse Carrier. Comparison of AM,DSB-SC,SSB-SC and VSB-SC Techniques. Applications of different AM Systems.

UNIT IV: **ANGLE MODULATION CONCEPTS**: Basic concepts. Frequency Modulation: Single tone frequency modulation. Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave. Comparison of FM & AM.

ANGLE MODULATION METHODS: Generation of FM Waves: Direct Method:

Parametric Variation Method (Varactor Diode, Reactance Modulator). Indirect Method: Armstrong Method. FM transmitter block diagram and explanation of each block.
Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector. Phase locked loop, Foster Seeley Discriminator, Ratio detector.FM Receiver. Comparison with AM Receiver, Amplitude limiting.

UNIT V: **NOISE**: Noise in Analog communication System, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis

PULSE MODULATION: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM

TEXT BOOKS:
1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe. TMH, 2007 3rd Edition
2. Principles of Communication Systems - Simon Haykin. John Wiley, 2r" Edition,.

REFERENCE BOOKS:
1. Electronics & Communication System - George Kennedy and Bernard Davis, 4th Edition TMH 2009
2. Analog Communications- KN Hari Bhat & Ganesh Rao, Pearson Publications, 2nd Edition 2008.
3. Communication Systems Second Edition - R.P. Singh. SP Sapre, TMH, 2007
4. Communication Systems - B.P Lathi, BS Publication, 2006.

COURSE OUTCOMES
After going through this course the student will be able to

- Design transmitters and receivers for Analog Communication.
- Apply and relate the analog modulation techniques to real time applications like Radio Broadcasting, telecommunications, TV’s etc.
- Design AM, FM communication systems by including noise analysis

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(A55035) **INTEGRATED CIRCUIT APPLICATIONS**

Prerequisite: Pulse and Digital Circuits

COURSE OBJECTIVES

The students will be able to

- Study about electrical properties of analog ICs like Op-Amps, IC 555 timer, PLL.
- Analyze and know the design concepts of various applications of ICs.
- Study the design concepts Digital circuits using ICs.

UNIT I: INTEGRATED CIRCUITS:
Introduction: Classification. Chip Size and Circuit Complexity, Ideal and Practical Op-Amp, Op-amp characteristics-DC and AC Characteristics. 741 Op-Amp and its Features, Modes of operation-inverting, non-inverting, differential.

Applications: Basic Applications of Op-Amp, Instrumentation Amplifier, AC Amplifier, V to I and I to V Converters, Sample & Hold Circuits, Differentiators and Integrators, Comparators, Schmitt Trigger, Multivibrators. Introduction to Voltage Regulators Features of 723 Regulators.

UNIT II: ACTIVE FILTERS & OSCILLATORS:
Active Filters: First Order and Second Order Low Pass, High Pass and Band Pass Filters. Active Band Reject and All Pass Filters.
Oscillators: Principle of Operation and Types of Oscillators – RC, Wien Bridge and quadrature type. Waveform Generators – Triangular, Saw Tooth, Square Wave.

UNIT III: 555 TIMER, PLL & CONVERTERS
Introduction to 555 Timer: Functional Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger.
PLL: Introduction, Block Schematic, Principles and Description of individual Blocks of 565, VCO

D-A & A- D Converters: Introduction, Basic DAC Techniques - Weighted Resistor Type, R-2R Ladder Type, Inverted R-2R Type. Different types of ADCs - Parallel Comparator Type, Counter Type, Successive Approximation Register Type and Dual Slope Type, DAC/ADC Specifications.

UNIT IV: DIGITAL INTEGRATED CIRCUITS INTRODUCTION:

Classification of Integrated Circuits, Standard TTL NAND Gate-Analysis & Characteristics, TTL Open Collector Outputs, Tristate TTL, MOS & CMOS Open Drain and Tristate outputs, Comparison of Various Logic Families. IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT V: COMBINATIONAL & SEQUENTIAL CIRCUIT ICs:

Combinational Circuit ICs: Use of TTL-74XX Series & CMOS 40XX Series ICs, TTL ICs - Code Converters, Decoders, Demultiplexers, Encoders, Priority Encoders, Multiplexers & their applications. Priority Generators, Arithmetic Circuit ICs-Parallel Binary Adder/Subtractor Using 2's Complement System, Magnitude Comparator Circuits.
Sequential Circuit ICs: Commonly Available 74XX & CMOS 40XX Series ICs - RS, JK.JK Master-Slave, D and T Type Flip-Flops & their Conversions, Synchronous and Asynchronous Counters, Decade Counters, Shift Registers & Applications.

TEXT BOOKS:

1. Linear Integrated Circuits -D. Roy Choudhury, New Age International (p)Ltd, 3" Ed., 2008.
2. Digital Fundamentals - Floyd and Jain, Pearson Education,8th Edition, 2005.
3. Op-Amps and Linear Integrated Circuits - Concepts and Applications by James M.Fiore, Cengage/ Jaicc, 2/e, 2009.

REFERENCE BOOKS:

1. Modern Digital Electronics - RP Jain - 4/e - TMH, 2010.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987.

COURSE OUTCOMES

After going through this course the student will be able to

- Design various applications of Op-Amps.
- Design the circuits using special ICs like 555 timer, 723 voltage regulator and 565 PLL.
- Design A/D and D/A Converters using ICs.
- Design digital circuits using digital ICs.
- Understanding of the different families of digital integrated circuits and their characteristics.

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(A55036) COMPUTER NETWORKS
(P.ELECTIVE –II)

Prerequisite: STLD

Course Objectives:

- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI model.
- To introduce UDP and TCP models.

UNIT-I - Introduction to networks, Internet, Protocols and standards, the OSI model, layers in OSI model, TCP/IP suite, Addressing. Physical layer: Review of digital transmission, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks, Switch and Telephone Network.

UNIT-II- Data link layer: Introduction, Block coding, cyclic codes, checksum framing, flow and error control, Noiseless channels, noisy channels, HDLC, point to Point Protocols. Medium Access sub layer: Random access, controlled access, channelization, IEEE standards, Ethernet, Fast Ethernet, GigaBit Ethernet. Wireless Lans, Connecting LANs, Backbone Networks and Virtual LANs, Wireless WANs, SONET, frame relay and ATM.

UNIT-III- Network layer: Logical addressing, Internetworking, tunneling, address mapping, ICMP, IGMP, forwarding, uni-cast routing protocols, multicast routing protocols.

UNIT-IV -Transport Layer: Process to process delivery, UDP and TCP protocols, SCTP, data traffic, congestion, congestion control, QoS, integrated services, differentiated services, QoS in switched networks.

UNIT-V- Application layer - Domain Name Space (DNS), DNS in internet, Electronic Mail, FTP, WWW, HTTP, SNMP, Multi-media, Network Security

TEXT BOOKS:
1. Data Communications and Networking - Behrouz A. Forouzan, Fourth Edition TMH, 2006
2. Computer Networks - Andrew S. Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:
1. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
2. Understanding Communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.
3. Computer and Communication Networks, Nader F. Mir, Pearson Education.
4. Computer Networking: A Top - Down Approach Featuring the Internet, James F. Kurose, K.W. Ross, 3rd Edition,Pearson Education.

5. Data and Computer Communications, G.S. Hura and M.Singhal, CRD Press, Taylor and Francis Group
6. Data Communications and Computer Networks, P.C. Gupta, PHI

Course Outcomes:

- Students should be understand and explore the basics of computer networks and various protocols.He/She will be in a position to understand the world wide web concepts.
- Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security,mobile and ADHOC networks.

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(A55037**) RELATIONAL DATA BASE MANAGEMENT SYSTEM (RDBMS)**
(P.Elective-II)

Prerequisite: CDS

Course Objectives: After completing this course, the student will be able to:

1. Describe a database management system and trace its historical development
2. Describe the architecture of a DBMS
3. Describe different types of logical-based data models
4. List the features of the entity-relationship modeling technique
5. Identify the features of hierarchical and network record-based models
6. Describe a relational record-based model in terms of its data structure
7. List the operators that work on relations
8. List the features of SQL as the relational database language

UNIT – I: AN OVERVIEW OF DBMS:
Introduction – Data – Information – Database – Goals of DBMS – Characteristics of DBMS – Types of DBMS – Advantages and Disadvantages of DBMS.

UNIT – II: RELATIONAL DATABASE MANAGEMENT SYSTEM:
Introduction to RDBMS –Terminology – Relational Data Structure – Data Integrity – Design Constraints – Primary Key – Foreign Key and its Constraints.

UNIT – III: ER MODELLING:
Introduction to Entity Relationship Modeling – ER Model – Enities – Attributes – Types of Attributes – ERD Conventions – Relationships – Degree – Connectivity – Cardinality – Dependency – Participation.

UNIT – IV: STRUCTURED QUERY LANGUAGE:`
Introduction to SQL – Characteristics of SQL – Data types – Types of SQL Commands – Data Definition Language (DDL) – Data Manipulation Language (DML) – Data Control Language (DCL) - SQL Operators (Arithmetic Operator – Comparison Operator – Logical Operators and Set Operators).

UNIT – V: Storage and File Structure : Overview of Physical Storage Media, Magnetic Disk and Flash Storage, Tertiary Storage, File Organization, Organization of Records in Files Data-Dictionary Storage, Database Buffer.

Indexing and Hashing: Basic Concepts, Ordered Indices, B+-Tree Index Files, B+-Tree Extensions, Multiple-Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices, Index Definition in SQL.

References books

1. Database Management System by Alexis Leon & Mathews Leon
2. Problem – Solving Cases using MS Access by Brandy Mons
3. DBMS a Practical Approach by E R Rajiv Chopra – S Chand Publications.
4. Com Primer – Wrox.
5. Database Management System by Hannur

Course Outcomes:

1.The basic concepts and appreciate the applications of database systems.

2. Study the basics of SQL and construct queries using SQL.

3. Design principles for logical design of databases, including the E-R method and normalization approach.

4. Understanding basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, and hashing.

5. Knowledge of issues of transaction processing and concurrency control.

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(A55038) **TELECOMMUNICATION SWITCHING SYSTEMS**
(P.Elective-II)
Prerequisite: COMPUTER NETWORKS

COURSE OBJECTIVES

The following are the **Course objective**

- To learn Switching, signalling and traffic in the context of telecommunication network.
- To expose through the evaluation of switching systems from manual and electromechanical systems to stored –program-controlled digital systems.
- To study signalling, packet switching and networks.

UNIT-I- Switching Systems: Basics of a switching system; Functions of a switching system; strowger switching components; Step by Step switching; Design parameters; Crossbar switching - principle of Crossbar Switching and its configurations; Cross point Technology; Crossbar exchange organization; A General Trunking; Electronic switching; Reed Electronic systems; Digital Switching Systems.
Telecommunications Traffic: The Unit of Traffic Congestion; Traffic Measurement; A Mathematical Model; Lost-call Systems – Theory; Traffic Performance; Loss Systems in Tandem; Use of Traffic Tables; Queuing Systems, The Second Erlang Distribution; Probability of Delay; Finite Queue Capacity; Some other useful Results; Systems with a Single Server; Queues in Tandem; Delay Tables; Applications of Delay formulae.

UNIT-II-Switching Networks: Introduction; Single Stage Networks; Gradings - Principle; Design of Progressive Gradings; Other Forms of Grading; Traffic Capacity of Gradings; Applications of Gradings; Link Systems - General, Two Stage Networks; Three Stage Networks; Four Stage Networks; Discussion; Grades of Service of Link Systems.
Time Division Switching: Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching: Combination Switching; Three Stage Combination Switching.

UNIT- III- Contol of Switching Systems: Introduction; Call Processing Functions - Sequence of Operation; Signal Exchanges; state Transition Diagrams; Common Control; Reliability; Availability and Security; Stored Program Control.
Signaling: Introduction; Customer Line Signaling; Audio Frequency Junctions and Trunk Circuits; FDM Carrier Systems - Outband Signaling;Inband (VF) Signaling; PCM Signaling; Inter Register Signaling; Common Channel Signaling Principles - General Signaling Networks; CCITT Signaling system Number 6;CCITT Signaling System Number 7; The High Level Data Link Control Protocol; Signal Units; The signaling Information Field.

Unit –IV- Packet Switching: Introduction; Statistical Multiplexing; Local Area and Wide Area Networks - Bus Networks; Ring Networks; Comparison of Bus and Ring Networks; Optical Fiber Networks; Large Scale Networks- General; Datagrams and Virtual Circuits; Routing; Flow control standards; Frame Relay; Broadband Networks General; The Asynchronous Transfer Mode; ATM Switches.

UNIT - V- Networks: Introduction; Analog Networks; Integrated digital Networks; Integrated Services digital Networks; Cellular Radio Networks; Intelligent Networks; Private networks; charging; routing – General, Automatic Alternative routing.

TEXT BOOKS:

1. J.E Flood, "Telecommunications Switching and traffic networks", Pearson Education, 2006.
2.Tyagarajan Viswanathan, "Telecommunications Switching Systems and Networks", prentice Hall of India Pvt. Ltd, 2006.

REFERENCE BOOK:

1.John C. Bellamy," Digital Telephony", John Wiley International Student Edition, 3rd Edition, 2000
2.Behrouz A. Forouzan, "Data Communications and Networking", TMH, 2nd Editon, 2002.
3.Tomasi, "Introduction to Data Communication and Networking"56+, Pearson Education, 1st Edition, 2007.

COURSE OUTCOMES

On completion of the course, it is expected that the student will be able to:

- Understanding the main concepts of telecommunication network design.
- Analyze and evaluate fundamental telecommunication traffic models.
- Understand basic modern signalling system.
- Solve traditional interconnection switching system design problems.
- Understand the concept of Packet switching.

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(A55039**) MICROPROCESSORS AND APPLICATIONS**

Prerequisite: Integrated Circuit Design

COURSE OBJECTIVES:
The student will be able to

- Understand the concepts of basic microprocessors like 8085.
- Learn the concepts of 8086 microprocessor, different addressing modes and programming of 8086.
- Understand interfacing of 8086 using 8255 (PPI) and function of DMA.
- Learn how to do interfacing of memory and other peripherals with the 8086
- Study about Interrupts and types of interrupt in 8086 and PIC.
- Study the features of 8051 Microcontroller and its instruction set.

UNIT-I: Introduction to Microprocessor: Basics of Microprocessor: Evolution of microprocessors, overview of 8085 microprocessor-Features, Architecture and Pin diagram

UNIT – II 8086 Microprocessor Architecture: Functional diagram, register organization, memory segmentation, programming model, memory Addresses, physical memory organization, signal descriptions of 8086, common function signals, minimum and maximum mode signals, timing diagrams.

UNIT – III Instruction set and Assembly Language programming of 8086: Instruction formats, Addressing modes, Instruction set, assembler directives, macros, simple programs involving logical, arithmetic expressions and string manipulations.

UNIT – IV Interrupt Structure and Communication Interface of 8086: Interrupt structure of 8086, Vector interrupt table, Interrupt service routine, 8259 PIC architecture, Interfacing Interrupt Controller 8259.
Communication interface: Serial communication standards, Serial data transfer schemes, 8251 USART architectures and interfacing. RS-232C, IEEE-488.

UNIT-V: Applications: I/O Interface with 8255-PPI, various modes of operation and interfacing to 8086, 8257 DMA controller to 8086,Memory interfacing to 8086, Interfacing Keyboard, Seven Segment Display, stepper motor Interfacing, A/D & D/A converter interface.

Text Books:
1. Ramesh S Goankar, "Microprocessor Architecture Programming and Applications with the 8085, Penram International Pvt.Ltd.
2. Douglas V Hall, "Microprocessors and Interfacing: Programming and Hardware", 2nd edition, TMH.

3. Advanced Microprocessors and peripherals – A.K. Ray & Bhuchani, TMH publications.

Reference Books:

1. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd edition.
2. Barry B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486,and Pentium processors. Architecture, programming and interfacing".
3. 8086 Micro Processor -Kenneth J. Ayala, Penram International/ Thomson,1995.

COURSE OUTCOMES

After going through this course the student will be able to

- Develop programs for different addressing modes.
- Perform 8086 interfacing with different peripherals and implement programs.
- Describe the key features of serial and parallel communication.
- Design a microcontroller for simple applications.

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(A55208) **IC APPLICATIONS LAB**

Note: Minimum 12 experiments should be conducted 6 from each part

List of Experiments

PART –1 TO VERIFY THE FOLLOWING FUNCTIONS.

1. Adder, Subtractor, Comparator using IC 741 Op-Amp.
2. Integrator and Differentiator using IC 741 Op-Amp.
3. Active Low Pass & High Pass Butterworth (second order).
4. RC Phase Shift and Wien Bridge Oscillators using 741 Op-Amp.
5. IC 555 timer in monostable operation.
6. Schmitt trigger circuits using IC 741 & IC 555.
7. IC 565-PLL applications.
8. Voltage regulator IC 723, three terminal voltage regulators-7805, 7809,7912.
9. Sample and Hold LF 398 IC.

PART- 2: TO VERIFY THE FUNCTIONALITY OF THE FOLLOWING 74 SERIES TTL IC'S

10. D Flip (74LS74) and JK Master-Slave Flip-Flop (74LS73).
11. Decade counter (74LS90) and UP –Down Counter (74LS192).
12. Universal Shift registers – 74LS194/195.
13. 3-8 decoder – 74LS138.
14. 4 bit comparator 74LS85.
15. 8X1 Multiplexer- 74151 and 2X4 Demultiplexer-74155.
16. RAM (16X4) – 74189 (read and write operations)
17. Stack and Queue implementation using RAM, 74189
18. Design and inverter using NMOS, PMOS, CMOS

Equipment required for Laboratory:

6. Regulated Power Supply - 0-30 V
7. CRO - 0-20 M Hz
8. Function Generators - 0- 1 M Hz
9. Multi Meters.

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(A55209) **ANALOG COMMNICATIONS LAB**

Note: Minimum 12 experiments should be conducted, All these experiments to be simulated first using MATLAB or equivalent and then to be verified in hardware.

LIST OF EXPERIMENTS:

1. Amplitude Modulation & Demodulation.
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase shift method).
4. Frequency Modulation & Demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals.
6. Pre- emphasis & De-emphasis.
7. Time Division Multiplexing & De-Multiplexing.
8. Frequency Division Multiplexing & De-Multiplexing.
9. Verification of Sampling Theorem.
10. Pulse Amplitude Modulation & Demodulation.
11. Pulse Width Modulation & Demodulation.
12. Pulse Position Modulation & Demodulation.
13. Frequency Synthesizer.
14. AGC Characteristics.
15. PLL as FM Demodulator.

Equipments required for Laboratory:

i) CRO's - 0-20 M Hz
ii) Function Generators - 0- 1 M Hz
iii) Trainer kits
iv) TV Receiver Demo kit
v) Spectrum Analyzer - 60MHz
vi)Software: MATLAB or Equivalent
vii)Computers with latest Specifications.

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(A55210) **MICROPROCESSORS & APPLICATIONS LAB**

Note: Minimum of 12 experiments to be conducted.

List of Experiments:
The Following programs/experiments are to be written for assembler and execute the same with 8086 kit

1. Programs for 16 bits arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in a string for 8086.
4. Programs for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Program to find LCM and GCD of two numbers.
7. Program to generate Fibonacci series
8. Program to find number of even and odd numbers in an array.
9. Interfacing ADC and DAC to 8086.
10. Parallel communication between two microprocessors using 8255.
11. Serial communication between two microprocessor kits using 8251.
12. Interfacing to 8086 and programming to control stepper motor using 8255.
13. To interface Keyboard using 8086
14. To interface Seven Segment Display using 8086
15. Data Transfer from Peripheral to Memory through DMA controller 8237/ 8257.

Equipments required for Laboratory:

i) Computer System with Operating system (Windows XP)
ii) Software's – MASM, Keil µVision3, Proload
iii) 8086 µp & 8051 µc Trainer kits.
iv) Interfacing devices.

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*(*A55022) *English for Life Skills*

1. **Introduction:**

It is a general observation that today's techno savvy student's interest in reading is decreasing considerably with which they fail to acquire a good sense of language. The 'Language Skills' have transformed into "Life Skills or Survival Skills" in the present global scenario from mere communication skills. Any skills that are useful in life can be considered as Life Skills. Life skills are not always taught directly but often learned indirectly through experience and practice.

Course Objectives:

a. To increase the understanding of the world around and equip the learner to cope up with the challenges of life.
b. To help the students to accomplish the Life Skills which are associated with managing and leading a better life.
c. To equip the students with a set of Life Skills and increase their abilities for adaptive and positive behaviour.

UNIT-I

"**Education: Indian and American" by *Anurag Mathur*** from **English for Life Skills,** published by Orient Black Swan Private Limited, Hyderabad, India.

"Teamwork Skills" by *SP Dhanavel* from **English and Soft Skills,** published by Orient Black Swan Private Limited, Hyderabad, India.

UNIT-II

"Work" by *D.H.Lawrence* from **English for Life Skills,** published by Orient Black Swan Private Limited, Hyderabad, India.

"Emotional Intelligence Skills" by *SP Dhanavel* from **English and Soft Skills,** published by Orient Black Swan Private Limited, Hyderabad, India.

UNIT-III

"Learning Skills" by *SP Dhanavel* from **English and Soft Skills,** published by Orient Black Swan Private Limited, Hyderabad, India.

UNIT-IV

"Problem-solving Skills" by *SP Dhanavel* from **English and Soft Skills,** published by Orient Black Swan Private Limited, Hyderabad, India.

UNIT-V

"How Wealth Accumulates and Men Decay" by *G.B.Shaw* from **English for Life Skills,** published by Orient Black Swan Private Limited, Hyderabad, India.

"Adaptability Skills" by *SP Dhanavel* from **English and Soft Skills,** published by Orient Black Swan Private Limited, Hyderabad, India.

References:

1. Life and Language, An Anthology of English Prose and Poetry published by Oxford University Press, Delhi, India
2. Fluency in English II edited by Promodinivarma and Mukti Sanyal, published by Oxford University Press, Delhi, India
3. Essential life skills Form: I, II, III, IV by E.Wachira Et al published by Oxford University Press, Delhi, India.

Course Outcomes:

a. Enrichment of human skills through language and literature
b. Building up confidence to deal effectively with the demands and challenges of everyday life.
c. Acquisition of psychosocial competency.

Textbooks:

1. **"**English for Life Skills" published by Orient Black Swan Private Limited, Hyd, India.
2. "English and Soft Skills" by SP Dhanavel published by Orient Black Swan Private Limited, Hyd, India.

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(A56034) **Antennas and Wave Propagation**

Prerequisite: Electromagnetic Theory and Transmission Lines

COURSE OBJECTIVES
The student will be able

- To understand the applications of the electromagnetic waves in free space.
- To introduce the working principles of various types of antennas
- To discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic system requirements.
- To understand the concepts of radio wave propagation in the atmosphere.

UNIT I: ANTENNA BASICS: Introduction, Basic Antenna Parameters-patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain - Resolution, Antenna Apertures, Effective Height, Related Problems.

Fields from oscillating dipole, Field zones, shape-impedance considerations, Antenna Temperature, Front to back ratio, Antenna Theorem, Radiation-Basic Maxwell's equations, Retarded Potentials-Helmholtz Theorem .

Thin Linear Wire Antennas: Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam width, Directivity, Effective Area and Effective Height. Natural current distributions, Far fields and patterns of Thin Linear Center-fed Antennas of different lengths, Related Problems.

UNIT II: Loop Antennas: Introduction. Small Loop, Comparison of far fields of small loop and short dipole, Radiation Resistances and Directivities of small and large loops(Qualitative Treatment).

ANTENNA ARRAYS : Point sources-Definition, Patterns, arrays of 2 Isotropic sources-different cases, Principle of pattern Multiplication, Uniform Linear Arrays – Broadside, End fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison,BSA's with non uniform amplitude distributions-general considerations and Binomial Arrays, Illustrated Problems

UNIT III: VHF, UHF AND MICROWAVE ANTENNAS - I : Arrays with Parasitic Elements, Yagi - Uda Arrays, Folded Dipoles & their characteristics. Helical Antennas-Helical Geometry, Helix modes, practical Design considerations for monofilar helical antennas in Axial Mode and Normal Modes. Horn antenns-Types,Fermats Principle, optimum horns, design considerations of pyramidal horns, Related Problems.

Micro strip Antennas-Introduction, Features, advantages and limitations, rectangular patch antennas-geometry and parameters, characteristics of micro strip antennas. Impact of different parameters on characteristics

UNIT IV: VHF, UHF AND MICROWAVE ANTENNAS - II: Reflector antennas-Introduction, flat sheet and corner reflectors,paraboloidal reflectors-geometry, pattern characteristics, feed methods, reflector types-related features. Illustrative problems.

Lens Antennas – Introduction, Geometry of non-metallic Dielectric Lenses, Zoning, Tolerances, Applications.

Antenna Measurements –Introduction,concepts,Reciprocity,near and far fields, coordinate system, sources of errors, Patterns to be measured, pattern measurement arrangement, Directivity measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods).

UNIT V: WAVE PROPAGATION - I: Introduction, Definitions, categorizations and general classifications, different modes of wave propagation, Ray/mode concepts. Ground Wave Propagation(qualitative treatment)–Introduction, plane earth reflections, space and surface waves, wave tilt, curved earth reflections. Space Wave Propagation –Introduction, field strength variation with distance and height, effect of earth's curvature,absorption.super refraction-curves and duct propagation, scattering phenomena,tropospheric propagation, fading and path loss calculations.

WAVE PROPAGATION - II: Sky wave propagation- Introduction, structure of ionosphere, refraction and reflection of sky waves by ionosphere, ray path, critical frequency, MUF,LUF OF virtual height and skip distance, relation between MUF and skip distance,multi-hop propagation, energy loss in ionosphere, summary of wave characteristics in different frequency ranges.

List of text books / References / Websites / Journals / Others:

Text Books:

1. Antennas and wave propagation – John D. Kraus, Ronald J. Marhefka and Ahmad S. Khan, TMH 4th Edn.,(Special Indian edition) 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000.

References:

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3.Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vl. 5, Standard Publishers Distributors, Delhi.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill(Internation Edition) SECOND EDITION, 1988.

COURSE OUTCOMES:

After going through this course the student will be able to

- Identify basic antenna parameters.
- Design and analyze wire antennas, loop antennas, reflector antennas,lens antennas, horn antennas and microstrip antennas
- Quantify the fields radiated by various types of antennas
- Design and analyze antenna arrays
- Analyze antenna measurements to assess antenna's performance
- Identify the characteristics of radio wave propagation

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(A56035) **OPTICAL COMMUNICATIONS**
(**P.ELECTIVE** – III)

Prerequisite: Analog Communication

Course objectives

The objectives of the course are:

- To realize the significance of optical fiber communications.
- To understand the construction and characteristics of optical fiber cable.
- To develop the knowledge of optical signal sources and power launching.
- To identify and understand the operation of various optical detectors.
- To understand the design of optical systems and WDM.

UNIT-I- Overview of Optical fiber communication: Historical development, the general system, advantages of optical fiber communications, Optical fiber wave guides – Introduction, Ray Theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical Fibers – Modes, Vnumber, Mode Coupling, Step Index fibers, Graded Index fibers.
Single Modes fibers – Cut Off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber Materials – Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers – Attenuation, Absorption, Scattering and Bending Losses, Core and Cladding Losses.

UNIT-II- Information: capacity determination, Group delay, Types of Dispersion – Material dispersion, Wave – guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening. Optical fiber Connectors – Connector types, Single mode fiber connectors, Connector return loss.
Fiber Splicing – Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss – Multimedia fiber joints, single mode fiber joints,.

UNIT-III- Optical Sources : LED's, Structures, Materials, Quantum efficiency, Power Modulation, Power bandwidth product. Injection Laser Diodes – Modes, Threshold conditions, External quantum efficiency, laser Diode rate equations, Resonant frequencies. Reliability of LED & ILD. Source to fiber power launching – Output patterns, Power Coupling, power launching, Equilibrium Numerical Aperture, Laser Diode to fiber coupling. Transmission distance, Line coding in Optical Links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye Pattern.

UNIT-IV- Optical detectors: Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photodetectors. Optical receiver operation – Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT-V- Optical system design: Considerations, Component Choice, Multiplexing. Point – to – point links, System Considerations, Link power budget with examples. Overall fiber dispersion in Multi Mode and Single Mode Fibers, Rise time budget with examples.

TEXT BOOKS:

1. Optical Fiber Communications – Gred Keiser, McGraw Hill International edition, 3rd edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd edition, 2002.

REFERENCES:

1. Fiber Optic Communications – D. K. Mynbaev, S. C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fiber Communication and Its Applications – S. C. Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P Agarwal, John Wiley, 3rd edition, 2004.
4. Fiber Optic Communication Systems – Joseph C. Palais, 4th edition, Pearson Education, 2004.

Course Outcomes:

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

- Understand and analyze the constructional parameters of optical fibers.
- Be able to design an optical system.
- Estimate the losses due to attenuation,absorption,scattering and bending
- Compare various optical detectors and choose suitable one for different applications

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(A56036**) DIGITAL SIGNAL PROCESSORS AND ARCHITRECTURES**

(P.ELECTIVE -III)

Prerequisite: Signals and Systems

Course objectives:
The objectives of the course are

- To recall digital transform techniques.
- To introduce architectural features of programmable DSP Processors of TI and Analog Devices.
- To give practical examples of DSP Processor architecture s for better understanding.
- To develop the programming knowledge using instruction set of DSP Processors.
- To understanding interfacing techniques to memory and I/O devices.

UNIT – I- Introduction To Digital Signal Processing: Introduction**,** A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.
Computational Accuracy In DSP Implementations: Number formats for signals and coefficients in DSP systems. Dynamic Range and Precision, Sources of error in DSP implementations, A/D conversion errors, DSP computational errors. D/A conversion errors, compensating filter.

UNIT – II- Architectures For Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT – III- Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT – IV- Implementations Of Basic DSP Algorithms: The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.
Implementation Of FFT Algorithms: An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

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).A Multichannel

buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.

REFERENCES

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkata Ramani and M.Bhaskar, TMH, 2004.
2. Digital Signal Processing – Jonatham Stein, John Wiley, 2005

Course Outcomes:

Upon completion of the course the student

- Be able to distinguish between the architectural of general purpose processors and DSP processors.
- Understand the architectures of TMS320C54XX and ADSP 2100 DSP devices.
- BE able to write simple assembly language using instruction set of TMS320C54XX.
- Can interface various devices to DSP Processors.

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(A56037) DATA ACQUISITION SYSTEM

Prerequisite: EMI and ICA

Course Objectives

1. Understand the fundamentals of data acquisition, configuration, characteristic and specifications of various components used in DAS
2. Comprehend data conversion concept and associate performance metrics such as INL, DNL, ENOB, THD, SNR, and SNDR
3. Familiarize different methods of ADC's and DAC's characteristics, specifications and applications of various commercial IC's
4. Recognize various interfacing issues of ADC's and DAC's to a microprocessor/PC
5. Identify sources of error their reduction techniques and prepare an error budget for a given DAS that include DAC and ADC

UNIT-1 DATA ACQUISITION SYSTEMS: Types of data, Sensors used in Data acquisition systems, Data Acquisition Systems- Objective of a DAS, single channel DAS, Multi-channel DAS, Block Diagram, Configurations, Components used in DAS. Analog Multiplexers and Sample & Hold circuits- Specifications and Design Considerations.
Hybrid DAS - Schematic diagram- configurations- specifications.

UNIT-2 DIGITAL TO ANALOG CONVERTERS (DACS):
Specifications– Characteristics. Types of DACs- Serial, parallel, direct and indirect DACs, R– 2R, Weighted resistor, inverted ladder DACs, D/A decoding- codes other than ordinary binary. Hybrid and monolithic DACs. Interfacing of DACs to microprocessors and PCs.

UNIT-3 ANALOG TO DIGITAL CONVERTERS (ADCS):
Specifications– Characteristics. Types of ADCs- Serial, parallel, direct and indirect ADCs. Hybrid and monolithic ADCs, Sigma-delta ADCs, Successive approximation – Ramp comparison – Dual slope integration – Voltage to frequency – Voltage to Time – Logarithmic types of ADCs. Interfacing of ADCs to microprocessors and PCs.

UNIT-4 ADC APPLICATIONS: Data Acquisition systems – Digital signal processing systems – PCM voice communication systems – Test and measurement instruments – Electronic weighing machines.

UNIT-5 DATA CONVERTER APPLICATIONS:
DAC applications – Digitally programmable V/I sources – Arbitrary waveform generators – Digitally programmable gain amplifiers – Analog multipliers/ dividers – Analog delay lines.

NON-LINEAR DATA CONVERTERS (NDC):

Basic NDC configurations – Some common NDACS and NADCS – Programmable non-linear ADCS – NADC using optimal sized ROM – High speed hybrid NADC – PLS based NADC – Switched capacitor NDCS.

TEXT BOOKS:

1. Electronic data converters fundamentals and applications – Dinesh K. Anvekar, B.S. Sonde – Tata McGraw Hill.

REFERENCES:

1. Electronic Analog/ Digital conversions – Hermann Schmid – Tata McGraw Hill.
2. E.R. Hanateck, User's Handbook of D/A and A/D converters – Wiley
3. Electronic instrumentation by HS Kalsi- TMH 2 nd Edition, 2004.
4. Data converters by G.B. Clayton

Course Outcomes:

- Learn to identity a data acquisition system.
- Identify to prescribe a sensor type to measure a specific environmental change.
- Able to determine what type of amplifier is needed for a specific sensor output.
- Familiar with different methods of Analog-to-Digital conversion and Digital and Analog Convertor.
- Design the type of interface used to get a digital signal into a microprocessor.

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(A56038) **MICROCONTROLLER &EMBEDDED SYSTEMS**

Prerequisite: Microprocessors

COURSE OBJECTIVES:
The student will be able

- To study the programming concepts and its applications in 8051 microcontrollers.
- To understand the role of embedded systems and their Design Process with examples.
- To study advanced architectures: ARM and their Instruction level parallelism.
- To know basic concepts of Real Time Operating System & their Kernel objects in µCos.
- To study Embedded Software Development Tools and the techniques used in debugging an embedded software.
- To study Serial Bus Protocols like I2C, CAN bus.

UNIT – I Introduction to Microcontrollers: Overview of 8051 microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, simple programs with embedded-C.

UNIT –II: Interrupts in 8051: Interrupts, Interrupt Priority in the 8051, Timer/Counter & its Programming in 8051, serial communication & its programming in 8051.

AVR RISC microcontroller Architecture: AVR family Architecture, Register File, ALU, Memory access and instruction execution, I/O Memory, I/O ports, Timers, UART, Interrupt Structure .

UNIT –III: Embedded Systems:
Introduction, Classification of Embedded Systems, Complex Systems, Embedded system design process, Formalisms for System Design, design examples.
.
ARM Processor as System on Chip:
Acorn RISC Machine-ARM Processor architecture –Register set, modes of operation, Memory organization and overview of instructions. -ARM development tools.

UNIT –IV: Introduction to Real Time Operating Systems:
Tasks and Task states, Tasks and data, semaphores and shared data, Message Queues, Mail boxes and Pipes, Timer functions, Events, Memory Management, Interrupt Routines in RTOS environment

Basic Design using Real Time Operating System: principles, semaphores and queues, Hard Real Time scheduling considerations, Saving memory and power, An example RTOS like µCos (open source).

UNIT –V: Embedded System development:

Networked Embedded Systems: Bus protocols, I2c bus and CAN bus, Internet Enabled Systems.

Sensors and Actuators, Communication Interface: Infrared, Bluetooth, WIFI, GSM, Onboard and External Communication Interfaces

Embedded system development tools: Host and target machines. Linker/Locators for embedded software. Getting embedded software into target system, debugging techniques: testing host machine.

Design examples: Elevator Controller, Data Acquisition System for industrial application, Process control System, Tele medicine Systems, Robotics.

TEXT BOOKS:

1. 'Computers as components-Principles of Embedded Computing System Design' Wayne Wolf, Elsevier (2nd edition)
2. 'The 8051 microcontroller', Kenneth Ayala and DhanunjayGadre, Thomson
3. Introduction to Embedded Systems - Shibu K.V, McGraw Hill.
4. Embedded / Real Time Systems – KVKK Prasad, Dreamtech Press, 2005.

REFERENCE BOOKS:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education.

COURSE OUTCOMES:

After going through this course the student will be able to

- Acquire the basic knowledge on Embedded Systems.
- Understand the basic microcontrollers---8051, AVR and their programming.
- Acquire basic knowledge on Real Time Operating Systems- µCos, Embedded Software Development Tools.
- Understand the techniques used in debugging an embedded software.

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(A56020) **DIGITAL SIGNAL PROCESSING**

Prerequisite: Signals and Systems

COURSE OBJECTIVES
The student will be able to
• Define and use Discrete Fourier Transforms (DFTs)
• Use Z - transforms and discrete time Fourier transforms to analyze adigital system.
• Understand simple finite impulse response filters
• Learn the design procedures used for filter bank
• Learn to program a DSP processor to filter signals

UNIT- I: INTRIDUCTION: Introduction to Digital Signal processing: Discrete time signals&sequences,linear shift invariant systems,stability, and causality. Linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems

UNIT- II: DISCRETE FOURIER SERIES: properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: properties of DFT, linear convolution of sequences using DFT, computation of DFT, Relation between Z-transform and DFS
FAST FOURIER TRANSFORMS: Fast Fourier transform (FFT)-Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT for composite N

UNIT- III: REALIZATION OF DIGITAL FILTERS: Review of Z-transform, Application of Z-transforms, solution of difference equations of digital filters, Block diagram representation of linear constant coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, system function.

UNIT- IV: IIR DIGITAL FILTERS: Analog filter approximations-Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations

FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters, frequency response. Design of FIR digital filters using Window techniques, frequency sampling technique, comparison of IIR&FIR filters.
MULTIRATE DIGITAL SIGNAL PROCESSING: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion

UNIT – V: INTRODUCTION TO DSP PROCESSORS: Introduction to programmable DSPs:Multiplier and Multiplier Accumulator(MAC),Modified Bus Structures and Memory Access schemes in DSPs multiple access memory, multiport memory,VLSIArchitecture,pipelining,Special addressing Architecture of TMS 320C5X-Introduction,Bus structure, Central Arithmetic Logic unit, Auxiliary registrar, Index

Registrar, Auxiliary Register Compare Register, Block Move Address Register parallel Logic Unit, Memory mapped registers, program controller, Some flags in the status registers, On-chip registers, On-chip peripherals.

TEXT BOOKS:

1.Digital Signal Processing,principles,Algorithms,andApplications:JohnG.Proakis,DimitrisG.Manolakis,Pearson Education/PHI,2007
2. Discrete Time signal processing-A.V Oppenheim and R.W.Schaffer,PHI
3.Digital Signal Processing-Architecture, Programming and Applications, B.venkataramani, M.Bhaskar, TATA McGraw Hill,2002

REFERENCE BOOKS:

1. Digital Signal Processing:AndreasAntoniou,TATA McGraw Hill,2006
2. Digital Signal Processing:MHHayes,schaum'sOutlines,TATAMc-Graw Hill,2007
3. DSP Primer-C.BrittonRorabaugh,Tata McGraw Hill,2005
4. Fundamentals DSP using Matlab-Robert J.Schilling,Sandra L.Harris,Thomson,2007
5. Digital Signal Processing-Alan V.Oppenheim,RonaldW.Schafer,PHI Ed.,2006

COURSE OUTCOMES

After going through this course the student will be able to

- Estimate the spectra of signals that are to be processed by a discrete time filter, and to verify the performance of a variety of modern and classical spectrum estimation techniques.
- Design and simulate a digital filter
- Design new digital signal processing systems.
- Design and realize FIR, IIR filters
- Program a DSP processor to filter signals

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(A56039) **DIGITAL COMMUNICATIONS**

Prerequisite: Analog Communication

COURSE OBJECTIVES:

The student will be able to

• Understand pulse digital modulation systems such as PCM,DPCMand DM.

• Understand various digital modulation techniques and able toanalyze various systems for their performance in terms ofprobability of error.

• Study the concept of entropy and need for source coding.

• Study Block codes, cyclic codes and convolution codes and the concept of spread spectrum modulation.

UNIT –I: Elements of Digital Communication Systems: model of digital communication systems, Digital representation of analog signal, Certain issues in digital transmissions, Advantages of Digital Communication Systems, Bandwidth-S/N tradeoff, Hartley shanonlaw ,Sampling theorem**.**

UNIT- II: Pulse code modulation: PCM generation and reconstruction, Quantization noise, Non uniform quantization and companding, Differential PCM Systems (DPCM), Delta modulation and it's draw backs, Adaptive DPCM, Adaptive Delta Modulation, Noise in PCM and DM.Digital modulation technique: ASK, ASK modulator, Coherent ASK detector, non Coherent ASK detector,FSK, Band width and frequency spectrum of FSK, Coherent FSK detector, non Coherent FSK detector, FSK detection using PLL, BPSK ,Coherent PSK detection , QPSK, differential PSK.

UNIT-III: Base band transmission and Optimal Reception of Digital signal:

Pulse shaping for optimum transmissions, A base band signal receiver, probability of error, Optimum receiver ,optimal of coherent reception, Signal space representation and probability of error, Eye diagram, cross talk.

Information theory:

Information and entropy, Conditional entropy and redundancy, Shannon fano coding , mutual information, information loss due to noise, source coding-Huffman code, Variable length coding, Source coding to increase average information for bit, Lossy source coding.

UNIT-IV: Linear block codes :

Matrix description of linear block codes, Error detection and correction capabilities of linear block codes.**Cyclic codes :** Algebraic structure and encoding, Syndrome calculation and decoding.

Convolution codes:Encoding and decoding using state, Trees and trellis diagrams, Decoding using veterbi algorithm, Comparision of error rates in coded and uncoded transmission.

UNIT-V: Spread Spectrum Modulation:
Use of spread spectrum,direct sequence spread spectrum (DSSS),
Code division multiple access & rating uses DSSS division multiple access raging using DSSS frequency Hopping spread spectrum PN sequence generation and characteristics: Generation and characteristics, Synchronization in spread spectrum systems

TEXT BOOKS:
1. Principles of communication systems - Herbert Taub. Donald L Schiling, Goutam Sana, 3rd
Edition,McGraw-Hill, 2008.
2. Digital and Analog Communicator Systems - Sam Shanmugam, John Wiley, 2005

REFERENCE BOOKS:
1. Digital Communications - John G. Proakis . Masoudsalehi – 5th Edition, McGraw-Hill, 2008.
2. Digital Communication - Simon Haykin, Jon Wiley, 2005.
3. Digital Communications - Ian A. Glover, Peter M. Grant, Edition, Pearson Edu., 2008.
4. Communication Systems-B.P. Lathi, BS Publication, 2006

COURSE OUTCOMES:
After going through this course the student will be able to
• Analyze the performance of a Digital Communication System forprobability of error and are able to design a digital communicationsystem.
• Analyze various source coding techniques
• Compute and Analyze Block codes, cyclic codes and convolutioncodes.
• Design a coded communication system.

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(A56040**) SATELLITE COMMUNICATIONS**
(P.ELECTIVE-IV)

Prerequisite: Analog Communication

Course objectives:

- To prepare students to excel in basic knowledge of satellite communication principles.
- To provide students with solid foundation in orbital mechanics and launches for satellite communication.
- To train the students with a basic knowledge of link design of satellite with design examples.
- To provide better understanding of multiple access systems and earth station technology.
- To prepare students with knowledge in satellite navigation and GPS and satellite packet communications.

UNIT-I- Introduction: Origin Of Satellite Communications, Historical Back-Ground, Basic Concepts of Satellite Communications, Frequency Allocations For Satellite Services, Applications, Future trends of Satellite Communications.

Orbital Mechanics and Launchers: Orbital Mechanics, Look angle determination, Orbital Perturbations, Orbit determination. Launches and Launch Vehicles, Orbital effects in Communication Systems Performance.

UNIT-II -Satellite Subsystems: Attitude and Orbit Control System, Telemetry, Tracking, Command and Monitoring, Power Systems, Communication Subsystems, Satellite Antennas, Equipment Reliability and Space Qualification.

Satellite Link Design: Basic Transmission Theory, System Noise Temperature and G/T ratio , Design Of Down Links, Up Link Design, Design Of Satellite Links For Specified C/N, System Design Examples,

UNIT-III -Multiple Access: Frequency Division Multiple Access (FDMA), Intermodulation, Calculation of C/N Time Division Multiple Access (TDMA), Frame Structure, Examples. Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

Earth Station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking Systems. Terrestrial Interface, Primary Power Test Methods.

UNIT-IV- Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit Considerations, Coverage And Frequency Consideration, Delay And Throughput Considerations, System Consideration Operational NGSO Constellation Designs.

UNIT-V- Satellite Navigation & Global Positioning System: Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers And Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A Code Accuracy, Differential GPS

TEXT BOOKS :

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES :

1. Satellite Communications : Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

Course outcomes:

At the end of the course,

- Students will understand the historical background, basic concepts and frequency allocations for satellite communication.
- Students will demonstrate orbital mechanics, launch vehicles and lanchers.
- Students will demonstrate the design of satellite links for specified C/N with system design examples.
- Students will able to visualize satellite subsystems like telemetry, tracking, command and monitoring power systems etc.
- Students will understand the various multiple access systems for satellite communication systems and satellite packet communications.

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(A56041**) ANALOG INTEGRATED CIRCUIT DESIGN**
(P.ELECTIVE-IV)

Prerequisite: Electronic Circuit Analysis

Course Objectives:

- Analysis, design, and applications of modern analog circuits using integrated bipolar and field effect transistor technologies.
- Introduce the principles of analog circuits and apply the techniques for the design of analog integrated circuit (Analog IC's).
- Apply the methods learned in the class to design and implement practical projects
- The final objective of the class is to implement a complete analog system. In each week's lab, the class will build parts of the system with an overall objective of completing the entire system by the end of the term.

UNIT –I- MOS Devices and Modeling:

The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT -II:

Analog CMOS Sub-Circuits:
MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III:

CMOS Amplifiers:
Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

UNIT -IV:

CMOS Operational Amplifiers:
Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

UNIT -V:

Comparators:
Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

TEXT BOOKS:
1. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
2. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.

REFERENCE BOOKS:
1. Analog Integrated Circuit Design- David A. Johns, Ken Martin, Wiley Student Edn, 2013.
2. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition.
3. CMOS: Circuit Design, Layout and Simulation- Baker, Li and Boyce,

Course Outcomes:

- Demonstrate the use of analog circuit analysis techniques to analyze the operation and behavior of various analog integrated circuits.
- Apply knowledge by designing analog circuits.
- Learn Design, layout, and testing of Analog circuits.

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(A56042) **DIGITAL IMAGE PROCESSING**

(P.ELECTIVE – IV)

Prerequisite: Digital Signal Processing

Course objectives

- Provide student with the fundamentals of digital image processing.
- Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some lab sessions.
- Introduce the students to some advanced topics in digital image processing.
- Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

UNIT – I- Digital Image Fundamentals & Image Transforms: Digital Image fundamentals, Sampling and quantization, Relationship between pixels. Image Transforms: 2-D FFT, properties, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Haar transform, Slant transform, Hotelling transform.

UNIT – II- Image Enhancement(spatial Domain): Introduction, Image Enhancement in spatial domain, enhancement through point operation, types of point operation, histogram manipulation, linear and non-linear gray level transformation, local or neighborhood operation, median filter, spatial domain high-pass filtering.
Image Enhancement (Frequency Domain): Filtering in frequency domain, obtaining frequency domain filters from spatial filters. Generating filters directly in the frequency domain, low-pass (smoothing) and High pass (sharpening) Filters in Frequency Domain.

UNIT – III- Image Restoration: Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT – IV - Image Segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.
Morphological Image Processing: Dilation and Erosion, Dilation, Structuring Element Decomposition, The strel function, Erosion. Combining Dilation and Erosion: Opening and closing, the hit or miss Transformation, Overview of Digital Image Watermarking Methods.

UNIT – V- Image Compression: Redundancies and their removal methods, Fidelity criteria, Image compression models, source encoder and decoder. Error free compression, Lossy compression, JPEG 2000 standards.
Wavelet based Image Processing: Introduction to wavelet Transform, Continuous Wavelet Transform, Discrete Wavelet Transform, Filter banks, Wavelet based Image compression, Wavelet based denoising and wavelet thresholding methods.

TEXT BOOKS:

1. Digital Image Processing – Rafael C. Gonzalez. Richard E. Woods, 3rd edition, Pearson, 2008
2. Digital Image Processing – S. Jayaraman, S. Esakkirajan, T. Veerakumar- TMH, 2010

REFERENCES :

1. Digital Image Processing using MATLAB – Rafael C. Gonalez, Richard E. Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
2. Fundamentals of Digital Image Processing – A.K. Jain PHI, 1989
3. Digital Image Processing and Computer vision – Somka, Hlavac, Boyle- Cengage learning(Indian edition) 2008.
4. Introductory Computer vision Imaging Techniques and Solutions – Adrian low, 2008, 2nd Edition.
5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC Press. 2010

Course Outcomes:

Upon successfully completing the course, the student should

- Have an appreciation of the fundamentals of digital image processing including the topics of filtering, transforms and morphology, and image analysis and compression.
- Be able to implement basic image processing algorithms in MATLAB.
- Have the skill base necessary to further explore advanced topics of Digital image Processing.
- Be in a position to make a positive professional contribution in the field of Digital image processing

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(A56207) **MICROCONTROLLER & EMBEDDED SYSTEMS LAB**

Note: : Minimum of 12 experiments to be conducted.

List of Experiments:

The following embedded systems are to be developed using appropriate ARM7/8051 micro controller.

Programming in Assembly Language/ embedded C

1. Programming using arithmetic, logic and bit manipulation instructions of 8051/AVR.
2. Program and verify Timer / Counter in 8051.
3. Program and verify Interrupt handling in 8051.
4. UART Operation in 8051.
5. LCD interface
6. Keypad Interface
7. Transfer of data (text) from PC terminal to embedded system kit for display on LCD.
8. From keyboard on embedded system kit to PC terminal.
9. To acquire data through different sensors and process the data for control of external devices through actuators, relays etc.
10. To sort RTOS on to ARM7 microcontroller and verify execution of 2 or 3 tasks simultaneously using SDK.
11. To accept input from touch screen and control external devices.
12. A Line following ROBOT.
13. A robotic application for controlling devices with MEMS.
14. A patient monitoring system.

Equipments required for Laboratory:

i) Computer Systems with Operating system (Windows XP)
ii) Software's – Keil µVision 3&4, Flash Magic,Term51E.
iii) 8051 and ARM Trainer kits.
iv) External Peripherals: Assorted.

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(A56208) DIGITAL SIGNAL PROCESSING LAB

Note: Minimum 12 Experiments to be conducted:

List of Experiments

The program shall be implemented in software (Using MATLAB / Lab view / C programming / OCTAVE or Equivalent) and hardware (Using TI / Analog devices / Motorola / Equivalent DSP Processors).

1. Generation of Sinusoidal waveform / signal based on recursive difference equations.
2. To find DFT / IDFT of given DT signal.
3. To find frequency response of a given system given in (Transfer Function / Differential equation form).
4. Implementation of FFT of given sequence.
5. Determination of Power Spectrum of a given signal(s).
6. Implementation of LP FIR filter for a given sequence.
7. Implementation of HP FIR filter for a given sequence.
8. Implementation of LP IIR filter for a given sequence.
9. Implementation of HP IIR filter for a given sequence.
10. Generation of Sinusoidal signal through filtering.
11. Generation of DTMF signals.
12. Implementation of Decimation Process.
13. Implementation of Interpolation Process.
14. Implementation of I / D sampling rate converters.
15. Audio application such as to plot a time and frequency display of microphone plus a cosine using DSP. Read a .wav file and match with their respective spectrograms.
16. Noise removal: Add noise above 3 KHz and then remove, Interference suppression using 400 Hz tone.
17. Impulse response of first order and second order systems.

Equipments required for Laboratory:

i) Computer System with Operating system (Windows XP).
ii) MATLAB & CC Studio or equivalent software.
iii) DSP Processor – TMS 320C6713 or equivalent.

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(A56209) **ADVANCED ENGLISH COMMUNICATION SKILLS LAB**

1. Introduction

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be an integrated theory and lab course to enable students to use good English and perform the following:
Gather ideas and information, to organize ideas relevantly and coherently.

Engage in debates.

Participate in group discussions.

Face interviews.

Write project/research reports/technical reports.

Make oral presentations.

Write formal letters.

Transfer information from non-verbal to verbal texts and vice versa.

To take part in social and professional communication.

2. Objectives:

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

To improve the students‘ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:
1. **Vocabulary Building** – synonyms and antonyms, Word Roots, One-Word Substitutes, Prefixes and Suffixes, Study of Word Origin, Analogy, Idioms and Phrases.

2. **Reading Comprehension –** Reading for Facts, Guessing meanings from context, Scanning, Skimming, Inferring Meaning, and Critical Reading.

3. **Writing Skills** –Structure and presentation of different types of writing - Resume Writing /E-Correspondence/Statement of Purpose.

4. **Technical Writing**- Technical Report Writing, Research Abilities/Data Collection/Organizing Data/Tools/Analysis.

5. **Group Discussion** – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Coherence.

6. **Presentation Skills** – Oral presentations (individual and group) through JAM sessions/Seminars, Written Presentations through Projects/ PPTs/e-mails etc.

7. **Interview Skills** – Concept and Process, Pre-Interview Planning, Opening Strategies, Answering Strategies, Interview through Telephone and Video-Conferencing.

4. 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
a) Speed – 2.8 GHZ
b) RAM – 512 MB Minimum
c) Hard Disk – 80 GB
ii) Headphones of High quality

5. Suggested Software:
The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:
Clarity Pronunciation Power – part II
Oxford Advanced Learner‘s Compass, 7th Edition
DELTA‘s key to the Next Generation TOEFL Test: Advanced Skill Practice.
Lingua TOEFL CBT Insider, by Dreamtech.
TOEFL &GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

The following software from ‗train2success.com‘
i. Preparing for being Interviewed,
ii. Positive Thinking,
iii. Interviewing Skills,
iv. Telephone Skills,
v. Time Management
vi. Team Building,
vii. Decision making
English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Books Recommended:

1. Technical Communication by Meenakshi Raman &Sangeeta Sharma, Oxford University Press 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. English Language Communication : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam& Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
4. English Vocabulary in Use series, Cambridge University Press 2008.
5. Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. Communication Skills by LeenaSen, PHI Learning Pvt Ltd., New Delhi, 2009.
7. Handbook for Technical Writing by David A McMurrey& Joanne Buckely CENGAGE Learning 2008.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
10. English for Technical Communication for Engineering Students, AyshaVishhwamohan, Tata McGraw-Hil 2009.
11. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron‘s/DELTA/Cambridge University Press.
12. International English for Call Centres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009

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(A56011) **LOGICAL REASONING & QUANTITATIVE APTITUDE**

UNIT I :

Series Completion : Number Series, Alphabet Series, Alpha – Numeric Series

Analogy: Completing the Analogous Pair, Simple Analogy, Choosing the Analogous Pair, Double Analogy, Word Analogy and Number Analogy. Classification / Odd One Out: Word Classification, Number Classification, Letter Classification.

Coding – Decoding: Letter Coding, Number Coding, Matrix Coding, Substitution, Deciphering Message Word Codes, Jumbled coding.

UNIT II:

Blood Relations: Deciphering Jumbled up Descriptions, Relation Puzzle.

Direction sense test – Number, Ranking & Time Sequence Test – Arithmetical Reasoning– Mathematical Operations.

Number System : Test for Divisibility, Test of prime number, Division and Remainder – HCF and LCM of Numbers – Fractions.

Ratio and Proportion: Properties of Ratio, Comparison of Ratios, Useful Simple Results on Proportion – Partnership and Share – Mixtures.

UNIT III:

Data Sufficiency: Problems in which a question on any topic such as Coding – Decoding, Blood Relations, Directions, Arithmetical Reasoning, etc.

Puzzle Test: Classification Type Questions, Seating Arrangements Comparison Type Questions, Sequential Order of Things, Selection Based on given conditions, Family – Based Puzzles, Jumbled Problems.

Assertions and Reason – Logical Venn Diagrams – Alpha Numeric Sequence Puzzle. Cubes and Dice – Analytical Reasoning.

UNIT IV:

Logical Deduction: Logic, Statement – Arguments, Statement – Assumptions, Statement – Conclusions, Deriving Conclusions from Passages.

Clocks & Calendar.

Simple Interest : Effect of change of P, R and T on Simple Interest – Compound Interest: Conversion Period, Difference between Compound Interest and Simple Interest – Time and Work – Time and Distance.

UNIT V: Mensuration: Area of Plane Figures, Volume and Surface Area of solid figures.

Data Interpretation: Tabulation, Bar Graphs, Pie Charts, Line Graphs.

Text Books:

1. Verbal and Non Verbal Reasoning by R.S.Agarwal.
2. Quantitative Aptitude by R.S.Agarwal.
3. Quantitative Aptitude by Abhijit Guha.

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(A57037) MICROWAVE AND RADAR ENGINEERING

Prerequisite: AWP

Course Objectives:

1.Understand Microwave devices, components, their characteristics, their working , and their applications.

2.To provide good understanding of radar systems, radar signal processing, radar target tracking and electronic navigational systems.

Unit-I: Introduction to microwaves-characteristic features, advantages and applications, waveguide basic concepts. Rectangular Waveguides – TE/TM mode analysis, power flow and Power Losses. Micro strip Lines–Zo Relations. Effective Dielectric Constant, Losses, Q factor. Cavity Resonators. Illustrative Problems.

Waveguide Components and Applications - : Coupling Mechanisms. Waveguide windows, Tuning Screws and Posts, Waveguide Attenuators and Phase Shifters, Waveguide Multiport Junctions. Illustrative Problems.

UNIT-II: Scattering Matrix & Calculations for E plane and H plane Tees, Magic Tee, directional coupler, Circulator and Isolator. Illustrative Problems.

Microwave Tubes: Limitations and Losses of conventional tubes at microwave frequencies, construction and operation of - 2 Cavity Klystrons, Reflex Klystrons,TWT and Magnetron. Illustrative Problems.

UNIT-III: Microwave Solid State Devices: Classification, Applications. Construction and operation of TEDs –Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation-Gunn Oscillation Mode. Introduction to Avalanche Transit Time Devices.

Microwave Measurements: Description of Microwave Bench, Microwave Power Measurement – Bolometer. Measurement of Attenuation, Frequency, low and high VSWR and Impedance.

UNIT-IV: Introduction to radars: Radar range equation, radar frequencies and applications, prf, unambiguious range, Radar cross section and clutter.
CW radar-block diagram and operation, application, CW radar with non-zero IF.FM CW radar. FM CW radar altimeter.

MTI and Pulse Doppler Radar: MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers, Blind Speeds, Double Cancellation, Staggered PRFs.MTI versus Pulse Doppler Radar.

UNIT-V: Tracking Radar : Tracking with Radar, basic principle and operation of - Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse.

Radar Receivers: Noise Figure and Noise Temperature, Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes.Antenna systems design considerations.

TEXT BOOKS:

1. Microwave Devices and Circuits – Samuel Y. Liao, Pearson , 3rd Edition,2003.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.
3. Introduction to Radar Systems-Merrill I. Skolnik, Second Edition, Mcgraw-Hill, 1981
4. Introduction to Radar Systems-Merrill I. Skolnik, Third Edition, Mcgraw-Hill, 2001
5. Radar :Principles,Technology,Applications-Byron Edde,Pearson Education,2004.
6. Radar Principles- Peebles, Jr. P. Z. Wiley, New York,1998.

REFERENCES:

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.
5. Elements of Microwave Engineering – R. Chatterjee, Affiliated East-West Press Pvt. Ltd., New Delhi, 1988.
6. Micro Wave and Radar Engineering – M. Kulkarni, Umesh Publications, 1998.

Course outcomes:

Upon completion of the course the students will be able to

- Understand the significance of microwave and microwave transmission lines.
- Analyze the characteristics of microwave tubes and compare them.
- Be able to list and explain the various microwave solid state devices.
- Can setup a microwave bench for measuring microwave parameters
- Understand radar fundamentals and analysis of the radar signals.
- Understand various radar transmitters and receivers.
- Understand various radars like MTI, Doppler and tracking radars and their comparison

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(A57022) **VLSI SYSTEM DESIGN**

Prerequisite: ICA and EDC

Course objectives:

- Give exposure to different steps involved in the fabrication of ICs using MOS transistor,CMOS/BICMOS transistors and passive components
- Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.
- Give exposure to the design rules to be followed to draw the layout of any logic circuit.
- Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts to design building blocks of data path of any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

UNIT- I- Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS
Technologies- Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Probe testing, Integrated Resistors and Capacitors, CMOS Nanotechnology.

Basic Electrical Properties : Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, g_m, g_{ds}, figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, BiCMOS Inverters.

UNIT- II- VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT- III- Gate Level Design : Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

UNIT- IV- Array Subsystems: SRAM, DRAM, ROM, Serial Access Memory, Content addressable memory

Semiconductor Integrated Circuit Design: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

UNIT- V-**CMOS Testing :** CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, System-level Test Techniques, Layout Design for improved Testability.

TEXTBOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, PHI, 2005 Edition
2. VLSI Design – K.Lal Kishore,V.S.V.Prabhakar,I.K Imternational,2009.
3. CMOS VLSI Design – A circuits and systems perspective,Neil H.E Weste,David Harris,Ayan Banerjee,pearson,2009.

REFERENCES:

1. CMOS logic circuit Design- John P.Uyemura, Springer, 2007.
2. Modern VLSI Design – Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. VLSI Design-A. Albert Raj, Latha, PHI, 2008.
4. Introduction to VLSI-Mead & Convey, BS Publications, 2010.
5. VLSI Design-M.Micheal Vai, CRC Press, 2009.

Course Outcomes:

Upon successfully completing the course, the student should be able to:

- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Choose an appropriate inverter depending on specifications required for a circuit.
- Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit.
- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts required to design building blocks of data path using gates.
- Design simple memories using MOS transistors and can understand design of large memories.
- Design simple logic circuit using PLA, PAL, FPGA and CPLD.
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

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(A57038) **ENTRPERNEURSHIP DEVELOPMENT**
(OPEN ELECTIVE-I)

Course Aim: - The aim of this subject is to give an insight to the students about business start up and motivate them to set up their own unit and create employment for others.

UNIT- I Introduction:
Introduction to Entrepreneurship – CHARACTERISTICS, Qualities, Key Elements and Skills of an Entrepreneur, Entrepreneurial Stress, Corporate Entrepreneurship, Entrepreneurial Process.

UNIT –II: Business Plan Preparation
Search for Business Idea, Project Identification, Project Formulation and Development, Contents of Business Plan and Preparation of a Bankable Project Report.

UNIT-III Launching Entrepreneurial Venture
Opportunities Identification, Methods to Initiate Ventures - Creating New Ventures, Acquiring Existing Ventures, Franchising. Sources of Finance, forms of Capital Requirements, Funding Agencies and Supporting Institutions

UNIT IV:
Legal challenges of entrepreneurship
Intellectual Property Protection – Patents, Copyrights, Trademarks and Trade Secrets. The Challenges of New Venture Startups- Poor Financial Understanding, Critical Factors for New Venture Development, Evaluation Process, Feasibility Criteria Approach.

UNIT V:
Strategic perspectives in entrepreneurship:
Strategic Planning – Strategic Action, Strategic Positioning Business Stabilization, Building The Adaptive Firms, Understanding the Growth Stage, Unique Managerial Concern Of Growing Ventures.

Text Book:
1. D F Kuratko and T V Rao "Entrepreneurship- A South-Asian Perspective "Cengage Learning, 2012

References:
1. Vasant Desai, Small Scale Industries and Entrepreneurship, HPH, 2012.
2. Rajeev Roy, Entrepreneurship, 2e, Oxford, 2012.
3. B. Janakiram and M.Rizwana, Entrepreneurship Development: Text & Cases, Excel Books, 2011.
4. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
5. Robert Hisrich et al "Entrepreneurship" 6e, TMH, 2012.
6. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013
7. Shejwalkar, Entrepreneurship Development, Everest, 2011
8. Khanka, Entrepreneurship Development, S.Chand, 2012

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(A57039**) CLOUD COMPUTING AND IOT**
(OPEN ELECTIVE-I)

Prerequisite: Database management system and computer networks.

Course Objectives:

- To learn the new computing model this enables shared resources on demand over the network,
- To learn about the pay-per-use scenarios.
- To learn about the new kind of service models and deployment models.
- To learn about the virtualization technology.
- To understand the basics of Internet of Things
- To get an idea of some of the application areas where Internet of Things can be applied
- To understand the middleware for Internet of Things

UNIT-I
Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Map reduce.

Unit -II
Cloud Platforms for Industry, Healthcare and education, Cloud Platforms in the Industry, cloud applications. Virtualization, cloud virtualization technology, deep dive: cloud virtualization, Migrating in to cloud computing, Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems,

Unit-III

Cloud computing Applications: Industry, Health, Education, Scientific Applications, Business and Consumer Applications, Understanding Scientific Applications for Cloud Environments, Impact of Cloud computing on the role of corporate IT. Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

Unit IV:
Introduction to Internet of Things (IoT) - Definition and characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels and Deployment Templates.

Unit V:

Domain Specific IoTs Introduction, Home Automation, cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

IoT and M2M Introduction to M2M, Difference between IoT and M2M, SDN and NFV to IoT. Basics of IoT System Management with NETCOZF, YANG NETCONF, YANG, SNMP NETOPEER

Text Books:

1. Cloud Computing : Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.
3. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
4. Cloud computing: Dr Kumar Saurab Wiley India 2011.
5. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

References:

1. Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT)
2. Essentials of cloud computing: K Chandrasekharan CRC Press.
3. Cloud Computing: John W. Rittinghouse, James Ransome, CRC Press.

Course Outcomes:

- Compare and contrast different cloud architecture
- Learn & Implement Virtualization
- Identify and design the new models for market strategic interaction
- Analyze various protocols for IoT
- Design a middleware for IoT
- Analyze and design different models for network dynamics

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(A57040) **SOFTWARE ENGINEERING**

(OPEN ELECTIVE-I)

Prerequisite: CDS

Course objectives

1. Understand the framework activities for a given project.
2. Choose a process model to apply for given project requirements.
3. Design various system models for a given scenario.
4. Design and apply various testing techniques.
5. Understand metrics for Process and Products.

UNIT I: Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), personal and team process models.

UNIT II: Process models: The waterfall model, Incremental process models, Evolutionary process model, agile process. Software Requirements: Functional and non-functional requirements, the software requirements document.

UNIT III: System models: Context Models, Behavioral models, Data models, Object models, structured methods. Design Engineering: Design process and Design quality, Design concepts, the design model, Performing User interface design: Golden rules.

UNIT IV: Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, Product metrics : Software Quality, Metrics for Analysis Model, Metrics for source code, Metrics for maintenance.

UNIT V: Metrics for Process and Products: Metrics for software quality. Risk management: Reactive vs. Proactive Risk strategies, Risk identification, Risk projection, Risk refinement, RMMM.Quality Management: Quality concepts, Software Reviews, Software reliability, The ISO 9000 quality standards.

Text Books:

1. Software Engineering, A practitioner‘s Approach- Roger S. Pressman, 6th edition. McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.

References:

1. Software Engineering- K.K. Agarwal&Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, WitoldPedrycz, JohnWiely.
3. Systems Analysis and Design- ShelyCashmanRosenblatt,Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

Course Outcomes:

Student will be able to:

- Choose a process model to apply for given project requirements.
- Analyze and apply the framework activities for a given project.
- Design various system models for a given scenario.
- Design and apply various testing techniques.
- Understand metrics for Process and Products.

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(A57041**) CELLULAR MOBILE COMMUNICATIONS**
(P. Elective-V)

Prerequisite: AC and DC

Course Objectives:

- To provide the student with an understanding of the cellular concept, frequency reuse and handoff strategies.
- To enable the student to analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel.
- To provide the student with an understanding of co-channel and non-co-channel interferences.
- To give the student an understanding of cell coverage for signals and traffic,diversity techniques and mobile antennas.
- To give the student an understanding of frequency management,channel assignment and types of handoff.

UNIT- I- Introduction to Cellular Mobile Radio Systems: Limitations of Conventional Mobile Telephone Systems, Introduction to cellular mobile system, Generations of cellular wireless systems, Performance criteria. Uniqueness of mobile radio environment – Long term fading, Short term fading & Factors influencing short term fading, Parameters of mobile multipath fading – Time dispersion parameters, coherence bandwidth, Doppler Spread and coherence time, Types of Small scale fading.
Elements of Cellular Radio System Design: Operation of cellular systems, Concept of frequency reuse, Co-channel Interference, Reduction Factor, Desired C/I from a normal case in a omnidirectional Antenna system, System Capacity, Trunking & Grade of Service, Improving Coverage & Capacity in cellular systems - Cell splitting, Sectoring, Microcell Zone Concept.

UNIT- II-Interference Co-Channel Interference: Measurement of real time Co-Channel interference, Design of Antenna system, Antenna parameters and their effects, Diversity Techniques – Space diversty, Polarization diversity, Frequency diversity, Time diversity ;
Non-cochannel interference : Adjacent channel interference, Near end Far end interference, Cross-talk, Effects of Coverage & Interference by applying Power Decrease, Antenna Height Decrease; Effects on Cell-Site Components, UHF TV Interference.

UNIT- III- Cell Coverage For Signal And Traffic: Signal reflections in flat and hilly terrain, Effect of human made structures, Phase difference between direct and reflected paths, Constant standard deviation, Straight line path loss slope, General formula for mobile propagation over water and flat open area, Near and Long distance propagation, Path Loss from a point to point prediction model in different conditions, Merits of Lee Model.

UNIT- IV- Cell Site and Mobile Antennas: Sum and difference patterns and their synthesis, Coverage - Omni directional antennas, Interference reduction-Directional antennas for

interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, Mobile antennas.

Frequency Management And Channel Assignment: Numbering and grouping, Setup access and Paging channels, Channel assignments to cell sites and mobile units, Channel sharing and Borrowing, Sectorization, Overlaid cells, Non fixed channel assignment.

UNIT –V- Handoffs & Dropped Calls: Handoff Initiation, Advantages of handoff, Types of handoff, delayed handoff, forced handoff, Power difference Handoff, mobile assisted handoff, Intersystem handoff, Introduction to dropped call rates and their evaluation.

Text Books:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

REFERENCES :

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2001

2. Modern Wireless communications- Simon Haykin, Michael Moher, Pearson Education, 2005.

3. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.
4. Wireless Communications – Andrea Goldsmith, Cambridge University Press, 2005.

Course outcomes:

By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems.

- The student will be able to understand impairments due to multipath fading channel.
- The student will be able to understand the fundamental techniques to overcome the different fading effects.
- The students will be able to understand co-channel and Non-co-channel interferences.
- The student will be able to familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.
- The student will have an understanding of frequency management, channel assignment and types of handoff.

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(A57042)**AVIONICS & NAVIGATIONAL AIDS**
(P. Elective-V)

Prerequisite: SC

Course Objectives:
in this course we are introduced to avionics, the systems that are installed in aircraft and other flight vehicles that are used for communication with ground and for navigation and safe landing

We also discuss the corresponding communication and navigational facilities provided on ground to meet this requirement.

In latter units we are introduced to the latest and future naviagational aids like Inertial navigation system, GPS and GNSS.Lastly we study about air borne radars and other equipment used in spacecraft

UNIT-1- Avionics Technology: Introduction to avionics system. Data bus systems –MIL STD 1553, ARINC 429/ARINC 629 bus systems, optical data bus systems. Integrated modular avionics architectures-commercial off- the shelf systems. Avionics packaging.

UNIT-II- Communication and Navigation Aids: Radio frequency spectrum, communication systems:HF, VHF, satellite communications.ATC transponder, traffic collision avoidance systems. Navigational aids: Automatic direction finding, VHF Omni range, Distance Measuring Equipment .TACAN, VOR, Satellite navigation systems –The GPS instrument landing system, Transponder landing system, Microwave landing system. Hyperbolic navigation systems.

UNIT-III- Navigation: Basic navigation, radio, inertial navigations, satellite navigation-GPS, differential GPS, wide area augmentation systems, local area augmentation system and GPS overlay programme. Integrated navigation, sensor usage. Flight management system (FMS), FMS control and display unit. Lateral navigation, area navigation, terminal navigation, vertical navigation, and four dimensional navigation, full performance based navigation, FMS procedure, and structural terminal arrival routes. ILS approach.

UNIT-IV- Future Air Navigation and Communication Systems: GNSS, Ground proximity warning system (GPW) and extended GPW (EGPW). Improvements in communications – air-ground data link, air-ground SATCOM communications. Actual navigation performance. Required navigation performance.

UNIT-V- Airborne Radar, Astronics – Avionics For Spacecraft: Propagation of Radar waves- functional elements of radar –antenna- transmitter. Types of radar –Pulse Doppler – civil aviation applications, military applications. Attitude determination & control of spacecraft –magnetometer. Sun sensors, star trackers, and earth and horizon sensors. Command and telemetry systems.

TEXT BOOKS:

1. Moir, I. and sea bridge, A... Civil avionics systems, AIAA Education series
2. Collision, R.P.G. Introduction to avionics systems (aerospace), second edition, Springer, 2003,
3. Moir, I.seabridge A... Military avionics systems, (aerospace)

Course Outcomes:

The student will understand how an aircraft or other flight vehicles fly safely ,navigate and land safely with the help of radio communication and navigational aids that are provided in the vehicle and on ground. He will be learning one of the most important applications of electronics and communication engineering where all the courses in the curriculum find application in real life.

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(A57043) **OPERATING SYSTEMS**
(P. Elective-V)

Prerequisite: CA

Course Objectives:
The student will be able to

- Study the hierarchical memory system including cache memories and virtual memory
- Demonstrate the knowledge of functions of operating system and interface, distributed systems, security deadlocks.
- Implement a significant portion of an operating system

UNIT-I
Operating Systems Overview-Operating systems functions, Overview of computer operating systems, protection and security, distributed systems, special purpose systems, operating systems structures-operating system services and systems calls, system programs, operating system structure, operating systems generation.
Process Management-Process concepts, threads, scheduling-criteria, algorithms, their evaluation, Thread scheduling.

UNIT-II
Concurrency – Process synchronization, the critical – section problem, Peterson's solution, synchronization Hardware, semaphored, classic problems of synchronization, monitors, Synchronization monitors, Synchronization examples, atomic transactions.
Principles of deadlock-system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock.

UNIT-III
Memory Management-Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement, algorithms, Allocation of frames.

UNIT-IV
File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection. File System Implementation- File system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance.
Mass-storage structure-overview of Mass-storage structure, Disk structure, disk attachment , disk scheduling, swap-space management , RAID structure , stable –storage implementation, Tertiary storage structure. I/O systems-Hardware, application I/O interface, kernel I/O subsystem, Transforming I/O requests to Hardware operations, STREAMS, performance.

UNIT-V

Protection-protection, Goals of protection, Principles of Protection, Domain of protection Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based systems, Language-Based Protection,

Security- The security problem, Program Threats, system and network threats cryptography as a security tool, user authentication, implementing security defenses, firewalling to protect systems and networks, computer-security classifications.

Text Books:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.

2. Operating Systems - Internal and Design Principles, Stallings, Fifth Edition-2005, Pearson education/PHI

REFERENCE BOOKS:

1. Operating systems- A Concept based Approach-D.M.Dhamdhere,2nd Edition, TMH.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

Course Outcomes:

After going through this course the student will have thorough knowledge about:

- Operating system functions, types, system calls.
- Memory management techniques and dead lock avoidance
- Operating systems' file system implementation and its interface.

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(A57044) **LINEAR CONTROL SYSTEMS**

Prerequisite: S&S

COURSE OBJECTIVES:
The student will be able to

- Learn the fundamental concepts of Control systems andmathematical modelling of the system.
- Study the concepts of time response and frequency response of thesystem.
- Understand the basics of stability analysis of the system.

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.

UNIT – IITRANSFER FUNCTION REPRESENTATION:
Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra– Representation by Signal flow graph - Reduction using Mason's gain formula.
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 – Steadystate response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT – III STABILITY ANALYSIS IN S-DOMAIN:
The concept of stability – Routh's stability criterion – qualitative stability and conditional stability –limitations of Routh's stability
Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT – IV FREQUENCY RESPONSE ANALYSIS:
Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.
STABILITY ANALYSIS IN FREQUENCY DOMAIN: Polar Plots- Nyquist Plots-Stability Analysis.

UNIT – V CLASSICAL CONTROL DESIGN TECHNIQUES:
Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

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. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.,
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, NewAge International (P) Limited, Publishers, 2nd edition.
3. CONTROL SYSTEMS – by Nagoorkani

REFERENCE BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition,1998.
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.

COURSE OUTCOMES:

After going through this course the student will be able to
• Represent the mathematical model of a system.
• Determine the response of different order systems for various stepinputs.
• Analyse the stability of the system.

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(A57045**) Mixed Signal Design**
(P. Elective-VI)

Prerequisite: VLSI DESIGN

Course Objectives:

The Objectives of the Course are:

- To Understand characteristics of both analog and digital MOSFET models.
- To Analyze Differential Amplifiers.
- To understand the operation and characteristics of the Operational amplifiers.
- To understand the Mixed Signal & Data Converter Architectures.

UNIT – I- Analog MOSFET Models: Small-Signal Model of the MOSFET in Saturation, High-Frequency MOSFET Model, Variation of Transconductance with Frequency, Temperature Effects in MOSFETs, Noise in MOSFETs. **Digital MOSFET Model:**, Capacitive Effects, Process Characteristic Time Constant, De1ay- and Transition-Times, Series Connection of MOSFETs, DC Behavior of Series-Connected MOSFETs, Delay Through Series-Connected MOSFETs.

UNIT – II- Differential Amplifiers: Single ended differential Operation, Basic Differential Pair, Qualitative and Quantitative analysis, Common mode Response, Differential pair with MOS loads, Gilbert Cell, Basic Current mirror, Active Current mirror.

UNIT – III- Operational Amplifiers: General Considerations, performance parameters, One stage Op-Amps, Two stage Op-Amps, Gain Boosting, Comparison, Common-Mode Feedback, Input range limitations, Slew rate, Power Supply Rejection.

MIXED SIGNAL CIRCUITS:

UNIT – IV- MOSFET Switch, Switched capacitor circuits , Switched capacitor Integrator, dynamic Circuits, **Data Converter Fundamentals**: Analog Versus Discrete Time Signals, Converting Analog Signals to Digital Signals, Sample-and-Hold (S/H) Characteristics, Digital-to-Analog Converter (DAC) Specifications, Analog-to-Digital Converter (ADC) Specifications.

UNIT – V- Data Convertor Architectures: DAC Architectures, ADC Architectures **Mixed Signal Layout issues**: Floor planning, Power Supply and Grounding Issues, Fully Differential Design, Guard Rings Shielding, Other Interconnect Considerations, **Possible Student Projects.**

TEXT BOOKS:

1. CMOS Circuits Design, Layout and Simulation – Baker, Li, Boyce, 1st ed., TMH
2. Design of Analog CMOS Circuits – B.Razavi,MGH,2003,TMH

REFERENCES:

1. Analog Integrated Circuit Design – David A.Johns,Ken Martin,1997, John-Wiley &

Course Outcomes:

On Completion of this Course, the student will be able to:

- Understand the Operation and the Characteristics of the MOSFETs.
- Design the Differential Amplifiers.
- Design the Multistage Operation Amplifiers.
- Understand the fundamentals of Data Converters and Design mixed Signal ICs.

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	3	1/ -/-	3

(A57046) **RF CIRCUIT DESIGN**
(P. ELECTIVE – VI)

Prerequisite: EMTL

Course Objectives:

- This course covers the circuit and system design of modern CMOS radio-frequency (RF) receivers and transmitters. The system performance metrics, circuit performance metrics and figure-of-merits are introduced.
- Design examples from practical applications such as GSM, WCDMA, WLAN or GPS are included.
- The course includes design and simulation projects with CMOS technologies.
- Students will gain the basic understanding of RF integrated circuits design as well as familiar with the necessary design and simulation tools.

UNIT I: INTRODUCTION: Importance of RF Design-Dimensions and UNITs-Frequency spectrum-RF Behavior of passive components: High Frequency Resistors, High Frequency Capacitors. High Frequency Inductors-Chip Components and circuit board considerations: chip resistors, chip capacitors and surface mount inductors.

REVIEW OF TRANSMISSION LINES:Types of Transmission lines-Equivalent circuit representation-R, L, C, G parameters of different line configurations-Terminated lossless Transmission lines-special Terminations: short circuit, open circuit and quarter wave Transmission lines-Sourced and Loaded transmission Lines: Power considerations, Input Impedance Matching, Return Loss and Insertion Loss.

UNIT II: SINGLE AND MULTI-PORT NETWORKS

The Smith chart: Reflection coefficient, Normalised impedance Transformation: Standing Wave Ratio, Special Transformation Conditions-Admittance Transformation-Parallel and Serial RL &RC Connections-Basic Definitions of single and multi-Port Networks-Interconnecting Networks.

RF FILTER DESIGN: Scattering parameters: Definition, Meaning, Chain Scattering Matrix, Conversion between S-and z-parameters, Signal Flow Chart Modeling, Generalization-Basic Resonator and Filter Configurations: Low Pass, High Pass, Band Pass and Band Stop type Filters-Filter Implementation using UNIT Element and Kuroda's Identities Transformations-Coupled Filters.

UNIT III: ACTIVE RF COMPONENT MODELLING:

RF Diode models: nonlinear and linear models-transistor models: large signal and small signal BJT models, large signal and small signal FET models scattering parameter device characterization.

MATCHING AND BIASING NETWORKS :Impedance matching using discrete components: two component matching networks, forbidden regions, frequency response and qualityfactor, T and Pi Matching Networks-Amplifier classes of operation and Biasing Networks: classes of operation and efficiency of amplifiers, Biasing Networks for BJT, Biasing Networks for FET.

UNIT IV: RF TRANSISTOR AMPLIFIER DESIGN:

Characteristics of amplifiers-amplifier power relations: RF source, transducer power gain, additional power relations-Stability considerations: stability circles, unconditional stability, and stabilization methods-unilateral and bilateral design for constant gain-noise figure circles-constant VSWR circles.

UNIT V: RF OSCILLATIORS AND MIXERS

Basic oscillator model: Negative resistance oscillator, feedback oscillator design, design steps, Quartz oscillators-Fixed Frequency high Frequency oscillator-Basic Characteristics of Mixers: Concepts, Frequency Domain considerations, single ended mixer Design, single and double balanced mixers.

TEXT BOOKS:

1. RF Circuit Design-Theory and applications by Reinhold Ludwig, Pavel Bsetchko-Pearson Education India, 2000.
2. Radio frequency and Microwave Communication circuits-Analysis and design by Devendra K.Misra-Wiley student Edition-John Wiley& Sons, Inc.

REFERENCES:

1. Radio Frequency and Microwave Electronics-illustrated by Matthew M.Radmanesh-PEI.
2. RF Circuit Design-Christopher Bowick, Cheryl Aljuni and john Biyler, Elsevier science, 2008.
3. Secrets of RF Circuit Design by Joseph J.carr, TMH, 2000.
4. Design of RF and Microwave Amplifiers and Oscillators, Peter L.D.Abrif, Artech House, 2000.
5. The Design of CMOS Radio Frequency Integrated Circuits By Thomas H.Lee,2/e-Cambridge University Press,2004.

Course Outcomes:

- Study the basic RF circuits and systems
- Design skills related with wide types of CMOS electronics.
- Able to Learn apposite RF circuits for different applications
- Apply knowledge of mathematics and engineering, identify formulas, build up simulation netlists to simulate RF electronic circuits

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IV Year B.Tech, ECE.-I Sem	**L**	**T/P/D**	**C**
	3	1/ -/-	3

(A57047) **REAL TIME OPERATING SYSTEMS**
(P.Elective –VI)

Prerequisite: ES

Course Objectives:

The Objectives of the Course are:

- To introduce students to the modern embedded systems and to show how to understand and program such systems using a concrete platform built around
- Meet the participant with basics of real-time operating systems and to give the participant knowledge and skills necessary to develop software for embedded computer systems using a real-time operating system.

UNIT - I BASIC REAL-TIME CONCEPTS:
Terminology, Real-Time System Design Issues, Example Real-Time Systems, Common Misconceptions, Brief History; Hard Vs Soft Real-Time Systems. A REFERENCE MODEL OF REAL TIME SYSTEMS: Processors and Resources, Temporal Parameters of Real Time Work Load, Periodic Task Model Precedence Constraints and Data Dependency, Functional Parameters, Resource Parameters of Jobs and Parameters of Resources, Typical Real Time Applications.

UNIT - II REAL-TIME KERNELS:
Pseudo kernels, Interrupt-Driven Systems, Preemptive-Priority Systems, Hybrid Systems, The Task-Control Block Model, Theoretical Foundations of Real-Time Operating Systems. INTERTASK COMMUNICATION AND SYNCHRONIZATION: Buffering Data, Time-Relative Buffering, Ring Buffers, Mailboxes, Queues, Critical Regions, Semaphores, Other Synchronization Mechanisms, Deadlock, Priority Inversion.

UNIT - III REAL TIME SCHEDULING:
Commonly used Approaches to Real Time Scheduling, Clock Driven Scheduling, Priority Driven Scheduling; Scheduling Aperiodic and Sporadic jobs in priority driven systems. MEMORY MANAGEMENT: Process Stack Management , Run-Time Ring Buffer, Maximum Stack Size , Multiple-Stack Arrangements ,Memory Management in the Task-Control-Block Model ,Swapping , Overlays , Block or Page Management , Replacement Algorithms , Memory Locking Working Sets ,Real-Time Garbage Collection , Contiguous File Systems ,Building versus Buying RealTime Operating Systems , Selecting Real-Time Kernels .

UNIT - IV HADRWARE CONSIDERATIONS TO REAL TIME SYSTEMS:
Basic Architecture ,Hardware Interfacing , Central Processing Unit, Memory , Input/output , Enhancing Performance , Other Special Devices , Non Von-Neumann Architectures.

UNIT - V REAL TIME COMMUNICATION: Model of Real Time communication, Priority based service disciplines for switched networks, Weighted Round Robin Service disciplines, Medium Access-Control protocols of Broadcast networks, internet and Resource Reservation Protocols, Real Time Protocol, Communication in Multicomputer Systems. CASE STUDIES: Threads ,POSIX Mutexes and Condition ,POSIX Semaphores ,Using Semaphores and Shared Memory ,POSIX Messages ,Real-Time POSIX Signals ,Clocks and Timers ,Asynchronous Input and Output , POSIX Memory Locking.

TEXT BOOKS:

1. Liu, Jane W. S. (2009), Real-Time Systems, 8th edition, Pearson Education, India.
2. A. Phillip Laplante (2004), Real Time Systems Design and Analysis, 3 rd edition, John Wiley and Sons, India.

REFERENCE BOOKS:

1. C. M. Krishna, Kang G. Shin (2010), Real Time Systems, Tata McGraw-Hill, New Delhi.
3. K. V. K. K. Prasad (2005), Embedded / Real Time Systems, Dreamtech Press, New Delhi.
4. Sri Ram V. Iyer, Pankaj Gupta (2004), Embedded Real Time Systems Programming, Tata McGraw-Hill, New Delhi, India

Course outcomes:

- Possess knowledge and skill in embedded systems.
- Able to demonstrate embedded system applications.
- Design real time embedded systems using the concepts of RTOS
- Able to learn formal methods to the analysis and design of real-time systems
- Able to learn formal methods for scheduling real-time systems

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	-	-/ 3/-	2

(A57210) **MICROWAVE ENGINEERING & DIGITAL COMMUNICATIONS LAB**

Note: Minimum of 12 Experiments to be conducted

PART –A Microwave Engineering (ANY 6 EXPERIMENTS):

1. Reflex Klystron Characteristics
2. Gunn Diode Characteristics
3. Directional Coupler Characteristics
4. VSWR Measurement
5. Measurement of Waveguide Parameters
6. Measurement of Impedance of a given load
7. Measurement of Scattering parameters of a Magic Tee
8. Measurement of Scattering parameters of a Circulator
9. Attenuation Measurement
10. Microwave Frequency Measurements.

PART-B DIGITAL COMMUNICATIONS LAB (ANY 6 EXPERIMENTS):

1. PCM Generation and Detection
2. Differential Pulse Code Modulation
3. Delta Modulation
4. Time Division Multiplexing of 2 Band Limited Signals
5. Frequency shift Keying: Generation and Detection
6. Phase Shift Keying: Generation and Detection
7. Amplitude Shift Keying: Generation and Detection
8. Study of the Spectral characteristics of PAM, QAM
9. DPSK: Generation and Detection
10. QPSK: Generation and Detection

Equipment required for laboratories:

Microwave Lab Equipment:

Microwave bench setup with Klystron power supply
Microwave bench setup with Gunn power supply
Milli ammeter
VSWR Meter
Microwave components
Digital Communication Lab
CRO : 0-20MHz ;0-60MHz
Function Generators:0-1MHz
Experimental Kits

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	-	-/ 3/-	2

(A57211) **VLSI SYSTEM DESIGN LAB**

List of Experiments:

Note: Any SIX of the below experiments from each part are to be conducted (total 12).

E-CAD programs:

Programming can be done using any complier. Down load the programs on FPGA/CPLD boards and performance testing may be done by simulation using XILINX or equivalent front end tools.

1. HDL code to realize all the logic gates
2. Design of 2-to-4 decoder
3. Design of 8-to-3 encoder (without and with parity)
4. Design 8-to-1 multiplexer
5. Design of 4-bit binary to gray converter
6. Design of Multiplexer / Demultiplexer, Comparator
7. Design of full adder using 3 modeling styles
8. Design of flip flops: SR, D, JK, T
9. Design of 4 bit binary, BCD counters (Synchronous/Asynchronous reset) or any sequence counter
10. Finite State Machine Design

VLSI programs:

Programming can be done using CADENCE or Equivalent CAD tools

1. Introduction to layout design rules.
2. Layout, physical verification, placement & route for complex design. Static timing analysis, IR drops analysis and crosstalk analysis of the following.
   - Basic logic gates
   - CMOS inverter
   - CMOS NOR /NAND gates
   - CMOS XOR and MUX gates
   - CMOS 1-bit Full Adder
   - Static /Dynamic logic circuit (register cell)
   - Latch
   - Pass Transistor
3. Layout of any combinational circuit (complex CMOS logic gate) learning about data paths
4. Introduction to SPICE simulation and coding of NMOS/CMOS circuit.
5. SPICE simulation of basic analog circuits: Inverter/Differential amplifier
6. Analog Circuit simulation (AC analysis) – CS & CD amplifier
7. System level design using PLL.

Equipment required for laboratories:

PC: P-IV

Operating system: Windows XP or Higher version

Software: XILINX, Cadence and LT spice or equivalent
Kits: FPGA Spartan 3 & ZED Boards.

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	3	1	3

(A58017) **POWER ELECTRONICS**
(OPEN ELECTIVE-II)

Prerequisite: EDC

Course Objectives:

1. To understand and acquire knowledge about various power semiconductor devices
2. To analyze and design various power converter circuits
3. To know their applicability as per the specific requirement
4. Introduce hardware and software used in power electronic switching circuits

UNIT-I

Power Semi Conductor Devices and Commutation Circuits

Thyristors – Silicon Controlled Rectifiers (SCRs) – BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors .Basic theory of operation of SCR – Static characteristics and Dynamic characteristics of SCR - Turn on and Turn off times – Turn on and turn off methods- Salient points.

Two transistor analogy of SCR - UJT firing circuit - Series and parallel connections of SCRs Snubber circuit details – Specifications and Ratings of SCRs, BJT, IGBT - Numerical problems.

UNIT-II

Single Phase Half Controlled Converters and Fully Controlled Converters

Phase control technique - Single phase Line commutated converters Midpoint and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load with continuous current mode of operation –Derivation of average load voltage and current - Active and Reactive power inputs to the converters without and with Free wheeling Diode.

Fully controlled converters, Midpoint and Bridge connections with Resistive, RL loads and RLE load for continuous current mode of operation. Derivation of average load voltage and current – Line commutated inverters. Active and Reactive power inputs to the converters without and with Freewheeling Diode. Effect of source inductance – Derivation of load voltage and current – Numerical problems.

UNIT-III

Three Phase Line Commutated Converters

Three phase converters – Three pulse and six pulse converters – Midpoint and bridge connections average load voltage With R and RL loads.

Effect of Source inductance–Dual converters (both single phase and three phase) - Waveforms –Numerical Problems.

UNIT-IV

AC Voltage Controllers & Cyclo Converters

AC voltage controllers – Single phase two SCRs in anti parallel – With R and RL loads – modes of operation of Triac with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms. Firing circuits -Numerical problems.

Cyclo converters – Single phase midpoint Cyclo converters with Resistive and inductive loads (Principle of operation only) – Bridge configuration of single phase Cyclo converter (Principle of operation only) – Waveforms

UNIT-V

Choppers and Inverters

Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads for continuous and discontinuous current modes.

Step up Chopper – load voltage expression

Morgan's chopper – Jones chopper (Principle of operation only) -Waveforms - AC Chopper – Problems.

Inverters – Single phase inverter – Basic series inverter – Basic parallel Capacitor inverter-Bridge inverters -120^{o} and 180^{o} modes of operation – Waveforms – Simple forced commutation circuits for bridge inverters. Voltage control techniques for inverters-Pulse width modulation techniques – Numerical problems.

TEXT BOOKS:

1. Power electronics-P.S. Bimbhra- Khanna Publishers, 4^{th} Edition

REFERENCE BOOKS:

1. Power electronics – M.D. Singh & K.B. Kanchandhani, Tata Mc Graw – Hill Publishing Company, 2^{nd} edition.
2. Power Electronics: Circuits Devices and Applications – M.H. Rashid, Prentice Hall of India, 3^{rd} edition.
3. Power Electronics – Vedam Subramanyam, New Age International (p) Limited, Publishers.

4. Power Electronics – P.C. Sen, Tata Mc Graw-Hill Publishing.
5. Thyristorised power Controllers – G.K. Dubey, S.R Doradra, A. Joshi and R.M.K. Sinha, New Age international Pvt Ltd. Publishers latest edition

Course Outcomes

After completing this course the student must demonstrate the knowledge and ability to

1. Characteristics of various Power Electronics devices such as SCR, TRIAC, DIAC, IGBT, GTO etc.
2. To apply fundamental concepts of Power Electronics devices in Choppers, Inverters and Converters etc.
3. To identify basic requirements for power electronics based design application.
4. To understand the use of power electronics in commercial and industrial applications.

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	3	1	3

(A58009**) PROJECT MANAGEMENT**
(OPEN ELECTIVE-II)

Course Aim: The objective of this course is to lay the foundation to students in managing projects with a special focus on every phase such as project planning, execution, monitoring and evaluation

UNIT-I

Introduction: Introduction to Project management, Need for Project Management, Project Lifecycle, Project Management Phases In Lifecycle, Project Management Research in Brief, Project Management Today, Organization Strategy and Structure And Culture, Format Of Organization Structure, Stake Holder Management, Organization Culture, Creating a Culture for Project Management, Project Management Principles.

UNIT-II

Project Identification and Planning: Project Identification Process, Defining the Project, Approaches to Project Screening and Selection, Project Planning, Work Breakdown Structure, Financial Module, Getting Approval And Compiling a Project Charter, Setting up a Monitoring and Controlling Process.

UNIT-III

Project Execution: Initiating The Project, Controlling and Reporting Project Objectives, Conducting Project Evaluation, Risk, Role of Risk Management, Project Management, Four Stage Process, Risk Management an Integrated Approach, Cost Management, Creating a Project Budget

UNIT-IV

Leading Project Teams: Building a Project Team, Characteristics of an Effective Project Team, Achieving Cross- Functional Co-Operation, Virtual Project Teams, Conflicts Management, Negotiations.

UNIT-V

Performance Measurement and Evaluation: Monitoring Project Performances , Project Control Cycles, Earned Value Management, Human Factors in Project Evaluation and Control, Project Termination, Types of Project Terminations, Project Follow-Up. Current and Future Trends in Project Management.

Text Book:

1. Gray, Larson, Project Management, Tata McGraw Hill,2015.

References

1. Jeffery K.Pinto, Project Management, Pearson Education,2015
2. Enzo Frigenti, Project Management, Kogan, 2015
3. R. Panneerselvam & P. Senthilkumar, Project Management, PHI, 2015
4. Thomas M.Cappels, Financially Focused Project Management, SPD, 2008.
5. Guide to Project Managemen1t Body of Knowledge (PMBOK® Guide) of Project Management Institute, USA.

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	3	1	3

(A58008) **DISASTER MANAGEMENT**
(OPEN ELECTIVE-II)

UNIT - I:Environmental Hazards & Disasters:
Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT - II: Types of Environmental hazards & Disasters:
Natural hazards and Disasters - Man indeced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards / disasters - Planetary Hazards - Endongenous Hazards - Exogenous Hazards

UNIT - III: Endogenous Hazards - Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards / disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjusment, perception & mitigation of earthquake.

UNIT - IV: Exogenous hazards / disasters - Infrequent events - Cumulative atmospheric hazards / disasters
Infrequent events: Cyclones - Lightning - Hailstorms
Cyclones: Tropical cyclones & Local stroms - Destruction by tropical cyclones & local stroms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters :- Floods - Droughts - Cold waves - Heal waves Floods :- Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception & mitigation) Droughts :- Impacts of droughts - Drought hazards in India - Drought control measures - Extra Planetary Hazards / Disasters - man induced Hazards / Disasters - Physical hazards / Disasters - Soil erosion
Soil Erosion: Mechanics & forms of Soil Erosion - Factors 7 causes of Soil Erosion - Conservation measures of Soil Erosion.

Chemical hazards / disasters: Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes :- Global Sedimentation problems - Regional Sedimentation problems - Sedimentation & Environmental problems - Corrective measures of Erosion & Sedimentation
Biological hazards / disasters: Population Explosion.

UNIT - V:
Emerging approaches in Disaster Management - Three stages

1. Pre-disaster Stage (preparedness)

2. Emergency Stage
3. Post Disaster stage - Rehabilitation

TEXT BOOKS:

1. Disaster Mitigation: Experiences And Reflections by Pradeep Sahni
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning

REFERENCES:

1. R. B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990
2. Savinder Singh Environmental Geography, Prayag Pustak Bhawann 1997
3. Kates, B. I & White, G. F The Environment as Hazards, oxford, New York, 1978
4. R. B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
5. H. K. Gupta (Ed) Disaster Management, Universities Press, India, 2003
6. R. B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
7. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003
8. A. S. Arya Action Plan For Earthquake, Disaster, Mitigation in V. K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
9. R. K. Bhandani An overview on Natural & Man made Disaster & their Reduction, CSIR, New Delhi
10. M. C. Gupta Manuals on Natural Disaster Management in india, National Centre for Disaster Management, IIPA, New Delhi, 2001.

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	3	1	3

(A58018) **ENGINEERING SYSTEMS MODELING & SIMULATION**
(OPEN ELECTIVE-III)

UNIT - I

Basic Simulation Modeling, Systems, Models and Simulation, Nature of systems, event Driven Models, Simulation of Single server queuing system, event Driven models, Characterizing systems, Simulation Diagrams, approach to modeling and simulation.

UNIT – II: Stochastic Generators

Uniformly Distributed Random Numbers, Statistical Properties of U[01] generators, Generation Non-Uniform and Arbitrary Random Varietes, Random Processes, Characterizing and Generating Random Processes, White Noise.

Modeling time driven systems: Modeling Input signals, Discrete and Distributed Delays, System Integration, Linear Systems.

Exogenous signals and events: Disturbance signals, state machines, Petri nets & their analysis, System encapsulation.

UNIT – III: Markov Process

Probabilistic models, Discrete Time Markov processes, Random walks, Poisson processes, Exponential distribution, simulating a Poisson process, Continuous – Time Markov processes.

Even driven models: Simulation diagrams, Queuing theory, M/M/I Ques, simulating queuing systems, Finite Capacity Queues, Multiple Servers, M/M/C Queues.

UNIT – IV: System Optimization

System identification, Searches, Alpha/beta trackers, Multidimensional optimization, Modeling and simulation Methodology.

UNIT V : Simulation Software and Building Simulation Models

Comparison of simulation packages with Programming Languages, Classification of Simulation Software, Desirable Software features, General purpose simulation packages – Arena, Extend ;Guide Lines for Determining the level of Model detail, Techniques for increasing Model Viability and Credibility

TEXT BOOKS:

1. System Modeling & Simulation, An introduction – Frank L.Severance, John Wiley&Sons, 2001.
2. Simulation Modeling and Analysis – Averill M.Law, W.David Kelton, TMH, 3rd Edition, 2003

REFERENCE BOOKS:

1. Systems Simulation – Geoffery Gordon, PHI.

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	3	1	3

(A58019) **FUZZY AND NEURAL NETWORKS**

(OPEN ELECTIVE-III)

UNIT - I INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS:

Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between Brain and the Computer, Comparison Between Artificial and Biological Neural Networks, Network Architecture, Setting the Weights, Activation Functions, Learning Methods.

UNIT - II FUNDAMENTAL MODELS OF ARTIFICIAL NEURAL NETWORKS:

Introduction, McCulloch: Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Least mean Square (LMS) rule, Competitive Learning Rule, Out Star Learning Rule, Boltzmann Learning, Memory Based Learning.

UNIT - III FEED FORWARD NETWORKS :

Introduction, Single Layer Perceptron Architecture, Algorithm, Application Procedure, Perception Algorithm for Several Output Classes, Perceptron Convergence Theorem, Brief Introduction to Multilayer Perceptron networks, Back Propagation Network (BPN), Generalized Delta Learning Rule, Back Propagation rule, Architecture, Training Algorithm, Selection of Parameters, Learning in Back Propagation, Application Algorithm, Local Minima and Global Minima, Merits and Demerits of Back Propagation Network, Applications, Radial Basis Function Network (RBFN), Architecture, Training Algorithm for an RBFN with Fixed Centers.

UNIT - IV ADALINE AND MADALINE NETWORKS:

Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm. COUNTER PROPAGATION NETWORKS: Winner Take: all learning, out star learning, Kohonen Self organizing network, Grossberg layer Network, Full Counter Propagation Network (Full CPN), Architecture, Training Phases of Full CPN, Training Algorithm, Application Procedure, Forward Only counter Propagation Network, Architecture, Training Algorithm, Applications, Learning Vector Quantizer (LVQ).

UNIT - V CLASSICAL AND FUZZY SETS:

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. FUZZY LOGIC SYSTEM COMPONENTS: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

TEXT BOOKS:

1. S. N. Sivanandam, S. Sumathi, S. N. Deepa (2006), Introduction to Neural Networks using MATLAB 6.0, Tata McGraw-Hill, New Delhi.

2. S. Rajasekharan, G. A. Vijayalakshmi Pai(2004), Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis And Applications, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. B. Yegnanarayana (2007), Artificial Neural Networks, Prentice Hall of India, New Delhi.

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	3	1	3

(A58020) **BIG DATA ANALYTICS**
(OPEN ELECTIVE –III)

Objectives:
To understand about big data To learn the analytics of Big Data To Understand the Map Reduce fundamentals.

UNIT I Big Data Analytics : What is big data, History of Data Management ; Structuring Big Data ; Elements of Big Data ; Big Data Analytics; Distributed and Parallel Computing for Big Data; Big Data Analytics:What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; Basically Available Soft State Eventual Consistency (BASE); Open source Analytics Tools;

UNIT- II Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics; Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

UNIT -III Understanding MapReduce Fundamentals and HBase : The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop : Introduction of HDFS, Architecture, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS;

UNIT IV Big Data Technology Landscape and Hadoop : NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors; HDFC (Hadoop Distributed File System), HDFC Daemons, read,write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN.

UNIT V Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets; Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools;

TEXT BOOKS

1. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. BIG DATA, Black BookTM , DreamTech Press, 2015 Edition. BUSINESS ANALYTICS 5e , BY Albright |Winston

REFERENCE BOOKS:

1. Rajiv Sabherwal, Irma Becerra- Fernandez," Business Intelligence –Practice, Technologies and Management",
2. John Wiley 2011. Lariss T. Moss,ShakuAtre, " Business Intelligence Roadmap",
3. Addison-Wesley It Service. Yuli Vasiliev, " Oracle Business Intelligence : The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012.