GR-14 Syllabus

B. Tech. ELECTRONICS & COMMUNICATION Engineering

I Year B.Tech. (ECE). – I Semester

ENGLISH -I *(Common to all branches)*

DETAILED TEXT-I English Essentials: Recommended Topics:

1. **IN LONDON: M. K. GANDHI**

   OBJECTIVE: To apprise the learner how Gandhi spent a period of three years in London as a student.

   OUTCOME: The learner will understand how Gandhi grew in introspection and maturity.

2. **THE KNOWLEDGE SOCIETY- APJ KALAM**
   OBJECTIVE: To make the learners rediscover India as a land of Knowledge.

   OUTCOME: The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. **THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE**

   OBJECTIVE: This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.

   OUTCOME: This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

4. **PRINCIPLES OF GOOD WRITING:**
   OBJECTIVE: To inform the learners how to write clearly and logically.

   OUTCOME: The learner will be able to think clearly and logically and write clearly and logically.

5. **MAN'S PERIL**
   OBJECTIVE: To inform the learner that all men are in peril.
   OUTCOME: The learner will understand that all men can come together and avert the peril.

6. **THE DYING SUN—SIR JAMES JEANS**

   OBJECTIVE: This excerpt from the book "The Mysterious Universe" presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.

   OUTCOME: This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.

7. LUCK—MARK TWAIN

OBJECTIVE: This is a short story about a man‟s public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

OUTCOME: The story is humourous in that it contains a lot of irony. Thus, this develops in the learner understand humourous texts and use of words for irony.

Text Book: English Essentials by Ravindra Publications

NON-DETAILED TEXT:

(From Modern Trailblazers of Orient Blackswan) (Common single Text book for two semesters)

(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)

1. G. D. Naidu

OBJECTIVE: To inspire the learners by G.D.Naidu‟s example of inventions and contributions.

OUTCOME: The learner will be in a position to emulate G.D.Naidu and take to practical applications.

2. G. R. Gopinath

OBJECTIVE: To inspire the learners by his example of inventions.

OUTCOME: Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

3. Sudhamurthy

OBJECTIVE: To inspire the learners by the unique interests and contributions of Sudha Murthy.

OUTCOME: The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

4. Vijay Bhatkar

OBJECTIVE: To inspire the learner by his work and studies in different fields of engineering and science.

OUTCOME: The learner will emulate him and produce memorable things.

Text Book : Trail Blazers by Orient Black Swan Pvt. Ltd. Publishers

I Year B.Tech. (ECE). – I Semester

MATHEMATICS – I (DIFFERENTIAL EQUATIONS)
(Common to all branches)

Objective: "In this course the student is expected to learn various techniques of solving first order and higher order Differential equations which are indispensable in all branches of Engineering. Also, he will learn the theory of Laplace transform and inverse transform having application mainly in solving Differential equations and infinite integrals. Finally, he will learn partial differentiation, able to solve first order partial differential equations and higher order partial differential equations with applications to Heat equation, Wave equation, Laplace equation

UNIT I: Differential equations of first order and first degree: Linear-Bernoulli-Exact-Reducible to exact. Applications: Newton‟s Law of cooling-Law of natural growth and decay-orthogonal trajectories.

UNIT II: Linear differential equations of higher order: Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e *ax* , Sin ax, cos ax, polynomials in x, e *ax* V(x), xV(x). Applications: LCR circuit, Simple Harmonic motion.

UNIT III Laplace transforms: Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac‟s delta function- Inverse Laplace transforms– Convolution theorem (with out proof). Applications: Solutions of ordinary differential equations using Laplace transforms.

UNIT IV Partial differentiation: Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent‟s series for two variables– Functional dependence- Jacobian.
Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT V First order Partial differential equations: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations.

UNIT VI Higher order Partial differential equations: Solutions of Linear Partial differential equations with constant coefficients- Method of separation of Variables. Applications: One-dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Books:

1. **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
3. **GREENBERG,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
4. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O'NEIL,** advanced Engineering Mathematics, Cengage Learning.

I Year B.Tech. (ECE). – I Semester

C- PROGRAMMING
(Common to CSE, ECE, EEE&IT)

Unit – 1: Introduction to Computers
Introduction to computer programming, Computer languages- Machine level, Assembly level and High-level language.

Number System: Representation of characters, integers, fractions, hexadecimal representation, conversions- decimal, binary, octal, hexadecimal.

Importance of C, Program development steps.

Unit – 2: Introduction – 'C' Fundamentals
Structure of a C-program, Algorithm, flow chart, C-character set, C Tokens, keywords and identifiers, constants, variables, data types and sizes.

Operators, Arithmetic expressions, type conversion, operator precedence and associativity.

Unit - 3: I-O statements, Decision making and branching
Header files, Standard I/O library functions, formatted I/O functions, simple if, if-else, nested if-else, else-if ladder, switch-case statements and sample programs.

Unit – 4: Decision making and Looping
Iterative- while, do, for statements, jump statements- goto, break, continue, structured programming, looping applications: summation, powers, smallest and largest.

Unit – 5: Arrays and Strings

Arrays- declaration, initialization, accessing and storing elements of 1-D, 2-D and multi-dimensional arrays, array applications- addition, multiplication, transpose, symmetry of a matrix.

Strings- declaration, initialization, reading and writing characters and strings, string operations, character and string manipulation functions.

Unit - 6: Functions

Functions- declaration, definition, prototype, function call, return statement, types of functions, parameter passing, scope of variables, storage classes, sample programs

Text Books

1. ***"Programming in C"*** by Ashok N. Kamthane, 2/e Pearson, 2013.
2. "***The C – Programming language***" B.W.Kernighan, Dennis M. Ritchie.PHI.
3. ***"Let Us C"***, *12th Edition* by Yashavant P. Kanetkar online in India.

Reference Books

1. ***"Programming in C"*** by Ajay Mittal, Pearson.
2. Programming with C, Bichkar, Universities press.
3. Programming in C, Reema Thareja, OXFORD.

I Year B.Tech.(ECE)– I Semester

Applied Mechanics

Course Objectives: *The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.*

Unit – I

Learning objectives: To understand the concepts of forces and its resolution in different planes. Introduction to Engg. Mechanics – Basic Concepts.

Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction.

Unit-II

Learning objectives: To understand the concepts of Equilibrium of Systems of Forces, law of Triangle of forces and converse of the law of polygon of forces.

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

Unit – III

Learning objectives: To understand the concepts of Centroid, Centre of Gravity law of Triangle of forces and pappus theorem.

Centroid: Centroids of simple figures (from basic principles)

Centre of Gravity: Centre of gravity of simple body (from basic principles), pappus theorem.

Unit-IV

Learning objectives: To understand the concepts of Area moments of Inertia, Mass Moment of Inertia.

Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia : Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

Unit – V

Learning objectives: To understand the concepts of Rectilinear and Curvilinear motions, Analysis as a Particle and Analysis as a Rigid Body in Translation.

Kinematics: Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Introduction to Equations of Plane Motion.

Unit – VI

Learning objectives: To understand the concepts of Equations for Translation and Impulse momentum method.

Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

Text Books:

1. Engg.Mechanics - S.Timoshenko & D.H.Young., 4th Edn, Mc Graw Hill publications.
2. Engineering Mechanics statics and dynamics , A Nelson , Mc Graw Hill publications
3. Engineering Mechanics, GS Sawhney, PHI Learning Pvt. Ltd.
4. Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press.

References:

1. Engineering Mechanics, statics and dynamics – I.H.Shames, – Pearson Publ.
2. Mechanics for Engineers, dynamics - F.P.Beer & E.R.Johnston –5th Edn Mc Graw Hill Publ.
3. Engineering Mechanics, Fedinand . L. Singer , Harper – Collins

I Year B.Tech. (ECE) – I Sem.

Basic Engineering Drawing

Course Objectives: *Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.*

Unit-I

Learning objectives: To understand the concepts and use of drawing Instruments and Curves used in Engineering Practice. Introduction to drawing Instruments and uses. Lettering.

Polygons: Construction of regular polygons using given length of a side; Curves used in Engineering Practice, conic sections, construction of conics by different methods.

Unit- II

Learning objectives: To understand the concepts of Vernier and Diagonal scales and concepts of orthographic projections. Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

Unit-III

Learning objectives: To understand the concepts of projections of straight lines. Projections of straight lines inclined to both the planes, determination of true lengths and angle of inclinations.

Unit- IV

Learning objectives: To understand the concepts of Projections of planes. Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

Unit –V

Learning objectives: To understand the concepts of Projections of various solids. Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

Unit- VI

Learning objectives: To understand the concepts of Projections of isometric views to orthographic views. Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Text Books:

1. Engineering Graphics by PI Varghese, McGrawHill Publishers
2. Engineering Drawing by N.D. Butt, Chariot Publications
3. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.

Reference Books:

1. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
2. Engineering Drawing by Shah & Rana, Pearson Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age Publishers

I Year B.Tech. (ECE). – I Semester

Professional Ethics and Human Values

Course Learning Objectives:

The objectives of the course is to impart

1. Overall understanding of the Human values like Morals, Values, Service learning, Respect for others.

2. Basic understanding of the Engineering Ethics like Profession, Professionalism, role of an Engineer, Consensus and Controversy in Engineering Ethics

3. To impart the knowledge regarding Engineer's Responsibility for Safety and Risk

4. An understanding of the Engineer's Rights such as collegiality, Conflict of interest , Collective Bargaining.

5. Awareness on the social issues, environmental Ethics and global treaties

UNIT I: Human values

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT II: Engineering ethics

The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer – Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics-Kohlberg‟s Theory – Gilligan‟s Argument – Heinz's Dilemma.

UNIT III: Engineering as social experimentation

Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers' responsibility for safety and risk

Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences – Expected Probability - Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk – Safety and the Engineer - Designing for Safety – Risk - Benefit Analysis-Accidents.

UNIT V: Engineer's responsibilities and rights

Collegiality - Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty – misguided – Loyalty - professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self Interest , Customs and Religion- Ethical egoism-Collective bargaining Confidentiality Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational in other companies-Occupational - price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

UNIT VI: Global issues

Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

TEXT BOOKS

1.“Engineering Ethics includes Human Values” by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009

2.“Professional Ethics and Morals” by Prof.A.R.Aryasri, Dharanikota Suyodhana – Maruthi Publications

3.“Professional Ethics and Human Values” by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-Laxmi Publications.

4.“Professional Ethics and Human Values” by Prof.D.R.Kiran

5.“Indian Culture, Values and Professional Ethics” by PSR Murthy-BS Publication

6.“Ethics in Engineering” by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.

7.“Engineering Ethics” by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

I Year B.Tech. (ECE). – I Semester

ENGLISH COMMUNICATION SKILLS LAB

S. No.	UNIT	TOPIC
1	I	Letter and sounds Sounds of English Important patters of Sounds
2	II	Stress and intonation Dialogue - Intonation Patterns
3	III	Conversational Skills
4	IV	Presentation skills, types of presentation
5	V	Argumentative skills
6	VI	Soft skills- Behavioural skills Time management Positive thinking Decision making

I Year B.Tech. (ECE). – I Semester

C PROGRAMMING LAB

(Common to CSE, ECE, EEE&IT)

Exercise l

a) Write a C Program to calculate the area of triangle using the formula
area = (s (s-a) (s-b)(s-c))1/2
where s= (a+b+c)/2
b) Write a C program to find the largest of three numbers using ternary operator.
c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2

a) 2"s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2"s complement of 11100 is 00100. Write a C program to find the 2"s complement of a binary number.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequenceUse the summing series method to compute the value of SIN(x),COS(x) and e^x
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value Supplied by the user.

Exercise 4

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.
b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5

a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to implement a liner search.
c) Write a C program to implement binary search.

Exercise 6

a) Write a C function to find both the largest and smallest number of an array of integers.
b) Write C programs illustrating call by value and call by reference concepts.

I Year B.Tech. (ECE). – I Semester

Engineering Workshop & IT Workshop

ENGINEERING WORKSHOP

Course Objective: To impart hands-on practice on basic engineering trades and skills.

Note: At least two exercises to be done from each trade.

Trade:

Carpentry	1. T-Lap Joint 2. Cross Lap Joint 3. Dovetail Joint 4. Mortise and Tennon Joint
Fitting	1. Vee Fit 2. Square Fit 3. Half Round Fit 4. Dovetail Fit
Black Smithy	1. Round rod to Square 2. S-Hook 3. Round Rod to Flat Ring 4. Round Rod to Square headed bolt
House Wiring	1. Parallel / Series Connection of three bulbs 2. Stair Case wiring 3. Florescent Lamp Fitting 4. Measurement of Earth Resistance
Tin Smithy	1. Taper Tray 2. Square Box without lid 3. Open Scoop 4. Funnel

IT Workshop

Objectives: The IT Workshop for engineers is a 6-training lab course spread over 45 hours. The modules include training on PC hardware, Internet and WWW and Productivity tools including MS-Word,Excel,Powerpoint and Publisher.

1. Identify the components of a computer, components in a CPU and its functions. Draw block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
2. Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a viva.

3. Every student should individually install windows XP on the personal computer. Lab instructors should verify the installation and follow it up with a viva.
4. Every student should install Linux on the computer. This computer should have windows installed .The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a viva.
5. Several mini tasks would be that covers Basic commands in Linux and Basic system administration in Linux which includes: Basic Linux commands in Bash, Create hard and symbolic links .Text processing, using wildcards.
6. Web Browsers and Surfing the web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and popup blockers.also, plugins like Macromedia Flash and JRE for Applets should be configured.
7. Search Engines and Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google.This should be demonstrated to the instructors.
8. Cyber Hygiene: Students would be exposed to the various threats on then internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block popups, block activeX downloads to avoid virus and/or worms.
9. Creating Project Abstract features to be covered: Formatting styles, inserting table, bullets and numbering, changing text direction ,cell alignment, footnote, hyperlink, symbols, spell check, track changes.
10. Creating A NewsLetter: Features to be covered-table of content, news paper coloums, images from files and clipart, drawing toolbar and wordart, formatting images, textboxes and paragraphs.
11. Excel orientation: The mentor needs to tell the importance of Ms-Excel as a spreadsheet tool, give the details of the four tasks and features that would be covered in each using Excel-Accessing, Overview of toolbars, saving Excel files, using help and resources.
12. Students will be working on basic power point utilities and tools which help them create a basic power point presentation.
13. PPT orientation slide layouts, inserting text, wordart, formatting text, bullets and numbering auto shapes lines and arrows in both Latex and Power point.

I Year B.Tech. (ECE). –II Semester

English – II

DETAILED TEXT-II: Sure Outcomes: English for Engineers and Technologists

UNIT-1: Technolgy with a human face

Objective: *"To make the learner understand how modern life has been shaped by technology."*

Outcome: The proposed technology is people's technology. It serves the human person instead of making him the servant of machines.

UNIT II: Climate change and human strategy

Objective*: "To make the learner understand how the unequal heating of earth's surface by the Sun, an atmospheric circulation pattern is developed and maintained."*

Outcome: The learner's understand that climate must be preserved.

UNIT III: Emrging technologies

Objective: *"To introduce the technologies of the 20th century and 21st centuries to the learners".*

Outcome: The learner will adopt the applications of modern technologies such as nanotechnology.

UNIT IV: Water- the elixir of life

Objective: "*To inform the learner of the various advantages and characteristics of water".*

Outcome: The learners will understand that water is the elixir of life.

UNIT V: The secret of work

Objective: *"In this lesson, Swami Vivekananda highlights the importance of work for any development".*

Outcome: The students will learn to work hard with devotion and dedication.

UNIT VI: Work brings solace

Objective: *"In this lesson Abdul Kalam highlights the advantage of work".*

Outcome: The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

TEXT BOOK: Sure Outcomes" by Orient Black Swan Pvt. Ltd. Publishers

NON-DETAILED TEXT:

UNIT V: J.C. Bose

Objective*: "To apprise of J.C.Bose's original contributions."*

Outcome: The learner will be inspired by Bose's achievements so that he may start his own

original work.

UNIT VI: Homi jehangir bhaba

Objective: *"To show Bhabha as the originator of nuclear experiments in India*

Outcome: The learner will be inspired by Bhabha's achievements so as to make his own experiments.

UNIT VII: Vikram sarabhai

Objective: "*To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes".*

Outcome: The learner will realize that development is impossible without scientific research.

UNIT VIII: A Shadow- R.K.Narayan

Objective: "*To expose the reader to the pleasure of the humorous story".*

Outcome: The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

TEXT BOOK: Trail Blazers" by Orient Black Swan Pvt. Ltd. Publishers

I Year B.Tech. (ECE). –II Semester

MATHEMATICS –II
(Numerical Methods and Integral Transforms)
(Common to CSE, ECE and EEE)

Objective: *"Upon the completion of this course the student is expected to learn numerical techniques useful in solving algebraic and transcendental equations, interpolating given data, solving initial value problems in ordinary differential equations. Next the student will learn theory of fourier series, fourier transforms, z – transforms useful in solving boundary value problems in conduction of heat electrodynamics, fluid mechanics, communication systems, control systems etc. "*

UNIT I: Solution of Algebraic and Transcendental Equations
Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method.

UNIT II: Interpolation
Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton‟s formulae for interpolation – Interpolation with unevenlyspaced points - Lagrange‟s Interpolation formula

UNIT III: Numerical solution of Ordinary Differential equations
Solution by Taylor‟s series-Picard‟s Method of successive Approximations-Euler‟s Method-Runge-Kutta Methods

UNIT IV: Fourier Series
Introduction- Determination of Fourier coefficients – even and odd functions –change ofinterval–Half-range sine and cosine seriesapplication: Amplitude, spectrum of a periodic function

UNIT V: Fourier Transforms
Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosinetransforms – properties – inverse transforms – Finite Fourier transforms

UNIT VI: Z-transform
Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z transform- Convolution theorem – Solution of difference equation by Z -transforms.

REFERENCE BOOKS:

1. **B.S. GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **DEAN G. DUFFY,** Advanced Engineering Mathematics with MATLAB, CRC Press
3. **V. RAVINDRANATH and P. VIJAYALAXMI,** Mathematical Methods, Himalaya Publishing House
4. **ERWYN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India

B. Tech. I Year – II Sem.

MATHEMATICS –III
(LINEAR ALGEBRA & VECTOR CALCULUS)
(Common to all branches)

Objective: *"In this course the student is expected to learn various techniques in matrix theory multiple integrals, vector differentiation, vector integration, special functions which are useful in solving engineering problems like finding current in an electrical circuit, free vibrations of a two mass system, finding moment of inertia, work done when force is applied, potential of a vector function and evaluating complicated integrals".*

UNIT I: Linear systems of equations
Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods. Application: Finding the current in a electrical circuit.

UNIT II: Eigen values - Eigen vectors and Quadratic forms
Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem – **without proof** Inverse and powers of a matrix by using Cayley-Hamilton theorem- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature. Application: Free vibration of a two-mass system.

UNIT III: Multiple integrals
Review concepts of Curve tracing (Cartesian - Polar and Parametric curves)- **No question from this part** Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates. Multiple integrals - double and triple integrals – change of variables – Change of order of Integration Application: Moments of inertia.

UNIT IV: Special functions
Beta and Gamma functions- Properties - Relation between Beta and Gamma Functions - Evaluation of improper integrals Application: Evaluation of integrals

UNIT V: Vector Differentiation
Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities Application: Equation of continuity, potential surfaces

UNIT VI: Vector Integration
Line integral – work done – Potential function – area- surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems. Application: work done, Force

REFERENCE BOOKS:

1. **GREENBERG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
2. **B.V. RAMANA,** Higher Engineering Mathematics, Tata McGrawhill
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
4. **PETER O'NEIL,** Advanced Engineering Mathematics, Cengage Learning
5. **D.W. JORDAN AND T. SMITH,** Mathematical Techniques, Oxford University Press

I Year B.Tech – II Semester

ADVANCED C PROGRAMMING
(Common to CSE, ECE, EEE &IT)

Unit - 1: Working with Arrays & Pointers
Defining a pointer variable, Using pointers in Expressions, Pointers and Arrays, Operations on pointers, Pointers and Memory address.
Unit - 2: Working with Structures and Union
Defining structure, Functions and structures, Initializing structures, Array of structures, structures containing structures, structures containing Arrays, Structure variants. Defining Union, Unions and structures, Initializing Unions, Programs with Union.
Unit - 3: Fundamentals of Linked List
Memory Allocation of list, Self-referential structures, Single list creation, list operations: insertion, deletion and traversing a list.
Unit - 4: Operations on Bits
Bit operators, Bit fields, the pre-processor: The # define statement, The # # operator, The #include statement, Conditional compilation. More on Data Types: Enumerated Data Types, The type def statement, Data Type conversions.
Unit – 5: Operations on Files
Introduction to files, initializing file, file operations- read, write, update, add, delete, programs using Files
Unit – 6: Searching & Sorting
Linear search, binary search, bubble sort, insertion sort, selection sort, Linear sort,

Text Books:

1. The C – Programming language B.W.Kernighan, Dennis M .Ritchie.PHI.
2. Let Us C, 12th Edition written by Yashavant P. Kanetkar online in india.
3. C programming and data Structures 5th Edition, by E Balagurusamy, Tata Mc Graw Hill.
4. Problem Solving and Program Design in C 7thEdition, Jeri R Hanly, Elliot B Koffman, Pearson.

Reference Books

1. Programming in C by Ajay Mittal, Pearson.
2. Programming with C, Bichkar, Universities press.
3. Programming in C, Reema Thareja, OXFORD.
4. Data Structures and algorithm analysis in C, 2nd e dition, Mark Allen Weiss, Pearson.

I Year B.Tech – II Semester

Engineering Physics

UNIT I: PHYSICAL OPTICS FOR INSTRUMENTS

Objective: *"Designing an instrument and enhancing the resolution for its operation would be effect as achieved through study of application aspects of physical Optics"*

Interference: Introduction – Interference in thin films by reflection – Newton‟s rings.(4)

Diffraction: Introduction – Fraunhofer diffraction – Fraunhofer diffraction at double slit (qualitative)–Diffraction grating–Grating spectrum–Resolving power of a grating Rayleigh's criterion for resolving power. (3)

Polarization: Introduction – Types of Polarization – Double refraction – Quarter wave plate and Half Wave plate.(3)

UNIT II: COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objective*: "lasers are trusted Non-linear coherent sources establishing for the fitness of Instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base".*

Lasers: Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein‟s coefficients – Population inversion – Three and Four level pumping schemes – Ruby laser – Helium Neon laser.
(3)

Fiber optics: Introduction – Principle of wave propagation in Optical Fiber – Acceptance angle and acceptance cone-Numerical pertutre. (4)

Crystallography: Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC

X-ray difraction techniques: Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg‟s law. (3)

UNIT III: MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY

Objective: *"many of the Electrical or Electronic gadgets are designed basing on the response of naturally*
abundant and artificially made materials, while their response to E- or H- fields controls their performance".

Magnetic properties: Magnetic permeability – Magnetization – Organ or magnetic moment– Classification of Magnetic materials – Dia, para, Ferro, anti-ferro and ferri-magnetism Hysteresis curve. (5)

Dielectric properties: Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius – Mossotti equation – Dielectric loss, Breakdown and Strength.(4)

Superconductivity: General properties – Meissner effect – Type I and Type II superconductors– BCS Theory Flux quantization London‟s equations – Penetration depth-DC and AC Josephson effects–SQUIDS. (4)

UNIT IV: ACQUSTICS AND EM – FIELDS

Objective: "*The utility and nuances of ever pervading SHM and its consequences would be the first handonto as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding".*

Acoustics: Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine‟s formula, Eyring‟s formula. (3)
Electro-magentic fields: Gauss and stokes theorems (qualitative) – Fundamental laws of Electro magnetism – Maxwell‟s Electromagnetic Equations (Calculus approach) (3)

UNIT V: QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT

Objective: *"The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence".*

Quantum mechanics: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box. (4)
Free electron theory: Classical free electron theory – electrical conductivity–Mean free path–Relaxation time and drifty velocity–Quantum free electron theory - Fermi-Dirac (analytical) and its dependence on temperature–Fermi energy–density of states–derivations for current density. (6)
Band theory of solids: Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors &insulators – Concepts of effective mass of electron - concept of hole.(5)

UNIT VI: SEMICONDUCTOR PHYSICS

Objective: *"In the wake of ever increasing demand for the space and power the watch word "small is beautiful", understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base".*

Introduction: Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein‟s equation – Hall Effect – direct & indirect band gap semiconductors – Electronic transport Mechanism for LEDs, Photo conductors and solar cells. (6)

TEXT BOOKS

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd)
2. A text book of Engineering Physics by M.N.Avadhanulu & P.G.Kshirasagar (S.Chand publications)
3. Engineering Physics by M.R. Srinivasan (New Age international publishers)

REFERENCE BOOKS

1. Introduction to solid state physics‟ by Charles Kittle (Willey India Pvt.Ltd)
2. Applied Physics‟ by T. Bhimasenkaram (BSP BH Publications)
3. Applied Physics‟ by M.Arumugam (Anuradha Agencies)
4. Engineering Physics‟ by Palanisamy (Scitech Publishers)
5. Engineering Physics‟ by D.K.Bhattacharya (Oxford University press)
6. Engineering Physics‟ by Mani Naidu S (Pearson Publications)
7. Engineering Physics‟ by Sanjay D Jain and Girish G Sahasrabudhe (University Press)
8. Engineering Physics‟ by B.K.Pandey & S. Chaturvedi (Cengage Learning)

I Year B.Tech – II Semester

Environmental Studies

Course Learning Objectives:

The objectives of the course is to impart

1. Overall understanding of the natural resources

2. Basic understanding of the ecosystem and its diversity

3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities

4. An understanding of the environmental impact of developmental activities

5. Awareness on the social issues, environmental legislation and global treaties

UNIT I:

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance –

Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming

and climate change, acid rains, ozone layer depletion, population growth and explosion, effects.

Role of information Technology in Environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT II:

Natural Resources: 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 non-agriculture activities-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, Wasteland reclamation, 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:

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats **to biodiversity:** habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – **Conservation of biodiversity:** conservation of biodiversity.

UNIT IV:

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT V:

Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns.

Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT VI:

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

TEXT BOOKS:

1. Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi

3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE BOOKS:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.

2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada

3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi

4. Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning, New Delhi

I Year B. Tech – II Semester

ENGLISH COMMUNICATION SKILLS LAB

S. No.	UNIT	TOPIC
1	I	Letter and sounds Sounds of English Important patters of Sounds
2	II	Stress and intonation Dialogue - Intonation Patterns
3	III	Conversational Skills
4	IV	Presentation skills, types of presentation
5	V	Argumentative skills
6	VI	Soft skills- Behavioural skills Time management Positive thinking Decision making

I Year B.Tech – II Semester

ADVANCED C - PROGRAMMING LAB

(Common to CSE,ECE,EEE&IT)

Exercise 1

a) Write C Program to reverse a string using pointers.

b) Write a C program to compare two arrays using pointers.

Exercise 2

a)Write a C program consisting of pointer based functions to exchange value of two integers using pass by address.

b) Write a C program consisting of pointer based functions to find length of a string without using string handling functions

Exercise 3

a)Write C Programs to create a structure name as student with the following elements pin no,name,6 subjects marks as an array and find out each student total and percentage in the class of 30 students.

b) Write C Programs to create a new data set name as week and print all the days using enumerated data type(enum).

Exercise 4

a)Write C Programs to perform the following operations in single linked list(use the typedef user defined data type)

1.insertion
2.deletion
3.display

Exercise 5

a)Write C programs for linear search.

b) Write C programs for binary search

Exercise 6

a)Write C programs for bubble sort.

b) Write C programs for insertion sort.

c) Write C programs for selection sort.

d) Write C programs for linear sort(radix).

Exercise 7

a) Write a C program which copies one file to another.

b) Write a C program to count the number of Characters and number of lines in a file.

c) Write a C Program to merge two files into a third file.

Engineering Physics Lab - List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton‟s rings –Radius of Curvature of Plano_Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde‟s experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Senses Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee‟s apparatus.
14. Energy Band gap of a Semiconductor p-n junction.
15. Hall Effect for semiconductor.

II Year B.Tech. (ECE). – I Semester

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to ECE CSE IT & MECH)

Course Objective:

The aim of this is to equip the students with fundamental concepts of economics, budgeting, management & accounting. It helps them to understand the Intricacies of business units. The study of this subject strengthens them to start an enterprise on their own accord.

Unit- I
Objective: To understand the concept ;and nature of Managerial Economics and its relationship with other disciplines, concepts of Demand and Demand forecasting for Proper Production Planning.

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics and Scope – Managerial Economics and its relation with other subjects – Concepts of Demand – Types – Determinants, Law of Demand its Exception – Elasticity of Demand – Types and Measurement - Demand forecasting and its methods.

Unit-II

Objective: To understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost – Volume – Profit Analysis.

Production and Cost Analysis:

Production function Isoquants and Isocosts – Law of Variable proportions – Cobb-Douglas Production function- Economies of Scale- Cost Concepts-Opportunity Cost-Fixed Vs Variable Costs – Explicit Cost Vs Implicit Costs – Out of Pocket Costs Vs Imputed Costs – Cost Volume Profit Analysis- Determination of Break-Even Point (Simple Problems)

Unit-III

Objective: To understand the nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods.

Introduction to Markets, Theories of the Firm and Pricing Policies:

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, And Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

Unit- IV

Objective: To know the different forms of Business Organization and their Merits and Demerits both Public and Private Enterprises and the concepts of Business Cycles.

Types of Business Organizations and Business Cycles:

Features and Evaluation of Sole trader – Partnership – Joint Stock Company – State / Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

Unit- V

Objective: To understand the different Accounting Systems preparation of Financial Statements and uses of Different tools for performance evaluation.

Introduction to Financial Accounts:

Introduction to Double Entry Systems, Preparation of Journal – Subsidiary Books- Ledger-Cash Book-Trial Balance- Preparation of Financial Statements, Analysis of Financial Statements through Ratio Analysis (Simple Problems).

Unit – VI

Objective: To understand the concept of Capital, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods.

Capital, Capital Budgeting:

Capital, Significance of Capital, Sources of Finance (Capital) - Meaning of Capital Budgeting Need for Capital Budgeting - Techniques of Capital Budgeting - Traditional and Modern Methods.

TEXT BOOKS:

1. Prof. J.V. Prabhakara Rao, Prof.P. Venkata Rao. "Managerial Economics and Financial Analysis", Ravindra Publication.
2. Dr.A.R.Aryasri- Managerial Economics and Financial Analysis – TMH Publications.
3. Dr.N.Appa Rao, Dr.P. Vijay Kumar 'Managerial Economics and Financial Analysis", Cengage Publications New Delhi

Reference:

1. Dr.B. Kuberudu and Dr.T.V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House.

Course Outcomes:

Upon successful completion of the course, the student should be familiar with and be able to:

- Know economic activities performed by the businessmen
- Aware the significance of demand, its analysis, measurement of demand and its forecasting
- Understand the different structures of market covering how price is determined under different market structures.
- Gain the knowledge how double entry book keeping will give an exposure to the maintenance of books of records and allocation of profits in an enterprise?
- Know how the allocation of capital plays a vital role in a business organization?

II Year B.Tech. (ECE). – I Semester

ELECTRICAL TECHNOLOGY

Course Objective: *To study of the electrical engineering, basically involves the analysis of the energy transfer from one form to another, an electrical machine, deals with the energy transfer either from mechanical to electrical from or from electrical to mechanical form,*

An electrical machine which converts mechanical energy into an electrical is called an electric generator, while an electrical machine which converts an electrical energy into the mechanical energy is called an electrical motor, in these subject constructional features of electrical machine, working principal and types are discussed.

UNIT-I

Objective: To lean the principle of electromechanical energy conversion of single excited and multi excited machines

Electromechanical Energy Conversion

Introduction to S.I units -Principles of electromechanical energy conversion - forces and torque in a magnetic field systems-energy balance – single excited machine - magnetic forces- co-energy - multi excited magnetic field system.

UNIT-II

Objective: To understand the principle of operation, constructional details and operational characteristics of DC generators

DC Generators

Operation and construction of DC generators , EMF equation - types of generators - magnetization and load characteristics of DC generators.

UNIT-III:

Objective: To understand the principle and characteristics of DC motors. To introduce starting and speed control methods of DC motors

DC Motors

Principle of operation and construction of DC Motors - types of DC Motors - Characteristics of DC motors - basic starting methods for DC shunt motor - losses and efficiency - Swinburne's test-speed control of DC shunt motor - flux and Armature voltage control methods.

UNIT-IV

Objective: To learn the principle of operation and constructional details of transformers. Develop the equivalent circuit and evaluate the performance of transformers

Transformers

Principle of operation of single phase transformer- types - constructional features - phasor diagram on no-load and load - equivalent circuit, losses and efficiency of transformer - regulation of transformer – OC and SC tests- predetermination of efficiency and regulation.

UNIT-V

Objective: To lean the principle of operation and constructional details of three phase induction motor. Study the torque - slip characteristics and starting methods of induction motor

Induction Machine

Principle of operation and construction of three-phase induction motors -slip ring and squirrel cage motors - slip-torque characteristics - efficiency calculation - starting methods.

UNIT-VI

Objective: To study the principle of operation of single phase induction motor, shaded pole motor, capacitor motor and AC servo motor

Special Machines

Principle of operation and construction – single phase induction motor - shaded pole motors - capacitor motors and AC servomotor.

TEXT BOOKS:

1. Principles of Electrical Machines by VK. Mehta & Rohit Mehta, S.Chand publications

2. Theory & performance of Electrical Machines by J.B.Guptha, S.K.Kataria & Sons

REFERENCE BOOKS

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications

2. Fundamentals of Electrical Engineering* by Rajendra Prasad, PHI Publications, 2nd edition

3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition

Course Outcomes:

1. Able to understand the principles of electro mechanical energy conversion.
2. Able to understand the operation of DC generator and analyze the characteristics of DC generator.
3. Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of DC motors.
4. Capability to develop equivalent circuit and evaluate performance of transformers.
5. Ability to analyze speed- Torque characteristics of induction motor and understand methods of induction motor.
6. Capability to understand the operation of various special machines.

II Year B.Tech. (ECE). – I Semester

NETWORK ANALYSIS

***Course Objective**: To impart knowledge on network and network topologies and various parameters which are using to design a networks new methods and techniques.*

UNIT – I

Objective: To get a basic understanding of network, network elements and network topology and also study various network analysis and reduction technique

Introduction to Electrical Circuits

Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources also

A.C Fundamentals and Network Topology

Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor- problem solving, Phase angle, Phasor representation, Addition and subtraction of phasors, mathematical representation of sinusoidal quantities, explanation with relevant theory, problem solving. Principal of Duality with examples.

Network Topology

Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule

UNIT – II

Objective: Understand AC fundamentals, study of steady state analysis of AC circuits and resonance and also study the concept of self and mutual inductance and coupled circuit analysis

Steady State Analysis of A.C Circuits : Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving

UNIT – III

Objective: To understand the application of network theorems in analyzing both AC and DC networks

Coupled Circuits and Resonance

Coupled Circuits Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits-problem solving. Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance,

Bandwidth of parallel resonance, general case- resistance present in both branches, anti resonance at all frequencies

UNIT – IV

Objective: Understanding fundamentals of two-port networks, study of various two-port network parameters and relationship between parameters sets

Network Theorems

Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Max Power Transfer, Tellegens- problem solving using dependent sources

Two-port networks

Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Inverse h-parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also

UNIT – V

Objective: Study of transients (AC and DC), understanding time constant, time domain and frequency domain transient analysis**.**

Transients

First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method.

UNIT – VI

Objective: To understand concept of filters, classification of filters and filter designing

Filters

L.P.F, H.P.F, B.P.F, Band Elimination, All pass prototype filters design, M-derived filters of L.P. and H.P. filters only, Composite design of L.P. and H.P filters

TEXT BOOKS :

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.

2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning

3. Electric Circuit Analysis by Hayt and Kimmarle, TMH

REFERENCES :

1. Network lines and Fields by John. D. Ryder 2nd edition,

2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.

3. Network Analysis and Filter Design by Chadha, Umesh Publications.

II Year B.Tech. (ECE). – I Semester

ELECTRONICS DEVICES & CIRCUTS

***Course Objective**:*

The course intends to provide an overview of the principles, operation and applications of the basic electronic components like diodes, BJT, FET etc. for performing various functions as well as understanding the characteristics of active devices and the frequency response of different amplifiers. This course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved.

UNIT-I

Objective: To learn the basic of semiconductor physics.

Semi Conductor Physics

Insulators, Semi conductors and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi conductors, extrinsic semi conductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.

UNIT-II

Objective: To study the construction details, operation and characteristics of various semiconductor diodes.

Junction Diode Characteristics

Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Devices

Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, optocoupler Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT Construction, operation and characteristics of all the diodes is required to be considered.

UNIT-III

Objective: Understand the operation and analysis of rectifiers with and without filters. Further study the operation of series and shunt regulators using zener diodes

Rectifiers and Filters

Basic Rectifier setup, Half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms; Filters; Inductor filter, Capacitor filter, L- section filter, π- section filter, Multiple L - section and Multiple-section filter ,comparison of various filter circuits in terms of ripple factors, voltage regulators-series and shunt.

UNIT-IV

Objective: To study the characteristics of different bipolar junction transistors (BJT) and field effect transistors (FET)

Transistor Characteristics

BJT, Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT-V

Objective: To study different BJT biasing stabilization and compensation techniques.

Transistor Biasing and Thermal Stabilization

Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in VBE, IC, and Stability factors, (S, Si, S"), compensation, Thermal runaway, Thermal stability.FET biasing methods and stabilization.

UNIT-VI

Objective: To understand the concepts of small signals low frequency circuits and analyzes transistor amplifiers using h-parameters.

Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h- parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h- parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

TEXT BOOKS:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition.
2. Electronic Devices and Circuits-B.P.Singh, Rekha Singh,Pearson Publications, Second Edition.

REFERENCES:

1. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition.
2. Electronic Devices and Circuits -BV Rao, KBR Murty, K Raja Rajeswari, PCR Pantulu, Pearson, 2nd edition.
3. Electronic Devices and Circuit Theory-R.L. Boylestad and Louis Nashelsky, Pearson Publications, Tenth Edition.

Course Outcomes:

1. Ability to know the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.
2. Obtain the characteristics of diode in forward and reverse bias and perform mathematical modelling of diode as a resistor and capacitor.
3. Perform analysis and design of a complete AC to DC converter (Eg: Mobile Charger) consisting of Rectifiers, Filters and regulators.
4. Ability to describe the construction and working of a Bipolar Junction Transistor and field effect transistor in various modes (CE, CB, CC) and (CS,CG,CD) respectively.
5. Ability to use biasing, stabilization and compensation techniques used in transistor circuits.
6. Convert the BJT into its equivalent h-parameter model and perform exact and approximate analysis of BJT Amplifiers in mid frequency region for different modes of operation.

II Year B.Tech. (ECE). – I Semester

SWITCHING THEORY AND LOGIC DESIGN

***Course Objective**:*

Now a day the word 'DIGITAL' plays a major role. Digital implies 1 and 0. The main objective of this subject is design the digital circuits using logic gates and flip-flops which play the major role in the electronic gadgets.

UNIT – I

Objective: Students will learn different number systems- binary, octal, hexadecimal and BCD Number system and their applications, Boolean algebra, minimization of switching functions

REVIEW OF NUMBER SYSTEMS & CODES

Representation of different radix, Number systems base conversion methods, complements of numbers, r's, r – 1's compliment of signed numbers, problem solving.4-bit codes, BCD, excess-3, alphanumeric code, self complement codes, 2421, 8421.

Logic operations

Basic Logic gates- NOT, OR,AND, Universal building blocks, EX-OR, EX-NOR gates, standard SOP and standard POS. Minimization of logic functions using theorems, gray code, error detection and correction codes, Parity checking codes, Hamming codes. Multi level NAND – NAND, NOR – NOR realizations.

UNIT-II

Objective: To study the various methods of Simplification of logic circuits this includes Boolean algebra and theorem, K-maps, Quine McCluskey method

MINIMIZATION OF SWITCHING FUNCTIONS

Boolean theorems, complements and duality of logic expressions, De-morgan theorems, Minimization of switching functions using Boolean theorem, K – map up to 6-variables, code converters and binary multiplier is using K –map, tabular minimization (Quine McCluskey method).

UNIT-III

Objective: To understand the design of Combinational Logic Circuits and to understand realization of Boolean functions using MSI and LSI components such as multiplexers**,** de-multiplexer, decoder, encoder.

COMBINATIONAL LOGIC CIRCUITS

Design of half adder, full adder, half sub tractor, full subtractor, applications of full adders, 4-bit binary adder, 4-bit binary subtractor, BCD adder, excess – 3 adder, carry look – a – head adder. Design of decoder, encoder, multiplexer, de-multiplexer, priority encoder, comparators and seven segment display, realization of Boolean functions using decoders and Multiplexers, Priority encoder, 4-bit digital comparator.

UNIT-IV

Objective: To study the basic structure and realization of Boolean functions with PLD, PROM, PLA, PAL.

INTRODUCTION OF PLD's

PROM, PAL, PLA- Basic structures, realization of Boolean functions with PLD's, programming tables of PLDs, merits & demerits of PROM, PAL,PLA, comparision, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

UNIT-V

Objective: To understand the concepts of sequential circuits **.**

SEQUENTIAL LOGIC CIRCUITS I

Classification of sequential circuits, flip-flops with truth tables and excitation tables. Conversion of flip-flops. Design of ripple counters, synchronous counters, Johnson and ring counters. Design of buffer register, control buffer register, shift register, bi – directional shift register and universal shift register.

UNIT-VI

Objective: To understand the concepts of sequential circuits such as finite state machines

SEQUENTIAL LOGIC CIRCUITS II:

Finite state machines: Analysis of clocked sequential circuits,state diagrams, state tables, reduction of state tables and state assignments, design procedure. Realization of circuits using various flipflops. Mealy to Moore conversion and vice-versa.

Text Books:

1. Anand kumar. A 8th printing (second edition) – January 2015.
2. Digital design – Moris Mano, PHI, 2/e.

Reference Books:

1. Switching and Finite automata theory – Zvi Kohavi, Tata Mcgraw – Hill, 1978, 2/e.
2. Fundamentals of Logic Design – Charles H.Roth Jr, Jaico Publishers.

Course Learning Outcomes:

- Students will be aware of theory of Boolean Algebra and the underlying features of various number systems.
- Student will be able to use the concepts of Boolean Algebra for the analysis & Design of various combinational and sequential logic circuits.
- Students will be able to design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays.
- Student will be able to design programmable logic devices and also they know how to use these in different applications

II Year B.Tech. (ECE). – I Semester

SIGNAL & SYSTEMS

Course Objective*: To impart knowledge on Signals and their representation using Fourier series. Representation of a time domain signals in frequency domain, S-plane and Z-plane. Convolution and correlation of Signal and their relation. Sampling of the signals*

UNIT-I:

Objectives: Introduction to Signals and systems, conditions, classification and their repesentation

Signal Analysis & 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. 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:

Objectives: Introduction to time domain and frequency domain and importance of transforms,need for sampling and its techniques.

Fourier Transforms & Sampling

Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function.

Introduction to Hilbert Transform, Sampling theorem, Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling - Aliasing, Introduction to Band Pass sampling.

UN**IT-III:**

Objectives: To familiarize techniques for analyzing both continuous & discrete time systems.

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 functions 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 Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT-IV:

Objectives: Provide the applications for techniques and mathematics used, convolution and correlation relations

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, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT-V:

Objectives: Introduction to Laplace transforms ROC and its constraints, relation of Laplace to other transforms

Laplace Transforms

Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation between L.T, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT-VI:

Objectives: Introduction to Z transforms, ROC and its constraints, properties of Z transforms

Z-Transforms

Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time 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 and Systems - A.V Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
2. Signals Systems & Communications - B.P. Lathi, Oxford Publications, 8th Impression 2014.

REFERENCES:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.
2. Signals and Systems - K R Rajeswari, B.V Rao, PHI 2009.
3. Fundamentals of Signals and Systems- Michel .I Robert, MGH International Edition, 2008.
4. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Pub

COURSE OUTCOMES

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

CO1 Identify different types of signal and systems properties that are commonly used in engineering.

CO2 Explain and differentiate the properties of continuous-time and discrete-time Linear Time Invariant (LTI) systems.

CO3 : Distinguish the Fourier series and transform in terms of applicable time functions and the resulting spectral properties
CO4 Evaluate the Laplace Transform for the calculation of time responses of LTI systems.
CO5 Apply the Z Transform for the calculation of time responses of LTI systems

II Year B.Tech. (ECE). – I Semester

NETWORKS & ELECTRICAL TECHNOLOGY LAB

Any five experiments are to be conducted from each part.

PART -A

1. Series and Parallel Resonance - Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.

2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters - Z-Y Parameters, chain matrix and analytical verification.

4. Verification of Superposition and Reciprocity theorems.

5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.

6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

PART-B

1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.

2. V Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC
   Shunt machine working as motor and generator).
3. Brake test on DC shunt motor. Determination of performance characteristics.

4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation
   at given power factors and determination of equivalent circuit).

5. Brake test on 3-phase Induction motor (performance characteristics).

6. Regulation of alternator by synchronous impedance method.

II Year B.Tech. (ECE). – I Semester

ELECTRONIC DEVICES AND CIRCUITS LAB

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils,
Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments
(For Laboratory Examination-Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics

    Part A: Germanium Diode (Forward bias& Reverse bias)

    Part B: Silicon Diode (Forward Bias only)

2. Zener Diode Characteristics

    Part A: V-I Characteristics

    Part B: Zener Diode as Voltage Regulator

3. Rectifiers (without and with c-filter)

    Part A: Half-wave Rectifier

    Part B: Full-wave Rectifier

4. BJ T Characteristics (CE Configuration)

    Part A: Input Characteristics

    Part B: Output Characteristics

5. FET Characteristics (CS Configuration)

    Part A: Drain Characteristics

    Part B: Transfer Characteristics

6. SCR Characteristics

7. UJT Characteristics

8. Transistor Biasing

9. CRO Operation and its Measurements

10. BJT-CE Amplifier

1 1. Emitter Follower-CC Amplifier

12. FET-CS Amplifier

PART C: Equipment required for Laboratory

1. Bred boards.

2. Ammeters (Analog or Digital)

3. Voltmeters (Analog or Digital)

4. Active & Passive Electronic Components

5. Regulated Power supplies

6. Analog/Digital Storage Oscilloscopes

7. Analog/Digital Function Generators

8. Digital Multimeters

9. Decade resistance Boxes/Rheostats

10. Decade Capacitance

II Year B.Tech. (ECE). – I Semester

SOFT SKILLS-1

(TITLE: PROFESSIONAL COMMUNICATION-1)

SYLLABUS 1

Course Outcomes:At the end of the Semester the student will be able to

- **Understand the necessity to improve four language skills**
- **Acquire knowledge about public speaking ability**
- **Strengthen their grammatical skills in the language**
- **Improve necessary vocabulary**
- **Improve writing skills**

Course Objective: To strengthen the four language skills of the learners and to prepare them for success in academics and the job market.

Semester I **45 hours**

Total: 15 weeks	Theory: 30 hours	Practical: 15 hours
Per week: 3 hours	Theory: 2 hours	Practical: 1 hours

UNIT 1: PLACES		**Theory/Lab**	**Book**
Reading	Introducing the theme; Scanning for information/numbers; understanding key vocab; making predictions	• Giving reading of imp. places and their significance • Collecting pictures of different places-asking students scan for the information	(RW) Pg-19
Writing	Punctuation, sentence structure, writing different sentences	• Using T-chart • Discussing positive. & Negative factors of different places	(RW) Pg-24
Listening & Pronunciation	listening for main ideas/details; wordstress vowel sounds	• Eng-365 C.D • Practice on word stress & Vowel Sounds	
Speaking	Organizing information for a presentation*;* Making a presentation	• Students presentation-Introducing a new place (life style,Food,Dressing,different resources available	
Grammar	Parts of speech: Nouns, verbs and adjectives; Subject + verb; There is / There are; Past simple		(RW) Pg-22,26 (LS) Pg-16,21.27
Vocabulary	Vocabulary to describe places		(LS) pg-31 (RW)

			Pg-31
UNIT 2: FESTIVALS AND CELEBRATIONS		**Theory/Lab**	**Book**
Reading	Previewing a text using the title, sub-titles and photographs; recognizing text types, skimming the text	• Collection of data about different regional festivals	
Writing	Organizing sentences into a paragraph*;* writing a first draft; writing paragraph :descriptive ,narrative etc.	• Preparation of a narration how different festivals are arranges and celebrated • Preparing a spider diagram	
Listening & Pronunciation	Listening and taking notes; listening for examples; Stressed words and unstressed sounds	• Listening to conversations from SP 1 • Difference between stressed and unstressed sounds	
Speaking	Making suggestions*;* Giving a poster presentation, understanding intonation	• Discussion on Q-8,9,10 • How to extend Greetings and wishes on special days • Sharing happiness in the conversation with right intonation • Making a poster presentation on any celebration like birthday, youth festival, friendship day	LS Pg -38
Grammar	Prepositions of time and place: *on, in, at;* Adverbs of frequency*;* Sentence structure: subject and verb order; Prepositional phrases; Present tense question forms	• collocations	RW Pg-42,45,46 LS Pg-40,41
Vocabulary	Vocabulary to describe festivals; Collocations		LS Pg-49
UNIT 3: SCHOOL AND EDUCATION		**Theory/Lab**	**Book**
Reading	Skimming for main ideas; reading for details; making inferences	• Importance of sports in educational institutes	RW Pg-56 (Q-10)
Writing	Paragraph organization: topic sentence and supporting sentences, selection of type of paragraph, ordering and sequencing	• Preparing a report on working of a famous university	RW Pg-58
Listening & Pronunciation	Using visual clues to listen; following native accent and intonation		
Speaking	Giving opinions in a debate*:* agreeing and disagreeing,convincing	• Debate topics from LS –Q-9 • A presentation on their schooling	LS pg-61,62, 63,64
Grammar	Tense and aspect, use of *because* and *so;* basic verb patterns	• Using pronouns	RW Pg-62
Vocabulary	Vocabulary in academic context; Collocations about learning; Prepositional phrases		RW Pg-67 LS Pg-67
UNIT 4: THE INTERNET AND		**Theory/Lab**	**Book**

TECHNOLOGY			
Reading	Understanding theme; Scanning to predict content; Making inferences	• Collecting information about different educational websites	
Writing	Describing an ordering steps,structurizing information		
Listening & Pronunciation	Listening for reasons; Listening and predicting the inner theme and conclusion ,consonant sounds		
Speaking	Presenting additional or contrasting information;	• Influence of social net work on youth- • A presentation on different social media or search engines available to you	
Grammar	Compound nouns; *and, also* and *too*; *but* and *however; can* / *be able to*		LS pg-74 RW pg - 77,80,81
Vocabulary	Vocabulary for Internet and technology		LS pg-84 RW pg-85
UNIT 5: LANGUAGE AND COMMUNICATION		**Theory/Lab**	**Book**
Reading	Reading for main ideas, identifying the meaning, preparing captions	• Observing different languages for the same words	RW pg-90,91
Writing	Writing supporting sentences; Reviewing a paragraph for content and structure, report writing ,types of report	• Preparing a brief note on Global language ,Changes from ancient to modern	
Listening & Pronunciation	Listening for genre; Listening for instructions; Consonant sounds		LS pg-91
Speaking	Sequencing words to organize instructions; Planning and giving a set of instructions	• Discussion on Q-9,10,12 • Prepare a flow chart with instructions to make a paper boat	LS pg.89,101
Grammar	Countable and uncountable nouns; Articles *a, an* or no article; Quantifiers: *some, many, a lot of, a few, a little;* Imperative clauses; Verb patterns		RW pg-96,97,99 LS pg-93
Vocabulary	Vocabulary for every day communication		RW pg-103

Prescribed Text Books: UNLOCK SERIES from Cambridge University Press

Unlock Book-2: Reading and Writing

Listening and Speaking

II Year B.Tech. (ECE). – II Semester

CONTROL SYSTEMS

Course Objective: *The student will Learn the fundamental concepts of Control systems and mathematical modeling of system. Study the concepts of time response and frequency response of the system. Understand the basics of stability analysis of the system.*

UNIT-I

Objective: Learn the fundamental concept of open loop, closed loops & feedback control systems, mathematical model of the system**.**

MATHEMATICAL MODELING OF CONTROL SYSTEMS

Open loop control systems and their differences, Classification of control systems, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor-AC Servo motor-Synchro-transmitter and Receiver , Block diagram algebra-Representation by Signal flow graph-Reduction using Mason's gain formula.

UNIT-II

Objective Study the concept of time response of first and second order systems. Understand steady state errors and error constants

TIME RESPONSEANALYSIS

Standard test signal-Time response of first order systems-Time response of second order systems-Time domain specifications-Steady state errors and error constants-Effects of proportional derivative, proportional integral systems.

UNIT – III

Objective: : Understand the concepts of Routh stability criterion, construction of root locus technique.

STABILITY AND ROOTLOCUS TECHNIQUE

The concept of stability – Routh's stability criterion – limitations of Routh's stability – The root locus concept – construction of root loci (Simple problems)

UNIT – IV

Objective: Study the concepts of frequency response analysis and understand stability analysis from Bode plot, polar plots & Nyquist plots

FREQUENCY RESPONSEANALYSIS

Introduction, Frequency domain specifications- Bode diagrams-transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion.

UNIT – V

Objective: Design of compensators by using Bode-plots

CLASSICAL CONTROL DESIGN TECHNIQUES

Lag, Lead, Lag-Lead compensators, design of compensators – using Bode plots.

UNIT – VI

Objective: Learn the concept of computation techniques, state space analysis, controllability and observability

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization – Solving the Time invariant state Equations – State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India .
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition.

REFERENCE BOOKS:

1. Control systems, Manik Dhaesh N, Cengage publications.
2. Control systems principles and design, M.Gopal, Tata Mc Graw Hill education Pvt Ltd, 4th Edition.
3. Control Systems Engineering S.Palani, Tata Mc Graw Hill Publications.

Course Outcomes:

After going through this course the student will be able to

1. Represent the mathematical model of a system.
2. Determine the response of different order systems for various step inputs.
3. Analyze the stability of the systems.

II Year B.Tech. (ECE). – II Semester

RANDOM VARIABLE AND STOCHASTIC PROCESS

Course Objectives:

To impart the basic concepts of Probability with the help of theorems. To gain the knowledge of random variables and its types with respective distributions as modern tools for engineering practices. To understand the concepts of Conditional and Unconditional Joint distributions of random variables and its types with respective distributions as modern tools for engineering practices. To be familiar with the concepts of Time domain Random Processes of First/Second order of different types. To understand the multi-disciplinary concepts of different spectral characteristics. To gain the knowledge in signal response linear systems and concepts of system response.

UNIT I – THE RANDOM VARIABLE

Objective: To impart the basic concepts of Probability with the help of theorems:

Concepts of probability, random experiments, sample space, events and nature of events Probability, Types Of Axioms - additive, multiplicative theorems, Random Variable- Properties, Types of Distribution Functions – Probability Mass Function, Probability Density Function, - Properties, Binomial, Poisson, Uniform, Normal, Exponential and Rayleigh distributions and their properties,

UNIT II – OPERATIONS ON ONE RANDOM VARIABLE – EXPECTATIONS:

Objective: To gain the knowledge of random variables and its types with respective distributions as modern tools for engineering practices

Introduction, Expected Value of a Random Variable, Function of a Random variable, Moments about the origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations of a Continuous Random Variable, NonMonotonic Transformations of a Continuous Random Variable,

UNIT III – MULTIPLE RANDOM VARIABLES

Objective: To understand the concepts of Conditional and Unconditional Joint distributions of random variables and its types with respective distributions as modern tools for engineering practices

Introduction to the concept of multiple random variables, concepts of conditional and unconditional joint distribution and density functions-related properties. Statistical Independence of random variables. Transformations of multiple random variable – Linear transformation of Gaussian Random Variables.

UNIT IV – RANDOM PROCESSES IN THE TIME DOMAIN

Objective: To be familiar with the concepts of Time domain Random Processes of First/Second order of different types.

Introduction to the concept of Random Process-Temporal characteristics, Classification of Random Processes, Deterministic and Non-deterministic random processes, Definitions of Distribution and Density Functions of a Random Process, Concepts of Stationary and Statistical Independence of Random Processes, Classification of Stationary Random Processes (First order, Second order, Wide-sense and Strict-sense Stationary Processes). Autocorrelation function and its properties, Cross correlation function and its properties, Covariance function. Concept of Time Averages and Ergodicity. Measures of Random Processes (Gaussian Random Process, Poisson Random Process).

UNIT V – RANDOM PROCESSES IN THE FREQUENCY DOMAIN

Objective: To understand the multi-disciplinary concepts of different spectral characteristics.

Introduction to the concept of Random Process-Spectral characteristics, The Power Spectrum and its properties, Relation between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum and its properties, Relation between Cross-Power Spectrum and Cross-

correlation Function.

UNIT VI – LINEAR SYSTEMS WITH RANDOM INPUTS

Objective: To gain the knowledge in signal response linear systems and concepts of system response.

Introduction to Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-Squared value of System Response, Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output. Concepts of Bandpass, Band-Limited and Narrowband Processes – properties. Noise Sources: Resistive (Thermal) Noise, Arbitrary Noise, Effective Noise Temperature, Average Noise Figure.

TEXT BOOKS:

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

REFERENCES:

1. Probability Theory and Stochastic Processes – B. Prabhakara Rao, Oxford University Press.
2. Probability and Random Processes with Applications to signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Probabilistic Methods of Signals & Systems Analysis, George R. Cooper, Clave D. Mc Gillem, Oxford, 3rd Edition, 1999.
4. StatisticalTheory of communications, S.P. Eugene Xavier, New Age Publications, 2003.
5. Signals, Systems & communications, B.P. Lathi, B.S. Publications, 2003.
6. Probability and Random processes, An Introduction for Applied Scientists and Engineers, Davenport W.B., Mc Graw-Hill, 1970.
7. Introduction to Random Processes with Applications to Singnals and Systems, Gardener W.A., Mc Graw-Hill, 2ndEdition.
8. Schaum's Outline of probability, Random Variables and Random Processes.
9. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.

COURSE OUTCOMES:

Student completing this module should be able to:

1.Paraphrase a comprehensive set of descriptive statistical methods, in order to display data in a meaningful way.

2.Exemplify probability theory in order to evaluate the probability of real world events;

Apply concepts of random signal response to various engineering problems and to provide solutions for practical problems.

3.Monitoring random processes in frequency domain with a various parameters.

Integrate correlation analysis in order to estimate the nature and the strength of the linear relationship.

4.Implement multiple random variables to predict the value of one variable based on the value of the other variable.

5.Execute comprehensive set of stochastic processes in making practical decisions and creating reports in workplace situations; and in completing papers and research projects in other university and college courses.

II Year B.Tech. (ECE). – II Semester

ELCTRONIC CIRCUIT ANALYSIS

Course Objective*: The course intends to provide an overview of the principles, operation and applications of analog building blocks as well as to provide an overview of amplifiers, feedback amplifiers and oscillators. To gain the knowledge on existing future analog circuits*

UNIT I

Objective: To study the concepts and importance of BJT and FET's in small signal high frequency amplifier models.

Small Signal High Frequency Transistor Amplifier models

Transistor at High Frequencies, The Hybrid- Common Emitter Transistor Model, Hybrid Conductance , The Hybrid Capacitances, Validity of Hybrid Model, determinations of high-frequency parameters in terms of low-frequency parameters , CE Short-Circuits Current Gain, Current Gain with Resistive Load, cut-off frequencies, frequency response and gain bandwidth product

Field Effect Transistor: Analysis of Common Source and the Common Drain Amplifier at High Frequencies.

UNIT- II

Objective: Understand the concepts of multistage amplifiers with high frequency circuits.

Multistage Amplifiers

Classification of Amplifiers, methods of coupling, cascade transistor amplifier and its analysis, analysis of two stage coupled amplifier, high input resistance transistor amplifier circuits and their analysis- Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Analysis of multi stage amplifiers using FET, Differential amplifier using BJT.

UNIT – III

Objective: Understand the concepts of positive and negative feedbacks and their role in amplifiers and oscillators.

FEEDBACK AMPLIFIERS

Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies , characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, performance comparison of feedback amplifiers, Methods of analysis of feedback amplifiers.

UNIT IV

Objective: Understand the use of BJT and FET as oscillators and their analysis and also find the importance of frequency and amplitude stabilization in oscillators.

OSCILLATORS

Oscillator principle, Condition for oscillations, RC-phase shift and Wien-bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC type Oscillators, Hartley and Colpitt's Oscillators with BJT and FET and their analysis , Crystal oscillators, Frequency and amplitude stability of oscillators.

UNIT-V

Objective: Understand the various types of power amplifiers and their practical applications.

Power Amplifiers

Classification of amplifiers, class A power amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifier and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class – C power amplifier, Thermal stability and heat sinks, advanced power amplifiers, distortion in amplifiers.

UNIT – VI

Objective: To study the basic concepts of tuned amplifiers.

TUNED AMPLIFIERS

Introduction, Q-Factor, Small Signal Tuned Amplifier, Capacitance single tuned amplifier, Double Tuned Amplifiers, Effect of Cascading Single tuned amplifiers on Bandwidth, Effect of Cascading Double tuned amplifiers on Band width, and Staggered tuned amplifiers, Stability of tuned amplifiers, Wideband amplifiers.

Text Books:

1. Integrated Electronics- J. Millman and C.C Halkias ,Tata Mc Graw Hill 1972.
2. Electronic Devices and Circuits-B.P.Singh, Rekha Singh, Pearson Publications, Second edition.

Reference Books:

1. Electronic Circuit analysis- B.V.Rao, K.R. Rajeswari, P.C.R. Pantulu, K.B.R. Murthy, Pearson publication.
2. Electronic devices and circuits- Salivahanam, N.Suresh kumar, A. Vallavaraj, TATA, IInd Edition.
3. Microelectronic Circuit- Sedra A.S. and K.C. Smith, Oxford university press, 6^{th} edition.
4. Electronic circuit analysis and design –Donald A, Meaman, Mc Graw Hill.
5. Electronic Circuits-I Ravish R Singh- Pearson publications.
6. Electronic devices and circuit theory- Robert L. Boylestad and Louis Nashelsky, Pearson tenth edition

Course Outcomes:

On successful completion of the module the student will be able to

1. Ability to know the theory of bipolar transistor operation, biasing effects and the hybrid models to know about how small signal models are needed in various configurations to determine frequency response and phase operations of voltage gain and application of configurations in hardware implementations.
2. Ability to demonstrate an understanding of multistage amplifiers and their internal high input resistance transistor devices and differential amplifiers using BJT.
3. Ability to determine the Feedback amplifiers and their characteristics practically and comparisons with real time applications.
4. Able to analyze and design basic electronic oscillator circuits, particularly with application to real time signal generators.
5. Ability to know types of power amplifier and their applications in different electronic fields.
6. Ability to understand the operation and design aspects of various types of tuned amplifiers.

II Year B.Tech. (ECE). – II Semester

DIGITAL SYSTEM DESIGN & DIGITAL IC APPLICATIONS

***Course Objective**: To impart knowledge on digital integrated circuits and their designing using integrated circuits. simulate the results using VHDL –Hardware description language.*

Unit-I

Objective: To know the design flow for digital system design, programming concepts in VHDL.

Digital Design Using HDL
Design flow, program structure, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

Unit-II

Objective: To know how the generation of netlist from the hardware description by using different tools .

VHDL Modeling
Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries, VHDL and Logic Synthesis, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach.

Unit-III

Objective: To know the internal structure of PLD's and the commercial Ic's available. Memories and the internal structures and storage mechanism.

Programmable Logic Devices (PLDs) & Memories
Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic Devices, ROM: Internal structure, 2D-Decoding, Commercial ROM types, timing and applications,. Static RAM: Internal structure, SRAM timing, standard, synchronous SRAMS, Dynamic RAM: Internal structure, timing, synchronous DRAMs. Design considerations of PLDs with relevant Digital ICs.

Unit-IV

Objective: Student can know the electrical behavior of CMOS both in static and dynamic conditions and before that study the diode/transistor-transistor logic and Emitter coupled logic.

Digital Logic Families and Interfacing
Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS Electronics & Communication Engineering logic families. Bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.

Unit-V

Objective: students can study Integrated circuits for all digital operational designs like adder, subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and their IC's

Combinational Logic Design
Adders & Subtractors, Ripple Adder, Look Ahead Carry Generator, Binary Parallel Adder, Binary Adder-Subtractor, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, parity circuits, comparators, multipliers, Barrel Shifter, Simple Floating-Point Encoder, Cascading Comparators, Dual Priority Encoder, Design considerations with relevant Digital ICs, modeling of Circuits by using VHDL.

Unit-VI

Objective: Understand the concepts of SSI Latches and Flip-Flops and Design of Counters using Digital ICs, modeling of sequential logic integrated circuits using VHDL

Sequential Logic Design
SSI Latches and Flip-Flops, Counters, Design of Counters using Digital ICs, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, MSI Registers, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Registers, MSI Shift Registers, Design considerations with relevant Digital ICs, modeling of circuits by using VHDL.

TEXT BOOKS:
1. Digital Design Principles & Practices – John F.Wakerly, PHI/ Pearson Education Asia, 3rd Edition, 2005.
2. Designing with TTL Integrated Circuits: Robert L. / John R. Morris & Miller.

REFERENCES:
1. "Fundamentals of Digital logic design with VHDL". Stephen Brown & Zvonko Vranesic, Tata McGraw Hill, 2nd edition.
2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

Course Outcomes:

After going through this course the student will be able to

1. Understand the concepts of different logics and implementations using Integrated circuits.
2. Design and analyze any digital design in real time applications.
3. Extend the digital operations to any width by connecting the ICs and can also design, simulate their results using hardware description language.
4. Understand the concepts of MSI Registers and Modes of Operation of shift registers, Universal Registers.

II Year B.Tech. (ECE). – II Semester

ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

***Course Objective**: The course intends to provide an overview of the principles, behavior and applications of the electron in electrostatic and magneto static fields as well as understanding the characteristics of electro magnetic waves. This course relies on elementary treatment and qualitative analysis of transmission lines and its characteristics.*

Unit – I

Objective: Acquire the prerequisites of the electro-magnetic fields and their interaction with materials Understand the applications of Coulomb's law and Gauss law to different charge distributions Understand the applications of Laplace's and Poisson's Equations to solve real time problems on capacitance of different charge distributions. Understand the physical significance of Biot-Savart's and Amperes's Law for different current distributions.

Electrostatics
Coulomb's Law, Electric Field Intensity, Fields due to Different 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, Related 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, Related Problems.

Magneto Statics
Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Related Problems.

Unit – II

Objective: Know the physical interpretation of Maxwell' equations and applications for various fields like Antennas, Waveguides Solve Maxwell's equations to obtain Plane wave equations and derive the behavioral equations for Propagation constant, Attenuation constant, Phase constant, Skin depth and wave polarization.

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. Related Problems.

Unit – III

Objective: Understand behavior of E.M. waves incident on the interface between two different media.

EM Wave Characteristics – I
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 & Dielectrics – Characterization,Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Related Problems.

Unit – IV

Objective:
Understand behavior of Reflection and Refraction of Plane Waves.

EM Wave Characteristics – II : 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. Related Problems.

Unit – V

Objective: Understand the significance of Transmission lines and their different parameters.

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. Related Problems.

Outcome:
Apply power concept associated with waves. The knowledge is used to study the behavior of transmission lines & their parameters. Get knowledge of transmission lines for pulsed and sinusoidal steady state excitation.

Unit – VI

Objective: Understand the significance of Input Impedance Relations, Reflection Coefficient and VSWR

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. Smith Chart – Configuration and applications, Single and double stub matching. Related Problems.

Text Books:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 2001, 3/e.
2. Antenna and wave propagation- K.D.Prasad,2014

Reference Books:

1)Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2000, 2/e.

2)Electromagnetic fields and Wave theory- G.S.N. Raju, Pearson Education, 2006.

3)Electromagnetic Field Theory and Transmission Lines- Gottapu Sasibhushana Rao, Wiley Publishers,2012.

4)Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2001.

5) Engineering Electro-magnetic – William H. Hayt Jr. and John A. Buck, TMH, 2006, 7/e.

Course Outcomes:

1. Students are able to understand how EM waves will propagate in free space and their characteristics at the boundary between media.

2. Students are familiar with the characteristics of transmission lines and their equivalent circuits at UHF.

3. Students able to learn Maxwell's equations to understand boundary conditions of time varying fields.

4. Able to learn parameters and transmission line equations.

5. Analyze electromagnetic wave propagation and attenuation in various medium and propagation through boundaries between media.

II Year B.Tech. (ECE). – II Semester

PULSE & DIGITAL CIRCUTS

***Course Objective**: The main objective of this subject is to analyze, built and troubleshoot various pulse and digital circuits. This subject is used to understand the concepts of wave shaping, switching characteristics of diode and transistors to design various circuits for any applications and also to introduce time base generators, design of multivibrators, principles of synchronization & frequency division, operation of sampling gates and to design different gates using various logic families.*

Unit I

Objective: To understand the response of sinusoidal and non-sinusoidal waves and also study how to convert signals from on form to another

Linear wave shaping
High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, double differentiation, attenuators, RL and RLC circuits and their response for step input, Ringing circuit.

Non – Linear Wave Shaping
Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

Unit II

Objective: To study the characteristics of diode and transistor & To understand the realization of logic families

Switching Characteristics of Devices
Diode and Transistor as switches, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

Digital Logic gate circuits
Realization of Logic Gates using DTL, TTL, ECL and CMOS logic circuits, Comparison of logic families

Unit III

Objective: Analyis and Design of Multivibrators

Multivibrators
Analysis & Design of Bistable Multivibrators : Fixed bias& self biased transistor binary, Commutating capacitors, Triggering in binary, Schmitt trigger circuit, applications, Analysis & design of Monostable Multivibrator: Collector-coupled and Emitter-coupled Monostable

multivibrators, Triggering in monostable multivibrator, Analysis & design of Astable multivibrator (Collector coupled and Emitter-coupled) using transistors.

UNIT IV

Objective: To generate the different signals using high frequency circuits with respect to time in voltage and current forms.

Time Base Generators

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

Unit V

Objective: To understand synchronization and frequency division techniques

Synchronization and Frequency Division

Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Phase delay& phase jitters; Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit.

Unit VI

Objective: To learn basic concepts of blocking oscillators using diodes and RC components & To under stand the basic sampling gates using BJT

Blocking oscillators

Monostable blocking oscillators (Basetiming & Emitter timing): Astable blocking oscillators (Diode-Controlled & RC controlled), Applications

Sampling gates

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Four-diode sampling gates; Applications of sampling gates.

Text Books :

1 . J. Millman and H. Taub, "Pulse, Digital and Switching Waveforms", McGraw-Hill, 1991.

2. A. Anand Kumar, "Pulse and Digital Circuits", PHI, 2008.Second Edition

References :

1. Venkat Rao. K. Ramasudha K, Manmadha Rao G, "Pulse and Digital Circuits," Pearson Education, 2010

2.David J.Comer,"Digital Logic State Machine Design', Oxford University Press,2008,Third Edition

3. MS Prakash Rao – " Pulse and Digital Circuits " Tata McGrawHill.

Course Outcomes:

After going through this course the student will be able to

1. Design linear and non-linear wave shaping circuits.
2. Apply the fundamental concepts of wave shaping for various switching and generating circuits.
3. Design different multi-vibrators and time base generators.

II Year B.Tech. (ECE). – II Semester

ELECTRONIC CIRCUIT ANALYSIS LAB

Note: The students are required to design the electronic circuit and they have to perform the simulation using multisim/Pspice/Equivalent licensed simulation tool. Further they required to verify the result using necessary hardware in the hardware laboratory.

PART A:

1. Determination of f_T of a given transistor.
2. Voltage- Series feedback Amplifier.
3. Current- Shunt feedback Amplifier
4. RC Phase shift/Wien Bridge Oscillator.
5. Hartley/Colpitt's Oscillators.
6. Two stage RC Coupled amplifier.
7. Darlington Pair amplifier.
8. Bootstrapped Emitter Follower.
9. Class-A Series- fed power amplifier.
10. Transformer Coupled Class-A Power Amplifier.
11. Class-B Push Pull Amplifier.
12. Complementary Symmetry Class-B Push pull Power amplifier.
13. Single tuned Voltage amplifier.
14. Double Tuned Voltage Amplifier.

PART-B: Equipment Required for Laboratory

1. Multisim / Pspice/Equivalent licensed simulation tool.
2. Computer system with required specifications

Hardware:

1. Regulated power Supplies
2. Analog/Digital Storage Oscilloscopes.
3. Analog/ Digital function generators.
4. Digital Multi-meters.
5. Decade Resistance boxes.
6. Decade Capacitance boxes.
7. Ammeters
8. Voltmeters.
9. Active & Passive Electronic Components

II Year B.Tech. (ECE). – II Semester

PULSE & DIGITAL CIRCUITS LAB

List of Experiments:

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 LABORATORY:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators 0 – 1 M Hz
4. Components
5. Multi Meters

III Year B.Tech. (ECE). – I Semester

MANAGEMENT SCIENCE
Common for **ECE, EEE, CSE**

UNIT – I

(The Learning objective of this Unit is to understand the concept and nature of Management, Evolution of Management theories, Motivation and leadership Styles)

Introduction to Management: Concept – Nature and Importance of Management, Functions – Evolution of Management, Motivation theories – Leadership Styles - Decision Making Process – designing Organization structure – Principles and types of Organization.

(The learner is able to understand the concept and functions of Management and Theories of Motivation, Styles of Leadership)

UNIT – II

(The Learning Objective of this Unit is to Equip with the concepts of Operations and Inventory control)

Operations Management: Principles and Types of Management – Work Study – Statistical Quality Control – Control charts (P –charts, R –charts, and C –charts) Simple problems.

Material Management: Need for Inventory control – EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE and FSN analysis).

(The learner is able to understand the main idea of Inspection and scrutinize the different methods of inspection, the concept of inventory management and control of inventory pricing)

UNIT – III

(The Objective of this unit is to understand the main functional areas of organization i.e., Financial Management, Production Management, Marketing Management and Human Resource Management and Product life cycle and Channels of Distribution)

Functional Management: Concept and Functions of Finance, HR, Production and Marketing, Functions of HR manager – Wage payment plans(simple problems) – Job Evaluation and Merit Rating – Marketing strategies based on Product Life Cycle, Channels of distributions.

(At the end of this chapter the learner is able to understand the different functional areas in an organization and their responsibilities – Product life cycles of distribution)

UNIT – IV

(The learning objective of this unit is to understand drawing the net work diagrams and crashing the projects)

Project Management: (PERT/CPM): Concept, Development of Network – Difference between PERT and CPM – Identification of Critical Path – Probability – Project Crashing (Simple Problems).

(The learner is able to understand PERT and Identifying Critical Path and reduce the project duration with Crashing)

UNIT – V

(The objective of this unit is to equip with the concept and practical issues relating to Strategic Management)

Strategic Management: Vision, Mission, goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis – Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

(The learner is able to familiar with the meaning of Vision, Mission, Goals and Strategies of the Organization and to implement successfully)

UNIT – VI

(The learning objective of this unit is to equip with the contemporary management practices, i.e., MIS, MRP, JIT and ERP etc.,)

Contemporary Management Practices: Basic concepts of MIS, MRP, Just in Time (JIT) System, Total Quality Management (TQM), Six sigma and Capital Maturity Models (CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), business Process Outsourcing (BPO), Business Process Re- engineering and Bench Marking, Balanced Score Card.

(The Learner is able to Understand the various contemporary issues in Management practices like TQM and BPO etc.,)

Text Books

1. Dr.P.Vijaya Kumar & Dr.N.Appa Rao, 'Introduction to Management Science' Cengage, Delhi.

2. Dr.A.R.Aryasri, Management Science 'TMH 2011.

References

1. Koonz & Weihrich: 'Essentials of Management' TMH 2011.

2. Seth & Rastogi: Global Management Systems, Cengage Learning, Delhi, 2011.

3. Robbins: Organizational Behavior, Pearson Publications, 2011.

4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011.

5. Philip Kotler & Armstrong: Principles of Marketing, Pearson Publications.

6. Biswajit Patnaik: Human Resource Management, PHI, 2011

7. Management shapers, Universities Press.

III Year B.Tech. (ECE). – I Semester

COMPUTER ARCHITECTURE AND ORGANIZATION

Course Objective: *The student will*

- *Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.*
- *Understand the principles and the implementation of computer arithmetic and ALU.*
- *Understand the memory system, I/O organization.*
- *Understand the operation of modern CPUs including interfacing, pipelining, memory systems and buses.*
- *Understand the principles of operation of multi processor systems.*

UNIT-I

Objective: To understand the concept of Basic operational concepts and computer arithmetic operations.

BASIC STRUCTURE OF COMPUTERS:
Computer types, functional units, basic operational concepts, bus structures, software, performance, multiprocessors and multi computers. Data types, complements, data representation. Fixed point representation. Floating – point representation. Instruction set architectures. Concepts of OS.

COMPUTER ARITHMETIC
Addition and subtraction, multiplication algorithms, division algorithms, floating point arithmetic operations. Decimal arithmetic unit, decimal arithmetic operations.

UNIT-II

Objective: To understand the concept of Register Transfer language.

REGISTER TRANSFER LANGUAGE AND MICRO-OPERATIONS

Register Transfer language. Register Transfer, Bus and memory transfer, Arithmetic Micro-operations, logic micro operations, shift micro-operations, Arithmetic logic shift unit.

Instruction codes. Computer Registers, Computer instructions –Instruction cycle. Memory Reference Instructions. Input- Output Instructions and Interrupts.

UNIT-III

Objective: To understand the concept of central processing unit, micro programmed control and Hard wired control.

CENTRAL PROCESSING UNIT

Stack organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer & CISC.

MICRO PROGRAMMED CONTROL

Control memory, Address sequencing, micro program example, Design of control unit-Hard wired control. Micro programmed control.

UNIT-IV

Objective: To understand the concept of Memory management hardware.

THE MEMORY SYSTEM

Memory organization-RAM,ROM.Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware.

UNIT-V

Objective: To understand the concept of Input-Output Interface and Input –Output Processor.

INPUT-OUTPUT ORGANIZATION

Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP), Serial communication.

UNIT-VI

Objective: To understand the concept of Pipelining and Multi processors.

PIPELINE AND VECTOR PROCESSING

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors. Multi processors: Characteristics of Multiprocessors, Interconnection Structures, Inter-processor Arbitration. Inter-processor Communication and Synchronization, Cache Coherence.

TEXT BOOKS

1. Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.

2. Computer Organization – Carl Hamacher, ZvonksVranesic, SafwatZaky, V Edition, McGraw Hill,
2002.

REFERENCES:

1. Computer Organization and Architecture – William Stallings Seventh Edition, PHI/Pearson, 2006.

2. Computer Architecture and Organization – John P. Hayes, McGraw Hill International editions, 1998.
3. Computer Organization and design D. A. Patterson and j. l. hennessy.4th edition.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK

Course Outcomes:

The student will be able to

- Understand the concept of Basic operational concepts, computer arithmetic operations and Register Transfer language.
- Understand the concept of central processing unit, micro programmed control and hard wired control.
- Understand the concept of Memory management hardware, Input-Output Interface and Input-Output Processor.
- Understand the concept of Pipelining and Multi processors

LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

***Course Objective**: The student will*

- *Study characteristics , realize circuits, design for signal analysis using Op-amp IC's.*
- *Study the linear and non- linear applications of Op-amp.*
- *Study IC 555 timer, PLL and VCO with their applications.*
- *Study and understand different types of ADCs and DACs*.

Unit I

Objective: To learn the concepts of integrated circuits and differential amplifiers.

INTEGRATED CIRCUITS: Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

Unit II

Objective: To Study DC and AC characteristics of OP-AMP's and its effects on outputs and their compensation techniques.

Characteristics of OP-Amps, Integrated circuits-Types, Classification, Package Types and Temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics, 741 op-amp & its features, FET input. Op-Amps, Op-Amp parameters & Measurement, Input & Out put Off set voltages & currents, slew rates, CMRR, PSRR, drift, Frequency Compensation technique.

Unit III

Objective: To Study the linear and non-linear applications of operational amplifiers.

LINEAR and NON-LINEAR APPLICATIONS OF OP- AMPS: Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers. Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers, Precision rectifiers

Unit IV

Objective: To learn the concepts of Active filters , analog multipliers and modulators.

ACTIVE FILTERS, ANALOG MULTIPLIERS AND MODULATORS: Introduction, Butter worth filters and chebyshev filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters. Four Quadrant multiplier, balanced modulator, IC1496,Applications of analog switches and Multiplexers, Sample & Hold amplifiers.

Unit V

Objective: To Study IC 555 timer, PLL and VCO with their applications.

TIMERS & PHASE LOCKED LOOPS: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL –

frequency multiplication, frequency translation, AM, FM & FSK demodulators. Applications of VCO (566)

Unit VI

Objective: To Study and understand different types of ADCs and DACs.

DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS : Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).

TEXT BOOKS :

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 4th Edition,2010.

2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 4th edition, 2009.

REFERENCES:

1. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988.

2. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.

3. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin& Fredrick Driscoll, PHI, 6th Edition.

4. Operational Amplifiers – C.G. Clayton, Butterworth & Company Publ.Ltd./ Elsevier, 1971.

5. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition.

WEB REFERENCES:

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Design circuits using operational amplifiers for various applications.
2. Analyze and design amplifiers and active filters using Op-amps.
3. Acquire skills required for designing and testing integrated circuits.
4. Understand the gain bandwidth concept and frequency response of the three basic amplifiers. Understand thoroughly the operational amplifiers with linear integrated circuits.
5. Design combinational logic circuits for different applications

III Year B.Tech. (ECE). – I Semester

ANTENNAS AND WAVE PROPAGATION

Course objective: *The student will be able to*

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

UNIT I

Objective: To understand the concept of Radiation Mechanism in different antennas and antenna parameters.

ANTENNA FUNDAMENTALS

Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beam widths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, illustrated Problems.

UNIT II

Objective: To understand the concept of Current Distributions in various antennas and related parameters.

THIN LINEAR WIRE ANTENNAS

Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beam widths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum.

Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, Concept of short magnetic dipole, D and Rr relations for small loops.

UNIT III

Objective: To understand the concept of Antenna Arrays, based on the arrays system different types of antennas and their characteristics

ANTENNA ARRAYS:

Two element arrays – different cases, Principle of Pattern Multiplication, N element Uniform Linear Arrays – Broadside, End fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison; Concept of Scanning Arrays. Directivity Relations (no derivations). Related Problems. Binomial Arrays, Effects of Uniform and Non-uniform Amplitude Distributions, Design Relations. Arrays with Parasitic Elements, Yagi-Uda Arrays, Folded Dipoles and their characteristics,Smart antennas.

UNIT IV

Objective: To understand the concept of resonant radiators and broadband antennas their characteristics

NON-RESONANT RADIATORS:
Introduction, Traveling wave radiators – basic concepts, Long wire antennas – field strength calculations and patterns, Micro-strip Antennas-Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas –Geometry and Parameters, Impact of different parameters on characteristics. Broadband Antennas: Helical Antennas – Significance, Geometry, basic properties; Design considerations for mono-filer helical antennas in Axial Mode and Normal Modes (Qualitative Treatment).

UNIT V

Objective: To understand the concept of based on the frequency different types of antennas and designing characteristics

VHF, UHF AND MICROWAVE ANTENNAS

Reflector Antennas : Flat Sheet and Corner Reflectors. Paraboloidal Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds. Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Dielectric Lenses and Zoning, Applications, Antenna Measurements – Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

UNIT VI

Objective: To understand the concept of Wave Propagation in various layers and losses due to earth effects

WAVE PROPAGATION

Concepts of Propagation – frequency ranges and types of propagations. Ground Wave Propagation– Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations. Sky Wave Propagation – Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF and Skip Distance – Calculations for flat and spherical earth cases, Optimum Frequency, LUHF, Virtual Height, Ionosphere Abnormalities, Ionospheric Absorption. Fundamental Equation for Free-Space Propagation, Basic Transmission Loss Calculations. Space Wave Propagation – Mechanism, LOS and Radio Horizon. Tropospheric Wave Propagation – Radius of Curvature of path, Effective Earth's Radius, Effect of Earth's Curvature, Field Strength Calculations, M-curves and Duct Propagation, Tropospheric Scattering.

TEXT BOOKS

1. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Antennas and Wave Propagation – K.D. Prasad, SatyaPrakashan, Tech India Publications, New Delhi, 2001.

REFERENCES

1. Antenna Theory - C.A. Balanis, John Wiley and Sons, 2nd Edition, 2001.

2. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
3. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th Edition, 1955. 5. Antennas – John D. Kraus, McGraw-Hill, 2nd Edition, 1988.
4.Antennas and Wave Propagation-G.S.N Raju Pearson Education.

WEB REFERENCES:

1. NPTEL online courses.

2. MOOCS online courses by JNTUK

Course Outcomes:

After going through this course the student will be able to

1. Identify basic antenna parameters.
2. Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas, and micro-strip antennas.
3. Quantify the fields radiated by various types of antennas.
4. Design and analyze antenna arrays.
5. Analyze antenna measurements to assess antenna’s performance.
6. Identify the characteristics of radio wave propagations.

III Year B.Tech. (ECE). – I Semester

ANALOG COMMUNICATIONS

***Course Objective**: The main objective of this course is to know about analog communication system, the need for modulation and the different modulation techniques.*

Understand the concept of noise and detection of signals in presence of noise.

Understand different radio transmitters and receivers.

Study the concept of multiplexing and pulse modulation techniques.

Unit I

Objective: To know about communication system, the need for modulation ,and about amplitude modulation and detection.

AMPLITUDE MODULATION

Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector

Unit II

Objective: To know about DSB & SSB modulation and demodulation techniques and their advantages and drawbacks.

DSB & SSB MODULATION

Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, 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, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

Unit III

Objective: To learn about angle modulation techniques like FM & PM and its comparison with amplitude modulation.

ANGLE MODULATION

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 - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

Unit IV

Objective: To know about noise and its types. The effects of noise in analog communications.

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.

Unit V

Objective: To know about different radio transmitters and receivers and its characteristics.

TRANSMITTERS & RECEIVERS:

Radio Transmitter – Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter.

Radio Receiver -Receiver Types - Tuned radio frequency receiver, Super-hetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

Unit VI

Objective: To know about analog pulse modulation techniques like PAM, PWM, PPM and the concept of multiplexing.

PULSE MODULATION

Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation &demodulation of PWM, PPM, Generation and demodulation of PPM, TDMVs FDM.

TEXT BOOKS:

1. Principles of Communication Systems – H Taub& D. Schilling, GautamSahe, TMH, 2007 3rd Edition.

2. Communication Systems – B.P. Lathi, BS Publication, 2006.

REFERENCES:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.
2. Electronics & Communication System – George Kennedy andBernard Davis, TMH 2004.
3. Communication Systems– R.P. Singh, SP Sapre, Second EditionTMH, 2007.
4. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.

WEB REFERENCES:

1. NPTEL online courses.

2. MOOCS online courses by JNTUK

Course Outcomes:

CO1:To understand modulation, demodulation and design of major building blocks of communication systems.

CO2:To understand the communication systems, signal modulation techniques will be emphasized.

CO3: Modulation techniques will be analyzed both in time and frequency domains.

CO4:To develop a clear insight into the relations between the input and output AC signals in various stages of a transmitter and receiver of AM and FM systems.

III Year B.Tech. (ECE) – I Semester

Digital System Design & DICA Laboratory

Course Objective*: The students are required to design and draw the internal structure of the following Digital Integrated Circuits and to develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer. Further, it is required to verify the logic with necessary hardware*.

List of Experiments:

Minimum Five experiments to be done using digital IC;s

1. Realization of Logic Gates, Decoders - 74138
2. Multiplexer-74151 and 2*1 De-multiplexer-74155, 4-Bit Comparator-7485.
3. Flip-Flop IC' s-7474, 7493
4. IC Counter -7490 &-7439
5. Shift Register -7495 & - 749
6. RAM (74189) & ALU

Minimum Five Experiments to be done using simulator

1. Realization of Logic Gates, Decoders -74138
2. Multiplexer -74151 and De-multiplexer -74155, 4-Bit Comparator -7485.
3. Flip-Fliop IC's-7474,7476.
4. IC Counter -7490&-7493
5. Shift Register - 7495
6. RAM (74189) & ALU

The following experiments to be done using FPGA

1. Decoders – 74138
2. Multiplexer – 74151

Equipment Required :

1. Digital IC; s
2. Xilinx ISE software – latest version
3. Personal computer with necessary peripherals
4. Hardware kits – Various FPGA families

III Year B.Tech. (ECE). – I Semester

LIC APPLICATIONS LAB

Objective: *The students are required to design the following Linear Integrated Circuits and to verify the practical output with theoretical output.*

Minimum Twelve Experiments to be conducted:

1. Study of ICs – IC 741, IC 555, IC 565, IC 566, IC 1496 – functioning, parameters and Specifications.
2. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
3. Integrator and Differentiator Circuits using IC 741.
4. Active Filter Applications – LPF, HPF (first order)
5. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
6. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
7. Function Generator using OP AMPs.
8. IC 555 Timer – Monostable Operation Circuit and Astable Operation of circuit
9. Schmitt Trigger Circuits – using IC 741 and IC 555.
10. IC 565 – PLL Applications.
11. IC 566 – VCO Applications.
12. Voltage Regulator using IC 723.
13. Three Terminal Voltage Regulators – 7805.
14. 4 bit DAC using OP AMP AND 4 Bit ADC

EQUIPMENT REQUIRED FOR LABORATORIES:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components:- IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester

III Year B.Tech. (ECE). –I Semester

ANALOG COMMUNICATIONS LAB

Course Objectives: *The objective of the course is to introduce the students fundamentals of communication in analog form and different Modulation techniques.*

List of Experiments :(Ten experiments to be done in Hardware and Five experiments to be done in MATLAB simulink).

1. Amplitude Modulation - Mod. & Demod.
2. AM - DSB SC - Mod. & Demod.
3. Spectrum Analysis of Modulated signal using Spectrum Analyser
4. Diode Detector
5. Pre-emphasis & De-emphasis
6. Frequency Modulation - Mod. & Demod.
7. AGC Circuits
8. Sampling Theorem
9. Pulse Amplitude Modulation - Mod. & Demod.
10. PWM , PPM - Mod. & Demod.
11. PLL

Equipments & Software required: Software :

i.) Computer Systems with latest specifications
ii) Connected in Lan (Optional)
iii) Operating system (Windows XP)
iv) Simulations software (Simulink & MATLAB)

Equipment

1. RPS - 0-30 V
2. CRO - 20 M
3. Function Generators - 0Hz.
4. Components
5. Millimeters
6. Spectrum Analyzer

III Year B.Tech (ECE)- II Sem
Soft Skills-2

(Title: Employability skills)

Course Objectives: To help the students

1. Participate in group discussions with confidence and to make effective presentations.
2. With- resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management and goal setting, self-confidence and assertiveness.
4. Understand, what constitutes proper grooming and etiquette in a professional environment.

Course Outcomes: The students will be able to

1. Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to manage time effectively and deal with stress.
4. Make the transition smoothly from campus to corporate.

Unit-1

Communicative Competence – The Art of Communication, basic grammar, personal SWOT Analysis, Analyzing audience, role of emotions and body language in communication-Effective listening skills, using English in different situations

Unit-2

Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence-Elements of effective presentation – Structure of presentation – Presentation tools

Unit-3

Interview Skills – Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-pre-interview planning, opening strategies, answering strategies, mock interviews

Unit-4

Personality Development through Soft Skills – Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values, success stories of great business people, Steve Jobe, Chanda Kocher, Warren Buffet, Indra Nuyi.

Unit- 5

Technical Communication: Report writing: Importance, structure, drafting of reports, Business Writing: Sales letters, claim and adjustment letters, Job Application letter, preparing a personal resume, notices, agenda and minutes of the meeting

Unit-6

Development of Occupational Competency

Leadership skills - Problem solving skills - Organising and Co-ordination skills - Critical thinking Decision Making

Prescribed Text:

1. **English and Soft Skills by Prof. Dhanvel, Orient Blackswan, 2012.**

Suggested Reading:

2. **Soft Skills by Alex Ben, S Chand Publications.**
3. **Personality Development and Soft Skills - Barun K Mithra, Oxford Publications.**
4. **Technical Communication – Principles and Practice by Meenakshi Raman, Sangeeta Sharma, Oxford Publications.**
5. **Effective Technical Communication – Ashraf Rizvi, Mc. Grawhill Publications.**

COMPUTER NETWORKS

Course Objectives:

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

1. *Build an understanding of the fundamental concepts of computer networking.*
2. *Familiarize the student with the basic taxonomy and terminology of the computer networking area.*
3. *Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.*

Unit – I

Introduction: OSI model overview, TCP/IP and other networks models, Network Topologies, Network technologies (WAN, LAN, MAN), Physical layer: Transmission media (Guided, Wireless)

Unit – II

Data link layer: Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum

Elementary Data Link Layer protocols: Simplex protocol, Simplex stop and wait protocol. **Sliding window protocol**: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing, multi link PPP.

Unit – III

Random Access: ALOHA, Carrier Sense Multiple Access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA).

Unit –IV

Network Layer: Design Issues, Internetworking, Routing Algorithms. Shortest path routing, Flooding, Broadcast routing, Congestion control algorithms: general principles of congestion control, congestion prevention policies.

Unit –V

Network Layer Protocols: ARP, ICMP, IPV6 frame format

Transport Layer: The transport service, Elements of transport protocols, the internet transport protocols: UDP, TCP congestion control.

Unit –VI

Application layer (WWW and HTTP): Architecture: Client server model, Domain name system (DNS): E-mail (SMTP) and File transfer (FTP), HTTP and WWW.

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan. Third Edition TMH.

REFERENCES

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition,Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

Course Outcomes:

After going through this course the student will be able to

1. Analyze a communication system by separating out the different functions provided by the network; and some example networks.
2. Understand various network topologies required for communications.
3. Understand that there are fundamental limits to any communications systems
4. Understand the general principles behind addressing routing, reliable transmission and other stateful protocols as well as specific examples of each.
5. Have an informed view of both internal workings of the Internet and of number of common internet applications and protocols.

III Year B.Tech. (ECE). II Semester

MICRO PROCESSOR AND MICROCONTROLLER

COURSE OBJECTIVES: *The student will*
- *learn concepts of microprocessor, different addressing modes and programming of 8086.*
- *understand interfacing of 8086, with memory and other peripherals.*
- *learn concept of DMA, USART RS-232 controller.*
- *study the features of advanced processors and Pentium processors.*
- *study the features of 8051 Microcontroller, its instruction set and Also other controllers.*

Unit I

Objective: To learn concepts of microprocessor, different addressing modes and programming of 8086.

8086/8088 MICROPROCESSORS and ADVANCED PROCESSORS: Register organization of 8086, Architecture, signal description of 8086, physical memory organization, general bus operation, I/O addressing capability, special purpose activities, Minimum mode, maximum mode of 8086 system and timings the processor 8088, ,80286,80386,80486 and Pentium processors .

Unit II

Objective: To understand the basic concepts of 8086 programming

PROGRAMMING WITH 8086 MICROPROCESSOR: machine language instruction formats, addressing mode of 8086, instruction set off 8086, assembler directives and operators. Machine level programs, programming with an assembler, Assembly language programs, and introduction to stack, stack structure of 8086/8088, interrupts and interrupt service routines, interrupt cycle of 8086, non-mask able interrupt and mask able interrupts, interrupt programming.

Unit III

Objective: To learn concept of PIO, DMA, USART RS-232 and PIC controller and interfacing of 8086, with memory and other peripherals.

BASIC AND SPECIAL PURPOSE PROGRAMMABLE PERIPHERALS AND THEIR INTERFACING WITH 8086/88: Semiconductor memory interfacing, dynamic RAM interfacing, interfacing i/o ports, PIO 8255 modes of operation of 8255, interfacing to D/A and A/D converters, stepper motor interfacing, control of high power devices using 8255.Programmable interrupt controller 8259A, the keyboard /display controller8279, programmable communication interface 8251 USART, DMA Controller 8257.

Unit IV

Objective: To learn basic concepts of 8051 Microcontroller features,

Introduction to 8051 Micro Controller
Introduction to microcontrollers, 8051Microcontroller, 8051pin description and its Internal Architecture, connections, I/O ports and memory organization, MCS51.

Unit V

Objective: To learn the assembly language programming concepts, interfacing and its Applications.

Interfacing of 8051 MICROCONTROLLER and APPLICATIONS:

Algorithms for Implementation of FOR Loop–WHILE–REPEAT and IF-THEN-ELSE Features– Addressing modes and Instruction set of 8051–Assembly language programming of 8051– Development systems and tools.

Applications of Micro Controllers– Interfacing 8051 to LED's–Push button– Relay's and Latch Connections– Keyboard Interfacing– Interfacing Seven Segment Display–ADC and DAC Interfacing.

Unit VI

Objective: To study the features of ARM processor.

Advanced Microcontroller: ARM architecture and organization, ARM / Thumb programming model, ARM / Thumb instruction set and programming tools.

TEXT BOOKS:

1. Microprocessors and Interfacing, Douglas V Hall, Mc–Graw Hill, 2nd Edition.
2. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
3. Ajay V Deshmukh,"Microcontrollers", TATA McGraw Hill publications, 2012.
4. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw–Hill.
5. N.Sentil Kumar, M.Saravanan, S.Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press, 2010.

REFERENCES:

1. A.K.Ray, K.M.Bhurchandi,"Advanced Microprocessors and Peripherals", Tata McGraw Hill
   Publications, 2000.
2. Krishna Kant, "Microprocessors and Microcontrollers", PHI Publications, 2010.
3. MS Prakash Rao – "Pulse and Digital Circuits "TataMcGraw Hill.

Course Outcomes:

After going through this course the student will be able to

1. Develop programs for different addressing modes.
2. Perform 8086 interfacing with different peripherals and implement programs.
3. Describe the key features of serial and parallel communications
4. Design a microcontroller for simple applications.

III Year B.Tech. (ECE). – II Semester

DIGITAL SIGNAL PROCESSING

Course objective: *The student will be able to*

- *Define and use Discrete Fourier Transforms (DFTs).*
- *Use Z - transforms and discrete time Fourier transforms to analyze a digital 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

Objective: To study different types of signals and properties of discrete time systems.

Introduction

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

Objective: To study the properties of DFT and computation of Fast Fourier Transforms.

Discrete Fourier Analysis

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.

Fast Fourier transforms (FFT) – Radix–2 decimation in time and decimation in frequency FFT Algorithms – Inverse FFT, Split Radix and Radix-4 FFT.

Review of Z-transforms, Applications of Z-transforms Solution of difference equations and System Function.

UNIT III

Objective: To understand the concept of IIR and FIR Digital filters

IIR Digital Filters & FIR Digital Filters

Analog filter approximations – Butter worth and Chebyshev – Design of IIR Digital filters from analog filters – Design Examples**:** Analog–Digital transformations. Characteristics of FIR Digital Filters – Frequency response – Design of FIR Digital Filters using Window Techniques – Frequency Sampling technique – Comparison of IIR & FIR filters

UNIT–IV

Objective: To learn the concepts of realization of Digital Filters.

Realization 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. Finite word length effects.

UNIT–V

Objective: To study the concept of multi–rate signal processing.

Multirate Digital Signal Processing

Decimation, interpolation, sampling rate, Conversion , Implementation of sampling rate conversions and applications.

UNIT–VI

Objective: To study the architecture of digital signal processors.

Introduction to Digital Signal Processors (DSP)

Introduction to programmable DSPs**:** Multiplier and Multiplier Accumulator (MAC) – Modified bus structures and memory access schemes in DSPs – Multiple access memory – Multiport

memory – VLSI architecture – Pipelining – Special addressing modes – On–chip peripherals – 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. Programming tools and Environment.

Text Books:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G.Manolakis,Pearson Education / PHI, 2007
2. Digital Time Signal Processing – A. V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006.
3. Digital Signal Processors – Architecture, Programming and Applications,, B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002.

Reference Books:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra Harris,Thomson, 2007
5. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006 .
6. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
7. Digital Signal Processing – K Raja Rajeswari, I.K. International.

WEB REFERENCES:

1. NPTEL online courses.

2. MOOCS online courses by JNTU

Course Outcomes:

After going through this course the student will be able to

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

III Year B.Tech. (ECE). – II Semester

DIGITAL COMMUNICATIONS

Course Objective: *The student will be able to*
- *understand pulse digital modulation systems such as PCM, DPCM and DM.*
- *understand various digital modulation techniques and able to analyze various systems for their performance in terms of probability of error.*
- *study the concept of entropy and need for source coding.*
- *study Block codes, cyclic codes and convolution codes.*

UNIT I
Objective: To understand pulse digital modulation systems such as PCM, DPCM and DM.

PULSE DIGITAL MODULATION
Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT II
Objective: To understand various digital modulation techniques

DIGITAL MODULATION TECHNIQUES: Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

UNIT III
Objective: To analyze various systems for their performance in terms of probability of error

DATA TRANSMISSION
Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK,QPSK.

UNIT IV
Objective: To study the concept of entropy

INFORMATION THEORY
Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties.

UNIT V

Objective: To study the need for source coding

SOURCE CODING
Introductions, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

UNIT VI

Objective: To study Block codes, cyclic codes and convolution codes

LINEAR BLOCK CODES

Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.

CONVOLUTION CODES

Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

TEXT BOOKS:

1. Digital communications - Simon Haykin, John Wiley, 2005

2. Principles of Communication Systems – H. Taub and D. Schilling,TMH, 2003

REFERENCES:

1. Digital and Analog Communication Systems - Sam Shanmugam, JohnWiley, 2005.

2. Digital Communications – John Proakis, TMH, 1983.

3. CommunicationSystems Analog&Digital – Singh &Sapre, TMH, 2004.

4. Modern Analog and Digital Communication – B.P.Lathi, Oxfordreprint, 3rd edition, 2004.

WEB REFERENCES:

1. NPTEL online courses.

2. MOOCS online courses by JNTU.

Course Outcomes:

After going through this course the student will be able to

1. Analyze the performance of Digital communication system for probability of error and are able to design a digital communication system.
2. Analyze various source coding techniques.
3. Compute and analyze block codes, cyclic codes and convolution codes.
4. Design a coded communication system.

III Year B.Tech. (ECE). – II Semester

OPEN ELECTIVE

OOPs through JAVA

Course Objective:
Implementing programs for user inferface and application devlopment using core java principles.

Unit-I

Objective: Focus on object oriented concepts and java program structure and its installation.
Introduction to OOP: Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

Unit-II
Objective: Comprehension of java programming constructs, control structures in Java.
Programming Constructs: Variables, Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Flow of control-Branching, Conditional, loops.

Unit-III
Objective: Understanding the concept of Classes and Objects
Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.

Unit-IV
Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class, Interfaces & Packages.

Unit-V
Objective: Implementing Thread concepts, I/O and exception handling in Java
Exceptions & Assertions - Introduction, Exception handling techniques-try... catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions, Multithreading- Using isAlive()and join(),Synchronization.

Unit-VI
Objective: Being able to build dynamic user interfaces using applets in java.
Applets-Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint (), update () and repaint ()

Text Books:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH.

5. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson.

Reference Books:

1. JAVA Programming, K. Rajkumar. Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna, University Press.

Course outcomes:

By the end of the course student will be able to

1. Describe the general architecture of computers.
2. Describe object oriented concepts.
3. Describe, contrast and compare differing structures of operating systems.
4. Understand and analyze theory and implementation of processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.

III Year B.Tech. (ECE). – II Semester

MICRO ELECTRO MECHANICAL SYSTEMS
(OPEN ELECTIVE)

Course Objectives:

1. *To learn basics of Micro Electro Mechanical Systems (MEMS).*
2. *To learn about various sensors and actuators used in MEMS.*
3. *To learn the principle and various devices of MEMS, Fluidic, bio and chemical systems.*

UNIT – I

INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT – II

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermistors, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

UNIT – III

MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

UNIT – IV

MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for

MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, mag MEMS actuators, by directional micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

UNIT – V

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps.

RADIO FREQUENCY (RF) MEMS: RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

UNIT - VI

CHEMICAL AND BIO MEDICAL MICRO SYSTEMS: Sensing mechanism & principle, membrane-transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (E-nose), mass sensitive chemosensors, fluroscence detection, calorimetric spectroscopy.

TEXT BOOK:

MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.

REFERENCE BOOKS:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.
2. MEMS and NEMS, Sergey Edwrd Lyshevski, CRC Press, Indian Edition.
3. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.
4. Introductory MEMS, Thomas M Adams, Richard A Layton, Springer International Publishers.

III Year B.Tech. (ECE). – II Semester

MECHATRONICS

(OPEN ELECTIVE)

Course Objective

The main objective of this course is to introduce the integrative nature of Mechatronics. To describe the different components and devices of mechatronics systems.

UNIT-I

Mechatronics systems – elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II

Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.

UNIT-III

Hydraulic and pneumatic actuating systems - Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro- pneumatic, hydro-pneumatic, electro-hydraulic servo systems. Mechanical actuating systems and electrical actuating systems – basic principles and elements.

UNIT-IV

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V

System and interfacing and data acquisition – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing – data flow in DSPs, block diagrams, typical layouts, Interfacing motor drives.

UNIT -VI

Dynamic models and analogies, System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trends.

TEXT BOOK:

MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran, GK Vijaya Raghavan & MS Balasundaram/WILEY India Edition.

REFERENCES:

1 Mechatronics – Smaili A, Mrad F, Oxford Higher Education, OxfordUniversity Press.

2 Mechatronics Source Book by Newton C Braga, ThomsonPublications, Chennai.

3 Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.

4 Mechatronics System Design / Devdas shetty/Richard/Thomson.

5 Mechatronics/M.D.Singh/J.G.Joshi/PHI.

6 Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg. 4th Edition, Pearson, 2012 W. Bolton.

7 Mechatronics – Principles and Application Godfrey C. Onwubolu, Wlsevier, Indian print.

III Year B.Tech. (ECE). – II Semester

POWER ELECTRONICS

(OPEN ELECTIVE)

UNIT–I

Power Semi Conductor Devices: Introduction of Diodes and Diode reverse recovery characteristics Diode bridge rectifier with R–load and capacitive filter–Output voltage and input current waveforms. Thyristors–Silicon controlled rectifiers (SCR's) Basic theory of operation of SCR–Static characteristics– Turn on and turn off methods–Dynamic characteristics of SCR–Snubber circuit design–Numerical problems –Characteristics of power MOSFET and power IGBT—Diode bridge rectifier with R–load and capacitive filter–Output voltage and input current waveforms.

UNIT–II

Phase Controlled Converters –AC to DC Converters: Firing circuits for SCR– single phase Half wave converters with R,RL and RLE loads– Derivation of average load voltage and current– Effect of freewheeling diode for RL load. Single phase full converter Operation with R, RL and RLE loads–Derivation of average voltage and current – Effect of source Inductance.

UNIT–III

Semi Converters (Half Controlled): Operation with R, RL and RLE loads – Harmonic analysis for input current waveform in a system with a large load inductance –Calculation of input power factor.

UNIT–IV

Three Phase controlled Rectifiers & AC-AC Converters: Full converter with R and RL loads–Semi converter (Half Controlled) with R and RL loads– Derivation of load voltage–Line commutated Inverter operation–Dual converters with non–circulating and circulating currents. Operation of AC voltage controller with R& RL Loads and operation of single phase stepup cyclo converters & operation of single phase stepdown cyclo converter

UNIT – V

DC–DC Converters: High frequency DC–DC converters**:** Buck Converter operation– Time ratio control and current limit control strategies–Voltage and current waveforms–Derivation of output voltage–Boost converter operation–Voltage and current waveforms–Derivation of output voltage – Buck-Boost converter operation –Voltage and current waveforms.

UNIT – VI

DC–AC Inverters: Single phase inverters– Unipolar and bipolar switching–Three phase Inverters (120^0 and 180^0 modes of operation) –PWM techniques–single PWM ,Multiple PWM Sinsoudial PWM Sine triangular PWM technique– amplitude and frequency modulation Indices –Harmonic analysis.

Text Books:

1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
3. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.

III Year B.Tech. (ECE). – II Semester

MICROPROCESSORS AND MICROCONTROLLERS LAB

Learning Objectives :

- *To study programming based on 8086 microprocessor and 8051 microcontroller .*
- *To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.*
- *To study modular and Dos/ Bios programming using 8086 micro processor.*
- *To study to interface 8086 with I/O and other devices.*
- *To study parallel and serial communication using 8051 micro controller.*

Any 8 of following experiments are to be conducted :

-I: MICROPROCESSOR 8086

. Introduction to MASM/TASM.

1. Arithmetic operation- Multi byte Addition and Subtraction, Multiplication and Division- Signed and using arithmetic operation, ASCII- Arithmetic operation
2. Logic operations-Shift and rotate- Converting packed BCD to Unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Modular Program: Procedure, Near and Far implementation, Recursion.
5. DOS/BIOS programming : Reading keyboard (Buffered with and without echo) - Display characters, Strings.
6. Interfacing 8255-PPI
7. Programs using special instructions like swap, bit/byte, set/reset etc.
8. Programs based on short, page, absolute addressing.
9. Interfacing 8259. Interrput Controller.
10. Interfacing8279 - Keyboard Display.
11. Stepper motor control using 8253/8255.

PART-III: MICROCONTROLLER 8051

12. Reading and Writing on a parallel port.
13. Timer in different modes.
14. Serial communication implementation.
15. Understanding three memory areas of 00 – FF (Programs using above areas). Using external interrupts.

III Year B.Tech. (ECE). – II Semester

DIGITAL COMMUNICATIONS LAB

List of Experiments
(For Laboratory Examination-Minimum of Ten Experiments)

1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation
.
4. Delta modulation
.
5. Frequency shift keying.
6. Phase shift keying .
7. Differential phase shift keying.
8. Companding
9. Source Encoder and Decoder
10. Linear Block Code-Encoder and Decoder
11. Binary Cyclic Code - Encoder and Decoder
12. Convolution Code - Encoder and Decoder

Equipment required for Laboratory

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators - 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for Digital Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees.

III Year B.Tech. (ECE). –II Semester

DIGITAL SIGNAL PROCESSING LAB

LIST OF EXPERIMENTS:

1. To study the architecture of DSP chips – TMS 320C 5X/6X Instructions.
2. To verify linear convolution.
3. To verify the circular convolution.
4. To design FIR filter (LP/HP) using windowing technique
   a) Using rectangular window
   b) Using triangular window
   c) Using Kaiser window
5. To Implement IIR filter (LP/HP) on DSP Processors
6. N-point FFT algorithm.
7. MATLAB program to generate sum of sinusoidal signals.
8. MATLAB program to find frequency response of analog LP/HP filters.
9. To compute power density spectrum of a sequence.
10. To find the FFT of given 1-D signal and plot.

IV Year B.Tech. (ECE). – I Semester

VLSI DESIGN

Course Objective: *The student will be introduced to*

- *Use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnects.*
- *Learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.*
- *Apply CMOS technology-specific layout rules in the placement and routing of transistorsand interconnect and to verify the functionality, timing, power and parasitic effects.*
- *The concepts and techniques of modern integrated circuit design and testing (CMOS VLSI).*
- *Design static CMOS combinational and sequential logic at the transistor level, including mask layout.*

Unit I

Objective: To learn the various fabrication steps of IC and basic electrical properties of MOSFET.

Introduction:

Introduction to IC Technology, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, IC production process, MOS and CMOS Fabrication processes, Bi-CMOS Technology, Comparison between CMOS and Bipolar technologies.

Basic Electrical Properties of MOS and Bi-CMOS Circuits:

I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. The Pass transistor, NMOS Inverter, Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS inverter. Alternative forms of pull-up, The CMOS Inverter, MOS transistor circuit model, Bi-CMOS Inverter, Latch-up in CMOS circuits and Bi CMOS Latch-up Susceptibility.

Unit II

Objective: To Apply CMOS technology specific layout rules in the placement and routing of transistors and interconnections.

MOS and Bi-CMOS Circuit Design Processes:

MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µ m Double Metal, Double Poly, CMOS/Bi-CMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

Unit III

Objective: To understand the basic circuit concepts and scaling factors of MOS circuits.

Basic Circuit Concepts:

Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, The Delay Unit, Inverter Delays, Propagation Delays, Wiring Capacitances, Fan-in and fan-out characteristics, Choice of layers, Transistor switches, Realization of gates using NMOS, PMOS and CMOS technologies.

Scaling of MOS Circuits:

Scaling models, Scaling factors for device parameters, Limits due to sub threshold currents, current density limits on logic levels and supply voltage due to noise.

UNIT IV

Objective: To use mathematical methods and circuit analysis models in analysis of CMOS digital electronics Circuits, including logic components and their interconnection.

Subsystem Design:

Architectural issues, switch logic, Gate logic, examples of structured design, clocked sequential circuits, system considerations, general considerations of subsystem design processes, an illustration of design processes.

Unit V

Objective: To understand concepts and techniques of modern integrated Circuit design and testing.

VlSI Design Issues:

VLSI Design issues and design trends, design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design, ASIC design flow, FPGA design flow, introduction to SoC design.

Unit VI

Objective: To learn FPGA architecture and design process.

Basic FPGA architecture, FPGA configuration, configuration modes, FPGA design process-FPGA design flow, FPGA families, FPGAdesign examples-stack, queue and shift register implementation using VHDL, step-by-step approach of FPGA design process on Xilinx environment.

TEXT BOOKS :

1. Essentials of VLSI Circuits and Systems By Kamran Eshraghian, Douglas and A. Pucknell and SholehEshraghian, Prentice-Hall of India Private Limited,2005 Edition.

2. Principles of CMOS- Weste and Eshraghian, Pearson education,1999.

REFERENCES :

1. Digital Integrated Circuits- John M Rabaey, PHI, EEE-1997.

2. VLSI Design-Black Book By Dr. K.V.K.K. Prasad, KattulaShyamala, Kogent Learning Solutions Inc.2012 Edition.

3. VLSI Design By A.Albert Raj & T.Latha, PHI Lerning Private Limited,2010.

4. VLSI Design-A.Shanthi and A.Kavita, New Age International Private Limited, 2006 First Edition.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Apply the concept of design rules during the layou5t of a circuit.
2. Model and simulate digital VLSI systems using hardware design language.
3. Synthesize digital VLSI systems from register transfer or higher level descriptions.
4. Understand current trends in semiconductor technology, and how it impacts scaling and performance.

IV Year B.Tech. (ECE). – I Semester

MICROWAVE ENGINEERING

Course Objectives:

The student will

- *Understand fundamental electrical characteristics of waveguides and transmission lines through electromagnetic field analysis.*
- *Understand the basic properties of Polarization and Ferrite materials composition in the case of waveguide components.*
- *Understand the multiport junction concept for splitting the microwave energy in a desired direction.*
- *Understand the function, design, and integration of the major microwave components like oscillator, modulator, in building a Microwave test bench setup for measurements*

Unit I

Objective: To understand fundamental electrical characteristics of waveguides and transmission lines through electromagnetic field analysis in Rectangular waveguides.

MICROWAVE TRANSMISSION LINES

Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides– TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations; Power Transmission and Power Losses in Rectangular Guide, Impossibility of TEM mode. Related Problems.

Unit II

Objective: To understand the concept of circular waveguides, micro strip lines and cavity resonators.

CIRCULAR WAVEGUIDES

Introduction, Nature of Fields, Characteristic Equation, Dominant and Degenerate Modes. Microstrip Lines– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor. Cavity Resonators– Introduction, Rectangular and Cylindrical Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients, Excitation techniques- waveguides and cavities, Related Problems.

Unit III

Objective: To Understand the multiport junction concept for splitting the microwave energy in a desired direction.

WAVEGUIDE COMPONENTS AND APPLICATIONS - I

Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities –Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters– Dielectric, Rotary Vane types. Scattering Matrix–

Significance, Formulation and Properties. S-Matrix Calculations for – 2 port Junction, E plane and H-plane Tees, Magic Tee, Hybrid Ring; Directional Couplers –2Hole, Bethe Hole types, Ferrite Components– Faraday Rotation, S-Matrix Calculations for Gyrator, Isolator, Circulator, Related Problems.

UNIT – IV

Objective: To understand the concept of O type tubes and related expressions in microwaves.

MICROWAVE TUBES

Limitations and Losses of conventional tubes at microwave frequencies. Microwave tubes – O type and M type classifications. O-type tubes : 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance; Oscillating Modes and o/p Characteristics, Electronic and Mechanical Tuning, Related Problems.

UNIT V

Objective: To understand the concept of M type tubes with output characteristics.

HELIX TWTS

Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants.

M-type Tubes

Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave. Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

Unit VI

Objective: To Understand the function, design, and integration of the major microwave components like oscillator, modulator in building a Microwave test bench setup for measurements.

MICROWAVE SOLID STATE DEVICES

Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics.

MICROWAVE MEASUREMENTS

Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q. Impedance Measurements.

.

TEXT BOOKS :

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition,1994.

2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung andH.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.

REFERENCES :

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press,John Wiley, 2nd Edition, 2002.

2. Microwave Engineering- David M.Pozar wiley, $th edition,2012.

3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.

4. Microwave Engineering – G S N Raju , I K International

5. Microwave and Radar Engineering – G Sasibhushana Rao Pearson

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Gain knowledge of transmission lines and waveguide structures and how they are used as elements in impedance matching and filter circuits.
2. Apply analysis methods to determine circuit properties of passive or active microwave devices.
3. Gain knowledge and understanding of microwave analysis methods.
4. Distinguish between M-type and O-type tubes.
5. Analyze and measure various microwave parameters using a Microwave test bench.

IV Year B.Tech. (ECE). – I Semester

OPTICAL COMMUNICATION

***Course Objective**:*

The student will be introduced to

- *The functionality of each of the components that comprise a fiber-optic communication system .*
- *The properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.*
- *The principles of single and multi-mode optical fibers and their characteristics*
- *Working of semiconductor lasers, and differentiate between direct modulation and external electro-optic modulation.*
- *Analyze the operation of LEDs, laser diodes, and PIN photo detectors (spectral properties, bandwidth, and circuits) and apply in optical systems.*
- *Analyze and design optical communication and fiber optic sensor systems.*

Unit I

Objective: To analyse the characteristics of optical fiber communication and modes in fiber

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, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems

Unit II

Objective: To study the characteristics of fiber materials and dispersion and pulse broadening

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, Information capacity determination, Group delay, Types of Dispersion:- Material dispersion, Wave-guide dispersion, Polarization-Mode dispersion, Intermodal dispersion, Pulse broadening in Graded index fiber, Related problems.

Unit III

Objective: To understand various modes of fiber connectors and fiber alignment and joints

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-Multimode fiber joints, single mode fiber joints.

UNIT IV

Objective: To study the characteristics of optical sources , detectors & their principles

Optical sources- LEDs, 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, Optical detectors-Physical principles of PIN and APD, Detector response time, Temperature effect on

Avalanche gain, Comparison of Photo detectors, Related problems.

Unit V

Objective: To understand the concept of power launching to fiber & optical receiver operation

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers.

Unit VI

Objective: To learn basic concepts of optical system design and WDM

Optical system design - Point-to- point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS:

1. Optical Fiber Communications – Gerd 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. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
3. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Choose necessary components required in modern optical communication systems.
2. Design and build optical fiber experiments in laboratory, and learn how to calculate electromagnetic modes in wave guides, the amount of light lost going through an optical system, dispersion of optical fibers.
3. Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.
4. Choose the optical cables for better communication with minimum losses.
5. Design, build and demonstrate optical fiber experiments in the laboratory.

IV Year B.Tech. (ECE). – I Semester

CELLULAR AND MOBILE COMMUNICATIONS

Course Objective: *The student will be able to know the*

- *Fundamentals of Cellular Systems and elements of Cellular Systems.*
- *Antenna parameters and interference parameters.*
- *Concepts of different antennas used for cellular communication*
- *Concepts of frequency management and channel assignment techniques.*

Unit I

Objective: To understand basics of cellular mobile communication and their elements

CELLULAR MOBILE RADIO SYSTEMS

Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analogand Digital Cellular systems.

ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN

General description of the problem, concept of frequency channels, Co-channelInterference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of cellular system.

Unit II

Objective: To understand the antenna parameters and their effects and to know the concepts of cell coverage and traffic.

INTERFERENCE

Introduction to Co-Channel Interference, real time Co- Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co channel interference-different types.

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 antenna height gain, form of a point to point model.

Unit III

Objective: To understand different antennas used for cellular communication and their patterns.

CELL SITE AND MOBILE ANTENNAS

Sum and difference patterns and their synthesis, omni-directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas ,minimum separation of cell site antennas, high gain antennas.

UNIT IV

Objective: To study the concepts of frequency management, channel assignment and grouping of cells.

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

Objective: To understand the concepts of handoffs and their mechanisms.

Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

Unit VI

Objective: To study the GSM architecture and different multiple access schemes used for mobile communication.

DIGITAL CELLULAR NETWORKS

GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA, overview of 3G, 4G technologies.

Text Books :

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill,2rd Edn., 2006.

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

2007.

References:

1. Cellular Mobile Communication- Gottapu Sasibhushana Rao, Pearson Education
2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002
3. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition,2006.
4. Wireless Communication and Networking – Jon W. Mark and WeihuaZhqung, PHI, 2005.
5. Wireless Communication Technology – R. Blake, Thompson Asia Pvt.Ltd., 2004.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

1. Identify the limitations of conventional Mobile Telephone System and interpret the operation of cellular system.
2. Illustrate the concept of frequency Reuse channels, Deduce the Co-channel interference reduction factor.
3. Design the Antenna system to reduce Co-channel interference.
4. Understand adjacent channel interference, near end far end interference and UHF TV interference.
5. Evaluate cell site and mobile antennas.
6. Analyze the frequency management and channel assignment strategies
7. Classify Handoff, Distinguish types of handoffs and evaluation of dropped call rates.

IV Year B.Tech. (ECE). – I Semester
(Elective –I)

TELECOMMUNICATION SWITCHING SYSTEMS & NETWORKING

Course Objectives:

The student will

- *Understand the basics of telecommunication switching systems from basic to new versions.*
- *Understand the concepts of electromechanical switching systems.*
- *Understand the routing concepts in telecom networks and signaling systems concepts*
- *Understand the concepts switching techniques and their types.*
- *Understand concepts ISDN and SONET concepts.*

UNIT -I:
Objective: To understand the basics of telecommunication switching systems from basic to new versions.

Introduction
Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System, Manual Switching System, Major Telecommunication Networks.
Crossbar Switching
Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

UNIT -II:
Objective: To study the concepts of electromechanical switching systems.

Electronic Space Division Switching
Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, and Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks.

Time Division Switching
Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three-Stage Combination Switching, n- Stage Combination Switching.

UNIT -III:
Objective: To learn the routing concepts like how the call is routed from source to destination and also to know charging and numbering plans and also concepts of different signaling systems.

Telephone Networks
Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, Cellular Mobile Telephony.

Signaling
Customer Line Signaling, Audio- Frequency Junctions and Trunk Circuits, FDM Carrier Systems, PCM Signaling, Inter- Register Signaling, Common- Channel Signaling Principles, CCITT

Signaling System no.6, CCITT Signaling System no.7, Digital Customer Line Signaling.

UNIT -IV:

Objective: To study the concepts of switching techniques and also how the telephone traffic is measured in telecom networks.

Packet Switching

Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks.

Telecommunications Traffic

The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model, Lost-call Systems, Queuing Systems.

UNIT -V:

Objective: To study the concepts of switching networks.

Switching Networks

Single- Stage Networks, Grading, Link Systems, Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, Call Packing, Rearrange-able Networks, Strict- Sense non-blocking Networks, Sectionalized Switching Networks

UNIT -VI:

Objective: To learn the concepts of ISDN and SONET

Integrated Services Digital Network

Motivation for ISDN, New Services, Network and Protocol Architecture, Transmission Channels, User- Network Interfaces, Signaling, Numbering and Addressing, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, Voice Data Integration and SONET concept.

TEXT BOOKS:

1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, 2000, PHI.
2. Telecommunications Switching, Traffic and Networks- J. E. Flood, 2006, Pearson Education.

REFERENCES:

1. Digital Telephony- J. Bellamy, 2nd Edition, 2001, John Wiley.
2. Data Communications and Networks- Achyut S. Godbole, 2004, TMH.
3. Principles of Communication Ststems- H. Taub & D. Schilling, 2nd Edition, 2003, TMH.
4. Data Communication & Networking- B. A. Forouzan, 3rd Edition, 2004, TMH.
5. Telecommunication System Engineering – Roger L. Freeman, 4th Ed., Wiley-Inter Science, John Wiley & Sons, 2004.

Course Outcomes:

1. To study the basic concepts on switching systems and their classifications from basic version to new versions.
2. To study the concept of combinational switching techniques and also stored program concepts for automatic exchanges.
3. To study basics of how a call to be routed and also how much amount to be charged for different calls originated from different locations and also they study how a number is assigned to subscriber.
4. To study the concepts of data transmission through land lines and also they study the concepts on Topologies and different network components.
5. To study the concept of data, pictures, voice through one channel i.e ISDN and also they study the concepts of ISDN and their types.
6. To study the digital subscriber line techniques for high speed data transmission through optical fiber cables.

IV Year B.Tech. ECE. – I Semester
(Elective –I)

Network Security and Cryptography

Course objectives:
The main objective of this course is to teach students to understand and how to address various software security problems in a secure and controlled environment. During this course the students will gain knowledge (both theoretical and practical) in various kinds of software security problems, and techniques that could be used to protect the software from security threats. The students will also learn to understand the "modus operandi" of adversaries; which could be used for increasing software dependability.

Unit- I
Introduction: The OSI Security Architecture, Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense (Phishing Defensive measures, Web based attacks, SQL injection & Defense techniques), Buffer overflow & format string vulnerabilities.

Unit-II
Block Ciphers & Symmetric Key Cryptography: Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Block Cipher Modes of Operations

Unit-III
Number Theory: Divisibility and the division Algorithm, Euclidean Algorithm, Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

Unit-IV
Public Key Cryptography: Principles of public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal cryptosystem, Elliptic Curve Cryptography.
Cryptographic Hash Functions: Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC.

Unit-V
Digital Signatures: Digital Signatures, NIST Digital Signature Algorithm. X.509 Certificate, Key management & distribution.
User Authentication- Remote user authentication principles, Kerberos

Unit-VI
Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.
IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Text Books:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin,

CRC press
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

Reference Books:

1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
2. Network Security & Cryptography, Bernard Menezes, Cengage,2010

Course Outcomes

1. be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

IV Year B.Tech. (ECE). – I Semester

(Elective- I)

DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES

Course Objectives: *The student will*

- *Understand the concepts of programmable DSP devices and its applications.*
- *Understand the concept of computational accuracies in DSP implementation.*
- *Understand the concept of computational accuracies in DSP implementation.*
- *Understand the various addressing modes of DSP TMS320C54XX.*
- *Understand concept of MATLAB DSP toolbox for analysis and design of DSP.*

Unit I

Objective: To understand the concepts of programmable DSP devices and its applications.

Review of 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-Analysis and design, design tools for DSP systems

Unit-II

Objective: To understand the concept of computational accuracies in DSP implementation.

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 III

Objective: To understand the concept of architecture and addressing modes in DSP devices.

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, parallelism and pipelining.

UNIT –IV

Objective: To acquire knowledge about various addressing modes of DSP TMS320C54XX and are able to program DSP processor.

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, overview of developmental tools.

UNIT V

Objective: To understand the concept of Micro Signal Architecture and basic peripherals.

Analog Devices Family of DSP Devices

Analog Devices Family ofDSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals, overview of developmental tools.

Unit VI

Objective: To understand the concept of MATLAB DSP toolbox for analysis and design of DSP.

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 multi channel buffer serial port-MCBSP

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP processor fundamentals- Architectures and features-Phil Lapsley, Jeffbier, Amit shoham, Edward Lee Wiley-IEE press.
3. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 2002, TMH.

REFERENCE BOOKS:

1. A Practical Approach to Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
2. Digital Signal Processing – Jonatham Stein, 2005, John Wiley.
3. Handouts of analog devices family and DSP devices available on web.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

IV Year B.Tech. (ECE). – I Semester
(ELECTIVE – I)

ANALOG IC DESIGN

Course Objective:
The student will

- *Understand the behavior of MOS Devices and Small-Signal Modeling of MOS Transistor.*
- *Understand the concepts of Analog CMOS circuits and cascading.*
- *Understand the characteristics of CMOS amplifiers.*
- *Understand the concepts of operational Amplifiers and design.*
- *Understand the concepts of various oscillators and PLL.*

UNIT -I:

Objective: To study the concept of MOS Transistor and small signal analysis of the MOS Transistor

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:

Objective: To understand the concept of Analog CMOS circuits and cascading.

Analog CMOS Sub-Circuits

MOS Switch, MOS Diode, MOS ActiveResistor, 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:

Objective: To study the characteristics of CMOS amplifiers types.

CMOS Amplifiers

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

UNIT –IV

Objective: To study the concept of operational Amplifiers and design.

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:

Objective: To Study the characteristics of different comparators

Comparators

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

UNIT -VI:

Objective: To understand the PLL, LOCKED Range and CAPTURE Range

Oscillators & Phase-Locked Loops

General Considerations, Ring Oscillators, LC Oscillators, Voltage Controlled Oscillators. Simple PLL, Charge Pump PLLs, Non-Ideal Effects in PLLs, Delay Locked Loops, Applications.

TEXTBOOKS:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition.

2. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn, 2013

REFERENCES:

1. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.

2 CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

WEB REFERENCES:

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Understand the concepts of MOS Devices and modeling.
2. Design and analyze any Analog Circuits in real time applications.
3. Extend the analog circuit design to different applications in real time.
4. Understand of Open-loop comparators and different types of oscillators.

IV Year B.Tech. (ECE). – I Semesters
(Elective- II)

RADAR SYSTEMS

Course Objective:
The student will

- *Understand the basics of RADAR systems and its components.*
- *Understand the basic concepts of ambiguity functions, CW Radar, FM-CW Radar and their applications.*
- *Understand concept of MTI and Pulse Doppler Radar*
- *Understand concepts about different trackers and radar antennas*
- *Understand the concept of Noise and radar receivers.*

Unit I

Objective: To understand the components of radar system and their relationship to overall system performance.

Introduction

Nature of Radar. Maximum Unambiguous Range. Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Related Problems. Radar Equation: Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere). Transmitter power.

Unit II

Objective: To understand the basic concepts of ambiguity functions, CW Radar, FM-CW Radar and their applications.

PRF and Range Ambiguities, System Losses (Qualitative treatment). Related Problems. CW and Frequency Modulated Radar: Doppler effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirement, Applications of CW radar. FMCW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Multiple Frequency CW Radar.

Unit III

Objective: To learn concept of MTI and Pulse Doppler Radar.

MTI and Pulse Doppler radar

Introduction, Principle, MTIR Radar with Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, and Double Cancellation staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance. Non-coherent MTI, MTI versus Pulse Doppler radar. Tracking Rader: Tracking with Radar, Sequential Lobing, Conical Scan, Mono-pulse tracking.

Unit IV

Objective: To study the basic concepts about different trackers and radar antennas.

Radar Amplitude Comparison Mono-pulse (one – and two –coordinates), Phase Comparison Mono-pulse. Target Reflection Characteristics and Angular Accuracy. Tracking in Range Acquisition and Scanning Patterns. Comparison of Trackers. Radar Antennas – Antenna Parameters, Reflector Antennas, Lens Antennas, Lens Antennas Cosecant- Squared Antenna Pattern, Radomes.

Unit V

Objective: To learn basic concepts of array Antennas and characteristics of Matched filter receiver.

Electronically Steered Phased Array Antennas, Phase Shifters, Frequency – scan Arrays, Radiation for Phased Array, and Architecture for Phased Arrays. Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver

Unit VI

Objective: To study the concept of Noise and radar receivers.

Radar Receivers – Noise Figure and Noise Temperature. Displays – types. Duplexer – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas- Basic Concepts, Radiation Pattern. Beam Steering and Beam Width changes, Series versus Parallel Feeds. Applications, Advantages and Limitations.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, Second Edition, McGraw – Hill, 1981.

2. Radar Engineering and fundamentals of Navigational Aids-G.S.N.Raju, I.K International, 2008.

REFERENCES:

1. Introduction to Radar Systems – Merrill I. Skolnik, Third Edition, Tata McGraw – Hill, 2001.

2. Radar: Principles, Technologies, Applications- Byron Edde, Pearson Education.

3.Radar principles-Peyton, Z.peebles, John wiley, Jr 2004.

4.Principles of Modern Radar- Mark A. Richards, Scitech publishing, INC.

WEB REFERENCES:

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Acquire the knowledge to apply and design required parameters for RADAR system.
2. Apply the techniques learned, to choose suitable RADAR from the available, for the required application.

IV Year B.Tech. (ECE). – I Semester
(Elective-II)

DIGITAL IC DESIGN

Course Objective:

The student will

- *Understand the basics of MOS Design*
- *Understand the basics of Combinational MOS Logic Circuits and design of complex circuits.*
- *Understand the basics of Sequential MOS Logic Circuits*
- *Understand concepts digital integrated circuits and its applications*
- *Understand the concepts of different interconnection techniques*
- *Understand the concepts of Semiconductor memories and RAM array Organization*

UNIT-I:

Objective: To understand the MOS Design.

MOS Design: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II:

Objective: To study the Combinational MOS Logic Circuits and design of complex circuits.

Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III:

Objective: To study the sequential MOS Logic Circuits.

Sequential MOS Logic Circuits: Behaviour of bi stable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV:

Objective: To design and to develop the Digital Integrated Circuits for different Applications.

Dynamic Logic Circuits: Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-V:

Objective: To study about different interconnection and its techniques

Interconnect: Capacitive Parasitics, Resistive Parasitics, InductiveParasitics, Advanced Interconncet Techniques, clock distribution networks , clock delays, clock skew and Jitter.

UNIT-VI:

Objective: The concepts of Semiconductor Memories, Flash Memory, RAM array organization.

Semiconductor Memories: Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.

TEXT BOOKS:

1. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2nd Ed., PHI.
2. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.
3. Modern VLSI Design-Wayne Wolf, fourth edition, copyrights 2009.

REFERENCES:

1. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.
2. CMOS VLSI Design – Neil H.E Weste, David harris, Ayan Banerjee 3rd Edition, Pearson

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Understand the concepts of MOS Design.
2. Design and analysis of combinational and sequential MOS circuits.
3. Extend the digital IC design to different applications.
4. Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.

IV Year B.Tech. (ECE). – I Semester
(Elective-II)

SPEECH PROCESSING

Course Objectives:

The student will

- *Understand the basics of speech processing*
- *Understand the Time Domain Models for Speech Processing*
- *Understand the concepts of linear predictive coding and its applications*
- *Understand the properties of Homomorphic speech processing*
- *Understand the concepts of speech enhancement techniques*
- *Understand the concepts of speech pattern and its representation.*

UNIT –I:

Objective: To understand the fundamentals of speech processing.

Fundamentals of Digital Speech Processing

Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulator Phonetics, The Acoustic Theory of Speech Production- Uniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models for speech signals.

UNIT –II:

Objective: To understand time domain models, correlation and autocorrelation function of speech processing

Time Domain Models for Speech Processing

Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT –III:

Objective: To understand and to analyze linear predictive coding and its applications.

Linear Predictive Coding (LPC) Analysis

Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT –IV:

Objective: To understand the properties of homomorphic speech processing.

Homomorphic Speech Processing

Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder.

UNIT-V

Objective: To understand speech enhancement techniques by using different types of filers.

Speech Enhancement:

Nature of interfering sounds, Speech enhancement techniques: Single Electronics & Communication Engineering Microphone Approach : spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter, Multi microphone Approach.

UNIT-VI:

Objective: To understand speech pattern and its representation.

Automatic Speech & Speaker Recognition:

Basic pattern recognition approaches, Parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System.

Hidden Markov Model (HMM) for Speech:

Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS,

Speaker Recognition:

Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

TEXT BOOKS:

1. Digital Processing of Speech Signals - L.R. Rabiner and S. W.Schafer. Pearson Education. 2006.

2. Speech Communications: Human & Machine – Douglas O'Shaughnessy, 2nd Ed., Wiley India, 2000.

REFERENCE BOOKS:

1. Discrete Time Speech Signal Processing: Principles and Practice - Thomas F. Quateri, 1st Ed., PE.

2. Speech & Audio Signal Processing- Ben Gold & Nelson Morgan, 1st Ed., Wiley.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

IV Year B.Tech. (ECE). – I Semester
(Elective-II)

ARTIFICIAL NEURAL NETWORKS AND FUZZY LOGIC

Course Objectives:

The student will

- *Understand the operation of Neural Networks and their essentials*
- *Understand the concepts of Feed Forward Neural Networks*
- *Understand the concepts of Hopfield Network*
- *Understand the concepts of Self-Organizing Maps (SOM) and Adaptive Resonance Theory (ART)*
- *Understand the properties of Fuzzy sets*
- *Understand the components of Fuzzy logic system*

Unit I

Objective: To understand the operation of Neural Networks and their essentials

Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, BiologicalNeuron, Biological and Artificial Neuron Models, Hodgkin-Huxley NeuronModel, Integrate-and-Fire Neuron Model, Spiking Neuron Model,Characteristics of ANN, McCulloch-Pitts Model, Potential Applications of ANN.

Essentials of Artificial Neural Networks

Artificial Neuron Model, Operations of Artificial Neuron, Types of NeuronActivation Function, ANN Architectures, Classification Taxonomy of ANNConnectivity,Neural Dynamics (Activation and Synaptic), Learning Strategy(Supervised, Unsupervised, Reinforcement), Learning Rules, Types ofApplication.

Unit II

Objective: To learn the feedforward recall and error back-propagation training, associative memories, matching and self-organising networks will also be discussed

Feed Forward Neural Networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category,TrainingAlgorithms: Discrete and Continuous Perceptron Networks, PerceptronConvergence theorem, Limitations of the Perceptron Model, Applications.Multilayer Feed Forward Neural Networks. Credit assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP). Training, Summary of Back-propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

Unit III

Objective: To understand the concepts of Hopfield Network

Associative Memories

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

UNIT IV

Objective: To learn the concept of self-organizing maps and Artificial Resonance Theory and its applications

Self-Organizing Maps (SOM) and Adaptive Resonance Theory (ART)

Introduction, Competitive Learning, Vector Quantization, Self-Organized Learning Networks, Kohonen Networks, Training Algorithms, Linear Vector Quantization, Stability- Plasticity Dilemma, Feed forward competition, Feedback Competition, Instar, Outstar, ART1, ART2,Applications.

Unit V

Objective: To study the function of Fuzzy sets and their properties

Classical & Fuzzy Sets

Introduction to classical sets – properties, Operations and relations; Fuzzysets, Membership, Uncertainty, Operations, Properties, fuzzy relations,cardinalities, membership functions.

Unit VI

Objective: To study the components of Fuzzy logic system

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.Neural Netwroks, Fuzylogic ,Gnenetic algorithms: synthesis and applications by Rajasekharan and Rai- PHI Publication.

2. Introduction to Artificial Neural Systems- JacekM.Zurada, JaicoPublishing House, 1997.

References :

1. Neural and Fuzzy Systems: Foundation, Architectures and Applications, - N. Yadaiah and S. BapiRaju, Pearson Education

2. Neural Netwroks – James A Freeman and Davis Skapura, Pearson, 2002

3. Neural Netwroks – Simon Hykins, Pearson Education.

4. Neural Engineering by C. Eliasmith and CH. Anderson, PHI.

5. Neural Netwroks and Fuzzy Logic System by BrokKosko, PHI Publications

IV Year .Tech. (ECE) – I Semester

VLSI LABORATORY

Course Objective:

The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using CMOS 130nm Technology with necessary EDA tools (Mentor Graphics/Tanner).

List of Experiments:

1. Design and implementation of an inverter
2. Design and implementation of universal gates
3. Design and implementation of full adder
4. Design and implementation of full subtractor
5. Design and implementation of RS-latch
6. Design and implementation of D-latch
7. Design and implementation asynchronous counter
8. Design and Implementation of static RAM cell
9. Design and Implementation of differential amplifier
10. Design and Implementation of ring oscillator

Equipment Required:

1. Mentor Graphics/Tanner software-latest version
2. Personal computer with necessary peripherals

MICROWAVE ENGINEERING AND OPTICAL COMMUNICATION LAB

Minimum Twelve Experiments to be conducted:

Part – A (Any 7 Experiments)

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance and Frequency Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Circulator.
9. Scattering parameters of Magic Tee.

Part – B (Any 5 Experiments):

10. Characterization of LED.
11. Characterization of Laser Diode.
12. Intensity modulation of Laser output through an optical fiber.
13. Measurement of Data rate for Digital Optical link.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1. Regulated Klystron Power Supply
2. VSWR Meter -
3. Micro Ammeter - 0 – 500 μA
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Reflex Klystron
8. Crystal Diodes
9. Micro wave components (Attenuation)
10. Frequency Meter
11. Slotted line carriage

12. Probe detector
13. Wave guide shorts
14. Pyramidal Horn Antennas
15. Directional Coupler
16. E, H, Magic Tees
17. Circulators, Isolator
18. Matched Loads
19. Fiber Optic Analog Trainer based LED
20. Fiber Optic Analog Trainer based laser
21. Fiber Optic Digital Trainer
22. Fiber cables - (Plastic, Glass)

IV Year B.Tech. (ECE).– II Semester

DIGITAL IMAGE PROCESSING

Course Objective: *The student will be*

- *Understand the fundamental concepts and applications of Digital Image Processing*
- *Understand the concepts of Intensity Transformations and Spatial Filtering*
- *Understand concepts of Image Restoration and Reconstruction.*
- *Understand the concepts of Color image processing*
- *Understand concepts of Wavelets and Multi-resolution Processing, Image compression*
- *Understand concepts of Morphological image processing , Image segmentation*

UNIT-I

Objective: To learn the fundamental concepts and applications of Digital Image Processingand to Ḳnow about the 2-D Fourier, discrete cosine, Walsh-Hadamard and wavelet transforms.

Introduction: Origins of digital image processing, uses digital image processing, fundamental steps in digital image processing, components of an image processing system, digital image fundamentals, Elements of visual perception, light and electromagnetic spectrum, image sensing and acquisition, image sampling and quantization. Some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

Image Transforms: Need for image transforms, Spatial Frequencies inimage processing, introduction to Fourier transform, discrete Fourier transform, fast Fourier transform and its algorithm, properties of Fourier transform. Discrete sine transforms, Walsh Transform, Hadamardtransform, HaarTransform,Slant transforms, SVD and KL Transforms or Hotelling Transform

UNIT-II

Objective: To learn the concepts of and how to perform Intensity transformations and spatial filtering and Understand the relationship between Filtering in spatial and frequency domains

Intensity Transformations and Spatial Filtering: Background, Some basicintensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, Combining spatial enhancement methods, using fuzzy techniques for intensity transformations and spatial filtering.

Filtering in the frequency domain: Preliminary concepts, Sampling and theFourier transform of sampled functions, the discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform. The Basic of filtering in the frequency domain, image smoothing using frequency domain filters, Selective filtering, Implementation.

UNIT-III

Objective: To understand the concepts of and how to perform Image restoration and reconstruction.

Image restoration and Reconstruction: A model of the image degradation/Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimation of the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering,constrained

least squares filtering,geometric mean filtering, image reconstruction from projections.

Unit-IV

Objective: To understand the concepts of different color models and Color image processing.

Color image processing: Color fundamentals, color models, pseudo colorimage processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

Unit-V

Objective: To learn the concepts of Wavelets and multi-resolution processing, Image compression and Watermarking.

Wavelets and Multi-resolution Processing: image pyramids, sub bandcoding &Haar transforms multi resolution expressions, wavelet transforms in one dimensions. The fast wavelets transform, wavelet transforms in two dimensions, wavelet packets.

Image compression: Fundamentals, various compression methods-codingtechniques, digital image water marking.

Unit-VI

Objective: To learn the concepts of Morphological image processing, Image segmentation, Representation and description.

Morphological image processing: preliminaries Erosion and dilation, opening and closing, the Hit-or-miss transformation, some Basic Morphological algorithms, grey –scale morphology

Image segmentation: Fundamentals, point, line, edge detection thresholding, region –based segmentation, segmentation using Morphological watersheds, the use of motion in segmentation**.**

TEXT BOOKS :

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.

2. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002.

REFERENCES:

1.AnilK.Jain,"Fundamentals of Digital Image Processing" Pearson Education,2001.

2. B. Chanda and D. Dutta Majumdar, "Digital Image Processing and Analysis" PHI,2003.

3.R. C. Gonzalez, R. E. Woods and Steven L. Eddins , Digital Image Processing Using MATLAB , 2rd edition, Prentice Hall, 2009.

4. Jayaraman, S. Esakkirajan, and T. Veerakumar, Digital Image Processing, Tata McGraw-Hill Education, 2011.

WEB REFERENCES:

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Perform different transforms on image useful for image processing applications.
2. Perform spatial and frequency domain filtering on image and can implement all smoothing and sharpening operations on images.
3. Perform image restoration operation/techniques on images.
4. Operate effectively on color images and different color conversions on images and can code images to achieve good compression.
5. Do wavelet based image processing and image compression using wavelets.
6. Perform all morphological operations on images and can be able to do image segmentation also.
7. Develop simple algorithms for image processing and use the various techniques involved in biomedical applications, etc.

IV Year B.Tech. (ECE). – II Semester

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Objectives: *The student will*

- *Understand the performance characteristics of instruments*
- *Understand the concepts of various signal generators*
- *Understand different types ac bridges and measure of inductance*
- *Understand different types of Transducers*
- *Understand the concepts of the measurement of physical parameters of transducers*
- *Understand the concepts of data acquisition and display devices.*

UNIT I

Objective: To understand the various performance characteristics of instruments and understand operation meters

Performance characteristics of instruments

Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters- Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters-multi range, range extension, shunt.Thermocouple type RF ammeter, Ohmmeters series type, shunt type, Multimeter for Voltage, Current and resistance measurements.

UNIT II

Objective: To explain working of various signal genarators

Signal Generators:

fixed and variable, AF oscillators, Standard and AF sineand square wave signal generators, Function Generators, Square pulse,Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT III

Objective: To understand different parts of CRO and types of CROS Oscilloscopes

CRT features, vertical amplifiers, horizontal deflection system,sweep, trigger pulse, delay line, sync selector circuits,simple CRO, triggeredsweep CRO, Dual beam CRO, . Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digitalstorage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

UNIT IV

Objective: To understand different types ac bridges and principal of operation of different types of transducer.

AC Bridges Measurement of inductance, Maxwell's bridge, Anderson Bridge. Measurement of capacitance -Schearing Bridge, Wheatstone bridge.Wien Bridge, Errors and precautions in using bridges, Q-meter.

Active & passive transducers : Resistance, Capacitance,inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors

UNIT V

Objective: To study the Measurement of physical parameters of transducers Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

UNIT VI

Objective: To learn the concepts of data acquisition and display devices.

Data Acquisition and display devises

DAS specifications. Performance matrices: INL, DNL, ENOB, THD, SNR, various components of DAS, single / multi channel DAS, GDIB protocol, SCPI commands

Display systems: principles, flat panel display LED, LCDS and projection systems.

TEXTBOOKS:

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.

2. Modern Electronic Instrumentation and Measurement Techniques -A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

REFERENCES:

1**.** DAS hand book from analog devises available on WEB.

2. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.

3. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2nd Ed., 2004.

4. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education - 2005.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK

Course Outcomes:

The student will be able to

1. Select the instrument to be used based on requirement.
2. Understand and analyze different signal generators and analyzers.
3. Understand the design of oscilloscopes for different applications.
4. Design different transducers for measurement of different parameters.

IV Year B.Tech. (ECE). – II Semester

(Elective-III)

SATELLITE COMMUNICATIONS

Course Objectives: *The student will*

- *Understand the basics of satellite technology*
- *Understand the concepts of ORBITAL MECHANICS AND LAUNCHERS*
- *Understand the concepts of satellite sub systems.*
- *Understand the concepts satellite links establishment and also different multiple access techniques..*
- *Understand the concepts of earth station and LEO and GEO satellite systems*
- *Understand the concepts of GPS technology in detail.*

UNIT I

Objective: To understand the basics of satellite technology .

INTRODUCTION : Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

UNIT II

Objective: To study the concepts of launching vehicles and orbital mechanism techniques.

ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT III

Objective: To learn the concepts of satellite sub systems in detail.

SATELLITE SUBSYSTEMS : Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT IV

Objective: To know how the satellite links are established and also different multiple access techniques.

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 example.

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.

UNIT V

Objective: To learn the concepts of earth station and LEO and GEO satellite systems

EARTH STATION TECHNOLOGY: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs.

UNIT VI

Objective: To know the concepts of GPS technology in detail.

SATELLITE NAVIGATION & THE 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.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

IV Year B.Tech. (ECE) – I Semester

(Elective-III)

EMBEDDED SYSTEMS

***Course Objectives*:** *The student will*

- *Understand the basics in typical embedded system*
- *Understand the concepts of communication devices and basics integrated circuit design*
- *Understand concepts of firmware design approaches, ISR concept and interrupt servicing mechanism.*
- *Understand the basics of operating system and concept of choosing an RTOS*
- *Understand concepts of integrated development environment, compiler, debugger*
- *Understand concepts of software utility tool, quality assurance and testing of the design.*

Unit I

Objective: To understand the building blocks of typical embedded system and different memory technology and memory types.

Introduction:

Embedded System-Definition, History, Classification, application areas and purpose of embedded systems, the typical embedded system-Core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, PCB and passive components. Characteristics, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

Unit II

Objective: To learn about communication devices and basics integrated circuit design.

Embedded Hardware Design:

Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

Unit III

Objective: To learn concept of firmware design approaches, ISR concept and interrupt servicing mechanism.

Embedded Firmware Design:

Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

Unit IV

Objective: To understand the basics of operating system, task scheduling and learn how to choose an RTOS.

Real Time Operating System:

Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Threads, Processes and Scheduling, Task Scheduling, Communication, Synchronization, Device Drivers, How to choose an RTOS.

Hardware Software Co-Design:

Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

Unit V

Objective: To learn about the integrated development environment, the concepts of compiler and also the debugging tools.

Embedded System Development:

The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

Unit VI

Objective: To learn about the software utility tool, quality assurance and testing of the design, testing on host machine and simulators.

Embedded System Implementation and Testing:

The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

Text Books :

1. Embedded Systems Architecture By Tammy Noergaard, Elsevier Publications, 2005

2. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications.

References :

1. Embedded Systems, Raj Kamal-Tata McGraw Hill Education Private Limited, Second Edition, 2008

2. Embedding system building blocks By Labrosse, CMP publishe**.**

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Know basics of embedded system, classification, memories, different communication interface and what embedded firmware is and its role in embedded system, different system components.
2. Distinguish all communication devices in embedded system, other peripheral device.
3. Distinguish concepts of C versus Embedded C and compiler versus cross-compiler.
4. Choose and operating system, and learn how to choose an RTOS.

IV Year B.Tech. (ECE). – II Semester

(Elective-III)

MIXED SIGNAL DESIGN

***Course Objectives*:** *The student will*

- *Understand the concepts of Switched capacitors Circuits*
- *Able to know the concepts of PLLS*
- *To study concepts of Data Converter Fundamentals.*
- *Understand the concepts of Nyquist Rate A/D Converters ,and applications*
- *Understand concepts of the Oversampling Converters and Continuous-Time Filters*
- *Understand concepts of concepts of Continuous-Time Filters, CMOS Trans conductors*

Unit I

Objective: Understand the Switched capacitors Circuits and Operation and Analysis, PLLS.

Switched Capacitor Circuits: Introduction to Switched Capacitor circuits basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, Biquad filters.

UNIT-II:

Objective: Understand the Switched capacitors Circuits and Operation and Analysis, PLLS.

Phased Lock Loop (PLL): Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT-III:

Objective: In this course, students can study Data Converter Fundamentals,

Data Converter Fundamentals: DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT-IV:

Objective: In this course, students can study, Nyquist Rate A/D Converters ,and applications

Nyquist Rate A/D Converters: Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters. Electronics & Communication Engineering

UNIT-V:

Objective: Main objective of this course is to motivate the graduate students to study and to analyze the Oversampling Converters

Oversampling Converters: Noise shaping modulators, Decimating filters and Interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A

UNIT-VI:

Objective: The concepts of Continuous-Time Filters**,** CMOS Tran conductors Using Triode and Active Transistors and MOSFET-C Filters.

Continuous-Time Filters: Introduction to Gm-C Filters, Bipolar Trans conductors , CMOS trans conductors Using Triode and Active

Transistors, Bi CMOS Tran conductors, MOSFET-C Filters.

Text Books:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002

2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013

Reference Books:

1. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.

2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Understand the concepts of Switched capacitor circuits.
2. Design and analysis of Nyquist Rate A/D Convertors.
3. Extend the Mixed Signal Design to Different Applications.
4. Concepts of Oversampling Convertors and Continuous-Time Filters.

IV Year B.Tech. (ECE). – II Semester

(Elective-III)

RF CIRCUITS DESIGN

Course Objectives: *The student will*

- *Understand the concepts of RF circuits*
- *Understand the concepts of transmission lines and single and multiple port networks*
- *Understand the concepts of biasing Networks*
- *Understand the concepts the RF active and passive components*
- *Understand the characteristics of RF transistors amplifier circuits*
- *Understand the concepts of the Oscillators and RF Mixers*

UNIT -I:

Objective: To understand the study of RF circuits

Introduction to RF Electronics:
The Electromagnetic Spectrum, units and Physical Constants, Microwavebands – RF behavior of Passive components: Tuned resonant circuits,Vectors, Inductors and Capacitors - Voltage and Current in capacitor circuits– Tuned RF / IF Transformers.

UNIT -II:

Objective: To understand the study of transmission lines and single and multiple port networks

Transmission Line Analysis: Examples of transmission lines- Transmission line equations and Biasing- Micro Strip Transmission Lines- Special Termination Conditions- sourced and Loaded Transmission Lines

Single And Multiport Networks: The Smith Chart, Interconnectivity networks,

Network properties and Applications, Scattering Parameters

UNIT -III:

Objective: To understand the study of biasing Networks

Matching and Biasing Networks:

Impedance matching using discrete components – Micro strip line matching networks, Amplifier classes of Operation and Biasing networks

UNIT-IV:

Objective: To study the RF active and passive components

RF Passive & Active Components: Filter Basics – Lumped filter design –Distributed Filter Design – Diplexer Filters- Crystal and Saw filters- Active Filters - Tunable filters – Power Combiners / Dividers – Directional Couplers– Hybrid Couplers – Isolators. RF Diodes – BJTs- FETs- HEMTs and Models.

UNIT -V:

Objective: To study the characteristics of RF transistors amplifier circuits

RF Transistor Amplifier Design: Characteristics of Amplifiers – Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

UNIT -VI:

Objective: To study the Oscillators and RF Mixers

Oscillators: Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer.

RF Mixers: Electronics & Communication Engineering Basic characteristics of a mixer - Active mixers- Image Reject and Harmonic mixers, Frequency domain considerations

TEXT BOOKS:

1. RF Circuit design: Theory and applications by Reinhold Ludwing, Pavel Bretchko. Pearson Education Asia Publication, New Delhi 2001.

2. Radio Frequency and Microwave Communication Circuits – Analysis and Design – Devendra K. Misra, Wiley Student Edition, John Wiley & Sons

REFERENCE BOOKS:

1. Radio frequency and Microwave Electronics - Mathew M.Radmangh, 2001, PE Asia Publ.

2. RF Circuit Design – Christopher Bowick, Cheryl Aljuni and John Biyler, Elsevier Science, 2008.

3. Secrets of RF Design - Joseph Carr., 3rd Edition, Tab Electronics.

4. Complete Wireless Design - Cotter W. Sawyer, 2nd Edition, Mc-Graw Hill.

5. Practical RF Circuit Design for Modem Wireless Systems Vol.2 –Less Besser and Rowan Gilmore.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

IV Year B.Tech. (ECE). – II Semester

(Elective-IV)

WIRELESS SENSORS AND NETWORKS

***Course Objectives**: The student will*

- *Understand the basics of wireless sensor networks*
- *Understand the concepts of various topology's and networks are used in the sensor networks.*
- *Understand concept of design constraints of Ad-hoc Protocols with different mechanisms*
- *Understand concepts of various routing protocols and mechanisms.*
- *Understand the concepts transport layer and various design constraints of transport layer.*
- *Understand the concepts about various security algorithms and requirements of network platforms and tools*

Unit I

Objective: To understand the advantages and application and various architectures which are used in the sensor networks.

OVERVIEW OF WIRELESS SENSOR NETWORKS

Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints an challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

ARCHITECTURES:

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

Unit II

Objective: To understand the various topology's and networks are used in the sensor networks and problems occurred

NETWORKING TECHNOLOGIES

Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

Unit III

Objective: To understand the design constraints of Ad-hoc Protocols with different mechanisms and classifications.

MAC PROTOCOLS FOR WIRELESS SENSOR NETWORKS

Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

Unit IV

Objective: To understand the classification of routing protocols and various routing protocols and mechanisms.

ROUTING PROTOCOLS:

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing.

Unit V

Objective: To understand the classification of transport layer and various design constraints of transport layer.

TRANSPORT LAYER AND SECURITY PROTOCOLS:

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

Unit VI

Objective: To understand the various security algorithms and requirements of network platforms and tools .

SECURITY IN WSNs:

Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks

SENSOR NETWORK PLATFORMS AND TOOLS:

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

APPLICATIONS of WSN:

Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications.

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, 2004, PHI

2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – Jagannathan Sarangapani, CRC Press

3. Holger Karl & Andreas Willig, “Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

REFERENCES:

1. . Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, and Applications”, John Wiley, 2007.

2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.

4. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.

5. Wireless Sensor Networks – S Anandamurugan , Lakshmi Publications

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Know basics of system architecture and processor architecture.
2. Know different types of processors like VLIW processors, Superscalar Processors etc. and Basic concepts in Processor Micro Architecture.
3. Distinguish Cache Memory and multi caches, SOC external memory.
4. Know the concept of Interconnect Architectures, SOC standard buses and Reconfiguration Technologies.

IV Year B.Tech. (ECE). – II Semester

(Elective-IV)

LOW POWER VLSI DESIGN

Course Objectives: *The student will*

- *Understand the basics of low Power VLSI design*
- *Understand the concepts of low power design approaches.*
- *Understand concept of power estimation and its analysis*
- *Understand concepts about low voltage low power adders*
- *Understand the concepts about low voltage low power multipliers.*
- *Understand the concepts about low voltage low power memories and its future development*

UNIT-I:

Objective: To understand the Fundamentals of Low Power VLSI Design**.**

Fundamentals of Low Power VLSI Design: Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT-II:

Objective: To study the low-Power Design Approaches

Low-Power Design Approaches:

Low-Power Design through Voltage Scaling: VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches.

Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT-III:

Objective: To study the Power estimation and analysis

Power estimation and analysis: SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power and gate level capacitance estimation.

UNIT-IV:

Objective: To study and to analyze the Low-Voltage Low-Power Adders

Low-Voltage Low-Power Adders: Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look-Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power

Design Techniques –Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

UNIT-V:

Objective: To study and to analyze the Low-Voltage Low-Power Multipliers

Low-Voltage Low-Power Multipliers Introduction, Overview of Multiplication, Types of

Multiplier Architectures, Braun Multiplier, Baugh-Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT-VI:

Objective: To study the concepts of Low-Voltage Low-Power Memories and Future Trend and Development of DRAM**.**

Low-Voltage Low-Power Memories: Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

Text Books:

1. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

Reference Books:

1. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.

2. Practical Low Power Digital VLSI Design – Gary K. Yeap, Kluwer Academic Press, 2002.

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

After going through this course the student will be able to

1. Understand the concepts of Low-Power Design Approaches.
2. Design and analysis of Low-Voltage Low Power Approaches.
3. Extend the low Power Design to Different Applications.
4. Understand of Low-Voltage Low power Memories and Basics of DRAM.

IV Year B.Tech. (ECE). –II Semester

(Elective-IV)

EMI/EMC

Course Objectives:

The student will

- *Understand concepts of electromagnetic environment and observe the frequency spectrum conservations*
- *Understand the affects of EMI from apparatus,circuits and open area test sites*
- *Understand concepts of electromagnetic interface and transmission lines*
- *Understand concepts of different types of time generators.*
- *Understand concepts of EMC cables,connectors,gaskets*
- *Understand the EMC standards.*

Unit I

Objective: To study the electromagnetic environment and observe the frequency spectrum conservations

Natural and Nuclear sources of EMI / EMC

Introduction, Electromagnetic environment , History, Concepts, Practical experiences and Concerns, frequency spectrum conservations. An overview of EMI / EMC, Natural and Nuclear sources of EMI.

Unit II

Objective: To study the EMI from apparatus,circuits and open area test sites

EMI from apparatus, circuits and open area test sites :

Electromagnetic emissions, noise from relays and switches, non-linearities in circuits, passive inter modulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

Unit III

Objective: To study the electromagnetic interface and transmission lines

Radiated and conducted interference measurements:

Electromagnetic emissions, noise from relays and switches, non-linearities in circuits, passive inter modulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

UNIT IV

Objective: To study the different types of time generators.

ESD, Grounding, shielding, bonding and EMI filters

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

Unit V

Objective: To understand the EMC cables,connectors,gaskets Cables, connectors, components

Introduction, EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, opto-isolators, Transient and Surge Suppression Devices. Electronics & Communication Engineering

Unit VI

Objective: To learn basic concepts of MIL-standards,IEEE/ANSI and CISPR/IEC

EMC standards- National / International

Introduction , Standards for EMI and EMC, MIL-Standards, IEEE/ANSI standards, CISPR/IEC standards, FCC regulations, Euro norms, British Standards, EM I/ EMC standards in JAPAN, Conclusions.

Text Books

1. Engineering Electromagnetic Compatibility by **Dr. V.P. Kodali, IEEE Publication**, Printed in India by ***S. Chand & Co. Ltd., New Delhi,2000***.

2. Electromagnetic Interference and Compatibility **IMPACT series, IIT – Delhi, Modules 1 – 9**.

References :

1. Introduction to Electromagnetic Compatibility, NY, **John Wiley, 1992, by C.R. Pal.**

WEB REFERENCES

1. NPTEL online courses.

2. MOOCS online courses by JNTUK.

Course Outcomes:

At the end of the course

1. Students shall be able to distinguish effects of EMI and counter measures by EMC techniques.
2. Students shall apply the knowledge gained in selecting proper gadget/device/appliance/system, as per EMC-norms specified by regulating authorities.
3. Students shall choose career in the fields of EMI/EMC as an Engineer/Research/Entrepreneur in India/abroad.

IV Year B.Tech. (ECE). – II Semester
(Elective-IV)

BIO-MEDICAL INSTRUMENTATION

Course Objectives:
The student will

- *Understand the basics of ELECTRODES AND TRANSDUCERS*
- *Understand the concepts CARDIOVASCULAR SYSTEM AND MEASUREMENTS*
- *Understand concept of about instruments which are used for in the ICU & Respiratory system*
- *Understand concepts about instruments which are used for in the ICU*
- *Understand the concepts about various instruments which are used in the medical laboratories.*

Unit I

Objective: To understand the concept how the signal can be pick from living system using relative instruments

Sources of Bioelectric potentials and Electrodes

Resisting and Action Potentials, Propagation of Action Potentials, the Bioelectric Potentials. Electrodes: Electrode theory, Bio Potential Electrodes, Biochemical Transducers, introduction to bio-medical signals

Unit II

Objective: To understand the functioning of heart & Cardiovascular systems and their responses and instruments which are used for measuring

The Cardiovascular System

The Heart and Cardiovascular System, The Heart, Blood Pressure, Characteristics of Blood Flow, Heart Sounds, Cardio Vascular Measurements, Electrocardiography, Measurement of Blood Pressure, Measurement of Blood Flow and Cardiac output, Plethysmography, Measurement of Heart Sounds, Event detection, PQRS & T-Waves in ECG, the first & second Heart beats, ECG rhythm analysis, the di-crotic notch in the carotid pulse detection of events and waves, analysis of exercise ECG, analysis of event related potentials, correlation analysis of EEG channels, correlation of muscular contraction

Unit III

Objective: To have knowledge about instruments which are used for in the ICU & Respiratory System

Patient Care & Monitory and Measurements in Respiratory System

The elements of Intensive Care Monitory, Diagnosis, Calibration and reparability of Patient Monitoring equipment, other instrumentation for monitoring patients, pace makers, defibrillators, the physiology of respiratory system, tests and instrumentation for mechanics of breathing, respiratory theory equipment, analysis of respiration.

Unit IV

Objective: To acquire a knowledge about various telemetry systems used in clinical laboratory.

Bio telemetry and Instrumentation for the clinical laboratory

Introduction to bio telemetry, Physiological parameters adaptable to bio telemetry, the components of bio telemetry system, implantable units, applications of telemetry in patient care – The blood, tests on blood cells, chemical test, automation of chemical tests.

.**Unit V**

Objective: To have knowledge about various instruments which are used in the medical laboratory.

X-ray and radioisotope instrumentation and electrical safety of medical equipment: Generation of Ionizing radiation, instrumentation for diagnostic X-rays, special techniques, instrumentation for the medical use of radioisotopes, radiation therapy - Physiological effects of electrical current, shock Hazards from electrical equipment, Methods of accident prevention

Unit VI

Objective: To have knowledge about imaging system in medical laboratory.

Modern Imaging Systems: Tomography, Magnetic resonance Imaging System, Ultrasonic Imaging System, Medical Thermography.

TEXT BOOK:

1. Biomedical Instrumentation and Measurements – C. Cromwell, F.J. Weibell, E.A.Pfeiffer – Pearson education.

2. Biomedical signal analysis – Rangaraj, M. Rangayya – Wiley Inter science – John willey & Sons Inc.

REFERENCES:

1. Hand Book of Bio-Medical Instrumentation – R.S. Khandpur, (TMH)
2. Introduction to Bio-Medical Engineering – Domach, (Pearson)
3. Introduction to Bio-Medical Equipment Technology – Cart, (Pearson)

WEB REFERENCES

1. NPTEL online courses.
2. MOOCS online courses by JNTUK.

Course Outcomes:

1) Learn several signals that can be measured from Human body

2) Study the designs of several instruments used to acquire given signals from living systems

3) Analyze the positing & functioning physiological Cardiac system and respiratory system.

4) Understand how the signals are digitized and stored in a computer or presented on an output display

5) Summaries the various instruments used in laboratories

6) Understand the various shock hazards and prevention in the hospitals.