B.Tech.(Electronics) Sem-I

ENGINEERING MATHEMATICS-I

Teaching Scheme:	Examination scheme:	Credits Allotted:
Lectures: 3Hrs/Week	Semester Examination: 60 marks	Theory : 03
Tutorials: 1Hr/Week	Continuous Assessment: 40 marks	Tutorial : 01

Unit I

MATRICES

Rank, Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations. Eigen values, Eigen Vectors, Cayley – Hamilton Theorem.Application to problems in Engineering . **(08 Hours)**

Unit II

COMPLEX NUMBERS AND APPLICATIONS

Definition, Cartesian, Polar and Exponential Forms ,Argand's Diagram, De'Moivre's theorem and its application to find roots of algebraic equations., Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering. **(08 Hours)**

Unit III

DIFFERENTIAL CALCULUS

Successive Differentiation, nth Derivatives of Standard Functions,Leibnitz's Theorem.

EXPANSION OF FUNCTIONS

Taylor's Series and Maclaurin's Series.

(08 Hours)

Unit IV

DIFFERENTIAL CALCULUS

Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits.

INFINITE SERIES

Infinite Sequences, Infinite Series, Alternating Series, Tests for Convergence, Absolute and Conditional Convergence, Power series, Range of Convergence. **(08 Hours)**

Unit V

PARTIAL DIFFERENTIATION AND APPLICATIONS

Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, Total Derivatives, Change of Independent Variables. Errors and Approximations.

(08 Hours)

Unit VI

JACOBIAN

Jacobians and their applications, Chain Rule, Functional Dependence.

MAXIMA AND MINIMA

Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers.

(08 Hours)

Assignments

1. Rank, System of Linear Equations.
2. Complex Numbers.
3. Differential Calculus and Expansion of Functions.
4. Indeterminate Forms and Infinite Series.
5. Partial Derivatives, Euler's Theorem on Homogeneous Functions.
6. Jacobians, Maxima and Minima of Functions of two variables.

References / Text Books :

1. Applied Mathematics (Volumes I and II) by P. N. Wartikar& J. N. Wartikar, Pune VidyarthiGrihaPrakashan, Pune, 7th edition (1988).
2. Higher Engineering Mathematics by B. S. Grewal, Khanna Publication, Delhi, 42th edition (2012).
3. Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill (2008) .
4. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd, 8thedition(1999).
5. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil, Thomson Learning,6th edition (2007).
6. Advanced Engineering Mathematics, 2e, by M. D. Greenberg, Pearson Education, 2nd edition(2002).

Syllabus for Unit Test:	
Unit Test -1	Unit I to III
Unit Test -2	Unit IV to VI

02: Fundamentals of Civil Engineering

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hours / Week	End Semester Examination: 60 Marks	03 Credits
Practical: 02 Hours / Week	Continuous Assessment: 40 Marks	
	Term Work: 25 Marks	01 Credit

Course Pre-requisites:	
The Students should have	
1.	Concepts of units and conversions of units.
2.	Basic knowledge of Chemistry
3.	Basic knowledge of geography, concept of latitude and longitude.
Course Objectives:	
	To make student understand the scope and application of Civil Engineering
Course Outcomes:	
Students will be able to understand	
1.	Different building components and material
2.	Classification of surveying
3.	Levellingof the ground
4.	Planning of building
5.	Methods of irrigation and water supply
6.	Different methods of transportation

UNIT - I	**Civil Engineering Scope And Applications.**	**(06 Hours)**
	Civil Engineering scope, importance and applications to other disciplines of Engineering; Civil Engineering construction process and role of Civil engineer; Government authorities related to Civil Engineering; Types of structures based on loading , material and configuration; Building components and their functions; Civil Engineering materials: concrete, construction steel, bricks, flooring material and tiles, paints, plywood , glass and aluminum.	
UNIT - II	**Surveying**	**(06 Hours)**
	Objectives, Principles and Classification of Surveying; Linear, angular, Vertical and area Measurements and related instruments.	
UNIT - III	**Building Planning And Bye Laws**	**(06 Hours)**
	Site selection for residential building; Principles of building planning; Building bye laws- necessity, Floor Space Index, Heights , open space requirements, set back distance , ventilation and lighting, concept of carpet and built up area, minimum areas and sizes for residential buildings ; Concept of Eco friendly structures and Intelligent buildings.	
UNIT - IV	**Foundations and Earthquakes**	**(06 Hours)**
	Function of foundation, concept of bearing capacity and its estimation, types of foundation and its suitability, causes of failure of foundation. Earthquakes causes, effects and guidelines for earthquake resistant design, earthquake zones.	

UNIT - V	**Irrigation And Water Supply**	**(06 Hours)**
	Rainfall measurement and its use in design of dams; Types of dams, canals, methods of irrigation and their merits and demerits; hydropower structures ;Water supply, drinking water requirements and its quality, water and sewage treatment flow chart.	
UNIT - VI	**Infrastructure**	**(06 Hours)**
	Roads- types of roads and their suitability, cross section of roads, meaning of terms ; width of roads, super elevation, camber, gradient ,sight distance, materials used for construction of roads. Railways- Types of gauges, section of railway track, components of railway track, advantages. Bridges: Components - Foundation, Piers, Bearings, Deck. Airways- Components -Runway, Taxiway and Hangers.	

Term Work:	
(Term work shall consist of any eight exercises from the list given below.)	
1.	Study and use of prismatic compass and measurement of bearings.
2.	Study and use of Dumpy level and reduction of levels by collimation plane method.
3.	Area measurement by Digital Planimeter.
4.	Drawing plan and elevation of a residential bungalow.
5.	Study of features of topographical maps.
6.	Assignment on collection of information on Civil Engineering materials.
7.	Assignment on types of foundations.
8.	Assignment problem on irrigation and hydropower structures.
9.	Assignment on study of flow chart of water and sewage treatment.
10.	Assignments on types of transportation systems.

Text Books:	
1.	" Surveying- Vol I " - S.K. Duggal , Tata McGraw Hill Publication.
2.	"Built Environment" – Shah , Kale, Patki, , Tata McGraw Hill Publication
3.	"Building Construction" – Dr. B.C. Punmia , Laxmi Publication
4.	"Irrigation and water Power Engineering "- Dr. P.N. Modi,Standard Publishers ,New Delhi
5.	"Text book of Transportation Engineering "- Arora, Charotar Publishers.
6.	Water supply and sanitary engineering-Rangawala, Charotar Publishers.
7.	"Basic Civil engineering"- M.S. Palanichamy- Tata McGraw Hill Publication
Reference Books:	
1.	"Surveying –Theory and Practice"-James Anderson- Tata McGraw Hill Publication

Syllabus for Unit Test:	
Unit Test -1	Unit I to III
Unit Test -2	Unit IV to VI

ENGINEERING GRAPHICS

Teaching Scheme:	Examination Scheme:	Credits Allotted
Theory: -04 Hours / Week	End Semester Examination: -60Marks	05
Practical: 02 Hours / Week	Continuous Assessment: -40Marks	
	Term Work: 25 Marks	

Unit I	**Lines and Dimensioning in Engineering Drawing** Different types of lines used in drawing practice, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension. **Curves used in Engineering Practice** Ellipse by Directrix-Focus method, Arcs of Circle method, Concentric circle method and Oblong method. Involute of a circle, Cycloid, Archimedean Spiral, Helix on cone, Loci of points- Slider Crank mechanisms.	(6)
Unit II	**Orthographic Projection** Basic principles of orthographic projection (First and Third angle method). Orthographic projection of objects by first angle projection method only. Procedure for preparing scaled drawing, sectional views and types of cutting planes and their representation, hatching of sections.	(6)
Unit III	**Isometric Projections** Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, and construction of Isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, and Sphere.	(6)
Unit IV	**Projections of Points and Lines and planes** Projections of points, projections of lines, lines inclined to one reference plane, Lines inclined to both reference planes. (Lines in First Quadrant Only) Traces of lines, Projections of Planes, Angle between two planes, Distance of a point from a given plane, Inclination of the plane with HP, VP	(6)
Unit V	**Projection of Solids** Projection of prism, pyramid, cone and cylinder by rotation method.	(6)
Unit VI	**Section of Solids** Types of section planes, projections of solids cut by different sections of prism, pyramid, cone and cylinder.	(6)

Term work

Term work shall consist of five half-imperial size or A2 size (594 mm x 420 mm) sheets. Assignment 05 Problems on each unit in A3 size Drawing Book

SHEETS

1. Types of lines, Dimensioning practice, Free hand lettering, 1nd and 3rd angle methods symbol.
2. Curves and loci of points
3. Projections of Points and Lines and planes

4. Orthographic Projections
5. Isometric views
6. Projection of Solids

Text Books

1. “Elementary Engineering Drawing”, N.D. Bhatt, Charotar Publishing house, Anand India,
2. “Text Book on Engineering Drawing”, K.L.Narayana & P.Kannaiah, Scitech Publications, Chennai.
3.“Fundamentals of Engineering Drawing”, Warren J. Luzzader, Prentice Hall of India, New Delhi ,
4. “Engineering Drawing and Graphics”, Venugopal K., New Age International Publishers.
5. M. B. Shah and B. C. Rana, "Engineering Drawing", 1st Ed, Pearson Education, 2005
6. P. S. Gill, "Engineering Drawing (Geometrical Drawing)", 10 Edition, S. K. Kataria and Sons, 2005
7. P. J. Shah, "Engineering Drawing", C. Jamnadas and Co., 1 Edition, 1988

ENGINEERING CHEMISTRY

Teaching Scheme:	Examination scheme:	Credits Allotted:
Lectures: 4Hrs/Week	End Semester Examination: 60 marks	Theory: 04
Practical: 2Hr/Week	Continuous Assessment: 40 marks	Practical: 01
		Term Work: 25marks

Unit I

WATER

Introduction, Hardness of water, Effect of hard water on boilers and heat exchangers: a) boiler corrosion b) caustic embrittlement c) scales and sludges d) priming and foaming

Water softening methods for industrial purposes :a) Zeolite process b) Phosphate conditioning Numerical based on the zeolite process

(08 Hours)

Unit II

MATERIAL CHEMISTRY

Crystallography : Unit cell, Laws of crystallography, Weiss indices and Miller indices, Crystal defects (point and line defects), X-ray diffraction – Bragg's Law and numerical.

Cement : Introduction of cement, Hydraulic/ Non-hydraulic cementing materials, classification of cement, chemistry of portland cement, chemical composition and compound constituents of portland cement, properties of cement and its applications.

(08 Hours)

Unit III

FUELS

Introduction, classification of fuels, calorific value of fuels, NCV and GCV, Determination of calorific values using Bomb calorimeter and Boys' gas calorimeter.

Theoretical calculation of calorific value of a fuel, Analysis of coal a) Proximate b) Ultimate analysis of coal, Numericals based on NCV, GCV.

(08 Hours)

Unit IV

CORROSION AND ITS PREVENTION

Corrosion: - Definition, atmospheric corrosion-mechanism, Wet corrosion-mechanism, Electrochemical and galvanic series, Factors affecting corrosion-nature of metal, nature of environment.

Methods of prevention of corrosion- Cathodic and Anodic protection, Metallic coatings, Electroplating, Hot dipping.

(08 Hours)

Unit V

ELECTROCHEMISTRY

Introduction, Arrhenius Ionic theory, Kohlrausch's law of independent migration of ions

Laws of electrolysis: Faradays Laws, Ostwald's dilution law, Acids and Bases, concept of pH and pOH, Buffer solutions, Solubility Product, Redox Reactions.

Electrode Potential, electrochemical cell, concentration cell, reference Electrodes, Overvoltage, Conductometric Titrations, Fuel cells, Lead Acid Storage Cell and numericals based on the above articles.

(08 Hours)

Unit VI

STEREOCHEMISTRY

Introduction, chirality, optical activity, Enantiomers, Diastereomers, projection formula of tetrahedral carbon- Newman projection, Wedge projection, Fischer projection, Geometrical isomerism :- cis and trans isomerism, E and Z isomers

Optical isomerism :- Mesoform, the number of optical isomers for chiral molecules,

Conformations :- conformations of ethane, conformations of n-butane

(08 Hours)

TERM WORK

Experiments

Any Ten experiments from the following:

1. Estimation of hardness of water by EDTA method.
2. Estimation of chlorine by Mohr's method.
3. Determination of percentage of Ca in given cement sample
4. Determination of coefficient of viscosity by Ostwald's viscometer
5. Study of Bomb calorimeter for determination of calorific value.
6. Determination of calorific value of gas fuel by using Boy's gas calorimeter.
7. Determination of dissolved oxygen in a water sample.
8. To determine the Molecular Weight of polymer
9. Estimation of Copper from brass sample solution by Iodometrically
10. Estimation of percentage of Iron in Plain Carbon Steel by Volumetric Method
11. To standardize NaOH solution and hence find out the strength of given hydrochloric Acid solution
12. To determine Surface Tension of given liquid by Stalagmometer
13. Study of corrosion of metals in medium of different pH.
14. To set up Daniel cell
15. To determine pH of soil
16. To determine Acidity of soil

Assignments

7. Effect of hard water on boilers and heat exchangers
8. Hydraulic/ Non-hydraulic cementing materials
9. Analysis of coal a) Proximate b) ultimate analysis of coal
10. Wet corrosion-mechanism, Electroplating, Hot dipping
11. Geometrical isomerism :- cis and trans isomerism, E and Z isomers
12. Fuel cells

References / Text Books :

7. Engineering Chemistry by Jain and Jain, Dhanpat Rai Company (P) Ltd, New Delhi
8. Chemistry of Engineering Materials, Agarwal C.V, Rata Publication Varanasi, 6th edition (1979)
9. Chemistry in Engineering and Technology, Volume W, Tata McGraw Hill Publishing Company Ltd, New Delhi (1988)
10. Applied Chemistry, O. P. Vidyankar, J. Publications, Madurai, (1955)
11. Engineering Chemistry, S. N. Chand and Co., Jalandhar, 31st Edition (1990)
12. Engineering Chemistry by Dara S. S. S Chand Publications
13. Fundamentals of Electrochemistry, V. S. Bagotsky (Ed) Wiley NY (2006)

Syllabus for Unit Test:

Unit Test I :- Unit I,II,III

Unit Test II :- Unit IV,V,VI

Course: ELEMENTS OF ELECTRONICS ENGINEERING

TEACHING SCHEME	EXAMINATION SCHEME		CREDITS
Lectures : 03 Hrs/week	End semester exam	: 60 Marks	03
Practicals : 02 Hrs/week	Continuous Assessment	: 40 Marks	
	Term work	: 25 Marks	01

Course Prerequisite:

Students have completed a course in Physics and have the knowledge of laws of Dynamics

Course Objective:

This course will introduce the concepts of electronic engineering . By the end of the course, student will be familiar with electronic components, semiconductor devices and their applications. The course emphasizes on Electronic devices, ICs and Digital systems.

Course Outcomes:

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

1 understand the basic semiconductor physics and semiconductor devices.
2 understand transport phenomenon of semiconductor devices through energy band diagrams.
3. to identify electronic components like, resistors, capacitors, inductors and to study characteristics of semiconductor devices.
4. apply the knowledge of diodes to the rectifier and filter circuits.
5. to represent numerical values in various number systems and perform number conversions between different number system and study applications of logic gates.

Unit-I **(08 Hours)**

Electron Dynamics:

Motion of electron in electric, magnetic and combined electric and magnetic fields. Detection and focusing system of Oscilloscope tube-Television picture tube- LCD and Flat panel displays.

Unit-II **(08 Hours)**

Transport phenomenon in semiconductor:

Mobility and conductivity - Drift and Diffusion currents – Continuity Equation – Minority carrier injection and recombination in Homogeneous semiconductor – Thermistors – Peizo Resistors – Hall Effect – Thermoelectric effect

Unit-III **(08 Hours)**

Electronic components:

Resistors -Inductors and Capacitors and their types – Construction and characteristics of PN junction diode – Zener Diode – Tunnel diode - Bipolar junction transistors – CB,CC,CE circuits**,** Field Effect transistors **.**

Unit-IV **(08 Hours)**

Electronic Devices and Linear ICs:

Rectifiers: Half wave, Full wave and Bridge rectifiers - capacitor filter-wave forms-ripple factor regulation characteristics. Special semiconductor devices: FET - SCR - LED - VI characteristics – applications. Introduction to Op-Amp and Timers.

Unit-V **(08 Hours)**

Digital system:

Number system: Binary system, Decimal to Binary, Octal system, Hexadecimal system, binary –addition, subtraction, multiplication and division.

Logic gates: OR, AND, NOT, Exclusive-OR, NOR, NAND gates, Logic networks, Gate Standardization, Introduction to Logic Circuits –Combinational and Sequential Circuits.

(08 Hours)

Unit-VI

Consumer Electronics:

Basic study of various products such as radio receivers , television sets , MP3 players, video recorders , DVD players , digital cameras , microwaves , personal computers , video game consoles , telephones and mobile phones , laptops and palmtops and fax machines

Term work: For term work assessment the students will have to perform minimum of eight practicals.

1) To study various electronics components: Resistors, Inductors, Capacitors, diodes and transistors.
2) To study CRO and different modes of operation and some application.
3) To plot V-I characteristics of PN junction diode.
4) To plot regulation characteristics of half wave rectifier with and without capacitor filter.
5) To plot regulation characteristics of Full wave rectifier with and without capacitor filter.
6) To plot input-output characteristics of CE configuration of BJT.
7) To study basic logic gates: AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR.
8) To realize the Boolean expression using basic gates.
9) To verify the De-Morgan's theorem.
10) To fabricate at least 5 electronics component on a PCB.

TEXT BOOKS

1. Mottershed Allen, Electronic Devices & Circuits, PHI
2. R. P. Jain, Modern Digital Electronics, Mc Graw Hill

REFERENCE BOOKS

1. Thomas L. Floyd, Electronic Devices, Pearson Education (Sixth edition)
2. Millman & Halkis, Electronic Devices & Circuits, PHI
3. Malvino Leach, Digital Principles & Applications, Mc Graw Hill
4. Millman & Halkis, Integrated Electronics, MGH

Syllabus for Unit Test :

Unit Test 1	Unit I ,II & III
Unit Test 2	Unit IV, V &VI

Workshop Technology

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: -	End Semester Examination: -	01 Credit
Practical: 02 Hours / Week	Continuous Assessment: -	
	Term Work: 50 Marks	

Course Pre-requisites: Basic knowledge of hand tools used in day to day life.

Course Objectives: Make the students familiar with basic manufacturing processes

Course Outcomes: students should be able to understand

1. basic Manufacturing Processes used in the industry,
2. importance of safety

Term work shall consist of any three jobs, demonstrations on rest of the trades and journal consisting of six assignments one on each of the following topics.

Carpentry- Introduction to wood working, kinds of woods, hand tools & machines, Types of joints, wood turning. Pattern making, types of patterns, contraction, draft & machining allowances
Term work includes one job involving joint and woodturning.

Fitting- Types of Fits, concepts of interchangeability, datum selection, location layout, marking, cutting, shearing, chipping, sizing of metals, drilling and tapping.
Term work to include one job involving fitting to size, male-female fitting with drilling and tapping.

Sheet Metal Practice Introduction to primary technology processes involving bending, punching and drawing various sheet metal joints, development of joints.

Joining- Includes making temporary and permanent joints between similar and dissimilar material by processes of chemical bonding, mechanical fasteners and fusion technologies.
Term work includes one job involving various joining processes like riveting, joining of plastics, welding, brazing, etc.

Forging -Hot working, cold working processes, forging materials, hand tools & appliances, Hand forging, Power Forging.

Moulding -Principles of moulding, methods, core & core boxes, preparation of foundry sand, casting, Plastic moulding.

Plumbing (Demonstration Common for Electrical & Non electrical Group)
Types of pipe joints, threading dies, Pipe fittings.

B.Tech.(Electronics) Sem-II

ENGINEERING MATHEMATICS-II

Teaching Scheme:	Examination scheme:	Credits Allotted:
Lectures: 3Hrs/Week	End Semester Examination: 60 marks	Theory : 03
Tutorials: 1Hr/Week	Continuous Assessment:40 marks	Tutorial : 01

Unit I

DIFFERENTIAL EQUATIONS (DE)

Definition, Order and Degree of DE, Formation of DE.Solutions ofVariable Separable DE, Exact DE, Linear DE and reducible to these types.

(08 Hours)

Unit II

APPLICATIONS OF DIFFERENTIAL EQUATIONS

Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff's Law of Electrical Circuits, Motion under Gravity, Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical engineering problems.

(08 Hours)

Unit III

FOURIER SERIES

Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series,Harmonic Analysis.

INTEGRAL CALCULUS

Reduction formulae, Beta and Gamma functions.

(08 Hours)

Unit IV

INTEGRAL CALCULUS

Differentiation Under the Integral Sign, Error functions.

CURVE TRACING

Tracing of Curves, Cartesian, Pola and Parametric Curves.Rectification of Curves.

(08 Hours)

Unit V

SOLID GEOMETRY

Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder.

(08 Hours)

Unit VI

MULTIPLE INTEGRALS AND THEIR APPLICATIONS

Double and Triple integrations, Applications to Area,Volume, Mean and Root Mean Square Values.

(08 Hours)

Assignments

1. Differential Equations.
2. Application of DE.
3. Fourier Series and Integral Calculus.
4. DUIS and Curve Tracing.
5. Solid Geometry.
6. Double and Triple integrations, area and volume.

References / Text Books :

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd, 8th edition(1999).
2. Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill (2008)
3. Applied Mathematics (Volumes I and II) by P. N. Wartikar& J. N. Wartikar, Pune VidyarthiGrihaPrakashan, Pune, 7th edition (1988).
4. Higher Engineering Mathematics by B. S. Grewal, Khanna Publication, Delhi, 42th edition (2012).
5. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil, Thomson Learning,6th edition (2007).
6. Advanced Engineering Mathematics, 2e, by M. D. Greenberg, Pearson Education, 2nd edition(2002).

Syllabus for Unit Test:

Unit Test I :- Unit I,II,III
Unit Test II :- Unit IV,V,VI

FUNDAMENTALS OF MECHANICAL ENGINEERING

Teaching Scheme:	Examination Scheme:	Credits Allotted
Theory: -03Hours / Week	End Semester Examination: -60Marks	04
Practical: 02 Hours / Week	Continuous Assessment: -40Marks	
	Term Work: 25 Marks	

UNIT-I	**Thermodynamics-** Heat, work and Internal Energy, Thermodynamic State, Process, Cycle, Thermodynamic System, First Law of Thermodynamics, Application of First Law to steady Flow and Non Flow processes, Limitations of First Law, PMM of first kind (Numerical Treatment), Second Law of Thermodynamics – Statements, Carnot Engine and Carnot Refrigerator, PMM of Second Kind (Elementary treatment only)	(08)
UNIT-II	**Introduction to I.C. Engines and turbines-** Two stroke, Four Stroke Cycles, Construction and Working of C.I. and S.I. Engines, Hydraulic turbines, steam turbines, gas turbines.(Theoretical study using schematic diagrams) **Introduction to refrigeration, compressors & pumps-** Vapor compression and vapor absorption system, house hold refrigerator, window air conditioner. Reciprocating and rotary compressor, Reciprocating and centrifugal pump. (Theoretical study using schematic diagrams)	(08)
UNIT-III	**Energy Sources** - Renewable and nonrenewable, solar flat plate collector, Wind, Geothermal, Wave, Tidal, Hydro power, Bio-gas, Bio-Diesel, Nuclear power. **Heat transfer**- Statement and explanation of Fourier's law of heat conduction, Newton's law of cooling, Stefan Boltzmann's law. Conducting and insulating materials and their properties, types of heat exchangers and their applications.	(08)

UNIT-IV	**Properties of fluids-** Introduction, Units of measurements, mass density, specific weight, specific volume and relative density, viscosity, pressure, compressibility and elasticity, gas laws, vapor pressure, surface tension and capillarity, regimes in fluid mechanics, fluid properties and analysis of fluid flow. **Properties of Materials and their Applications-** Metals – Ferrous and Non-Ferrous, Nonmetallic materials, smart materials, Material selection criteria.	(08)
UNIT-V	**Mechanical devices** - Types of Belts and belt drives, Chain drive, Types of gears, Types of Couplings, friction clutch (cone and plate), brakes, Power transmission shafts, axles, keys, bush and ball bearings. **Mechanisms-** Slider crank mechanism, Four bar chain mechanism, List of various inversions of Four bar chain mechanism, Geneva mechanism, Ratchet and Paul mechanism	(08)
UNIT-VI	**Machine Tools-** Lathe Machine – Centre Lathe, Drilling Machine – Study of Pillar drilling machine, Introduction to NC and CNC machines, Grinding machine, Power saw, Milling Machine. **Introduction to manufacturing processes and Their Applications-** Casting, Sheet metal forming, Sheet metal cutting, Forging, Fabrication, Metal joining processes.	(08)

List of experiments-

The Term Work shall consist of **any Eight** experiments of following list

1	Measurement of viscosity using Redwood viscometer.
2	Assembly and working of 4-bar, 6-bar, 8-bar planer mechanisms
3	Finding relation between input angle and output angle for various link lengths.
4	Study of domestic refrigerator & window air-conditioner

5	Demonstration of operations of centre lathe
6	Demonstration of operations on drilling machines
7	Demonstration of Two stroke and four stroke engine
8	Study of power transmitting elements: Coupling, Gears and bearings
9	Demonstration of pumps and compressor
10	Study and demonstration of different types of clutches.

References-

1 "Thermodynamics An Engineering Approach" Yunus A. Cengel and Michael A. Boles, McGraw-Hill, Inc,2005,6th edition.
2. "Applied Thermodynamics for Engineering Technologists" T. D. Eastop and A. McConkey, 5th Edition, Prentice Hall.
3. "I.C. Engines Fundamentals" J. B. Heywood, McGraw Hill, 3rd Edition, MacMillian
4. "Internal Combustion Engine ": V. Ganeshan, Tata McGraw-Hill, 3rd edition.
5 "Strength of Materials" H. Ryder, Macmillians, London, 1969, 3rd edition.
6. "Mechanics of Materials" Johston and Beer TMH, 5th edition
7 "Mechanisms and Machine Theory" Ambekar A.G., Prentice-Hall of India**,** 2007.
8. "Theory of Machines" S.S. Rattan, Tata McGraw- Hill, 2nd edition.
9 "A Textbook of production engineering" P.C. Sharma, S. Chand Publication,
New Delhi, 2nd edition.
10 "Fluid Mechanics & Fluid Power" D.S. Kumar, Katson Publishing Engineering House, Ludhiana. 8th edition

Term work shall consist of any three jobs, demonstrations on rest of the trades and journal consisting of six assignments one on each of the following topics.

Carpentry- Introduction to wood working, kinds of woods, hand tools & machines, Types of joints, wood turning. Pattern making, types of patterns, contraction, draft & machining allowances
Term work includes one job involving joint and woodturning.

Fitting- Types of Fits, concepts of interchangeability, datum selection, location layout, marking, cutting, shearing, chipping, sizing of metals, drilling and tapping.
Term work to include one job involving fitting to size, male-female fitting with drilling and tapping.

Sheet Metal Practice Introduction to primary technology processes involving bending, punching and drawing various sheet metal joints, development of joints.

Joining- Includes making temporary and permanent joints between similar and dissimilar material by processes of chemical bonding, mechanical fasteners and fusion technologies.
Term work includes one job involving various joining processes like riveting, joining of plastics, welding, brazing, etc.

Forging -Hot working, cold working processes, forging materials, hand tools & appliances, Hand forging, Power Forging.

Moulding -Principles of moulding, methods, core & core boxes, preparation of foundry sand, casting, Plastic moulding.

Plumbing (Demonstration Common for Electrical & Non electrical Group)
Types of pipe joints, threading dies, Pipe fittings.

10: Engineering Mechanics

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 04 Hours / Week	End Semester Examination: 60 Marks	03 Credits
Practical: 02 Hours / Week	Continuous Assessment: 40 Marks	
	Term Work: 25 Marks	01 Credit

Course Pre-requisites:	
The Students should have knowledge of	
1.	Scalar and Vector
2.	Newton's law of motion
3.	Law of friction
4.	Concept of physical quantities, their units and conversion of units
5.	Concept of differentiation and integration
Course Objectives:	
	To develop and apply the concept of resultant and equilibrium for various static and dynamic engineering problems.
Course Outcomes:	
The student should be able to	
1.	calculate resultant and apply conditions of equilibrium.
2.	analyze the truss and calculate friction force.
3.	calculate centroid and moment of inertia.
4.	solve problem on rectilinear motion.
5.	solve problems on curvilinear motion.
6.	useD'Alembert's principle, Work Energy principle and Impulse Momentum principle for particle.

UNIT - I	**Resultant and Equilibrium**	**(06 Hours)**
	Types and Resolution of forces, Moment and Couple, Free Body Diagram, Types of Supports, Classification and Resultant of a force system in a Plane - Analytical and Graphical approach.. Equilibrant, Conditions of Equilibrium, Equilibrium of a force system in a Plane,Force and Couple system about a point.	
UNIT - II	**Truss and Friction**	**(06 Hours)**
	Coefficient of Static Friction, Impending motion of Blocks, Ladders and Belts. Analysis of Perfect Trusses - Method of Joint, Method of Section and Graphical Method.	
UNIT - III	**Centroid and Moment of Inertia**	**(06 Hours)**
	Centroid of line and plane areas, Moment of Inertia of plane areas, parallel and perpendicular axis theorem, radius of gyration, least moment of inertia.	

UNIT - IV	**Kinematics of Rectilinear motionof a Particle**	**(06 Hours)**
	Equations of motion, Constant and variable acceleration, Motion Curves, Relative motion, Dependent motion.	
UNIT - V	**Kinematics of Curvilinear motionof a Particle**	**(06 Hours)**
	Motion of a Projectile, Cartesian components, Normal and Tangential components of a curvilinear motion.	
UNIT - VI	**Kinetics of a Particle**	**(06 Hours)**
	D'Alemberts Principle, Work-Energy Principle and Impulse-Momentum Principle, Coefficient of Restitution, Direct Central Impact.	

Term Work:

A) The term-work shall consist of minimum **Five** experiments from list below.

1. Determination of reactions of Simple and Compound beam.
2. Study of equilibrium of concurrent force system in a plane.
3. Determination of coefficient of friction for Flat Belt.
4. Determination of coefficient of friction for Rope.
5. Study of Curvilinear motion.
6. Determination of Coefficient of Restitution.

B) The term-work shall also consist of minimum **Five** graphical solutions of the problems on different topics.

Text Books:

1) "Engineering Mechanics (Statics and Dynamics)",Hibbeler R.C., McMillan Publication.

2) "Vector Mechanics for Engineers-Vol.-I and Vol.-II (Statics and Dynamics)",Beer F.P. and Johnston E.R., Tata McGraw Hill Publication.

3) "Engineering Mechanics",Bhavikatti S.S. and Rajashekarappa K.G., New Age International (P) Ltd.

Reference Books:

1. "Engineering Mechanics (Statics and Dynamics)", Shames I.H., Prentice Hall of India (P) Ltd.
2. "Engineering Mechanics (Statics and Dynamics)", Singer F.L., Harper and Row Publication.
3. "Engineering Mechanics (Statics and Dynamics)",Meriam J.L. and Kraige L.G., John Wiley and Sons Publication.
4. "Engineering Mechanics (Statics and Dynamics)",Timoshenko S.P. and Young D.H., McGraw Hill Publication.
5. "Engineering Mechanics (Statics and Dynamics)",Tayal A.K., Umesh Publication.
6. "Engineering Mechanics-I and II (Statics and Dynamics)", Mokashi V.S., Tata McGraw Hill Publication.

Syllabus for Unit Test:	
Unit Test -1	UNIT – I to III
Unit Test -2	UNIT – IV to VI

ENGINEERING PHYSICS

Teaching Scheme:	Examination scheme:	Credits Allotted:
Lectures: 4Hrs/Week	End Semester Examination: 60 marks	Theory: 04
Practical: 2Hr/Week	Continuous Assessment: 40 marks	Practical: 01
	Term Work: 25marks	

UNIT – I

MODERN PHYSICS

Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatic focussing, Wavelength and resolution, Specimen limitation, Depth of field and focus, Electron microscope, Positive rays, Separation of isotopes by Bainbridge mass spectrograph.

NUCLEAR PHYSICS

Nuclear fission, Liquid drop model of nucleus, Nuclear fission in natural uranium, Fission energy, Critical mass and size, Reproduction factor, Chain reaction and four factor formula, Nuclear fuel and power reactor, Nuclear fusion and thermonuclear reactions, Merits and demerits of nuclear energy, Particle accelerators, Cyclotron, Betatron,

(08hours)

UNIT – II

SOLID STATE PHYSICS

Band theory of solids, Free electron theory, Fermi-Dirac probability function and position of Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semi-conductors, Band structure of p-n junction diode under forward and reverse biasing, Conductivity in conductor and semi-conductor, Hall effect and Hall coefficient, Photovoltaic effect, Solar cell and its characteristics.

SUPERCONDUCTIVITY

Introduction, Properties of a super conductor, Meissner's effect, Critical field, Types of superconductors, BCS theory, High temperature superconductors, Application of superconductors.

(08hours)

UNIT – III

THERMODYNAMICS

Zeroth law of thermodynamics, first law of thermodynamics, determination of j by Joule's method, Applications of first law, heat engines, Carnot's cycle and Carnot's engine, second law of thermodynamics, entropy, change in entropy in reversible and irreversible processes, third law of thermodynamics.

NANOSCIENCE

Introductions of nanoparticals, properties of nanoparticals (Optical, electrical, Magnetic, structural, mechanical), synthesis of nanoparticals(Physicaland chemical), synthesis of clloids, growth of nanoparticals, synthesis of nanoparticals by colloidal rout, applications.

(08hours)

UNIT-IV

OPTICS - I

INTERFERENCE

Interference of waves, Visibility of fringes, interference due to thin film of uniform and non-uniform thickness, Newton's rings, Engineering applications of interference (optical flatness, interference filter, non-reflecting coatings, multi-layer ARC.

DIFFRACTION

Classes of diffraction, Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Diffraction at a circular aperture (Result only), Plane diffraction grating, Conditions for principal maxima and minima, Rayleigh's criterion for resolution, Resolving power of grating and telescope.

(08 hours)

UNIT-V

OPTICS - II

POLARISATION

Introduction, Double refraction and Huygen's theory, Positive and negative crystals, Nicol prism, Dichroism, Polaroids, Elliptical and circular polarisation, Quarter and half wave plates, Production of polarised light, Analysis of polarised light, half shade polarimeter, LCD.

LASERS

Spontaneous and stimulated emission, Population inversion, Ruby laser, Helium-Neon laser, Semiconductor laser, Properties of lasers, Applications of lasers (Engineering/ industry, medicine, communication, Computers), Holography.

(08 Hours)

UNIT-VI

ARCHITECTURAL ACOUSTICS

Elementary acoustics, Limits of audibility, Reverberation and reverberation time, Sabine's formula, Intensity level, Sound intensity level, Sound absorption, Sound absorption coefficient, different types of noise and their remedies, Sound absorption materials, basic requirement for acoustically good hall, factors affecting the architectural acoustics and their remedies.

QUANTUM MECHANICS

Electron diffraction, Davisson and Germer's experiment, Wave nature of matter, De-Broglie waves, Wavelength of matter waves, Physical significance of wave function, Schrodinger's time dependant and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box and non rigid box.

(08hours)

TERM WORK

Experiments

Any ten experiments from the following:

1. Determination of band gap of semi-conductor.
2. Solar cell characteristics.
3. e/m by Thomson's method.
4. Uses of CRO for measurement of phase difference and Lissajos figures.
5. Hall effect and Hall coefficient.
6. Conductivity by four probe method.
7. Diode characteristics (Zener diode, Photo diode, LED, Ge/Si diode).
8. Plank's constant by photodiode.
9. Wavelength by diffraction grating.
10. Newton's rings.
11. Ultrasonic interferometer.
12. Sound intensity level measurement.
13. Wavelength of laser by diffraction.
14. Determination of refractive index for O-ray and E-ray.
15. Brewester's law.

Assignments

1. Recent advances in Nanotechnology
2. Nuclear radiation detectors.
3. Atomic force microscope (AFM).
4. Advanced opto-electronic devices.
5. Laser in Industry.
6. Different spectroscopic methods – a comparison (Raman, IR, UVR, etc.).

Unit Tests:

Unit Test I : Unit I, II, III

Unit Test II: Unit IV, V, VI

Reference Books:

1. Physics for Engineers – Srinivasan M.R.
2. A text Book of Engineering Physics- M.N. Avadhanulu, P.G. Kshirsagar
3. Engineering Physics- K. Rajagopal
4. Electronics Principles – A.P.Molvino
5. Fundamentals of Optics – Jenkins and White
6. A Textbook of Sound – Wood
7. Engineering Physics – Sen, Gaur and Gupta

02: Fundamentals of Electrical Engineering

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 04 Hours / Week	End Semester Examination: 60 Marks	03 Credits
Practical: 02 Hours / Week	Continuous Assessment: 40 Marks	
	Term Work: 25 Marks	01 Credit

Course Pre-requisites:

The Students should have

1.	Mathematics
2.	Physics

Course Objectives:

	The course introduces fundamental concepts of DC and AC circuits, electromagnetism, transformer and measuring instruments and electronic components to all fist year engineering students.

Course Outcomes:

1.	Understand and apply knowledge of basic concepts of work ,power ,energy for electrical, mechanical and thermal systems
2.	Understand and apply knowledge of Kirchoff's laws and network theorems to solve electrical networks
3.	Describe construction, principle of operation, specifications and applications of capacitors and batteries
4.	Describe and apply fundamental concepts of magnetic and electromagnetic circuits for operation of single phase transformer
5.	Define basic terms of single phase and three phase ac circuits and supply systems
6.	Know and use electrical safety rules

UNIT - I	**Basic concepts .**	**(06 Hours)**
	Concept of EMF, Potential Difference, current, resistance, Ohms law, resistance temperature coefficient, SI units of Work, power, energy. Conversion of energy from one form to another in electrical, mechanical and thermal systems	
UNIT - II	**Network Theorems**	**(06 Hours)**
	Voltage source and current sources, ideal and practical, Kirchoff's laws and applications to network solutions using mesh analysis, Simplifications of networks using series- parallel, Star/Delta transformation. Superposition theorem, Thevenin's theorem, Max Power Transfer theorem.	
UNIT - III	**Electrostatics**	**(06 Hours)**
	Electrostatic field, electric field intensity, electric field strength, absolute	

	permittivity, relative permittivity, capacitor composite, dielectric capacitors, capacitors in series& parallel, energy stored in capacitors, charging and discharging of capacitors, Batteries-Types, Construction& working.	
UNIT - IV	**Magnetic Circuit & Transformer**	**(06 Hours)**
	Magnetic effect of electric current, cross and dot convention, right hand thumb rule, concept of flux, flux linkages, Flux Density, Magnetic field, magnetic field strength, magnetic field intensity, absolute permeability, relative permeability, B-H curve, hysteresis loop, series-parallel magnetic circuit, composite magnetic circuit, Comparison of electrical and magnetic circuit Farady's law of electromagnetic induction, statically and dynamically induced emf, self inductance, mutual inductance, coefficient of coupling, Single phase transformer construction, principle of operation, EMF equation, voltage ratio, current ratio, kVA rating, losses in transformer, Determination of Efficiency & Regulation by direct load test.	
UNIT - V	**AC Fundamentals & AC Circuits**	**(06 Hours)**
	AC waveform definitions , form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar & rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3-ph AC Circuits.	
UNIT - VI	**Electrical Wiring and Illumination system**	**(06 Hours)**
	Basic layout of distribution system, Types of Wiring System & Wiring Accessories, Necessity of earthing, Types of earthing, Different types of lamps (Incandescent, Fluorescent, Sodium Vapour, Mercury Vapour, Metal Halide, CFL, LED), Study of Electricity bill.	

Term Work:

The term work shall consist of record of minimum eight exercises / experiments.

1. Determination of resistance temperature coefficient
2. Verification of Superposition Theorem
3. Verification of Thevenin's Theorem
4. Verification of Kirchoff's Laws
5. Verification of Maximum power transfer Theorem
6. Time response of RC circuit
7. Study of R-L-C series circuits for $X_L > X_C$, $X_L < X_C$ & $X_L = X_C$
8. Verification of current relations in three phase balanced star and delta connected loads.
9. Direct loading test on Single phase transformer
   a)Voltage and current ratios.
   b) Efficiency and regulations .
10. Study of a Residential (L.T.) Bill

Text Books:
1) B.L.Theraja- “A Textbook of Electrical Technology” Volume- I, S.Chand and Company Ltd.,New Delhi
2) V. K. Mehta, - “Basic Electrical Engineering”, S. Chand and Company Ltd., New Delhi
3) I. J. Nagrath and Kothari – “Theory and problems of Basic Electrical Engineering”, Prentice Hall of India Pvt. Ltd
Reference Books:
1. Edward Hughes – “Electrical Technology”- Seventh Edition, Pearson Education Publication
2. H. Cotton – “Elements of Electrical Technology”, C.B.S. Publications
3. John Omalley Shawn – “Basic circuits analysis” Mc Graw Hill Publications
4. Vincent Del Toro – “Principles of Electrical Engineering”, PHI Publications

Syllabus for Unit Test:	
Unit Test -1	UNIT – I to III
Unit Test -2	UNIT – IV to VI

FUNDAMENTALS OF COMPUTING

TEACHING SCHEME	EXAMINATION SCHEME	CREDITS
Practical: 2 Hours/Week	**Term Work: 50 Marks**	**01**

Course Prerequisite:

Students must possess knowledge about basic fundamentals of computer and professional Microsoft office development tools.

Course Objective:

This course will introduce the concepts of C language software development and compiling tool. By the end of the course, student will be familiar with various fundamentals of C- language, software file system, computer graphics and its various multimedia applications.

Course Outcomes: At the end of the course, a student will be able to

1. Write C programs using conditional statements and loops**.**
2. Execute the logic using Arrays and strings and perform matrix operation using them.
3. Perform logic operations using Structures &Unions and use them with pointers.
4. Write C program for File manipulations and Dynamic memory allocation
5. Understand the concept and application of Graphics & Multimedia.

Unit –I **(08 Hours)**

Introduction: Computer systems, Hardware & software concepts.
Algorithm / pseudo code, flowchart, program development steps, Computer Languages: machine, symbolic, and high-level languages, Creating and running programs: Writing, editing, compiling, linking, and executing.

Basic of C: Structure of a C program, identifiers, basic data types and sizes. Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operators, bit-wise Operators expressions, type conversions, conditional expressions, precedence and order of evaluation, Managing input and output operations, Sample programs.

Conditional Statements and Loops: Decision making within a program, conditions, if statement, if-else statement, loops: while loop, do while, for loop. Nested loops, infinite loops, switch statement, sample programs

Unit-II **(08 Hours)**

Arrays & Strings

Arrays - concepts, declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays , Array applications: Matrix Operations

Unit –III **(08 Hours)**

Function & Pointers

FUNCTIONS: basics, parameter passing, storage classes- extern, auto, register, static, scope rules, user defined functions, standard library functions, recursive functions, Recursive solutions for Fibonacci series, Towers of Hanoi, header files, example c programs. Passing arrays & strings to functions.
Pointers: concepts, initialization of pointer variables, pointers and function arguments, passing by address, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays.

Unit-IV **(08 Hours)**

Structures & Unions
Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications.

Unit-V **(08 Hours)**

Files and Dynamic Memory Allocation

Input and output – concept of a file, text files and binary files, Formatted I/o, file I/o operations, example programs.
Dynamic memory allocation, malloc, calloc, realloc ,free. Concepts of linked lists, Sample programs

Unit-VI **(08 Hours)**
Graphics and Multimedia
Introduction to Computer Graphics: Overview of Computer Graphics, Computer Graphics Application, Description of graphics devices, Input Devices for Operator Interaction
Introduction to Multimedia: History, elements of multimedia – text, audio, video, image, animation, Multimedia applications different areas

TEXT BOOKS

1. Programming in ANSI C – E Balagurusamy (5^{th} Edition-TMH)
2. Computer Graphics: Principles and Practices in C – Andrea Von Dam, Steven K Fiener, F Hughes John [2^{nd} Edition- Pearson]

REFERENCE BOOKS

1. Let Us C- Yashwant Kanitkar
2. D. Hearn, M. Baker, "Computer Graphics - C Version", 2nd Edition, Pearson Education, 2002, ISBN 81 - 7808 - 794 – 4
3. Ralf Steinmetz, Klara Nahrstedt, “Multimedia: Computing, Communication and Applications”
4. Judith Jeffcoate, “ Multimedia Technique”

Term work will consist of minimum of ten assignments based on C programming language.List of Practicals

1. a. Write a C program to take user Input and print it on the screen.
   b. Write a C program to perform addition or subtraction of two numbers.
   c. Write a C program to find whether the number is Odd or Even.
2. a. Write a C program to find out Prime numbers.
   b. Write a C program to find out Fibonacci series.
3. Write C programs to print different patterns
4. a. Write a C program to do factorial using recursion.
   b. Write a C program to find out Armstrong number.
5. Write a C program to sort the array in Ascending & Descending order.
6. Write C programs to perform operations on 2-D arrays
7. Write a C program to perform different operations on strings.
8. Use of Pointers
   a. Write a C program to swap numbers using pointers
   b. Write a C program to show the use of pointers in arrays.
   c. Write a C program to use functions using pointers.
9. a. Write a C program to create student mark sheet using structures
   b. Write a C program to show the use of structure using pointers
10. Write a C program to perform different operations on Files.
11. Write a C program to create single Linked List.
12. Application of Graphics and Multimedia

B.Tech.(Electronics) Sem-III

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- III

SUBJECT: - Engineering Mathematics-III

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End semester exam: 60 Marks**
Tutorial: 1 Hours/week	**Continuous Assessment: 40 Marks**
	Credits: 04

Course prerequisites:

Students should have basic knowledge of:

- Differential calculus
- Integral calculus
- Complex numbers
- Vector algebra

Course objective:

To develop ability to use the mathematical techniques, skills, and tools necessary for engineering practice.

Course Outcomes: On successful completion of this course, students will be able to

1. Form mathematical modeling of systems using differential equations and ability to solve linear differential equations with constant coefficient.
2. Apply basics of analytic functions and the basics in complex integration which is used to evaluate complicated real integrals.
3. Apply theorems to compute the Laplace transform, inverse Laplace transforms.
4. Solve difference equation by Z-transform.
5. Calculate the gradients and directional derivatives of functions of several variables.
6. Use Green's theorem to evaluate line integrals along simple closed contours on the plane.

Contents:

Unit-I

Linear Differential Equations (LDE) **(06Hours)**

Solution of nth order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy's &Legendre's DE, Solution of Simultaneous & Symmetric Simultaneous DE, Modeling of Electrical Circuits.

Unit-II

Complex Variables **(06Hours)**

Functions of Complex Variables, Analytic Functions, C-R Equations, Conformal Mapping, Bilinear Transformation, Cauchy's Theorem, Cauchy's Integral Formula, Laurent's Series, Residue Theorem

Unit-III

Transforms **(06Hours)**

Fourier Transform (FT): Complex Exponential Form of Fourier Series, Fourier Integral Theorem, Sine & Cosine Integrals, Fourier Transform, Fourier Sine and Cosine Transform and their Inverses. Introductory Z-Transform (ZT): Definition, Standard Properties, ZT of Standard Sequences and their Inverses. Solution of Simple Difference Equations.

Unit-IV

Laplace Transform (LT) **(06Hours)**

Definition of LT, Inverse LT. Properties & theorems. LT of standard functions. LT of some special functions viz., Periodic, Unit Step, Unit Impulse, ramp, jump, . Problems on finding LT & inverse LT. Applications of LT and Inverse LT for solving ordinary differential equations.

Unit -V

Vector Differential Calculus **(06Hours)**

Physical Interpretation of Vector Differentiation, Vector Differential Operator, Gradient, Divergence and Curl, Directional Derivative, Solenoidal, Irrotational and Conservative Fields, Scalar Potential, Vector Identities.

Unit-VI

Vector Integral Calculus **(06Hours)**

Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence Theorem, Stoke's Theorem, Applications to Problems in Electro-Magnetic Fields.

Assignments:

1. Solve the problem based on Linear Differential Equations

2. Solve the problem based on Complex Variables
3. Solve the problem based on Fourier and Z -Transforms
4. Solve the problem based on Laplace Transform
5. Solve the problem based on Vector Differential Calculus
6. Solve the problem based on Vector Integral Calculus

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. Advanced Engineering Mathematics by Peter V. O'Neil (Cengage Learning).
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).

Reference Books:

1. Engineering Mathematics by B.V. Raman (Tata McGraw-Hill).
2. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
3. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.)
4. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
5. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune).

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- III

SUBJECT: - Analog Electronics

Teaching Scheme:	**Examination Scheme**
Lecture: 4 Hours/week	**End Semester Exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW & PR.: 50 Marks
	Credits: 05

Course prerequisites:

- Knowledge of Electronic Components
- Fundamentals of P-N diode.
- Knowledge of BJT and its configuration

Course objective:

1. To make student understand working of bipolar junction transistor and field effect transistor with different biasing techniques
2. To make student understand a practical approach of design and analysis of waveshaping circuits using diode and multivibrator using transistors
3. To make student understand working of FET and MOSFET and its applications
4. To make student understand working of optoelectronic devices and its applications.
5. To make student understand the fabrication process of PCB

Course Outcomes: On successful completion of this course, students will be able to

1. Demonstrate knowledge of working and applications of diode.
2. Demonstrate knowledge of working of BJT with different biasing techniques.
3. Analyze applications of BJT as an amplifier and multivibrator.
4. Explain working of FET and MOSFET and its applications.
5. Demonstrate knowledge of working of optoelectronic devices.
6. Design, built and test any small electronic circuit on PCB.

Contents:

Unit-I

Transistor Biasing **(08Hours)**

Need of biasing, DC load line analysis, operating point, Thermal runaway. Requirements of a biasing circuit, Different biasing circuits: fixed bias, collector to base bias & voltage divider bias. Stability factor, General expression for stability factor, stability factor for all biasing circuits, Design of biasing circuits, Transistor as an amplifier.

Unit-II

BJT Amplifiers **(08Hours)**

Two port device and Hybrid model , transistor Hybrid model, h- parameters, Simplified CE Hybrid Model, Analysis of amplifiers using Approximate Model(CE, CC, CB), BJT Single Stage Amplifiers, Small Signal Analysis of Single Stage BJT Amplifiers, Distortion in Amplifiers.

Unit-III

Field Effect Transistor (FET) **(08Hours)**

Types of FET viz. JFET,MOSFET, JFET -construction, VI characteristics, transfer characteristics, Characteristics Parameters of JFET, FET Biasing(Self Bias, Fixed Bias, Current Source Bias), JFET amplifiers-CS,CD and CG amplifiers, Application of FET.

Unit-IV

MOSFETs **(08Hours)**

Types of MOSFET viz. D-MOSFET, E-MOSFET, n-MOS, p-MOS and CMOS devices, DMOSFET and EMOSFET characteristics and parameters,non-ideal V-I characteristics viz. finite output resistance, body effect, subthreshold conduction ,breakdown effects and temperature effects, MOSFET as VLSI device

Unit -V

Wave shaping and Multivibrator Circuits **(08Hours)**

Diode as clipper- series and parallel forms of clipper circuits, biased clipper, their operations, Diode as a clamper, voltage multiplier circuits-voltage doubler, tripler and quadrupler configuration, Multivibrator circuits-astable and monostable multivibrator circuit using BJT.

Unit-VI

Optoelectronic devices and PCB design **(08Hours)**

Construction ,V-I characteristics and applications of LED, LDR, Photodiode, Phototransistor, Photoconductive cell, Photovoltaic cell, optcoupler.

PCB: types of PCB, PCB design rules, layout design, artwork design, fabrication process of single sided PCB, different copper clad laminates, composition of solder metal.

List of Experiments:

1. Biasing techniques of BJT- to find stability factor of self bias, collector to base bias, fixed bias
2. To plot frequency response of single stage CE amplifier and find its bandwidth
3. To plot frequency response of single stage FET amplifier (CS/CD configuration) and find its bandwidth.
4. To study different types of Clipper circuits
5. To study different types Clamper circuits
6. To plot transfer characteristics of Optocoupler
7. To plot V-I and optical characteristics of LED and LDR
8. To plot V-I and optical characteristics of Photodiode and phototransistor

Assignments:

1. Simulation of BJT amplifier using Multisim.
2. Define h-parameters for CE, CB, CC configuration and describe how these parameters are determined from BJT characteristics.
3. Describe fabrication process of MOSFET and any two real time applications of MOSFETs
4. Real time applications of optoelectronics devices such as LED, Optoisolator
5. To design, built and test given electronic circuits (Group activity)
6. Obtain industry exposure based on product design industry and prepare report for the same.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. "Electronic Devices and Circuits" by S. salivahanan,Suresh kumar- Mc Graw Hill Publication
2. "Integrated Electronics", by Millman J and Halkias .C., TMH publication
3. "Electronic Devices and Circuits " by Millman ,Halkies,TMH publication

Reference Books:

1. “Electronic Devices and Circuits” by Allen Mottershed- PHI Publication
2. “Electronic Devices and Circuits” by J.B. Gupta-Katson educational series
3. “Microelectronics “by Jacob Millman, Arvin Garbel- Mc Graw Hill Publication
4. “Printed Circuits Handbook “ by Clyde F. Coombs - McGraw Hill Handbooks
5. “Microelectronic Circuits Theory and applications “by Adel S. Sedra , Kenneth C. Smith- Oxford

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- III

SUBJECT: - Signals and Systems

Teaching Scheme:	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam: 60 Marks**
Tutorial: 1Hour/week	**Continuous Assessment: 40 Marks**
	TW & OR.: 50 Marks
	Credits: 04

Course prerequisites:

Before proceeding with this tutorial, you must have a basic understanding of differential and integral calculus, limits and adequate knowledge of mathematics.

Course objective:

The course aims to develop good understanding about signals, systems and their classification and analysis tools in the time and frequency domain. It also provides knowledge of correlation function and sampling.

Course Outcomes: On successful completion of this course, students will be able to

1. Represent & classify signals, Systems & identify LTI systems
2. Analyze the systems in time domain using convolution.
3. Apply Fourier transform, Laplace transform and Z-Transform for analysis of LTI systems.
4. Conceptualize the effects of sampling on signal and describe the auto correlation and cross correlation between signals.

Contents:

Unit-I

Introduction to signals (06 Hours)

Definition of signals, classification of signals: continuous time signals & discrete time signals, even & odd signals, periodic & non-periodic, deterministic & non-deterministic, energy & power, elementary signals: unit impulse, unit step, unit ramp, exponential & sinusoidal, basic operations on signals.

Unit-II

Classification of Discrete time systems (06 Hours)

Definition ,Classification of System, System Interconnections, state space analysis, Linear & non - linear ,Time-Invariant & Time variant, causal & non-causal, static & dynamic, stable & unstable systems, stability & impulse response of systems to standard signals.

LTI system Analysis: Introduction to LTI systems. Block Diagram, Linear Convolution-Convolution Integral, Impulse response, Methods of Convolution. Properties of convolution

Unit-III

Continuous Time system Analysis: (06 Hours)

Response of LTI Systems to exponential signals, periodic signals. Fourier series, Fourier Transforms, properties, applications of Fourier series & Fourier transforms to the system analysis.

Unit-IV

System Analysis in Laplace Transform (06 Hours)

Laplace Transform: Definition and its properties, ROC and pole zero concept. Applications of Laplace transforms to the LTI system analysis. Inversion using duality, numerical based on properties.

Unit-V

System Analysis in Z-Transform (06 Hours)

Z-Transform: Definition and its properties, Region of Convergence for the Z-Transform, the Inverse z-Transform, Applications of Z-Transform to the LTI system analysis

Unit VI:

Correlation and Spectral Density (06 Hours)

Definition of Correlation and Spectral Density, correlogram, analogy between correlation, covariance and convolution, conceptual basis, auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter relation between correlation and spectral density, Sampling theorem & its proof, aliasing, reconstruction of sampled signals, interpolation.

Assignments:

Perform the following assignments using MATLAB (any three) and Virtual Lab (any three)

1. Generation of Signals
2. Linear convolution of any two signals
3. Fourier transform of given signal

4. Laplace Transform of given signal
5. Z-transform of given signal
6. Sampling Theorem & aliasing effect.

Content Delivery Methods: Chalk & talk, Power point presentation, Quiz

Assessment Methods:

1. Continuous Assessment (Attendance, Assignments/Tutorials, Unit Test)
2. End term Examination

Text Books:

1. Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab, “Signals and Systems” Pearson Education Asia / PHI, 2nd edition, 1997. Indian Reprint 2002
2. Simon Haykins and Barry Van Veen, Signals and Systems John Wiley & sons , Inc,2004.

Reference Books:

1. B. P. Lathi, “Linear Systems and Signals”, Oxford University Press, 2005
2. H. P Hsu, R. Ranjan, “Signals and Systems”, Scham‟s outlines, McGraw Hill,2006
3. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, McGraw Hill International/TMH, 2007

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) SEM: - III
SUBJECT: - Digital Logic Circuits

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & PR.:	**50 Marks**
	Credits:	**04**

Course Prerequisite:

1. Fundamentals of Number Systems.

Course Objective:

1. To understand principles, characteristics & operations of combinational & sequential logic circuits.
2. To design combinational circuits by using logic gates, MSI circuits, PLDs.
3. To design, implement analyze, asynchronous & synchronous sequential circuits using flip flops.

Course Outcomes: On successful completion of this course, students will be able to

1. Demonstrate the knowledge of Boolean algebra including simplification techniques.
2. Describe the characteristics of Logic families TTL, CMOS, ECL & explain the fundamentals of semiconductor memories.
3. Analyze & design digital combinational circuits such as of multiplexers, Demultiplexer, encoder, decoder and arithmetic circuits.
4. Demonstrate the knowledge of operations of basic types of flip-flops, registers, counters & the design of Finite State Machine.
5. Describe the characteristics of PLDs, Semiconductor memories and their applications.

Contents:

Unit –I

Number Systems, Codes & reduction techniques: (6 Hours)

Review of Binary number system: Binary addition and subtraction using 1's, 2'scomplement method, sign magnitude representation. BCD codes, 8421, Excess –3, Grey code, codes with more than four bits, ASCII code.

Fundamental theorems of Boolean algebra, Canonical and standard forms (SOP and POS), minimization of logic functions, Karnaugh maps up to 4 variables, Don't care conditions, Quine Mc-Cluskey method.

Unit-II

Combinational Logic Modules and their Applications (6 Hours)

Adder, subtractor, carry look ahead adder, BCD adder, magnitude comparator, Excess-3 Adder, series and parallel adder, ALU.

Code conversion, Multiplexer, Demultiplexer, Encoder, Decoder and their applications. Parity generator and checker.

Unit-III

Logic Families (6 Hours)

Parameter definitions - Noise margin, power dissipation, voltage and current parameters, propagation delay. Typical values for TTL, CMOS & ECL. Two input TTL NAND gate, TTL logic families standard, Totem – pole, open collector, tri-state (concept & application). TTL-CMOS/CMOS-TTL interfacing, comparison of TTL & CMOS ECL.

Unit-IV

Sequential Logic Modules (7 Hours)

Basic sequential circuits-latches and flip-flops: SR-latch, D-latch, D flip-flop, JK flip-flop, MS J-K flip flop, T flip-flop.

Definition of state machines, Moore and Mealy machine, Design of state machines: state table, state assignment, transition/excitation table, excitation maps and equations, logic realization.

Unit-V

Shift Registers & Counters (5 Hours)

Registers, Shift registers, Counters (ring counters, twisted ring counters), Sequence Generators, ripple counters, up/down counters, synchronous counters, lock out, Clock Skew, Clock jitter.

Unit-VI

PLDs & Memories **(6 Hours)**

Study of PROM, PAL, PLAs. Designing combinational circuits using PLDs.

Classification and characteristics of memory, different types of RAMs, ROMs and their applications, Double Data Rate RAMs.

List of Experiments:

1. Implementation of Boolean functions using logic gates
2. Study of characteristics of typical 74 TTL / 74 CMOS family like: fan in, fan out standard load , noise margin & interfacing with other families
3. Half, Full Adder and subtractor using gates and IC's
4. Code conversion using digital IC's
5. 1 & 2 bit digital comparator and ALU verification
6. Function implementation using Multiplexer and Demultiplexer
7. Sequence generator using MSJK flip flop IC's
8. Study of counters : Ripple , Synchronous , Ring , Johnson , Up-down counter and its application
9. Study of shift registers : Shift left , Shift right , parallel loading and Pulse Train generator
10. BCD Adder/Subtractor with Decoder driver and 7 segment display

Assignments:

1. Implement a multiplexer using Virtual laboratory
2. Design example based on combinational circuit
3. Design for e.g. digital clock, digital event counter,timers,and various multi-vibrator circuits, small processor ports or scrolling display
4. Implementation of combinational logic using PLAs
5. Design a pulse train generator using shift register
6. Design example based on state machine

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Attendance, Assignments/Tutorials, Unit Test)
2. End term Examination

Text Books:

1. R.P. Jain , "Modern digital electronics" , 3rdedition , 12th reprint TMH Publication, 2007.

2. Anand Kumar 'Fundamentals of Digital Circuits'--. PHI

3. Tocci R.J., Neal S. Widmer, *Digital Systems: Principles and Applications,* Pearson Education Asia, Second Indian Reprint 2002

Reference Books :

1. J.F.Wakerly "Digital Design: Principles and Practices", 3rd edition, 4th reprint, Pearson Education, 2004.

2. A.P. Malvino, D.P. Leach 'Digital Principles & Applications'' –Vith Edition-Tata Mc Graw Hill, Publication.

3. Morris Mano 'Digital Design'-- (Third Edition),.PHI

4. Thomas L Floyd & R.P Jain, *digital Fundamentals* (Eight editions), Pearson

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) SEM: - III
SUBJECT: - Circuit Theory

Teaching Scheme:	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW & PR.: 50 Marks
	Credits: 04

Course prerequisites:

- Knowledge of KCL and KVL Laws from Basic Electrical Engineering
- Knowledge of Linear Differential Equations and Systems of Linear Equations from Engineering Mathematics - I and II.

Course objective:

The objective of the course is to enable the student to perform any of the network analysis task required in the subsequent courses. The student is exposed to some concepts in graph theory for providing a good foundation for the methods of Mesh Analysis and Node Analysis. The transient analysis using Laplace Transforms is also included. The series and parallel resonance circuits which occur quite frequently in electronics are analyzed. The topic of constant K filter is included as it finds many applications in electronic design. The two port network parameters which are of fundamental importance in many courses on electronic devices are included in the last unit.

Course Outcomes: On successful completion of this course, students will be able to:

1. To find voltages and currents in a given network using Mesh Analysis or Node Analysis or Network Theorems.
2. To find voltages and currents in a given network by formulating network equilibrium equations from graph theory.
3. To find the transient response in a given network consisting of series or a parallel combination of resistance, capacitance and inductance.
4. To find all the parameters relating to a given series or a parallel resonant circuit.
5. To design a constant K prototype low pass, high pass, band pass or a band stop passive filter
6. To find any of the two port parameters of a given two port network.

Contents:

Unit I

Fundamentals Of Network **(6 Hours)**

KCL, KVL, Source Transformation, Source Shifting, Mesh Analysis, Node Analysis, Super Mesh, Super Node, Mesh and Node Analysis in Sinusoidal Steady State

Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

Unit II

Application Of Graph Theory **(6 Hours)**

Network Graph, tree, cotree & loops, Incidence Matrix, tie set matrix, cut-set matrix, Formulation of equilibrium equations in matrix form, Solution of resistive networks, Principle of Duality

Unit III

Transient Analysis **(6 Hours)**

Initial Conditions in networks. A procedure for evaluating initial conditions. Solution of step response in RC, RL, RLC circuits using classical method, Analogous equivalence of mechanical system.

Unit IV

Resonance **(6 Hours)**

Resonant condition, Definition of Quality factor. Finding resonant frequency, impedance at resonance, voltage and current variation with frequency, bandwidth, selectivity, magnification factor for series and parallel resonant circuits. General case of resistance present in both branches of parallel resonant circuit. Comparison of series and parallel resonant circuits, Applications of resonant circuits

Unit V

Passive Filters **(6 Hours)**

Filter Fundamentals, Image impedance, Characteristic impedance, Propagation constant. Constant K prototype for LPF, HPF, BPF and BSF, m-derived LPF, HPF, Terminating half sections, Composite filters

Unit VI

Two Port Networks **(6 Hours)**

Network Functions, Two port network parameters, Z, Y, H, ABCD and other parameters, Relationships between two-port network parameters, Interconnections of two-ports, Reciprocity and Symmetry conditions

List of Experiments:

1. To verify Thevenin's and Norton's Theorem.
2. To verify Superposition and Reciprocity Theorem.
3. To find resonant frequencies of series and parallel circuit.
4. To plot frequency response of frequency selective network (Twin T or Wein Bridge).
5. To plot frequency response & cut-off frequency of constant-k LPF and HPF.
6. To plot frequency response & cut-off frequency of constant-k BPF and BSF.
7. To find Z and Y parameters of given two port network.
8. To find H and ABCD parameters of given two port network.

Assignments:

1. Analyze the circuit using mesh and node analysis.
2. Apply graph theory for circuit.
3. Describe any two real time applications of passive filters.
4. Simulation of series and parallel resonance circuit using Multisim.
5. Transient response of RC, RL and RLC circuit using Multisim.
6. Obtain industry exposure based on product design industry and prepare report for the same.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books :

1. D. Roy Choudhury, 'Network and Systems', New Age International Publishers, Second Edition.
2. Franklin F. Kuo, 'Network Analysis and Synthesis', John Wiley & Sons (Second Edition)

References Books:

1. M. E. Van Valkenburg, 'Network Analysis', PHI (3rd Edition)
2. John D. Ryder, 'Networks, Lines and Fields', PHI Learning Pvt. Ltd., Second Edition

B.Tech.(Electronics) Sem-IV

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem: - IV

SUBJECT: - Analog Integrated Circuits

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & PR.:	**50 Marks**
	Credits:	**04**

Course prerequisites:

- Knowledge of KCL and KVL Law
- Basic knowledge of Op-Amp and its configurations

Course objective:

This course provides in depth knowledge on the Op-Amp. Also it introduces the design of PLL, Waveform generators, Timer IC's and Converters.

Course Outcomes: On successful completion of this course, students will be able to

1. Design linear and nonlinear applications of Op-Amp.
2. Design of first and second order active filters.
3. Analyze and design Waveform Generators.
4. Demonstrate knowledge of Phase Locked Loop IC 565 and Converters.
5. Design of multivibrators using Timer IC 555

Contents:

Unit-I

Fundamentals of Operational Amplifier (06 hours)

Block diagram representation of a typical op-amp, Schematic symbol for op-amp ,Definition of integrated circuits ,Types of Integrated Circuits ,Manufacturers ,Designation for IC ,IC package types ,PIN identification & temp ranges , Ordering information, Characteristics of an op-amp, Internal &external offset voltage compensation, Frequency Response of an op-amp.

Unit-II

Operational Amplifier – Linear circuits (06 hours)

Inverting amplifier, Non-inverting amplifier, Voltage Follower, Adder, Subtractor, Scaling averaging amplifier, Integrator, Differentiator, Instrumentation amplifier using 1, 2 and 3 op-amps, Instrumentation amplifier using transducer bridge, Peaking amplifier

Unit-III

Operational Amplifier - Non-linear circuits (06 hours)

Precision half wave rectifier & full wave rectifier, comparator, Schmitt trigger, window detector, log-antilog amplifier and its temperature compensation techniques, log ratio, sample and hold circuit.

Unit-IV

Active filters and waveform generators (06 hours)

First and second order low pass Butterworth filters, first and second order high pass Butterworth filter, Band pass filter, Band reject filter, All-pass filter, notch filter, Square wave, Triangular wave, Sawtooth wave generator and study of function general or IC 8038

Unit-V

Special function IC's (06 hours)

IC 555- as Monostable and Astable Multivibrators and its applications.

IC 565- operating principle of Phase Locked Loop IC 565, Applications like Frequency multiplier, FSK and FM detector

Unit-VI

Interfacing circuits (06 hours)

V to I & I to V converter, D to A converter- Binary weighted resistors and R & 2R resistors, A to D Converter- Counter-ramp type, Successive approximation and Dual Slope.

List of Experiments:

1. To design and build Integrator and draw frequency response
2. To design and build Differentiator and draw frequency response
3. To design and build precision rectifier
4. To design and build schmitt trigger and find threshold levels
5. To design and build first order Butterworth low pass filter
6. To design and build first order Butterworth high pass filter
7. To design and build triangular waveform generator using IC 741
8. To design and build Function generator using IC 8038
9. To design and build Astable multivibrator using timer IC 555.

Assignments:

1. Find out any three ICs of op-amp other than IC 741 and compare the characteristics with IC 741.
2. List out any two linear applications of op-amp which are not specified in syllabus and explain the working along with circuit diagrams.
3. List out any two non-linear applications of op-amp which are not specified in syllabus and explain the working along with circuit diagrams.
4. Design sinusoidal generators using op-amp for a given frequency.
5. Real time applications of IC555/ IC565.
6. Obtain industry exposure based on product design and prepare report for the same.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. Ramakant A.Gayakwad, OP-AMP and Linear ICs, Prentice Hall of India, 4th Edition, 2010.
2. K. R. Botkar, Integrated Circuits, khanna Publishers, 10th edition, 2010

References Books:

1. David A. Bell, "Operational Amplifiers and Linear ICs", Oxford publication,3rd edition,2011
2. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", Tata McGraw Hill, 3rd edition, 2008
3. D.Roy Choudhry, Shail Jain, Linear Integrated Circuits, New Age International Pvt. Ltd., 4th edition, 2010.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- IV

SUBJECT: - Electronic Circuits and Applications

Teaching Scheme:	**Examination Scheme**	
Lecture: 4 Hours/week	**End Semester Exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & PR.:	**50 Marks**
	Credits:	**05**

Course prerequisites:

- Knowledge of linear circuit theory
- Basic concept of BJT

Course objective:

1. To make student understand analysis of multistage transistor amplifier.
2. To make student understand a practical approach of design and analysis of feedback amplifiers ,power amplifiers and oscillators
3. To make student understand analysis and design of voltage regulators.
4. To make student understand the behavior of high frequency BJT amplifiers

Course Outcomes: On successful completion of this course, students will be able to

1. Analyze multistage amplifier.
2. Analyze and design feedback amplifier and power amplifier and oscillators
3. Analyze and design voltage regulators.
4. Characterize behavior of high frequency BJT amplifiers.

Contents:

Unit-I

Multistage amplifiers **(08hours)**

Need of Multistage amplifiers, Parameter evaluation such as Ri, Ro, Av, Ai & Bandwidth for general multi stage amplifier, Analysis & design at low frequency & mid frequency of direct coupled, RC coupled, transformer coupled (Two stage) amplifier, Darlington amplifier, cascode amplifier

Unit-II

Feedback amplifiers (08 hours)

Concept of feedback, classification of amplifiers, Negative feedback topologies with their block diagram representation, Effect of negative feedback on Input impedance, Output impedance, Gain and Bandwidth with derivation, method of analysis of feedback amplifier, analysis of all feedback topologies.

Unit-III

Power amplifiers (08 hours)

classification of power amplifiers - Class A, Class B, Class C, and Class AB. Operation of - Class A with resistive load; Transformer coupled class A Amplifier; Class B Push – pull amplifier ; Class B Complementary symmetry amplifier. Efficiency analysis for Class A transformer coupled amplifier and Class B push – pull amplifier, cross over distortion in power amplifiers, harmonic analysis

Unit-IV

Oscillators (08 hours)

Positive feedback, Barkhausen criterion, Classification of oscillators, derivation and analysis of RC oscillators, Wien bridge Oscillators, LC Oscillators for frequency of oscillation, Tuned collector oscillator, Piezo-electric effect in crystals and Crystal Oscillator

Unit- V

Regulators (08 hours)

Block schematic of linear regulators, Performance parameters – Load and Line regulations, Ripple rejection, Output resistance Emitter follower regulator, Transistor series regulator, shunt regulator Study and design of regulators using IC's :78XX,79XX,723,LM317, Method of boosting output current using external series pass transistor. Protection circuits – Reverse polarity protection, over circuit, fold back current limiting, over voltage protection.

Unit-VI

High frequency amplifiers (08hours)

High frequency T model. Common base short circuit current frequency response ,alpha cut-off frequency ,CE short circuit current frequency response, high frequency hybrid π CE model, Amplifier response taking into account source and load resistances.

List of Experiments:

1. Study of CE two-stage amplifier with capacitive coupling
2. Study of Voltage series and current series feedback amplifiers
3. Study of Voltage shunt and current shunt feedback amplifiers
4. Study of Class B/AB push – pull/ Complementary Symmetry power amplifier.
5. Study of RC Oscillators - phase shift and wien bridge oscillators
6. Study of LC oscillators – Hartley, Colpitt oscillators
7. Study of Linear voltage regulators – series regulator using series pass transistor, shunt regulator using zener diode
8. Study of Fold back current limiting using IC 723

Assignments:

1. Analyze given feedback amplifier.
2. Describe any two real time applications of power amplifier.
3. Simulation of oscillator using Multisim.
4. Describe any two real time applications of regulator.
5. To design, built and test given electronic circuits(Group activity)
6. Obtain industry exposure based on electronic product design and prepare report for the same.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. "Electronic devices and circuits" by S. Salivahanan, Suresh Kumar Vallavaraj, Mc Graw Hill Publication
2. "Electronic devices and circuits "by Millaman Halkies ,TMH publication
3. "Integrated Electronics", by Millman J and Halkias .C., TMH publication

Reference Books:

1. "Electronic Devices and Circuits "by Allen Mottershed- PHI Publication
2. "Electronic Devices and Circuits "by J.B. Gupta- KATSON educational series books
3. " Microelectronic Circuits Theory and applications "by Adel S. Sedra, Kenneth C. Smith- Oxford
4. "Microelectronics "by Jacob Millman, Arvin Garbel- Mc Graw Hill Publication
5. "Electronic Principles "by Albert Malvino and David J Bates, 7 edition, Tata McGrawHill
6. "Basic Electronics" by Zbar, Malvino and Miller, 7 edition, Tata McGraw Hill

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- IV

SUBJECT: - Instrumentation & Control System

Teaching Scheme:	**Examination Scheme**	
Lecture: 3 Hours/week	**End Semester Exam:**	**60 Marks**
Tutorial: 1Hour/week	**Continuous Assessment:**	**40 Marks**
	Credits:	**04**

Course prerequisites:

- Basic knowledge of signals.
- Basic mathematical tools like Laplace transform.
- Basic knowledge of software like MATLAB.

Course objective:

This course provides in depth knowledge of the various control systems. Also it introduces the stability of system, transducers, controllers etc.

Course Outcomes: On successful completion of this course, students will be able to

1. Identify various control systems and determine the 'Transfer Function' of a system using block diagram reduction technique and signal flow graph.
2. Measure various Non-electric quantities such as displacement, temperature, angular speed, acceleration etc using suitable transducer.
3. Determine the error in various control systems.
4. Evaluate the stability of a system using Routh's Stability Criterion, root locus and different graphical methods like Bode plot and polar plot.
5. Compare various control actions such as Proportional (P), Integral (I), Derivative (D), PI, PID.

Contents:

Unit I

Control System **(06 Hours)**

Introduction to Control System, control problems, Feedback and Non-feedback Systems, Transfer Function, Analysis of T.F. using Block diagram and signal flow graph.

Unit II

Transducers and Controller Components (06 Hours)

Classification of Transducers and its Characteristics. RTD, Thermocouple, Thermister, capacitive transducer, LVDT, strain gauge and Electromagnetic flow-meter. Linear Approximation of Nonlinear Systems, synchros, dc and ac servomotors, tacho-generators, electro hydraulic valves, electro pneumatic valves.

Unit III

Time Response Analysis (06 Hours)

Standard Test Signals, Time Response of First order system and second order system, steady state error (e_{ss}) and error constants (Kp, Kv, Ka), performance indices.

Unit IV

Stability (06 Hours)

Concept of stability, necessary conditions for stability, Hurwitz and Routh stability criteria, stability of system modeled in state variable form, root locus technique.

Unit V

Frequency Response Analysis (06 Hours)

Relationship between time & frequency response, Polar plots, Bode plot, stability in frequency domain, Nyquist stability criterion.

Unit VI

Controllers (06 Hours)

Control actions – On/Off, P, PI, PD, PID. PLC Architecture, Introduction to Ladder Diagram

List of Practicals:

1. Unit Step and Impulse response of the Transfer function using MATLAB.
2. To draw Root Locus theoretically and verify it using MATLAB.
3. To draw Bode plot theoretically and verify it using MATLAB.
4. Magnitude and phase plot of Lead network.
5. Magnitude and phase plot of Lag network.
6. To Study characteristics of temperature transducer.
7. To Study characteristics of LVDT for displacement measurement.

8. Study of Strain gauge.

Assignments:

1. Transfer function of closed loop system.
2. Transient response specifications of second order system.
3. Describe characteristics of temperature transducers..
4. Effect of addition of poles and zeros.
5. Describe architecture of PLC.
6. Simulation of Controller using Virtual Lab and LabVIEW.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books /Reference Books:

1. I. J. Nagrath & M. Gopal, "Modern Control Engineering", New Age International, New Delhi (Fifth Ediion) 2007.
2. Ogata, K., "Modern Control Engineering", Prentice Hall, second edition, 1991
3. A K Sawhney, Electrical and Electronic Measurements and Instrumentation, Dhanpt Rai and Co. Ltd.
4. H S Kalsi, Electronic Instrumentation, Tata McGraw-Hill.
5. Gopal. M., "Control Systems: Principles and Design", Tata McGraw-Hill.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- IV

SUBJECT: - Analog Communication

Teaching Scheme:	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW & OR.: 50 Marks
	Credits: 04

Course prerequisites:

- Basic knowledge of signals and systems.
- Basic mathematical tools like fourier series & transform

Course objective:

1. To introduce to student essential components of communication system and emphasize need of modulation.
2. To make student recognize concept of noise and its effects.
3. To make student understand amplitude & frequency modulation and demodulation and its mathematical background.
4. To make student understand working of radio receivers.

Course Outcomes: On successful completion of this course, students will be able to

1.Describes basic components of communication system and explains need of modulation.

2.Describes concept of noise and also recognizes its effects.

3.Describes amplitude and frequency modulation and demodulation and can do analysis in time and frequency domain.

4.Describes components of communication receiver system.

Contents:

Unit-I

Introduction to Communication Systems (6 Hours)

Review of signals and systems, Frequency domain of signals, Block schematic of communication system, types of communication channels, base band signals, RF bands, Necessity of modulation.

Unit-II

Noise **(6 Hours)**

Types of noise, External noise, Internal Noise, Noise calculations, signal to noise ratio, noise figure, and noise temperature.

Unit-III

Amplitude Modulation **(6 Hours)**

Amplitude Modulation, low level and high level transmitters,Frequency spectrum of AM wave, Representation of AM, power relations in AM, Generation of AM,DSB suppressed carrier (DSBSC)-modulator, Single Side Band (SSB):-Principle, Filter method, phase shift method and third method, Independent sideband (ISB) and Vestigial Side Band (VSB) principles and transmitters, Diode detector, practical diode detector, and square law detector. Demodulation of DSBSC, Demodulation of SSBSC.

Unit-IV

Angle Modulation **(6 Hours)**

Basic concept, mathematical analysis, frequency spectrum of FM wave, sensitivity, phase deviation and modulation index, frequency deviation and percent modulated waves, bandwidth requirement, deviation ratio, Narrow Band FM, and Wide Band FM. Varactor diode modulator, FET reactance modulator, stabilized reactance modulator- AFC, Direct FM transmitter, indirect FM Transmitter, pre-emphasis and de-emphasis.Amplitude limiting, FM demodulators

Unit-V

Radio Receivers **(6 Hours)**

Block diagram of AM and FM Receivers, TRF receiver, Super heterodyne Receiver, Performance characteristics:Sensitivity, Selectivity, Fidelity, Image Frequency Rejection. IF Amplifiers. Tracking, AGC, Mixers.

Unit -VI

Pulse Analog Modulation **(6 Hours)**

Pulse modulation. Sampling process, Sampling Theorem for low pass and band pass signals, Nyquist criteria ,

Sampling techniques, aliasing error, and aperture effect. PAM, PWM, PPM generation and detection. TDM and FDM.

List of Experiments (Minimum 08):

1. Study of Amplitude Modulation and Demodulation.
2. Study of Frequency Modulation and Demodulation
3. Study of SSB Modulation & Demodulation.
4. Analysis of standard signals (square and triangular)and Modulated signals(all types of AM, FM) using spectrum analyzer.
5. Sampling And Reconstruction.
6. Study of Pulse Amplitude Modulation (PAM.)
7. Study of Pulse Width Modulation.(PWM)
8. Study of Pulse Position Modulation.(PPM)
9. Study of PAM-TDM.
10. Study of Super heterodyne (AM) Receiver.

Assignments

1. Design of circuit for noise and noise figure analysis using Multisim.
2. Simulation of AM modulation and demodulation using MATLAB.
3. Simulation of FM modulation and demodulation using MATLAB.
4. Design and simulation of AM Receiver using MATLAB. Simulink.
5. Design of PWM modulator using Multisim.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Book:-

B.P.Lathi 'Modern Digital and analog Communication System' Oxford University press.

Reference Books:-

1.George Kennedy 'Electronics Communication System'- IV th Edition-Tata McGraw Hill Publication.

2. Taub & Schilling: Principles of Communication Systems, Tata McGraw-Hill.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- IV

SUBJECT: - Data structures and Files

Teaching Scheme:	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW & OR.: 50 Marks
	Credits: 04

Course prerequisites:

- Basic Knowledge of C language.

Course objective:

This course provides in depth knowledge of the various types of data structures and various algorithms. Also it introduces the concept of linked list, stack, queues, graph and tree.

Course Outcomes: On successful completion of this course, students will be able to

1. Write a program involving pointers and structures.
2. Write a program involving search and sorting techniques.
3. Write a program using linked and double linked lists.
4. Implement stacks and queues involving linked list.
5. Perform operations on a tree using linked lists.
6. Find the shortest path in a given graph.

Contents:

Unit-I

C Programming Revision (5 Hours)

Pointers, Arrays, Single and Multi-Dimensional arrays, Row major and Column Major, Arrays and polynomials, Structures , Call by Value ,Call by Reference , Passing arrays Passing a function to function, Pointer to function ,Pointers.

Unit-II

Data Structure and Analysis of algorithms. (4 Hours)

Introduction to data structure, Data representation, Abstract Data types, Primitive data types, Data structure and data types, Differences between data types. Algorithms and different approaches to

designing an algorithm, Complexity, Big O notation, algorithm analysis .Recursion. Sorting: Bubble sort, Selection sort, Quick sort, Merge sort, Insertion sort.

Unit-III

Linked Lists **(4 Hours)**

Definition, operations on linked list, Reversing the links, Merging of linked lists, Circular Linked list, Recursive operation on linked list, Doubly linked list, Linked list and Polynomials,

Unit-IV

Stack and Queues **(3 Hours)**

Operation on stacks, Stack as an array, Stack as a linked list, Application of stack, Infix to prefix conversion, Infix to postfix conversion, Postfix to prefix conversion, Postfix to infix conversion. Representation of Queue as an array, Queue as an linked list, Circular Queue, Priority queue

Unit-V

Tree **(3 Hours)**

Binary tree, Linked and array representation of Binary tree, Binary search tree, Operation: Searching of a Node in a Binary tree, Insertion of a node in binary tree, deletion from a binary tree. Threaded binary tree. AVL trees

Unit-VI

Graphs **(3 hours)**

Definition ,Adjacent vertices and Incident edges, graph representation, depth first search ,breadth first search, Spanning tree, Kruskal.s Algorithm, Shortest path algorithm, Dijkstra.s algorithm.

List of Experiments:

1. Program to create & manipulate database using structure.
2. Program to add two polynomial using array of structure.
3. Program to implement primitive operation on Sequential file.
4. Program to search for record from a given list of records stored in array using
    i) Linear search
    ii) Binary search
5. Program to sort an array of names using
    i) Bubble sort
    ii) Insertion sort
    iii) Quick sort
6. (a) Program to implement following operation on singly linked list:

i) Create

ii) Delete

iii) Insert

iv) Display

v) Search

(b) Program to add two polynomials using linked list.

7. (a) Program to implement stack using:

i) Array

ii) Linked list

(b) Program to convert an infix expression to postfix expression & evaluate the resultant expression.

8. Program to Implement Queue using: (i) Array (ii) linked list

9. Program to create a Binary search tree & Perform following primitive operation on it:

i) Search

ii) Delete

iii) Traversals (inorder, pre-order, post-order -recursive)

iv) Non-recursive in order traversal

10.Program to create a graph using adjacency list & traverse it using BFS & DPS methods

Assignments:

1. State various types of data types and create a database of students in a class using structures.
2. Write a C code to create a digital clock, rainbow etc.
3. Case study on any real time application.

Example :

i. Whatsapp, Hike, Wechat, Line social communication software

ii. Cars lined up at a car wash.

iii. Customers at a grocery store check out.

iv. Airplane taking off and landing on a runway, etc

4. Comparison between various types of programming languages.
5. Write a c program to construct tower of Hanoi.
6. Write a c program to sort structures on the basis of structure elements.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. “Data structure using C” ISRD group,TMH.
2. “Data Structure through C” ,Yashwant kanetkar,BPB Puplication.

Reference Books:

1. “Data structure using C” AM Tanenbaum, Y Langsam and MJ Augustein, Prentice Hall India.
2. “Data structure and Algorithm Analysis in C” Weiss, Mark Allen Addison Wesley.
3. “Data structure – A Pseudocode Approach with C”, Richard F Gilberg Behrouz A. Forouzan, Thomson
4. “Let us C” .Yashwant Kanetkar.BPB Publication.

B.Tech.(Electronics) Sem-V

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- V

SUBJECT: - Microprocessors & Microcontrollers

Teaching Scheme	**Examination Scheme**	
Lecture: 4 Hours/week	**End semester exam:**	**60 Marks**
Practical: 2 Hours/week	**Continuous Assessment:**	**40 Marks**
	TW & PR:	**50 Marks**
	Credits:	**05**

Course Prerequisites: Students should have basic knowledge of:

- Hexadecimal Number System
- Concept of Encoder Decoder & Multiplexer Demultiplexer

Course Objectives:

- To understand the architecture, instruction sets and various techniques to interface them with different real world I/O devices to accomplish certain tasks.
- To study the architecture of microcontrollers like 8051 and PIC and the instruction set and programming concepts.
- To know the techniques of interfacing them to the real world peripheral devices.
- To impart practical knowledge of 8051, and PIC Microcontroller.

Course Outcomes: On successful completion of this course, students will be able to

1. Identify the different block of microprocessor and microcontroller
2. Study the architecture and instruction set of 8051 and PIC microcontrollers.
3. Use the knowledge of instruction set to perform practical for 8051 and PIC Microcontrollers.
4. Interface peripheral devices with 8051 microcontroller for different applications.

Contents:

Unit I **(08 Hours)**

Introduction to Microprocessors

Evolution of Microprocessors, comparison of Microprocessor & Micro controller. Difference between RISC & CISC microcontrollers, Harvard & Von Neumann Architectures Internal architecture of 8 bit Microprocessor 8085, concept of fetch –decode and execute, Stack and Subroutines, concept of Memory mapped I/O, I/O mapped I/O

Unit-II

8051 Micro Controllers (08 Hours)

Architecture, Pin configuration, 8051 timers, counter and related SFR's, Internal RAM structure, 8051 addressing modes.8051 Interrupts Interrupt Priority in the 8051 concept of RESET. Introduction to 8051 assembly language programming: JUMP, LOOP and CALL instructions, Arithmetic instructions, Logic and Compare instructions, and I/O PORT Single bit instruction programming, single bit operations with CY.

Unit-III

8051 Serial Communication &Interfacing of 8051 (08 Hours)

Serial Communication of 8051: Basics, SBUF register, SCON and PCON registers, Modes of operation Simple program of serial communication.

Interfacing of 8051 with devices: LED, LCD, keyboard, LM35 temperature sensor & A/D converter

Unit-IV

Communication Protocols (08 Hours)

Use of communication protocols, need of communication interface in embedded system

Serial communication protocols: I2C, CAN, USB, UART, Serial peripheral interface(SPI),synchronous serial protocol(SSP).

Parallel communication protocol: PCI,PCI-X

RS232C, RS485/422.

Unit -V

PIC18F Family (08 Hours)

PIC18F programming model, instruction set Data copy, arithmetic, branch, logical, bit manipulation and multiply-divide operations, Stacks, subroutines and macros, Role of Assembler.

Unit-VI

Interrupts, Timers & Serial I/0 in PIC18F (08 Hours)

Concepts of Interrupts and Timers, Interrupts and their implementation in PIC18, The PIC18 timers, Use of Interrupts in applications. Concept of serial I/O, SPI protocol

List of Experiments:

Any 8 experiments should be conducted

1. Study of 8051µc using Keil software:
   (a) Block transfer without memory overlapping
   (b) Block transfer without memory overlapping
2. (a) To convert BCD no. to Hex no.
   (b) To convert Hex no. to BCD no.
3. To perform: (a) BCD up Counter
   (b) BCD down Counter
4. To generate a square wave of 5ms delay
5. To interface stepper motor with 8051µc
6. To interface LED with 8051µc

7. To interface Keyboard with 8051µc
8. To interface ADC/DAC with 8051µc
9. To perform 8/16-bit addition & subtraction using PIC microcontroller.
10. Serial communication by PIC microcontroller

List of Assignments:

1. Explain a Boolean processor of microcontroller 8051with two examples
2. Mention a real time application of microcontroller 8051.
3. Mention a real time application of PIC microcontroller.
4. Design a microcontroller (8051) based interfacing system with memory.
5. What is memory address decoding? Explain the different types of decoding.
6. An overview on PIC families.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1. Muhammad Ali Mazidi, Janice Gillespie Mazidi, "The 8051 Microcontroller and Embedded System" Pearson Education.
2. Muhammad Ali Mazidi, Rolin D. McKinlay, Danny Causey," PIC Microcontroller and Embedded Systems"3rd Edition ,Pearson Education
3. Ramesh Gaonkar "Fundamentals of Microcontrollers and Applications in Embedded Systems" (with the PIC18 Microcontroller Family) 2007 Edition,Penram international

Reference Books:

1. John B Peatman "Designing with PIC Microcontrollers" 2004 Pearson Education.
2. Ajay V. Deshmukh, "Micro-controllers - Theory and Applications", Tata McGraw Hill.
3. Kenneth J. Ayala, "The 8051 Micro-controller – Architecture, Programming & Applications", Second Edition Penram International & Thomson Asia,

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B. Tech. (Electronics) Sem: - V

SUBJECT: - Electronic Instruments and Measurement System

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End semester exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW &OR : 50 Marks
	Credits: 04

Course Prerequisites:

- Knowledge of process instrumentation.
- Knowledge of Integrated circuits.

Course Objectives:

- To help the students to have knowledge of the basic of instrumentation.
- To study the principles of working of various signal generators and wave analyzers
- To study the principle of working of CRO is specifications, applications in detail and study the working of various advanced CRO's and their applications.

Course Outcomes: On successful completion of this course, students will be able to:

1. Describe specifications, features and capabilities of electronic instruments
2. Use the electronic instruments like signal generators, wave analyzers, and various oscilloscopes by knowing their specifications for electronic measurements.
3. Make the required measurement using various instruments

Contents:

Unit-I

Fundamentals of Instrumentation & Measurement: (06 Hours)

Necessity of Electronic Measurements, Block diagram of electronic measuring system, Concepts of Accuracy, Precision, Linearity, Sensitivity, Resolution, Hysteresis, Calibration etc. Measurement Errors, Voltage, Current, Resistance measurement using DMM- 4 ½ & 6 ½, Auto zeroing, Auto ranging.

Unit-II

Measuring Instruments (06 Hours)

Voltage, current and impedance measurement, VTVM, TVM, DVMs, AC voltmeters true RMS meters, vector voltmeter, vector impedance meter, direct current probes, alternating current probes, LCR-Q meter.

Unit-III

Signal Generators & counters (06 Hours)

standard signal generators, swept frequency generator, random noise generator, Audio frequency signal generation, RF generator, Pulse generator (block diagram), Function generator Time, Frequency, Ratio, Time interval, Period & Multiple Period averaging using digital universal frequency counter.

Unit-IV

Oscilloscopes: (06 Hours)

Overview of analog CRO, dual/ Multi-trace CRO, Various CRO probes &its applications. Digital Storage Oscilloscope - Sampling speed & Memory depth of DSO, Design considerations, Attachments to DSO for enhancing the functionality, Measurements such as FFT, Math Functions, Curve Tracer, and Power scope.

Unit-V

Communication Measurements: (06 Hours)

Communication measurements, Measurements on transmitter and receiver: sensitivity, selectivity, phase jitter, S/N ratio, co-channel interference, SINAD test etc. Network analyzer- system elements, measurement accuracy, scalar network analyzer, vector network analyzer, S-parameter measurement using network analyzer, EMI/EMC standards.

Unit-VI

Signal Analyzers & computer aided measurements: (06 Hours)

Harmonic and Wave analyzer, Distortion factor meter, Spectrum analyzer -FFT analyzer, tracking generator, Logic analyzer, logic timing analyzer, logic state analyzer, FFT analyzer, Mixed signal oscilloscope, IEEE 488, VXI based instruments, Introduction of Lab view software.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

List of Experiments:

1. Peak, average and r.m.s. measurement using rectifier circuit.
2. Measurement using spectrum analyzer and tracking generator. Observing spectrum of AM and FM waveforms for different modulation indices
3. Measurements on DSO:
   i) FFT analysis of LF signal
   ii) Capturing transients
   iii) Storing and retrieving number of different signals
   iv) Study of various operations like add, subtract, integrate, differentiate.
4. Measurement and timing analysis of digital signals using Logic Analyzer.
5. Measurement of Total harmonic distortion using distortion factor meter.
6. Measurements on L-C-R Q meter.
7. Measurements with Universal counter (Frequency, Period, frequency ratio, Period Averaging and Time interval).
8. Study of characteristics of Diode, Transistors using Curve Tracer.

List of Assignments:

1. Calibration of DVM for any one range: e.g. 200V dc, 200Vac, 200mA dc, using standard calibrator or standard 6½ DMM.
2. Presentation on LCR-Q meter.
3. Describe any one real time applications of random noise generator.
4. Mathematical operations using Lab view software.
5. Seminar on network analyzer.
6. Describe any one real time applications of power scope.

Text Books:

1. Oliver-Cage, "Electronic Measurements and Instrumentation", TATA McGraw Hill, 1975.
2. M.M.S. Anand, "Electronics Instruments and Instrumentation Technology", Prentice Hall India, New Delhi, 2009.
3. Albert D. Helfrick and William D. Cooper,"Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall of India, 2010.

Reference Books:

1. Coombs, Clyde F. Jr., "Electronic Instrument Handbook", McGraw Hill, 2000.
2. J.J. Carr, "Elements of Electronic Instrumentation and Measurement", Pearson Education India, New Delhi, 2011.
3. A. J. Bouwens, "Digital Instrumentation", TATA McGraw Hill, 1997.
4. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw Hill, New Delhi, 2010

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem :- V

SUBJECT :- Digital Communication Systems

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End semester exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW &OR : 50 Marks
	Credits: 04

Course Prerequisites:

- Understanding of continuous and discrete linear systems.
- Knowledge of probabilities and random variables.
- Understanding of Fourier Transform.

Course Objectives:

- To understand the building blocks of digital communication system.
- To prepare mathematical background for communication signal analysis.
- To understand the basics of baseband and pass band digital communication systems.
- To analyze error performance of a digital communication systems.
- To acquire the knowledge of spread spectrum communication systems.

Course Outcomes: At the end of the course, a student will be able to

1. Solve and analyze problems related to Probability theory & random processes.
2. Identify and describe different modulation & detection techniques in digital communication &compare their performance.
3. Characterize error-control coding techniques
4. Analyze Performance of spread spectrum communication systems.

Contents:

Unit –I **(06 Hours)**

Overview of Probability Theory and Random Variables:

Sample space, events, Conditional probability, Joint probability, Baye's rule, random variables. Continuous and discrete random variables, ,Cumulative distribution Function, probability distribution function, Statistical averages, Random Processes, Time average, Ergodicity.

Unit -II

Digital transmission of analog signals **(06 Hours)**

Introduction to Digital Communication System, Sampling Process, Quantization–Uniform, Non-Uniform ,Companding, A-Law, μ Law, Pulse code modulation Delta Modulation, Adaptive Delta Modulation, Delta Sigma Modulation, Differential Pulse Code Modulation.

Unit –III : (06 Hours)

Baseband Transmission and Reception:

Line codes: Unipolar, Bipolar, NRZ, RZ, RZ-AMI, Manchester, Properties & their spectra, M-ary Signaling, ISI, scrambler, Unscramble. Optimum Receivers-Matched Filters, Correlation receivers.

Unit-IV (06 Hours)

Bandpass Modulation Techniques:

ASK, PSK, FSK, Binary Phase shift keying, Differential Phase shift keying, Differential encoded PSK, Quadrature PSK, M-ary PSK, Quadrature Amplitude shift keying (QASK), Binary frequency shift keying, Minimum shift keying (MSK) , signal space representation, Performance evaluation of modulation techniques in terms of probability of error (No derivations)

Unit-V

Error Control Coding: (06 Hours)

Types of Errors & codes, Linear block codes, error detection & correction, Hamming codes. Cyclic codes: Encoding and syndrome decoding. Convolutional codes, Introduction to turbo codes.

Unit-VI (06 Hours)

Spread Spectrum Techniques:

Introduction, Generation of PN Sequences and its properties, Direct Sequence Spread Spectrum Signals, Frequency Hopped Spread Spectrum Signals, Introduction to Multiple Access Techniques: CDMA, TDMA, FDMA.

List of Experiments:

Minimum 8 experiments should be conducted.

1. To verify the sampling theorem.
2. To study Pulse Code Modulation System (PCM) System.
3. To analyze a Delta modulation system and interpret the modulated and demodulated waveforms.
4. To perform ASK (Amplitude Shift Keying) System.
5. To study PSK (Phase Shift Keying) System.
6. To study FSK (Frequency Shift Keying) System.
7. To study of Quadrature Phase Shift Keying (QPSK).
8. To study of Spread Spectrum techniques.
9. To simulate any digital modulation scheme using MATLAB.
10. To perform different Data Formats
11. To study of Hamming codes.

List of Assignments:

Any six assignments can be completed

1. Study of sampling theorem using Virtual Labs
2. Study of ASK/FSK/PSK system using Virtual Labs.
3. Study of hamming code.
4. Experiments on random signals using MATLAB
5. Simulation of communication system using MATLAB.
6. Study of Eye Diagram using oscilloscope
7. Presentation on any communications topic relevant to the course.
8. Industrial Visit

- **Content Delivery Methods:** The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.
- **Assessment Methods:**
  1. Unit Test 2. Assignments
  3. Continuous Assessment 4. End term Examination

Text books:

1. Sklar, Bernard, "Digital Communications, Fundamentals & Applications," Second Edition, Prentice-Hall Inc.,2001.
2. Leon W. Couch, “Digital and Analog Communication Systems”, Sixth Edition, Pearson Education, 2001.
3. Lathi B P, and Ding Z “Modern Digital and Analog Communication Systems,” Fourth Edition ,Oxford University Press.

Reference Books:

4. Haykin Simon, “Digital Communication Systems,” Forth Edition,John Wiley and Sons, New Delhi.
5. Taub, D. Schlling, and G. Saha, “Principles of Communication Systems,” Third Edition, Tata McGraw Hill.
6. John G. Proakis , “Digital Communication” ,Fifth Edition, Pearson Education.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:-V
SUBJECT: - Power Devices & Machines

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End semester exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW &OR : 50 Marks
	Credits: 04

CoursePrerequisites:

- Knowledge of the principals and applications of electronic devices including semiconductor diodes, bipolar-junction and field-effect transistors.
- Understanding of transformers and magnetically coupled circuits

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Course Objectives:

- To understand and acquire knowledge about various power semiconductor devices.
- To understand the operation, characteristics and performance parameters of controlled rectifiers.

Course Outcomes: On successful completion of this course, students will be able to

1. Compare various power devices with their driver circuits & protection circuits
2. Comprehend the principle operationand models of different types of power electronic converters AC-DC, DC-AC and DC-DC converter systems.
3. Describe the basic principles of HVDC, UPS, motors, etc.

Contents:

UNIT I : **(06 Hours)**

Power devices

Power Diodes: Construction, Switching characteristics; Power BJT, PBJT: Construction, Operation, switching characteristics, Power MOSFET: PMOSFET, Construction, Operation, Static characteristics, switching characteristics, safe Operating Area, IGBT: Construction, Operation, Switching characteristics, Safe operating area.

Thyristor: Construction, Operation, transistor analogy, static characteristics, switching characteristics, thyristor turn-on, thyristor turn-off. DIAC / TRIAC – construction and operating Principle, Applications. GTO: Construction, Operation, Turn off mechanism, Applications, driver, protection and snubber circuits for power devices

UNIT II. **(07 Hours)**

Single phase AC-DC converters

Concept of line commutation, Single phase half controlled and fully controlled converters- Circuit diagram, operation and waveforms for resistive and highly inductive loads, Analysis of output voltage and supply current including following performance parameters: average and RMS output voltage, Fourier series expressions for supply current, power factor improvement, performance factors of line commuted converters, effect of source impedance.

UNIT III **(05 Hours)**

Three phase AC-DC converters

Three phase half controlled and fully controlled converters- Circuit diagram, operation and waveforms for resistive and highly inductive loads, Analysis of output voltage and supply current including following performance parameters: average and RMS output voltage.

UNIT IV **(06 Hours)**

Inverters

Single & Three-phase Inverters:

Circuit diagram, operation & waveforms for single phase full bridge &Push pull inverters. Switching techniques for obtaining square, quasi-square & sinusoidal PWM o/p waveforms. Use of Pulse width modulated IC's for Inverter control. Fourier analysis of quasi-square waveform & harmonic load currents for R& RL loads. Circuit diagram, operation & waveforms for three phase voltage source bridge inverters for 120 degree & 180 degree conduction for balanced star resistive load.

UNIT V. **(06 Hours)**

Switched & resonant DC/DC converters

Control of DC/ DC converters. Circuit diagram, Waveforms & operation (o/p voltage calculation) of step down chopper (Buck converter), Step up chopper (Boost converter) & 2-quadrant type C chopper. Circuit diagram, waveforms, operation & design of Fly back converter (SMPS)

Need for resonant converters:

Circuit diagram, waveforms & operation of SLR half bridge DC/DC converter in low frequency (discontinuous conduction) mode.

UNIT VI **(06 Hours)**

Introduction to Motors and Power converter applications

Motors: DC motors, AC Motors, Special Purpose Motors, Induction Motor, Universal Motor, Stepper Motor, Servomotors etc. (Qualitative analysis only)

Applications: UPS, HVDCtransmission, electronic ballast

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End term Examination

List of Experiments:

1. Study of characteristics of SCR
2. Study of Triggering circuits
3. Study of characteristics of IGBT
4. Study of characteristics of TRIAC
5. Study of single phase half controlled converter
6. Study of single phase fully controlled converter
7. Study of three phase half controlled converter
8. Study of TRIAC based AC motor control
9. Study of three phase VSI inverter
10. Study of first quadrant chopper
11. Study of UPS
12. Study of light dimmer

List of Assignments:

1. Real life applications of inverters.
2. Real life applications of PV cells.
3. Applications of single phase converter.
4. Different types of cyclo converters.
5. Describe AC Voltage regulators.
6. Real life applications of power devices.

Text Books:

1. M. H. Rashid, "Power Electronics Circuits, Devices And Applications", PHI, 3rd Edition, 2004, New Delhi
2. M D Singh & K B Khanchandani, "Power Electronics", TMH, New Delhi
3. P. C. Sen, "Modern Power Electronics", S. Chand & Co., New Delhi

Reference Books:

1. S. Tamil Asgar, "Power Electronics", PHI, 2004, New Delhi
2. N. Mohan, T. M. Undeland& W. P. Robbins, "Power Electronics, Converters Applications And Design", John Willey and sons, 3rd edition, Singapore
3. V. R. Moorthi, "Power Electronics, Devices, Circuits & Industrial Applications", Oxford University Press, New Delhi, 2005.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-V

SUBJECT: - Electromagnetic Engineering

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End semester exam: 60 Marks**
Tutorial: 1 Hour/week	**Continuous Assessment: 40 Marks**
	Credits: 04

CoursePrerequisites:
Fundamentals of integration, differentiations, partial diffraction.

Course Objectives:

- Provide fundamentals of Static Electromagnetic Fields.
- Explain basics of the vector Differential, Integral operators to Electromagnetic theory & Electrostatic & Electromagnetic fields.
- Define and derive different laws in Electrostatic & Electromagnetic fields.
- Explain Maxwell's equations and concepts of transmission lines.
- Analyze techniques for formulating and solving problems in Electrostatic & Electromagnetic fields.
- Develop mathematical skills related with differential, integral and vector calculus.

Course Outcomes: On successful completion of this course, students will be able to

4. Comprehend the fundamentals of Electrostatic and Electromagnetic fields..
5. Apply Gauss' law, Ampere's Law, Biot-Savart law, Faraday's law and laws related with steady magnetic field while solving problems in Electrostatic and Electromagnetic fields.
6. Develop field equations from understanding of Maxwell's Equations.
7. Extend the knowledge of basic properties of transmission lines to analyzeelectromagnetic wave propagation in generic transmission line geometries.
8. Demonstrate mathematical skills related with differential, integral and vector calculus.

Contents:

Unit I

Co-ordinate Systems **(5 Hours)**

Vector Algebra, product of vectors, Co-ordinate systems, Curl, Divergence & Gradient, Stoke's Theorem, Poisson's and Laplace Equations, Coulomb's law, line, Surface & Volume Charge distribution.

Unit II

Electrostatic Fields (7 Hours)

Electric Field Intensity, Electric Field due to infinite line and surface charges, Electric Flux Density, Gauss law (differential and integral form) and its applications, Divergence Theorem, Electric Potential and gradient, Work done, Energy Density, Electric Dipole and moment. Polarization in Dielectrics, Boundary conditions for Dielectric and Dielectric, boundary conditions for Conductor and Dielectric, boundary conditions for Conductor and free space. Method of Images for point and line charge, Capacitance – parallel, co-axial and spherical, Continuity equation.

Unit III

Magnetostatic Fields (6 Hours)

Biot - Savart law, Magnetic Field Intensity due to infinite and finite line. Ampere's Circuital Law in integral and differential form, Applications of Amperes Circuital law, Magnetic flux density, vector magnetic potential, Magnetic Torque, moment and dipole, nature of magnetic material, magnetization, Magnetic boundary conditions

Unit IV

Time Varying Fields& Wave Propagation (7 Hours)

Faradays law of induced emf, displacement current, Maxwell's Equations in point form & Integral form for various fields, Wave equations, wave propagation through different medium, skin depth, Poynting theorem, wave polarization, Reflection of plane wave from conducting medium, perfect dielectric.

Unit V

Transmission Lines (6 Hours)

Physical Description of Transmission line propagation, Transmission Line equations, Characteristic equation of infinite Transmission Line, Complex analysis of sinusoidal waves, Transmission lines equations & their solutions in phasor form, Uniform terminated Transmission Line, Input impedance, Phase velocity and group velocity, Short circuited and open circuited line, Reflection coefficient VSWR, smith chart (Numerical expected) and applications.

Unit VI

Waveguides & Electromagnetic radiation (5 Hours)

Plane wave analysis of parallel-plate waveguide, rectangular waveguides, TE and TM modes, wave impedance, wave velocities, attenuation in waveguide, EMI/EMC concepts, basic radiation principles, Hertzian dipole, magnetic dipole, thin wire antennas, antenna specifications, antenna arrays.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

4. Unit Test
5. Continuous Assessment
6. End term Examination

List of Assignments:

1. Analyze Coulombs law, Gauss Law, Divergence theorem with different problems on Scilab / MATLAB (Refer www.scilab.in-resources/completd book and Hayt& Buck, Engineering Electromagnetics, 7th Edition Tata McGraw-Hill).
2. Analyze Maxwell's equations for different fields on Scilab / MATLAB
3. Experimental study on antenna trainer kit & study different antenna specifications.
4. Analyze experimentally waveguides on Microwave test bench.
5. Analyze uniform plane wave for different media on Scilab / MATLAB
6. Analytical problems on transmission lines.

List of Tutorials: The main objective of this tutorial is to focus on the outcomes defined in the theory syllabus by solving the following problems based on paper work.

1. Find the Electric field intensity and electric flux density at a given point due to following charge distributions. (In all coordinate systems)
    - Point charges
    - Line charges (finite and infinite)
    - Surface charges (finite and infinite)
    - Mixed charges (Point charge, Line charge, Surface charge)
2. Application of Gauss's law
    - Given ρ_v (volume charge density) in a particular region, find $\overline{D}$ (electric flux density) using Law at the given location.
    - Given ρ_S(surface charge density), find $\overline{D}$ (electric flux density) using Gauss's Law at the given location.
    - Given $\overline{D}$ (electric flux density), find total charge enclosed by the surface (Q), ρ_v (volume charge density) using Gauss's Law.(In all coordinate systems).
3. Find the electrostatic fields (Tangential and Normal) at the boundary between,
    - Free space and dielectric medium
    - Free space and conductor
    - Dielectric medium and conductor

- Two dielectric media.
- Two dielectric media when boundary is defined by a equation of plane.

4. Find $\overline{H}$ (Magnetic field intensity) and $\overline{B}$ (Magnetic flux density) at a given point due to,
   - Infinitely long current carrying conductor
   - Finite current carrying conductor
   - Infinite conducting surface
   - Finite conducting surface
   - Different current carrying configurations (i.e. thin conductor, surface all together)
5. For the following current carrying configurations, find the $\overline{H}$ (Magnetic field intensity) in a given region (or point) using Ampere's circuital law.
   - Infinitely long current carrying conductor
   - Infinite cylindrical surfaces of different radii all centered at the same axis.
   - Spherical surfaces of different radii all centered at a given point.
6. Given the (Magnetic field intensity) of a particular region, find current (I), current density (J), enclosed by the given surface. (In all coordinate systems).
7. Given $\overline{H}$ (or $\overline{E}$) and the region properties (like ε, μ, σ etc.), find $\overline{B}$, $\overline{D}$ and $\overline{E}$ (or $\overline{H}$) using Maxwell's equations. (In all coordinate systems).
8. Given the primary constants (R, L, G, C) along with the generator specifications and termination, find secondary constants (α, β, γ, Z_0) and other parameters like Velocity, wavelength, received voltage, received power, reflection coefficient etc.
9. Problems on Transmission Line Analysis.
10. Problems on Impedance matching and design of stub matching using Smith Chart.

Text Books:

1. A. Murthi," Electromagnetic fields", S. Chand.
2. Edminister J.A, "Electromagnetics", Tata McGraw-Hill.

Reference Books:

1. Hayt& Buck, "Engineering Electromagnetics", 7th Edition, Tata McGraw-Hill.
3. Kraus,Fleisch, "Electromagnetics with applications", 5th Edition, McGraw Hill.
4. A. Das & S. K. Das, "Microwave Engineering", 2nd edition, McGraw Hill.
6. Jordan &Balmain, "Electromagnetic waves & radiating systems", 2nd edition, PHI.

B.Tech.(Electronics) Sem-VI

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VI

SUBJECT: - Digital Signal Processing

Teaching Scheme	**Examination Scheme**
Lecture: 4 Hours/week	**End semester exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW& OR: 50 Marks
	Credits: 05

CoursePrerequisites:

- Knowledge of mathematics
- Knowledge of signals and systems

Course Objectives:

- To introduce the concept of discrete Fourier transform.
- To learn the algorithm of fast computation.
- To design the finite impulse response filter & infinite impulse response filter.
- To learn the finite word length effect of filter.
- To understand the architecture & programming of DSP processor.

Course Outcomes: On successful completion of this course, students will be able to

1. Compute the Discrete Fourier transform & Fast Fourier transform.
2. Design FIR and IIR filters.
3. Understand the finite word length effect in digital filters.
4. Implement the various applications on DSP processor.

Contents:

Unit –I **(07 Hours)**

Discrete Fourier Transform:

Definition, periodicity concept, relationship with Z transform and Fourier series, properties, circular convolution, applications like linear filtering, overlap save, overlap add method, frequency analysis etc.

Unit-II **(09 Hours)**

Fast Fourier Transform Algorithm:

Direct computation of D.F.T., its computational complexity, FFT algorithms, their classification, radix 2 FFT algorithms, DIT – FFT, DIF –FFT, Inverse radix 2 algorithms, FFT algorithms for composite value of N, Goertzel algorithm, Chirp Z transform algorithm, Quantization effects, applications.

Unit-III **(08 Hours)**

Design of FIR Filters

Realization of FIR filters,Symmetric and anti symmetric FIR filters, design of linear phase FIR filters using different windows, frequency sampling method, FIR differentiators, Hilbert transformers, and Optimum equiripple linear FIR filters.

Unit-IV **(08 Hours)**

Design of IIR Filters:

Realization of IIR filters, Butterworth and Chebyshev approximations, frequency transformations, design of IIR filters from analog filters using Approximation of derivatives, impulse invariance, Bilinear transform, design of IIR filters from pole zeroplots.

Unit-V **(08 Hours)**

Finite Word Length Effects in Digital Filters

Number representation, fixed point, sign-magnitude, one's complement, two's complement forms, floating point numbers , Quantization, truncation, rounding, effects due to truncation and rounding, Input quantization error, Product quantization error, co-efficient quantization error, zero-input limit cycle oscillations, overflow limit cycle oscillations, scaling, Quantization in Floating Point realization IIR digital filters, finite word length effects in FIR digital filters, quantization effects in the computation of the DFT- quantization errors in FFT algorithms.

Unit-VI **(08 Hours)**

Introduction to DSP Processors

Introduction to fixed point and floating point DSP processor, multiplier and multiplier accumulator (MAC), modified bus structures and memory access schemes in DSPs, multiple access memory, multiport memory, VLIW architecture, pipelining, special addressing modes, on-chip peripherals .

Features of TMS 320C67xx DSP processor, architecture of TMS 320c67xx DSP processor, architecture features: computational units, bus architecture memory, data addressing, address generation unit, program control, program sequencer, pipelining, interrupts, features of external interfacing, Speech Processing: Speech analysis, digital processing of audio signals.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

7. Unit Test
8. Continuous Assessment
9. End term Examination

List of Experiments:

Minimum 10 experiments should be conducted using MATLAB & at least one using hardware.

1. To find DTFS for periodic and DTFT for non periodic signal.
2. To find DFT IDFT of DT signal.
3. To find the response of DT system using convolution.

4. To find the stability of DT system using the concept of convolution.
5. To perform convolution using overlap and add method.
6 To perform circular convolution.
7. To plot pole zero plot of Z-domain using transfer function.
8. To solve the difference equation and find the system response using Z transform.
9. To find the impulse invariance IIR digital filter to realize the first order analog Butterworth filter.
10. To design IIR filter for first order analog Butterworth approximation using bilinear transformation.
11. To find and plot the frequency response for the rectangular and Hamming window.
12. To Design FIR filter using frequency sampling method.
13.To plot spectrogram of speech signal.
14.To implement convolution sum using DSP processor.
15. To implement Speech processing applications using DSP processors.

List of Assignments:

Assignments should be conducted using SCILAB

1.Linear and circular convolution
2.DFT and IDFT
3.FFT& IFFT
4.Realization of filters
5..Design of FIR filter
6.Design of IIR filter

Text Books:

1.Proakis J., Manolakis D., "*Digital Signal Processing*", Pearson Education

References Books:

1. Babu R., "Digital Signal Processing", 4th Edition, Scitech Publications.
2. Salivahanan, Ganpriya and Vallavraj,"Digital signal Processing"Tata McGraw-Hill.
3. Ifeachor, Jervis "Digital Signal Processing ", Pearson Education.
4.Texas Instruments, DSP Manual.
5. B. VenkataRamani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications", Tata McGraw Hill.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B. Tech (Electronics) SEM:-VI

SUBJECT: - Embedded Systems

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End semester exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW& OR: 50 Marks
	Credits: 04

CoursePrerequisites:

- Fundamentals of Computer, Digital Logic Circuits, Computer Organization and Architecture.

Course Objectives:

- To understand need and application of ARM Microcontroller in embedded system.
- To study the architecture of ARM series microcontroller
- To understand architecture and features of typical ARM7& ARM CORTEX-M3 Microcontroller.
- To learn interfacing of real world input and output devices

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Course Outcomes: On successful completion of this course, students will be able to

1. Develop Firmware Embedded Systems.
2. Interface the advanced peripherals to microcontrollers.
3. Design embedded system with available resources.

Contents:

Unit 1:Introduction to Embedded Systems (4 Hours)

Definition of Embedded System, Embedded Systems Vs General Computing Systems, Classification, Characteristics of Embedded Systems, Hardware and Software components of an Embedded System, Introduction to IDEs. Major Application Areas.

Unit 2:Introduction to embedded programming & RTOS (8 Hours)

Introduction to embedded data types in embedded C, addressing memory & I/O, I/O functions of embedded C. Examples on Embedded C.

RTOS:Architecture of kernel, Task and Task scheduler, Interrupt service routines, Semaphores, Mutex, Mailboxes, Message queues, Event registers, Pipes, Signals, Timers, Memory management, Priority inversion problem.

Unit 3:ARM7 Based Microcontroller (8 Hours)

Introduction to ARM processors and its versions: ARM7, ARM9 & ARM11 features, ARM7 data flow model, programmer's model, modes of Operations, Overview of Instruction set.

ARM7 Based Microcontroller LPC2148: Features, Architecture (Block Diagram and Its Description), System Control Block (PLL and VPB divider) , Memory Map, GPIO, Pin Connect Block, timer.

Unit 4: Interfacing with ARM7 (6 Hours)

Interfacing the peripherals with LPC2148: LED, LCD, GLCD, KEYPAD, GSM and GPS using UART, on-chip ADC using interrupt (VIC), EEPROM using I2C, SDCARD using SPI, on-chip DAC for waveform generation.

Unit 5:ARM CORTEX Processors (6 Hours)

Introduction to ARM CORTEX series, improvement over classical series. CORTEX A, CORTEX M, CORTEX R processors series, versions, features and applications.

ARM-CM3 Based Microcontroller LPC1768: Features, Architecture (Block Diagram & Its Description), System Control, Clock & Power Control, GPIO and Pin Connect Block.

Unit 6:Interfacing with ARM CORTEX M3 (4 Hours)

Interfacing peripherals with LPC1768: RGB LED, Seven Segment, TFT Display, Motor control using PWM.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

3. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
4. End term Examination

List of Experiments: Minimum 8 experiments should be conducted.

1. Interfacing LPC2148 with LCD/GLCD
2. UART Interfacing LPC2148 in embedded system (GSM/GPS)
3. Interfacing LPC2148 for internal ADC on interrupt basis
4. Interfacing SD card with LPC2148
5. Interfacing EEPROM with LPC2148 using SPI protocol
6. SRAM interfacing with LPC2148/LPC1768.
7. Interfacing LPC1768 to Seven Segment / RGB LED
8. Generation of PWM signal for motor control using LPC1768
9. Interfacing TFT display to LPC1768
10. Implementing CAN protocol using LPC1768
11. Implementing ETHERNET protocol using LPC1768.
12. Semaphore as signaling and synchronizing in ARM7.
13. Mailbox implementation for message passing in ARM7.

List of Assignments:

1. Case study of any one of the latest ARM processors and Power point presentation of the same in class.
2. Survey of CORTEX M3 based controllers, its features and comparison.

3. Design of Firmware Embedded system using LPC 2148 (Simulation only).
4. Design of Firmware Embedded system using LLPC1768 (Simulation only).
5. Case study of any one of the RTOS with examples.

Text Books:

1. Rajkamal, "Embedded system-Architecture, Programming and Design", TMH Publications, Edition 2003.
2. Andrew Sloss, Dominic Symes, Chris Wright, "ARM System Developers Guide –Designing and Optimizing System Software", ELSEVIER.
3. Joseph Yiu, "The Definitive Guide to the ARM Cortex-M", Newness, ELSEVIER.

Reference Books:

1. LPC 214x User manual (UM10139) :- www.nxp.
2. LPC 17xx User manual (UM10360) :- www.nxp.com
3. ARM architecture reference manual : - www.arm.com
4. Trevor Martin, "An Engineer's Introduction to the LPC2100 series", Hitex (UK) Ltd.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:-VI
SUBJECT: - VLSI Design

Teaching Scheme
Lecture: 3 Hours/week
Practical: 2 Hours/week

Examination Scheme
End semester exam: 60 Marks
Continuous Assessment: 40 Marks
TW& PR: 50 Marks
Credits: 04

CoursePrerequisites:

- Analog Electronics
- Digital Electronics

Course Objectives:

- To introduce the VLSI Design Flow and design styles
- To introduce the VHDL Hardware Description Language (HDL) that shall help in describing a circuit to the tools for simulation and further processing of the same towards implementation.
- To introduce MOSFET physics and CMOS logic gates.

Course Outcomes: On successful completion of this course, students will be able to

1. Design and simulate digital system using structural, Behavioral, dataflow or mixed style of Modeling.
2. Apply concepts of Finite State Machine On sequential circuits.
3. Realize digital hardware system utilizing PLDs.
4. Identify MOSFET Physics and CMOS structures.
5. Implement CMOS combinational logic Design.

Contents:

UNIT I: (07 Hours)

HDL Modeling and Design Flow

Introduction to VLSI design flow (with reference to an EDA tool), sequential, data flow and structural modeling, functions, procedures, attributes, test benches, synthesizable and non synthesizable statements, packages and configurations, VHDL modeling.

UNIT II: (05 Hours)

FSM and sequential logic Principles

Sequential circuits, Meta stability synchronization, design of finite state machines and state minimization, Modeling of FSM-Mealy and Moore machines, FSM case studies- traffic light control, lift control, UART.

UNIT III: (05 Hours)

Programmable logic devices

CPLD: Introduction, study of architecture. FPGA: Introduction, study of architecture, PLAs, PALs, function implementation using PLDs.

UNIT IV: (07 Hours)

MOS Device Physics

MOSFET structure, MOS I/V characteristics, body effect, Scaling of MOS circuits, MOSFET capacitances, MOS small signal model, MOS amplifiers.

UNIT V: (06 Hours)

CMOS VLSI

CMOS parasites, equivalent circuit, CMOS inverter characteristics, power dissipation, power delay product, Layout design rules, introduction to CMOS layout, CMOS logic structures, concept of regularity, modularity and locality.

UNIT VI: (06 Hours)

CMOS Logic Circuits:

CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using CMOS gates , W/L calculations of CMOS, CMOS transmission gates, Designing with Transmission gates.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End term Examination

List of Experiments:

1. To model 8:1mux, 1:8 demux, 3:8line decoder, 8:3 encoder using VHDL
2. To model adder and subtractor
3. To model synchronous and asynchronous D FF
4. To model 4- bit universal shift register
5. To model 4-bit counter
6. To model bidirectional buffer
7. To model parity generator and checker
8. Study of RAM/FIFO
9. Study of Temperature sensing using ADC
10. Study of real time moving generator chip CMOS

List of Assignments:

1. Simulate TLC
2. Simulate UART
3. Simulate LIFT controller
4. Design Barrel shifter.
5. Design a Mealy and Moore Sequence Detector
6. Real life applications of FPGA/CPLD

Text Books:

1. Neil IL E. Weste and Kamran Eshraghain,"Principles of CMOS VLSI Deign", Pearson Education Publication.
2. Wayne Wolf, “Modern VLSI Design", Prentice Hall Publication.
3. J.Bhaskar”A VHDL primer” Pearson Education Publication.
4. BehzadRazavi,“Design of Analog CMOS Integrated Circuits”, Tata McGraw Hill

Reference Books:

1. John Walkerly,"Digital Design Principles and Practices",Prentice Hall Publication
2. Douglas Perry,"VHDL", Pearson Education Publication.
3. Charles Roth, "Digital System Design using VHDL", Tata McCraw Hill.
4. Wayne Wolf," FPCA Based System Design", Prentice Hall
6. Ken Martin, “Digital Integrated Circuit Design”, Oxford University Press, 2011.
7. Sung-Mo Kang, Yusuf Leblebici, “CMOS Digital Integrated Circuits Analysis and Design”, TMH, 3rd Ed., 2011.
8. ParthPratimSahu, “VLSI Design”, McCraw Hill Education Pvt. Ltd.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VI

SUBJECT: - Project Management & Finance

Teaching Scheme
Lecture: 3 Hours/week

Examination Scheme
End semester exam: 60 Marks
Continuous Assessment: 40 Marks
Credits: 03

Course Prerequisite:

- Understanding the various forms of Math, Economics and Statistics.

Course Objectives:

- To understand basic principles/concepts of project management and finance.
- To describe the most well-known theories and perspectives on project managements.

Course Outcomes: At the end of the course, a student will be able to

1. Describes the Characteristics, objectives and Stages of Project management.
2. Explain importance of time and work estimation in Project management.
3. Analyze Management Concepts for Developing Project Plan.
4. Analyze and Understand Financial & Project Management.
5. Demonstrate Scope, Objectives and Importance of Financial Management.
6. Identify and understand the main responsibilities and tasks of Securities and Exchange Board of India (SEBI) in money market and capital Market.

Unit -I **(06 Hours)**

Introduction to Project management:

Characteristics of projects, Definition and objectives of Project Management, Stages of Project Management, Project Planning Process, Establishing Project organization.

Unit –II **(06 Hours)**

Work Definition:

Defining work content, Time Estimation Method, Project Cost Estimation and budgeting, Project Documentation Introduction to CMM, Project Risk Management, Project scheduling and Planning Tools: Work Breakdown structure, LRC, Gantt charts, ,CPM/PERT Networks

Unit-III **(06 Hours)**

Management Concepts:

Developing Project Plan (Baseline) , Project cash flow analysis, Project scheduling with resource constraints: Resource Levelling and Resource Allocation. Time Cost Trade off: Crashing Heuristic.

Unit-IV **(06 Hours)**

Project Implementation:

Project Monitoring and Control with PERT/Cost, Computers applications in Project Management, Contract Management, Project Procurement Management.

Unit-V **(06 Hours)**

Financial Management:

Introduction of Finance, Types of Finance, Financial Management, Scope & Objectives of Financial Management, function of finance manager, Importance of Financial Management, Sources of finance, Security Finance.

Unit-VI **(06 Hours)**

Working Capital Management:

Capital Structure, Fixed & working capital, Role of Securities and Exchange Board of India (SEBI), function of money market and capital Market, sources of finance. Introduction to capital budgeting, Techniques of capital budgeting. Break even analysis - assumptions, importance, Cost-Benefit analysis, CVP graph.

List of Assignments:

1. Explain the nature and purpose of financial management
2. Discuss the relationship between financial objectives, corporate objectives and corporate strategy.
3. Identify the nature and role of money and capital markets, both nationally and internationally.
4. Write in brief on Concepts & Importance of organization.
5. Critically evaluate various approaches to the financial management
6. Explain the functions of a stock market and a corporate bond market..

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books:

1.Shtub, Bard and Globerson, "Project Management: Engineering, Technology, and Implementation", Prentice Hall, India

2. C. Paramasivan and T. Subramanian, "Financial Management", New age international publishers.

3. John M Nicholas, “Project Management for Business and Technology: Principles and Practice”, Prentice Hall, India, 2002.
4. Cleland and King, “VNR Project Management Handbook”.
5.Wiest and Levy, “Management guide to PERT/CPM”, Prentice Hall. India.

Reference Books:

1.HoraldKerzner, “Project Management: A Systemic Approach to Planning, Scheduling and Controlling”, CBS Publishers, 2002.
2. S. Choudhury, “ Project Scheduling and Monitoring in Practice”.
3. P. K. Joy, “Total Project Management: The Indian Context”, Macmillan India Ltd.

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VI

SUBJECT: - Electronics Circuit Design

Teaching Scheme	**Examination Scheme**
Lecture: 4 Hours/week	**End semester exam: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment: 40 Marks**
	TW& OR: 50 Marks
	Credits: 05

Course Prerequisites:

- Knowledge of basic electronics components and its functions.
- Knowledge of rectifiers, amplifiers, filters etc.
- Knowledge of basic Data acquisition systems.

Course Objectives:

- To introduce the basic concepts needed for Circuit design.
- To introduce the techniques such as signal amplification, filtering, audio power amplification etc
- To emphasize the understanding and practical implementations of the electronics circuits.

Course Outcomes: At the end of the course, a student will be able to

1. Choose proper electronic component for designing circuits.
2. Design basic electronics circuits like rectifiers, filters, voltage regulators, amplifiers, etc.
3. Distinguish between linear power supply and SMPS.
4. Implement Data Acquisition Systems.

Contents:

Unit-I

Electronic Components Selection: (08 Hours)

Passive and active components, types of resistors, capacitors and Inductors. Transformers types: power transformer, audio frequency transformer and intermediate frequency transformer. Integrated Circuits (ICs), wire/cable selection, shielding and grounding techniques.

Unit-II

Design of Analog Filter: (08 Hours)

Low pass filter and high pass filter. Design of Inductor Filter, Capacitor filter, LC- filter, RC- Filter and π section Filter.

Unit-III

Design of Linear power supply: (08 Hours) Block Schematic, Types of voltage regulators, Design of Zener diode shunt regulator , Transistor shunt regulator and transistor series voltage regulator. Short circuit protection, fold back current limiting. Discrete components & IC based design for linear power supply e.g. Three terminal regulators (LM317,LM78XX).

Unit-IV (08 Hours)

Switched Mode Power Supply:

Topology of SMPS. Comparison between Linear Power Supply and SMPS. IC based design for switch mode power supply with latest SMPS ICs.

Unit-V

Design of Data Acquisition System: (08 Hours)

Circuit level design of DAS, Design should include signal sensing, isolation, and signal conditioning ADC storage & display systems.

Unit-VI (08 Hours)

Audio Power Amplifier:

Design of Audio Power Amplifier: Design using ICs like TBA810, Design of signal conditioner, Design of pre amplifier, Design should include various controls, Parameters optimization & protection circuits.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

10. Unit Test
11. Continuous Assessment
12. End term Examination.

Mini Project & Assignments:

Mini-project should be from small systems required in laboratory or real life, project to be designed, tested on bread board, fabricated on manual or CAD based PCBs with due consideration to mechanical aspects for enclosure & control panel design. Complete documentation in the form of project report is to be submitted. Due consideration should be given to Mini Project while assessing students for term work.

Five assignments must be completed. Out of five assignments four should be corresponding to complete design of analog and digital system. Fifth assignment should be corresponding to the software simulation of system.

Use of softwares like MULTISIM / PROTEUSis expected.

List of Assignments:

1. Design of low pass filter.
2. Design of linear power supply using discrete components.
3. SMPS Topology.
4. Data acquisition system.
5. Design of audio power amplifier.

Text Books:

1. P.M.Chirlial, "Analysis & Design of Integrated Electronic Circuits", Wiley Eastern.
2. Hayt&Nudeck, "Electronic Circuit Analysis & Design ", Jaico Publishing House.
3. Horowitz Paul & Winfield Hill, "Art of Electronics", Cambridge University Press 2nd Edition 1989.
4. B.S.Sonde, "Introduction to system Design Using Integrated Circuits", Wiley Eastern-2nd Edition.
5. M.M.Shah, "Design of Electronic Circuits & Computer Aided Design", Wiley Eastern.

Reference Books:

1. Sergio Franco, "Design with Operational amplifiers and analog Integrated circuits", 3rd edition, TMH.
2. Franklin P. Prosser, David E. Winkel, "The Art of Digital Design", PHI.
3. Gotlib, "Power Supply Design", PHI

B.Tech.(Electronics) Sem-VII

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VII

SUBJECT: - Computer Networks

Teaching Scheme	**Examination Scheme**
Lecture: 03 Hours/week	**End Semester Exam: 60 marks**
Practical: 02 Hours/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW& OR: 50 marks
	Credits: 04

Course Prerequisites:
Analog communication, Digital communication systems.

Course Objectives:

1. To introduce various topologies and types of computer networks.
2. To introduce network hardware & OSI layers.
3. To know how of congestion control mechanism.
4. To familiarize the TCP/IP protocol.

Course Outcomes: On successful completion of this course, students will be able to

1. Identify the types of computer networks and topologies.
2. Identify the functions of network connectors, Hubs, Switches, Routers, Bridges, NIC & network layers.
3. Implement various algorithms used in computer networks.
4. Use TCP/IP protocol.
5. Apply the various Network security techniques.

Contents:

Unit I **[06 Hours]**

Introduction to computer networks

Networks definition & requirements, Networks topologies, Types of networks, network software issues, reference models- OSI TCP/IP and Hybrid.

Unit II **[06 Hours]**

Physical layer

Transmission media Guided media-twisted pair, coaxial cable, optical fiber, unguided media-RF allocation, terrestrial microwave, satellite communication, cellular telephone, EIA 232 D interface standard, modem-types, block schematic & standards network device: network connectors, Hubs, Switches, Routers, Bridges, NIC, Fast Ethernet, Gigabit Ethernet.

Unit III **[06 Hours]**

Data Link Layer

Design issues, error detection and correction, elementary data link protocols, sliding window protocols, HDLC-types of stations, modes of operation, HDLC frame formats, additional features, Medium access sub layer – channel allocation problem, multiple access protocols, IEEE 802 standards for LANS & WANS.

Unit IV **[06 Hours]**

Network Layer

Design issues, Routing algorithms – shortest path, distance vector routing, link state routing, flow based routing, routing for mobile hosts, Congestion control – congestion prevention policies-leaky bucket algorithm, token bucket algorithm, congestion control in virtual circuit subnet and choke packets, RSVP.

Unit V **[06 Hours]**

TCP/IP Protocol suit overview

TCP/IP and internet, IP protocol and it's header format, addressing, subnetting, other networks layer protocol – ARP, RARP, ICMP, IGMP, TCP, UDP, DHCP, Domain name system (DNS), Email, HTTP, IPV 6.

Unit VI **[06 Hours]**

Network security

Cryptography Algorithms and Trust Models, Ciphers vs Codes, Symmetric-key algorithms (DES, AES), Public- key algorithms – RSA, Digital signatures, IPSec, Firewall, Managements of publics keys, communications security, Authentication Protocols.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Experiments

1. Study of Networking.
2. Introductions to Network Simulation.
3. Study of LAN.
4. Study of Installation of Widows 2003 Server & introduction to DHCP.
5. i)Character transfer using Simplex method
   ii) Character transfer using Full-Duplex method
6. Simulation and implementation of bit stuffing Simulation and implementation of CRC
7. Study of Medium Access sub layer protocols and simulate using Network Simulator.
8. Simulation and implementation of
   i) Stop-and Wait protocol
   ii) Go-Back-N protocol
   iii) Selective repeat Protocol
9. Simulation and implementation of i) Distance Vector Routing Algorithm ii)Link State Routing algorithm
10. Study of Token Bucket Algorithm.
11. Study of TCP/IP Protocol Suite and Simulation Address resolution protocols.

List of Assignments:

1. Study of types of Networks and topologies.
2. Study of Network Hardware.
3. Study of TCP/IP Architecture
4. Study of Physical Layer
5. Study of Data Link Layer.
6. Describe the various Encoding techniques.
7. Study of Network Layer.
8. Study of Congestion control Mechanism.
9. Study of Session layer.
10. Study of Presentation layer.
11. Study of Application layer.
12. Study of Network security Mechanism.

Text Books

1. Andrew Tanenbaum, “Computer networks”, Prentice Hall.
2. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition

References

1. S. Keshav, “An Engineering Approach to Computer Networking” , Pearson Education
2. J.F. Kurose and K. W. Ross, “Computer Networking – A top down approach featuring the Internet”, Pearson Education, 5th Edition
3. D. Comer, “Computer Networks and Internet/TCP-IP”, Prentice Hall
4. William Stallings, “Data and computer communications”, Prentice Hall
5. L. Peterson and B. Davie, “Computer Networks – A Systems Approach” Elsevier Morgan Kaufmann Publisher, 5 th Edition.
6. T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B. Tech (Electronics) Sem: -VII

SUBJECT: - Programmable Logic Controllers and Applications

Teaching Scheme	**Examination Scheme**
Lecture: 03 Hours/week	**End semester Exam: 60 marks**
Practical: 02 Hours/week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignments: 10 marks
	TW &Pr: 50 marks
	Credits: 04

Course prerequisites:

Digital Electronics, Embedded systems, Power Electronics

Course objective:

1. To make the student aware of automation in industries.
2. To introduce the student to the programmable logic controllers.
3. To give the know-how of NC, CNC machines & their role in manufacturing industries.
4. To impart the knowledge of protocols & networking of PLCs

Course Outcomes: On successful completion of this course, students will be able to

1. Write the ladder logic for applications using logical & mathematical instructions.
2. Write the ladder logic for applications using program & data flow instructions.
3. Interface digital & analog input/output to the PLC
4. Identify NC, CNC machines and networking of PLCs.
5. Identify the components of SCADA and HMI.

Contents

Unit I

Process Control & Automation **[06 Hours]**

Definition of Process control, PID Controller, Cascade control, Analog control, Digital control, Types of Automation, Advantages and limitations of Automation, controllers & actuators. Introduction to PLC, architecture, working of PLC, functions of PLC, selection of PLC, ladder programming

Unit II

Transmitters and Signal Conditioning [06 Hours]

Need of transmitters,2-Wire & 3-Wire transmitters, Standardization of signals, Current, Voltage and Pneumatic signal standards, Necessity of Analog input, output interface to PLC. Analog and Digital signal conditioning for various parameters, Smart and Intelligent transmitters.

Unit III

Input and Output modules [06 Hours]

Various functions of PLC like mathematical, logical, dataflow, special functions. Interfacing of Input and Output devices with PLC. Sourcing & sinking, Classification of input & output modules,discrete & analog modules.

Unit IV

PLC and Human Machine Interface (HMI) [06Hours]

PLC based automated systems. High frequency inputs. PLC programming standard IEC61131, Soft PLC techniques. IT Interfaces required: for ERP, MIS, MES. Supporting Applications interfaces: RFID, Barcode, Vision Systems. HMI: Block Diagram, Types, Advantages, Applications.

Unit V

SCADA & Distributed control system [06Hours]

Elements of SCADA, Features of SCADA, MTU- functions of MTU, RTU- Functions of RTU, Applications of SCADA, Communications in SCADA- types & methods used, Introduction to DCS, Architecture of DCS, Input and output modules, communication module, Specifications of DCS

Unit VI

Automation and CNC (Computer Numeric Control) Machines [06 Hours]

Introduction of NC and CNC Machines: Need of CNC machines, Applications of CNC machines in manufacturing, Advantages of CNC machines.

Networking of PLCs - Network topology, industrial network, bus network, Device bus network, Process bus network, Modbus protocol Device net, Controlnet, AS-I interface, Foundation field bus, Profibus

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Practicals:

1. Application examples based on timers & counters.
2. Design & implement ON-OFF controller circuit
3. Application examples based on data flow instructions.
4. Application examples based on mathematical instructions.
5. Application examples using One shot rising instruction.
6. Application examples using advanced instructions.
7. Examples based on Industrial application s
8. Interfacing of analog inputs to PLC.

List of Assignments:

1. Conduct survey for different types of PLC programming.
2. Selection of PLC for a application with specifications.
3. Classify the timers & Counters with applications.
4. Design of signal conditioning circuit for any one analog application.
5. Identify sinking & sourcing PLC input output module.
6. Interface switch & sensor to PLC as input.
7. Communication between PLC HMI using Modbus protocol
8. Identify the applications of soft PLC.
9. Study of DCS in any industrial plant.
10. Practical examples where SCADA has played important role.
11. Identify different types of CNC machines (with applications) in industries.
12. Justify the need of networking of PLCs.

Text Books:

1. John W. Webb, Ronold A Reis, "Programmable Logic Controllers, Principles and Applications"; 5th Edition, Prentice Hall of India Pvt. Ltd

2. MadhuchhandaMitra, SamarjitSen Gupta, "Programmable Logic controllers and Industrial Automation"; Penram International Publishing India Pvt. Ltd

Reference Books:

1. Curtis Johnson, "Process Control Instrumentation Technology"; 8th Edition, PearsonEducation

2. Kilian, "Modern control technology: components & systems, Delmar 2nd edition.

3. Bela G Liptak, Process software and digital networks, 3rd edition, 2002.

4. Pollack. Herman, W & Robinson., T. “Computer Numerical Control”, Prentice Hall. NJ.

5. Pabla, B.S. &Adithan, M. “CNC Machines”, New Age Publishers, New Delhi

6. Stuart A. Boyer, SCADA supervisory control and data acquisition, ISA Publication

Reference Books

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B. Tech (Electronics) Sem: -VII

SUBJECT: - Electronic System Design

Teaching Scheme	**Examination Scheme**
Lecture: 03 Hours/week	**End semester Exam: 60 marks**
Practical: 00Hours/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignments: 10 marks
	Credits: 03

Course Pre-requisites:

Analog Electronics, Digital Electronics, Microprocessors & Microcontrollers, VLSI Design.

Course Objectives:

1. To introduce analog and digital interfacing techniques
2. To create awareness of EDA tools and techniques for testing and fault diagnosis
3. To imbibe the importance of international standards for electronic systems and packaging techniques
4. To enable the students to design electronic systems compliant with EMI specifications

Course Outcomes: On successful completion of this course, students will be able to

1. Address interfacing issues in analog and digital circuits.
2. Use EDA tools and Laboratory Instruments for testing and fault diagnosis.
3. Identify various international standards, specifications for electronic systems.
4. Use grounding and shielding techniques for safety in electronic systems and PCB designing.

Contents:

Unit I

Hardware Design- Analog **[06 Hours]**

Analog Signal Conditioning: Factors affecting choice of Op-Amps in signal conditioning, applications, Need for Instrumentation Amplifiers- Case study. Error budget analysis with Case study. ADCs: Interpretation of ADC specifications from design view point, considerations in selecting references (Vref for ADC). DACs: Interpretation of DAC specifications.

Unit II

Hardware Design- Digital **[06 Hours]**

Interface examples for LED, HB LED, LCD, Keyboard, Relays (Electromagnetic and Solid State). Microcontrollers: Comparative study of different Microcontroller architectures,
Factors affecting choice of Microcontroller for different applications with case study.
Introduction to buses and protocols used in Electronic products- I2C, SPI, CAN, Lin, Flexray.

Unit III

EDA Tools and Standards **[06 Hours]**

Different approaches to development of application software for Electronic Product. Debugging tools and techniques for software- Features of EDA, CAD, Simulators, Assemblers, ICE, and IDE. Documentation practices and templates for above software. Introduction to various international s standards like IEEE, FCC, IEC, BS & ISO standards.

Unit IV

Testing and Fault Diagnosis **[06 Hours]**

Analyses- DC/ Operating Point Analysis, AC (Frequency Response), Transient, Sensitivity, Monte Carlo. Debugging/ Fault finding- Features and limitations of Analog CRO, DSO, Logic Analyzer and Mixed Signal Oscilloscopes in finding hardware/software faults.

Unit V

ESD and Packaging **[06 Hours]**

Packaging & Enclosures of Electronic System: Need for Environmental Testing, Effect of environmental factors on electronic systems: Temperature, Humidity, Vibration and Shock tests, nature of environment and safety measures. Packaging's influence and its factors.Cooling in/of Electronic System: Heat transfer, approach to thermal management, mechanisms for cooling, operating range, basic thermal calculations, cooling choices, heat sink selection.

Unit VI

PCB Design and EMC **[06 Hours]**

PCB Design practices for Analog and Mixed signal circuits, High speed digital circuits, Precision circuits, Grounding of Electronic Systems: Safety grounds, signal grounds, single-point ground systems, multipoint-point ground systems, hybrid grounds, functional ground layout, practical low frequency grounding, hardware grounds, grounding of cable shields, ground loops, shield grounding at high frequencies.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Assignments:

1. State factors affecting choice of Op-Amps in signal conditioning.
2. State the need for Instrumentation Amplifier with an example.
3. State the need for signal conditioning circuits with an example
4. State selection criteria of Microcontroller for application with case study of one application.
5. Explain in details the I2C protocol for interfacing peripherals
6. Explain in details the SPI protocol for interfacing peripherals
7. Explain following International standards in detail
    a. IEEE standards.
    b. FCC standards.
    c. IEC standards.
    d. BS standards.
    e. ISO standards.
8. List the different Layout design & Tools available in market and write the specifications in detail.
9. State need for Environmental Testing. Temperature, Humidity, Vibration and Shock tests etc.
10. State the need of Cooling in an Electronic system.
11. Explain the PCB design practices for Analog and Mixed signal circuits, High speed digital circuits, Precision circuits.
12. State the need for Grounding of Electronic Systems.

Text Books

1. Bernhard E. Bürdek, "History, Theory and Practice of Product Design", SpringerScience, 2005
2. Paul Horowitz, "Art of Electronics", Cambridge University Press.

Reference Books

1. Howard Johnson, Martin Graham, "High-speed Digital design- A Handbook of Black Magic", Prentice Hall Publication.
2. G. Pahl and W. Beitz J. Feldhusen and K.-H. Grote, "Engineering Design – A Systematic Approach", Springer,2007.

3. Tim Williams, “EMC for Product Designers”, Elsevier, Fourth edition 2007.
4. Jerry C Whitaker, “The Electronics Handbook”, CRC Press, IEEE Press, ISBN 08493-8345-5.
5. David Bailey, “Practical Radio Engineering and Telemetry for Industry”, Elsevier ISBN 07506 58037.
6. Pressman, “Software Engineering - A Practitioner's Approach”.
7. W.Bosshart“Printed Circuit Boards - Design & Technology”, 1st edition, Tata McGraw Hill.
8. G. Pahl and W. Beitz J. Feldhusen and K.-H. Grote, “Engineering Design – A Systematic Approach”, Springer, 2007.
9. John G. Webster, “Measurement, Instrumentation, and Sensors Handbook”, CRC Press, 1999.
10. Peter Wilson, “The Circuit Designer’s Companion”, Elsevier Ltd, 2012

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B.Tech (Electronics) Sem: - VII

SUBJECT: - Advanced Communication System

Teaching Scheme

Lectures: 02 Hours/week

Practical: 00Hours/week

Examination scheme

End Semester Exam:60 Marks

Unit Test: 20 marks

Attendance: 10 marks

Assignment: 10 marks

Credits: 02

Course Prerequisite:

Analog Communication, Digital Communication Systems

Course Objectives:

1. To introduce radar & satellite communication system with its working principle and implementation techniques.
2. To enable student to integrate communication technologies in multidisciplinary applications.
3. To make the student aware of advanced communication techniques.

Course Outcomes: On successful completion of this course, students will be able to

1. Compare radio frequency and microwave frequency communication with respect to its working principle and its applications.
2. Describe satellite subsystem and analyze link budget for satellite.
3. Identify the fundamentals of orbital mechanics, the characteristics of common orbits used in satellite communications
4. Explore the concept of cognitive radio communication.
5. Apply different modulation techniques and access techniques for wireless communications.

Contents:

Unit I **[04 Hours]**

Introduction to microwave techniques

Introduction to microwave fundamentals, microwave frequencies and microwave devices, microwave transmission lines- reflection coefficient and transmission coefficient, standing waves , wave guides, rectangular wave guides, TE mode wave, power transmission in wave guide, power losses, excitation of modes in wave guide

Unit II **[04 Hours]**

Satellite communication

Basic transmission theory, system noise temperature and G/T ratio, orbital mechanics, look angle determination, satellite subsystem.

Unit III **[04 Hours]**

Satellite link design

Design of downlink, link budget, design of uplink, modulation techniques, multiplex techniques, earth station, application overview-Radio and satellite navigation, GPS position location.

Unit IV **[04 Hours]**

Radar

Radar fundamentals, radar principle, radar range equation, types of radar pulsed radar system, MTI, radar beacons, FMCW radar, Doppler radar, phased array radar, plane array radar.

Unit V **[04 Hours]**

Cognitive radio

Cognitive Radio Architecture, Dynamic Access Spectrum, Spectrum Efficiency, Spectrum Efficiency gain in SDR and CR, Spectrum Usage, OFDM as PHY layer , OFDM Modulator, OFDM Demodulator

Unit VI **[04 Hours]**

Mobile Communication

Mobile telephone service, Transmission protocols, Introduction to GSM, GPRS, CDMA switching techniques, Quality of service (QOS).

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Assignments:

1. Study of microwave components and equipments
2. Study of measurement of microwave frequency
3. Simulation of microwave building blocks
4. Study of Radar communication
5. Study of Satellite communication
6. Simulation of radar building blocks
7. Simulation of satellite communications building blocks

8. Visit to Mobile Telephone Switching Office (MTSO).
9. Compare GSM, GPRS and CDMA switching techniques.
10. Explain in detail the concept of cognitive radio
11. Analysis of 3G and 4G systems using any appropriate simulation tool.
12. Study of Transmission of Audio signal over satellite link.

Text books:

1. M.L. Sisodia , "Microwave and Radar Engineering" 1st Edition, New Age International Publisher.
2. Timothy Pratt, "Satellite Communication", 2nd Edition, Wiley India Pvt. Limited.

Reference Books:

1. Liao Samuel Y, "Microwave Devices and Circuits", Prentice Hall Publisher.
2. Andreas Molisch, "Wireless Communications", Wiley IEEE Press.
3. Mischa Schwartz, "Mobile Wireless Communications", Cambridge University Press.
4. Peter A. Rizzi, "Fundamentals of Microwave Engineering", Prentice hall of India.
5. Louis E. Frenzel , "Communication Electronics principle and application", 3rd Edition; Tata McGraw Hill

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VII

SUBJECT: - Elective-I Mobile and Broadband Communication

Teaching Scheme

Lecture: 3 Hours/week

Tutorial: 01 Hour/week

Examination scheme

End semester Exam: 60 Marks

Unit Test: 20 marks

Attendance: 10 marks

Assignment: 10 marks

TW & OR: 50 marks

Credits: 04

Course Prerequisites:

Analog Communication, Digital Communication

Course Objectives:

1. To make students familiar with fundamentals of mobile communication systems
2. To make students familiar with GSM and CDMA technologies.
3. To make students familiar with B-ISDN, services of B-ISDN, ATM networks.

Course Outcomes: On successful completion of this course, students will be able to

1. Develop mobile communication systems (cellular theory) and the characteristics of different multiple access techniques in mobile communication
2. Analyze the different inter-networking challenges and solutions in wireless mobile Networks and Transport Layers.
3. Develop applications that are mobile-device specific and demonstrate current practice in mobile communication contexts.

Contents:

Unit I

Mobile and Personal Communication **[05 Hours]**

Past, Present, and Future, The Cellular Concept, Multiple Access Technologies for Cellular System, Cellular System Operation and Planning: General Principles, Initial Implementations of the Cellular Concept: Analog Cellular Systems

Unit II

Digital Cellular Mobile Systems **[07 Hours]**

GSM Standardization and Service Aspects, GSM Reference Architecture and Function Partitioning, GSM Radio Aspects, Security Aspects, GSM Protocol Model, IS-95: The North American CDMA Digital Cellular Standard, Introduction, Service Aspects, Network Reference Model and Security Aspects, 4G Systems: Introduction to OFDM and MC-CDMA

Unit III

Mobile Network & Transport Layer **[06 Hours]**

Mobile IP, DHCP (Dynamic Host Control Protocol), Mobile adhoc networks, Mobile Transport Layer, Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and Selective retransmission and recovery, Transaction oriented TCP, TCP over 2.5/3G wireless networks, Support for Mobility, File systems, Wireless application protocol, i-mode, SyncML, WAP 2.0.

Unit IV

ISDN **[05 Hours]**

Switching Techniques, Principles of ISDN, Architecture, ISDN standards, I-series Recommendations, Transmission structure, User network interface, ISDN protocol architecture, ISDN connections, Addressing, Interworking,

Unit V

B-ISDN architecture and standards, B-ISDN Services **[06 Hours]**

Conversational, Messaging, Retrieval, Distribution, Business and Residential requirements, B-ISDN protocols, User plane, Control plane, Physical layer, Line coding, Transmission structure, SONET Requirement, Signal Hierarchy, System Hierarchy.

Unit VI

ATM **[07 Hours]**

Overview, Virtual channels, Virtual paths, VP and VC switching, ATM cells, Header format, Generic flow control, Header error control, Transmission of ATM cells, Adaptation layer, AAL services and protocols, ATM switching, ATM cell processing in a switch, Matrix type switch, Input, Output buffering, Central buffering, ATM Traffic and congestion Control, Requirements for ATM Traffic and Congestion Control, Cell-Delay Variation, ATM Service Categories.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Tutorials/Experiments:

1. Analyze Cellular Concept & cellular hierarchy.
2. Study of Cellular system operation & planning.
3. Analyze GSM architecture & GSM service aspects.
4. Study of CDMA Digital cellular standards.
5. Study of design principles of Mobile IP, mobile transport layer.
6. Analyze and study of architecture of ISDN standards and addressing.
7. Study of B-ISDN Protocols.
8. Analyze design principles of ATM cells, AAL services, protocols and ATM switching.

List of Assignments:

1. Visit mobile station/telephone switching & prepare visit report.
2. To carryout telephone signal switching system using EPBX trainer.
3. To carry out AT commands mobile communication using GSM trainer.
4. To transfer data between two computers using ISDN terminal adapter modem.
5. To understand CDMA trainer using DSSS technology.
6. Analyze digital & analog cellular systems.
7. To study Mobile IP & Mobile Transport Layer
8. Analyze ISDN protocol architecture, ISDN connections, Addressing, Interworking.
9. To study B-ISDN protocols, User plane, Control plane, Physical layer & Line coding.

10. Analyze handoff management in mobile communication by virtual lab.
11. To study AAL services and protocols and ATM switching.
12. Analyze ATM Traffic and congestion Control.

Text Books:

1.Jochen Schiller, Mobile Communications, Pearson Education,2nd Edition.
2.Raj Pandya, Mobile and personal communication Systems and Services, Prentice Hall of India.
3. William Stallings, ISDN and Broadband ISDN with Frame Relay and ATM, Prentice-Hall, 4th Edition.

Reference Books:

1. William C.Y. Lee, Mobile Cellular Telecommunications- Analog & Digital Systems, Mc.Graw Hill, 1995
2. Theodore S. Rappaport, Wireless Communications (principles and practices), Prentice Hall of India, 2nd Edition.
3. Balajikumar, Broadband Communications - Mc-Graw Hill.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B.Tech (Electronics) SEM:- VII

SUBJECT:- Elective - I Digital Image Processing

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam: 60 Marks**
Tutorial: 01 Hour/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW & OR: 50 Marks
	Credits: 04

Course prerequisites:

Signals and Systems, Digital Signal Processing.

Course objective:

1 To introduce the image fundamentals and enhancement techniques.

2 To introduce the image segmentation and representation techniques.

3 To familiarize various morphological operations on image.

4 To introduce the concepts of image registration and image fusion.

Course Outcomes: On successful completion of this course, students will be able to

1. Demonstrate the fundamentals of digital image processing.

2. Design the image enhancement filters.

3. Analyze morphological operations and its effects on image.

4. To perform various morphological operations on image.

5. Determine features of various images by using segmentation method.

Contents:

Unit I

Fundamentals Digital Image Processing **[06 Hours]**

Introduction, Fundamental steps in digital image processing and components, Elements of visual perception, Image sensing and acquisition, sampling and quantization, An Introduction to the mathematical tools used in digital image processing, Digital image representation, Relationships between pixels, Color models, Noises in color images.

Unit II

Image Enhancement **[06 Hours]**

Spatial domain, Gray level transformations, Intensity transformation functions, Histogram processing, Basics of spatial filtering, Smoothing and sharpening spatial filtering, Frequency domain, Introduction to Fourier Transform, One-Dimensional Fourier Transform and Inverse of Fourier Transform, Smoothing and sharpening frequency domain filters, Ideal, Butterworth and Gaussian filters.

Unit III

Multi Resolution Analysis and Compressions **[06 Hours]**

Multi resolution analysis, Image pyramids, Multi resolution expansion, Wavelet Transforms, Image compression, Fundamentals Models, Elements of Information Theory, Error free Compression, Lossy Compression, Compression Standards.

Unit IV

Morphological Operations in Image Processing **[06 Hours]**

Dilation and erosion, Opening and Closing, Hit or Miss transformation, Morphological algorithms, Extensions to grey scale images, Image Watermarking.

Unit V

Image Segmentation and Feature Extraction **[06 Hours]**

Thresholding, Region based segmentation, Region growing, Region splitting and Merging, Segmentation by morphological watersheds, First and second order edge detection operators, Hough transform, Types of Hough transform, shape features, Boundary descriptors, Localized feature extraction detecting image curvature.

Unit VI

Applications of Digital Image Processing **[06 Hours]**

Image Classification, Image Recognition, Image Understanding, Working principle of Video Motion Analysis (GIF), Introduction to Iris Recognition, Difference between 2D and 3D image Sources of 3D Data sets, Image processing in 3D, Measurements on 3D images..

Content Delivery Methods:

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit test
2. Continuous Assessment
3. End Semester Examination

List of Tutorials/Experiments:

1. Study of Reading and Displaying Image in different File Format.
2. Study of Simple Binary and Gray Level Transformation.
3. Study of Histogram and Histogram Equalization of Image
4. Study of Smoothing of Image in Special Domain using Averaging and Medium Method.
5. Study of Edge Detection of Image using First and Second Order.
6. Study of Morphological Operations.
7. Study of Segmentation using Thresholding.
8. Study of Image Compression using DCT.
9. Study of Hough transforms.
10. Study of Feature Detection and Feature Identification.
11. Study of Image Sources in 2D and 3D.
12. Study of Iris Recognition.

List of Assignments:

1. Discuss Digital image representation and Color Model.
2. Study of Fundamental steps in digital image processing and components.
3. Study of Spatial domain, Gray level transformations and Intensity transformation functions.
4. Discuss Histogram processing, Fourier Transform, Gaussian filters.
5. Perform various Morphological Operations on image.
6. Study of Dilation and erosion, Opening and Closing, Image Watermarking.
7. Analysis of resolutions of Image and color intensity.
8. Study Wavelet Transforms, Image compression and Compression.
9. Study image Segmentation and Thresholding, Hough transform.
10. Study of Boundary descriptors, Localized feature detection and extraction.
11. Discuss Video Motion Analysis.
12. Study of applications of Digital Image Processing in 2D and 3D.

Text Books:-

1. Gonzalez, Rafel C. and Woods, Richard E., "Digital Image Processing", Second Edition, Prentice Hall, 2006.
2. Jain, Anil K., "Fundamentals of Digital Image Processing", Prentice Hall of India, New Delhi.

Reference Books:-

1. Rosenfield, Azriel and Kak, Avinash C., "Digital Picture Processing", Academic Press Inc, New York, 1982.
2. Salomon, David, "Data Compression: The Complete Reference", Second Edition, Springer Verlag, New York, 2001.
3. Pratt, William K., "Digital Image Processing", John Wiley & Sons, New York, 2003.
4. Mark Nixon, Alberto Aguado, “Feature Extraction and Image Processing”, Academic Press, 2008.
5. Ardeshir Goshtasby, “2D and 3D Image registration for Medical, Remote Sensing and Industrial Applications”, John Wiley and Sons,2005.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B. Tech (Electronics) Sem :- VII

SUBJECT: - Elective-I Advanced Digital Signal Processing

Teaching Scheme
Lecture: 3 Hours/week
Tutorial: 1 Hour/week

Examination Scheme
End semester exam: 60 Marks
Unit Test: 20 marks
Attendance: 10 marks
Assignment: 10 marks
TW & OR: 50 Marks
Credits: 04

Course Prerequisites:

Signals & systems, Digital Signal Processing

Course Objectives:

1. To make student familiar with basic principles of spectral estimation methods.
2. To introduce the advanced concepts and techniques of digital signal processing.
3. To create awareness about the practical applications in the field of Digital Signal Processing.
4. To introduce DSP processor architecture.

Course Outcomes: On successful completion of this course, students will be able to

1. Apply parametric and non-parametric techniques for estimating the power spectral density.
2. Design and implement multistage sampling rate converter.
3. Design appropriate adaptive filter in communication applications.
4. Perform multi-resolution analysis using wavelet transform.
5. To implement the signal processing application using DSP processor.

Contents:

Unit I **[06 Hours]**
DSP Processor Characteristics

Features of DSP Processors, Harvard and modified Harvard Architecture, Multiply-Accumulate operation, Single Cycle Execution, Multiple on chip buses, ALU, MAC, Shifter Processing Units, Address Generation units, Modulo addressing, Bit reversed addressing, Efficient Looping Mechanisms, Examples of DSP Processors, Applications of DSP Processors

Unit II **[06 Hours]**

Linear Prediction

Random Processes, Stationary Random Process, Ergodic Random Process, , AR process, MA process and ARMA process, AR lattice and ARMA lattice Ladder Filters, Forward and backward linear prediction, Solution of Normal Equations, Levinson-Durbin Algorithm, Properties of Linear Prediction Error Filters.

Unit III **[06 Hours]**

Power Spectrum Estimation

Estimate definition, Nonparametric methods-Periodogram, modified periodogram, Bartlett's method, Blackman-Tukey Method, Performance Comparisons of nonparametric methods, Parametric methods, Methods for estimating parameters of AR, MA and ARMA models

Unit IV **[06 Hours]**

Multirate DSP fundamentals

Need for Multi-rate DSP, Decimation by factor D , Interpolation by factor I, Sampling rate conversion by rational factor I/D, software implementation of sampling rate converters (Decimators and Interpolators), sample rate conversion using poly-phase filter structures

Unit V **[06 Hours]**

Adaptive filters

FIR adaptive filters – the MMSE criterion and LMS and RLS algorithms, Adaptive Lattice-Ladder Filters - Recursive Least Squares Lattice Ladder Algorithms, Applications of Adaptive Filters

Unit-VI **[06 Hours]**

Time Frequency Representation of signals

Time Frequency description of signals, Concept of Instantaneous frequency and Complex signal, Uncertainty principle, need for joint time frequency representation, tiling diagrams. Short Time Fourier Transform, Wigner Ville distribution, Continuous Wavelet Transform, Discretization of STFT & CWT, Spectrogram.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit test
2. Continuous Assessment
3. End Semester Examination

List of Tutorials/Experiments:

1. Study of various addressing modes of DSP.
2. Describe the power spectrum estimation using Blackman and Tukey method.
3. Describe the role of Adaptive filters in Communication.
4. A brief survey of DSP applications in speech processing.
5. Implementation of Multi-rate application in digital audio processing.
6. Implementation of sub band coding for speech signal.
7. Discuss in detail various applications of wavelet transforms.
8. Explain the process of digital FM stereo signal generation.
9. Demonstration of Hardware and Software utilities for DSP starter kits.

List of Assignments:

1. Present a comparative study of DSP processors based on their features and applications.
2. Plot the Periodogram of a Noisy Signal and estimate PSD using Periodogram and Modified Periodogram methods.
3. Estimation of PSD of two sinusoids plus noise using Welch method
4. Find linear prediction coefficients and reflection coefficients using Levinson Durbin Algorithm .
5. Implement program to convert CD data into DVD data
6. Implement LMS algorithm using MATLAB.
7. Record a speech file in your own voice. Find pitch period for a voiced part of the segment.
8. Perform continuous and discrete wavelet analysis of a signal.
9. Implementation of Linear / Circular convolution on DSP processor.
10. Implementation of FIR filter using DSP processor
11. Design an Adaptive filter using LMS algorithm.
12. Mini-project based on the Matlab/Scilab.

Text books:

1. John G. Proakis, Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", Pearson education, Fourth Edition, 2007.
2. B. Venkataramani, M. Bhaskar, "Digital Signal Processors", TMH

Reference Books:

1. E. C. Ifeachor and B. W. Jervis, "Digital Signal Processing- A Practical Approach", 2nd Edition, Pearson education. 2007.
2. Widrow, B. and Stearns, S.D., "Adaptive Signal Processing", Pearson Education. 1985

3. Manolakis, D.G., Ingle, V.K. and Kogon, M.S., “Statistical and Adaptive Signal Processing”, Artech House. 2005.
4. Diniz, P.S.R., “Adaptive Filtering: Algorithms and Practical Implementation”, Kluwer. 1997
5. S. D. Apte, “Advanced Digital Signal Processing,” Wiley Publications, 2014.
6. Leon Cohen, “Time-Frequency Analysis”, Prentice Hall,1995.
7. K.P Soman, K.I Ramchandran, N.G.Reshmi, “Insight into Wavelets- from theory to Practice,” PHI Learning Private Limited, Third Edition, 2010.
8. Rao R M and A S Bopardikar, “Wavelet Transforms Introduction to theory and Applications”, Pearson Education, Asia, 2000.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VII

SUBJECT: - Elective-II Advanced Computer Programming

Teaching scheme	**Examination scheme**
Lecture: 03 Hours/week	**End Semester Exam: 60 marks**
Tutorial:01Hour/week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW & Oral: 50 marks
	Credits: 04

Course prerequisites:

Fundamentals of computing

Course objective:

1. To introduce object oriented programming concepts.
2. To develop programming ability by learning advanced coding techniques.

Course Outcomes: On successful completion of this course, students will be able to

1. Demonstrate basic knowledge of object oriented programming concepts.
2. Write simple programs in Java.
3. Apply Java for HTML and Applet applications.
4. Use SQL for database manipulation

Contents

Unit I **[06 Hours]**

Object Oriented Programming:

Programming fundamentals, Basic Concepts, Different Programming Paradigms, Evolution of Different Programming Languages and their Characteristics, Object-Oriented Paradigm, Objects and Classes, Data Abstraction and Encapsulation,

Inheritance, Polymorphism, DynamicBinding, Message Communication, Benefits of OOP, Applications of OOP, Java Language as an OOP Language.

Unit II **[06 Hours]**

Introduction to Java:

Introduction to Java, Different Characteristics of Java, C++ and Java: Feature Comparisons, Improvements, Detailed Overview, constants, variables and Data Types, Operators and Expressions, Decision Making and Branching and Decision Making and Looping, Classes Objects and Methods, Arrays, Strings and Vectors, Interfaces.

Unit III **[06 Hours]**

Threads:

Packages in Java, Multithreaded Programming concepts and applications, Managing Errors and Exceptions, Managing Input/Output Files in JAVA.

Unit IV **[06 Hours]**

HTML and Java Applets:

History, W3C Standards, Standard HTML Tags for Image and Text Formatting, Tables, Lists, Frames. Introduction to dynamic HTML. JavaApplets: History, Introduction, HTML and Java Applet. Basic Applet programming, Applets on Web. Applet applications for Web.

Unit V **[06 Hours]**

SQL and Java:

Introduction to databases, Data Models, Concepts, Schema, Relational Query. Detailed Overview of SQL Language, Basic SELECT Query, WHERE Clause, ORDER BY Clause, Merging Data from Multiple Tables: INNER JOIN, INSERT Statement, UPDATE Statement, DELETE Statement, and Installation of MySQL or PL SQL. Setting MySQL / PL SQL, User Account.

Unit VI **[06 Hours]**

Database Connectivity:

Introduction to JDBC, JDBC Architecture, Types of JDBC drivers, ResultSet, Metadata, Stored Procedure, Callable Procedure, Connection Procedure.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Tutorials/Experiments:

1. Write a Java program to implement Class and Inheritance Concept.
2. Write a Java program to differentiate between method overloading and method overriding.
3. Write a Java program to understand the use of String class and string buffer class
4. Write a Java program to implement the concept of Package.
5. Write a Java program to implement concept of Exception Handling.
6. Write a program to implement Frame and different graphics objects.
7. Write a program to implement Java Applet.
8. Write a SQL Program for implementation of DDL, DML, and DCL.

List of Assignments:

1. Write a C++ or Java Program to demonstrate the use of OOP features.
2. Write a Java Program to display pattern (Triangle, Pyramid) using different loops.
3. Implementation of different string functions by using switch case.
4. Write a Java Program implement multiple inheritances by using Interface.
5. Write a Java Program to perform different file operations.
6. Write a program to implement multithreading.
7. Design a College website containing detailed information using HTML Tags.
8. Write a program to implement a Java Applet.
9. Write a Java program to demonstrate JDBC connectivity.
10. Comparison of different database
11. Justify the role of SQL for database manipulation
12. A mini project on Java and SQL.

Text Books:

1. Programming with Java: A Primer, 3E by E Balagurusamy, Tata McGraw Hill Publishing Company.
2. Database System Concepts, Sixth Edition by Henry Korth, McGraw Hill Publishing Company
3. Java Complete Reference, Herbert Schildt, McGraw Hill Publishing Company

4. Java: How to Program by Deitel and Deitel

Reference Books:

1. Ivan Bayross, “Web Enabled Commercial Applications Development Using HTML, DHTML, JavaScript, Perl – CGI”, BPB Publication.
2. Korth, “Database System Concepts”, MGH Publication.
3. Ivan Bayross, “Programming with SQL”, Sybase Publication.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VII

SUBJECT: - Project stage - I

Teaching scheme	**Examination scheme**
Practical: 04 Hours/week	**TW & Oral: 50 marks**
	Total Credits: 04

Course objective:

1. To familiarize the students with the product development cycle
2. To impart the importance of working as a team.
3. To introduce the student to literature survey and documentation process.
4. To encourage the students to visualize and formulate a viable solution to practical engineering problems.

Course Outcomes: On successful completion of this course, students will be able to

1. Identify the problem for practical Engineering application
2. Formulate and design appropriate solution
3. Write specifications and identify constraints
4. Work as an effective team member
5. Effectively plan the financial budget for the project.

Project Stage –I includes various steps such as:

1. Problem Identification
2. Information gathering
3. Feasibility study
4. Synopsis
5. System analysis
6. Requirement analysis

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VII

SUBJECT: - In-plant Training

Teaching scheme	**Examination scheme**
-	**TW& OR: 50 marks**
	Credits: 04

Course Objectives:

1. To familiarize the students to industrial work processes.
2. To work as an effective team member.
3. To develop the communication and presentation skills.
4. To introduce the student to work ethics in industry.

Course Outcomes: On successful completion of this course, students will be able to

1. Work effectively in an industrial environment.
2. Effectively communicate and present himself/herself.
3. Indentify the various sections in the industry.
4. Work in a team.

In-plant Training:

Every student has to undergo training on site or in office of some company in June & July for one and half month to get the exposure and practical experience. He has to submit the detailed report of training, on the basis of which the term work and oral marks should be awarded.

Note: - Student should complete in-plant industrial training after semester-VI for a period of six weeks. Evaluation will be done in semester-VII.

B.Tech.(Electronics) Sem-VIII

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VIII

SUBJECT: - Optical Fiber Communication

Teaching Scheme	**Examination Scheme**
Lecture: 03 Hours/week	**End Semester Exam: 60 marks**
Practical: 02 Hours/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignments: 10 marks
	TW & PR: 50 marks
	Total credits: 04

Course prerequisites:

Analog Electronics, Analog Communication

Course objective:

1. To lay down the foundation for optical communication engineering.
2. To introduce the working of optical transmitter and receiver.
3. To familiarize the students to optical devices and concepts of various modulation techniques.
4. To introduce the students to Optical Fiber measurement techniques.

Course Outcomes: On successful completion of this course, students will be able to

1. Demonstrate the advantages and applications of optical fiber communication.
2. Identify different optical Sources/detectors with their operating principle.
3. Choose the multiplexing technique and optical amplifier for optical communication.
4. Select the connectors /couplers in Optical fiber link and explain measurement technique for the optical fiber losses.

Contents:

Unit I **[06 Hours]**

Introduction:

Advantages of optical fiber communication over other communication systems, Ray theory transmission, Electromagnetic mode theory for optical propagation, types of fibers, transmission characteristics of optical fibers-attenuation, scattering losses, fiber bend loss, dispersion, polarization, preparation of optical fibers.

Unit II **[06 Hours]**

Optical transmitter

Optical sources: Basic Concepts, Light Emitting Diodes, Semiconductor Laser, Laser Diodes, Line Coding, Laser Characteristics. Different modulation schemes**.** **Optical transmitters:** LED drive circuits for digital and analog transmission.

Unit III **[06 Hours]**

Optical Receivers and Optical links:

Optical receiver: Detector responsivity, Rise time and Bandwidth, P-N Photo Diode, P-I-N Photo Diode, Avalanche Photo Diode, Receiver Noise, Receiver Sensitivity.

Point to point Links: System design considerations, Link Power budget, Rise Time budget, Multichannel transmission techniques.

Unit IV **[06 Hours]**

WDM concept and Optical Amplifier:

WDM Concept, WDM Light wave Systems, WDM Components, System Performance Issues, Time Division Multiplexing, Sub Carrier Multiplexing, Code Division Multiplexing. Types of Optical Amplifier and its applications, Amplifier Noise, Optical SNR, Raman Amplifier.

Unit V **[06 Hours]**

Optical Components and Optical Networks:

Power launching & Coupling: Fiber optic splices, connectors & couplers & Coupling losses. Optical couplers, Isolators and Circulators. Network Concepts, network Topology, SONET/SDH.

Unit VI **[06 Hours]**

Optical Fiber measurements and application.

Fiber attenuation measurements, Fiber dispersion measurements, fiber numerical aperture measurement, reflectance and return loss measurements. OTDR. Application in military, industrial applications and applications in local area network.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of practicals:

1. Optical Source Characteristics: Aim: To plot the electrical and optical characteristics of different light sources.
2. Numerical Aperture of fiber: Aim: To estimate the numerical aperture of given fiber.
3. To measure the attenuation of given MMSI and SMSI fibers.
4. To measure the attenuation variation in length of optical cable.
5. To measure the attenuation due to bending of optical fiber.
4. Optical Detector Characteristics: Aim: To plot the frequency response of detectors with different values of load resistor.
5. Fiber Bandwidth/Data rate: Aim: To estimate the bandwidth of given fiber.
6. Transmission of analog signal using a simple fiber optic link.
7. Transmission of Digital signal using a simple fiber optic link.
8. To perform Frequency modulation using optical fiber.
9. To perform PWM using optical fiber
10. To find the optical power using “Optical Power Meter”.
11. To find the optical response using “OTDR”.
12. Determination of input, output and transfer characteristics of Optocoulper.

List of Assignments:

1. Explain different types of optical fibers.
2. Study of Electromagnetic mode theory of optical propagation.
3. Classify the types of optical connectors and couplers.
4. Study of the fiber optic analog and digital lab using Virtual Lab.
5. Study of the fiber optic bidirectional communication using Virtual Lab
6. Study of bending losses in optical fiber using virtual lab.
7. Study of LED and Detector characteristics using Virtual Lab
8. Study of attenuation loss in optical fiber using Virtual Lab
9. Numerical based on acceptance angle, N.A. and Number of guided modes.
10. To find power efficiency, optical power in LEDs.
11. Calculation of optical power budget.
12. Measurement of attenuation in optical fiber.

Text Books

1. Gerd Keiser, "Optical Fiber Communications", Tata McGraw Hill, Fourth Edition.

2. John M. Senior, Optical Fiber Communications-Principles and Practice, Prentice Hall of India, second Editio

References

1. Jasprit Singh, "Opto Electronics – As Introduction to materials and devices", Tata Mc Graw-Hill International Edition, 1998.
2. Djafar K.Mynbaev and Lowell L.Scheiner " Fiber optic communication Technology" Pearson education, 2001.
3. Eric Udd, Fiber Optic Sensors, John Wiley, New York, 1991.
4. J.H. Franz and V. K. Jain, " Optical Communication - Components and systems", Narosa Publishing house, 2000.
5. Bhattacharya "Semiconductor Opto Electronic Devices", PHI Learning, New Delhi, 1995

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem: - VIII

SUBJECT: - Biomedical Engineering

Teaching Scheme

Lecture: 3 Hours/week

Practical: 2 Hours/week

Examination Scheme

End Semester Exam: 60 marks

Unit Test: 20marks

Attendance: 10 marks

Assignments: 10 marks

TW & OR: 50 marks

Credits: 04

Course prerequisites:

Analog Electronics, Instrumentation and control system.

Course objectives:

1. To introduce various biopotentials, their measurements, and interpretations associated with human body.
2. To familiarize the student with medical equipments.
3. To expose the students to clinical laboratory equipments.
4. To imbibe the importance of patient's safety.

Course Outcomes: On successful completion of this course, students will be able to

1. Classify systems in a human body and Identify bio-potentials
2. To acquire and analyze ECG, EMG, EEG signals.
3. Correlate the parameters like B.P., ECG and PCG with the functioning of heart.
4. Categorize life saving equipments such as cardiac and respiratory equipments according to their applications.
5. Identify the equipments present in ICU/NICU and clinical laboratory.

6. Recognize physiotherapy equipments used for pain relief and describe various electrodes and techniques used for surgery.

Contents:

Unit I **[06 Hours]**

Human body & Origin of Bio-potentials

Human body: cell structure, overview of different systems in the body: cardiovascular system, respiratory system, nervous system, musculoskeletal system, gastrointestinal system, endocrine system and lymphatic system, Origin of Bio-potentials: action potential and muscle Contraction, bio-potentials such as ECG, EEG, EMG.

Unit II **[06 Hours]**

Electrocardiograph, Phonocardiograph and Blood pressure measurements

Electrocardiography: ECG lead system, typical set up for ECG, electrodes used for ECG, Phonocardiograph: heart sounds and heart murmurs, microphones used in Phonocardiograph (PCG), recording set up of PCG, Blood pressure measurement techniques: direct and indirect methods, relationship between ECG, PCG and Blood pressure as a function of time.

Unit III **[06 Hours]**

Cardiac and Respiratory Equipments

Types of defibrillator, defibrillator electrodes, types of pacemaker, pacemaker leads and batteries, ventilator and Modes of ventilator.

Unit IV **[06 Hours]**

ICU and NICU-Architecture and monitoring systems

Architecture of ICU and NICU**,** patient monitoring system, central monitoring system**,** ambulatory monitoring system, Baby incubator and Phototherapy unit

Unit V **[06 Hours]**

Clinical Laboratory Instruments

Colorimeter, spectrophotometer, flame-photometer, blood cell counter, auto analyzer and pH/blood gas monitoring.

Unit VI **[06 Hours]**

Physiotherapy & surgical diathermy instruments and Patient Safety

Short wave diathermy machine, microwave diathermy machine, surgical diathermy unit, types of electrodes used for electro-surgery, Patient safety: grounding, shielding and effect of electrical current on human body.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Experiments:

1. Study of Blood Pressure measuring techniques (Analog & Digital).
2. Study of ECG waveform & Heart Rate measurement using ECG system.
3. Study of Phonocardiograph.
4. Detection of Apnea and Tachyapnea using respiration rate monitor and Respiration Simulator.
5. Study of DC Defibrillator.
6. Study of External Pacemaker.
7. Study of Spectrophotometer.
8. Study of Surgical Diathermy Unit.

List of Assignments:

1. State in your own words: Human body systems and their functions.
2. Choose any two Bio-potentials and state the vital role with the help of diagrammatic representation.
3. Differentiate between heart sounds and heart murmurs. Where and why they originate?
4. Association between ECG and B. P as a function of time.
5. Elaborate concepts of cardiac equipments.
6. Importance of Ventilator as a life supporting instrument.

7. Sketch ICU and NICU Architecture. Categorize and locate ICU and NICU equipments and their significance.
8. Describe central monitoring system for 8 bedded ICU.
9. Categorize blood tests and give importance of various clinical laboratory equipments.
10. By applying acquired knowledge select appropriate physiotherapy equipment for pain relief and explain.
11. Identify the equipment used for surgery in O.T. and describe.
12. Visit to the hospital/industry to understand the concepts of biomedical instruments.

Text Books

1. R. S. Khandpur, "Hand book of Biomedical Instrumentation", Tata McGraw Hill Publishing Company limited, New Delhi.
2. Leslie Cromwell, Fred J. Weibel, Erich A. Pfeiffer, "Biomedical Instrumentation and Measurements", Second Edition, PHI.

Reference Books:

1. Joseph J. Carr & John M. Brown, "Introduction to Biomedical Equipment Technology", Forth Edition, PHI.
2. John G. Webster, "Medical Instrumentation- Application and Design", Third Edition, John Wiely and Sons Inc., New York.
3. Richard Aston, "Principles of Biomedical Instrumentation and Measurement", Merrill Macmillan Publishing Company, New York.
4. Dr. M. Arumugam, "Biomedical Instrumentation", Anuradha Agencies.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VIII

Subject: - Wireless Networks

Teaching Scheme	**Examination Scheme**
Lecture: 03Hours/week	**End Semester Exam: 60 Marks**
Tutorial: 01 Hour/week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignments: 10 marks
	Credits: 04

Course Prerequisites:
Digital Communication

Course Objectives:

1. To familiarize the students with fundamentals of wireless communication systems
2. To introduce the concepts and techniques associated with Wireless Cellular Communication systems.
3. To familiarize with state of art standards used in wireless cellular systems.
4. To introduce new technologies in wireless systems

Course Outcomes: On successful completion of this course, students will be able to

1. Identify the types of wireless communication systems.
2. Analyze the radio channel characteristics.
3. Analyze improved data services in cellular communication.
4. Work with GSM/CDMA/UWB technologies.

Contents:

Unit I

Introduction **[06 Hours]**

Wireless network generations, evolution of next-generation networks,Systems and Design Fundamentals, Propagation Models Description of cellular system, Frequency Reuse, Co channel and Adjacent channel interference, Propagation Models for Wireless Networks, Multipath Effects in Mobile Communication, Models for Multipath Reception.

Unit II

Cellular Communications **[06 Hours]**

Introduction to Cellular Communications, cellular terminology, cell structure and cluster, Frequency reuse, Multiple Access Technologies, Cellular Processes-Call Setup, Handover etc, Teletraffic Theory, Capacity Building, Blocking Probability

Unit III

GSM **[06 Hours]**

GSM: Architecture and Protocols - Air Interface, GSM Multiple Access Scheme, GSM Channel Organization, Traffic Channel multiframe, Control (Signaling) Channel Multiframe, Frames, Multi- frames, Super-frames and Hyper-frames, GSM Call Set up Procedure, GSM Protocols and Signaling, Location Update Procedure, Routing of a call to a Mobile Subscriber.

Unit IV

CDMA **[06 Hours]**

Introduction to CDMA, Spread spectrum, CDMA call processing, Walsh codes, Variable tree OVSF, PN Sequences, Multipath diversity, RAKE Receiver, CDMA Receiver Synchronization, power control in CDMA.

Unit V

3G and 4G Wireless Standards/UWB **[06 Hours]**

GPRS, EDGE technology, IMT-2000 standards, UMTS technology, WCDMA, LTE, 4G Technologies, Multicarrier Modulation, OFDM-MIMO Systems, WiMAX, UWB Definition and Features, UWB Wireless Channels, Bit-Error Rate Performance of UWB.

Unit VI

Emerging Wireless Network Technologies **[06 Hours]**

WLAN technology, HIPERLAN, WPAN, WMAN, Mobile Ad-hoc network(MANET), Mobile IP and mobility management, Mobile TCP, Wireless sensor networks, RFID technology, WATM, Wireless application protocol, Home RF.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Tutorials/Experiments:

1. Comparison of different wireless network generations.
2. Study of design principles of propagation models of cellular system.
3. Analyze the concept of frequency reuse, interference and multipath effects.
4. Study of design principles of cellular structure.
5. Study of multiple access technologies.
6. Analyze different methods of capacity expansion in cellular system.
7. Study of GSM architecture, channels and call setup procedure.
8. Study of CDMA calls processing.
9. Study of LTE & 4G network design issues.
10. Study of HIPERLAN standards& MANET.
11. Study of wireless sensor networks and WATM.
12. Study of WAP standards & Home RF.

List of Assignments:

1. Visit mobile station/telephone switching & prepare visit report.
2. To carry out AT commands mobile communication using GSM trainer.
3. To understand CDMA trainer using DSSS technology.
4. Analyze Radio Propagation and Propagation Path Loss Models on Scilab.
5. Analyze principles of cellular communication on Scilab (Refer Wireless Communications by T. L. Singal).
6. Analyze capacity of CDMA, calculate processing gain, number of users per cell, bandwidth efficiency, open loop power control in CDMA on Scilab. (Refer Scilab

Textbook Companion for Wireless Communications and Networking by V. Garg)

7. Prepare Ad-hoc network at your premises using mobile terminals/ laptops etc and analyze parameters like capacity, flexibility, complexity etc.
8. Comparison of HIPERLAN, WATM .
9. Understand about Wi-Fi network and its' different standards, protocols and requirements for connecting a Wi-Fi network on Virtual LAB. (Refer VLAB IIT Kharagpur, Advanced network Technologies Lab)
10. Simulating WiMAX network on Virtual LAB.(Refer VLAB IIT Kharagpur, Advanced network Technologies Lab)
11. Study the basics of Mobile and Adhoc network, various standards and different routing protocols including proactive and reactive on virtual lab.
12. Analyze Wireless Sensor Network Data Acquisition, Transmission, and Aggregation on virtual lab.

Text Books:

1. T L Singal, Wireless Communications, McGraw Hill Education India, 2014.
2. Kaveh Pahlavan, Prashant Krishnamurthy, Principles of Wireless Networks, Pearson Education Publication.

Reference Books:

1. William C.Y. Lee, Mobile Cellular Telecommunications- Analog & Digital Systems, Mc.Graw Hill, 1995

2. Wireless Communications (principles and practices) -(2nd Edition)-Theodore S. Rappaport (Prentice Hall of India).

3. Vijay Garg, Wireless Communication & Networking, Morgan Kaufmann Series

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VIII

SUBJECT: - Elective II Agricultural Electronics

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam: 60 marks**
Tutorial: 1Hours/Week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW& OR: 50 marks
	Credits: 04

Course Prerequisites:

Basic Electronics, Instrumentation & control systems.

Course Objectives:

1. To inculcate the ability to recognize environmental problems and to provide solutions to agricultural sector.
2. To give overview of technology of advanced topics like DAS, SCADA and Virtual Instrumentation.
3. To enable students to select practices needed to develop and implement the Engineering Automation for Agricultural sector.
4. To introduce Greenhouse Technology & Role of Electronics Governance.

Course Outcomes: After successfully completing the course students will be able to

1. Describe the role of computers & virtual instrumentation.
2. Provide communication solution for interpreting environmental parameters with Electronics systems.
3. Describe Instrument technology used in agriculture & apply knowledge of Electronics in Agriculture.

4. Describe Greenhouse Technology & Role of Electronics Governance

Contents

Unit I

Review of computers & Virtual instrumentation [06Hours]

Data loggers, Data acquisitions systems (DAS), Supervisory control and data acquisition (SCADA), Basics of PLC, Functional block diagram of computer control system, alarms, interrupts. Virtual Instrumentation: Historical Perspective, advantages, Block diagram and architecture of virtual instrument, data flow techniques, graphical programming in data flow, comparison with conventional programming.

Unit II

Communication Systems [06Hours]

Use of field buses, functions, international standards, field bus advantages and disadvantages, Instrumentation network: sensor networks, Open networks-advantages and limitations, HART Network, Foundation field bus network. Profibus PA: Basics, architecture, model, network design. Foundation field bus segments: General consideration, network design

Unit III

Instrument technology for agriculture [06Hours]

Instrument for measurement of pH, Electrical conductivity, gas analysis, humidity, leaf area, chlorophyll content, and soil moisture & temperature.

Unit IV

Precision Farming [06Hours]

An introduction to precision farming. GIS/GPS positioning system for precision farming, Yield monitoring and mapping, soil sampling and analysis. Computers and Geographic information systems. Precision farming- Issues and conditions. Role of electronics in farm machinery for precision farming.

Unit V

Electronics in Agriculture [06Hours]

Instrument for crop monitoring – moisture measurement – capacitive, infrared reflectance and resistance. Monitoring soil and weather – measurement of soil properties and meteorological parameters – irrigation control systems. Instruments for crop establishment monitoring. Crop spraying – selective crop spraying – flow control. Yield monitoring. Technology for precision farming. Instruments for protected cultivation – green house environment control – transducers and control system. Instruments and systems for crop handling processing and storage.

Unit VI

Applications & Electronics Governance [06Hours]

Greenhouse: History of modeling and control of Greenhouse, Identification of control and manipulation variables for Greenhouse. Crop Preservation : Importance of Preservation of various commodities and parts of plants, Drying process for preservation, Variable identification for drying process, Electronic control system for grape drying process. Agriculture & Electronics Governance: Governance products & services in agriculture sector, Role of Electronics Governance in Agricultural sector.

Content Delivery Methods: Chalk & talk, Power point presentation NPTEL videos.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Tutorials/Experiments

1. Case study of PLC for irrigation system.
2. Case study of Latest irrigation system.
3. Study of Profibus protocol for networking.
4. Role of GIS/GPS positioning system for precision farming.
5. Study of Computers and Geographic information systems for precision farming.
6. Concept of crop preservation.

List of Assignments:

1. Study of Data Acquisition Systems (DAS).
2. Study of Data logger.
3. Study of basics of PLC and applications in Agriculture electronics.
4. Study of Communication systems used in Agriculture electronics.
5. Study of Transducers and control systems.
6. Study of electronics systems for PH, gas, humidity, conductivity and temperature measurement.
7. Study of selective crop spraying, flow control, yield monitoring, green house environment control.
8. Study of Electronics Governance in Agricultural sector.
9. Describe GIS/GPS positioning system for precision farming.
10. Describe advantages and disadvantages of field bus and Open networks.
11. Write a note on HART Network.
12. Write a note on Greenhouse.

Text Books

1. Curtis Johnson, “Process Control Instrumentation Technology”; 8th Edition, Pearson Education

2. Stuart A. Boyer, SCADA supervisory control and data acquisition, ISA Publication

Reference Books

1. De Mess M. N. Fundamental of Geographic Information System. John Willy & sons, New York, Datta S.K.1987.

2. K. Krishna Swamy, “Process Control”; New Age International Publishers

3. Kuhar, John. E. 1977. The precision farming guide for agriculturalist. Lori J. Dhabalt, USA

4. Manual of Soil & Water conservation Engineering. Oxford

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Class: B.Tech (Electronics) SEM: -VIII

SUBJECT: - Elective-II System on Chip

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam: 60 Marks**
Tutorial: 1Hour/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW & OR: 50 Marks
	Credits: 4

Course Prerequisites: Digital Electronics, VLSI Design

Course objective:

1) To make students familiar with fundamentals of SOC design methodology.
2) To categorize requirements of SOC design.
3) To recognize essentials of SOC design.
4) To comprehend applications of SOC.

Course Outcomes: On successful completion of this course, students will be able to

1) Conceptualize SOC design methodology
2) Understand SOC design flow
3) Design complex SOC
4) Intellectualize future trends in SOC design

UNIT-I

SOC Design Methodology **(06 Hours)**

The age of Megagate SOCs, The fundamental trends of SOC design, An improved design methodology for SOC design.

UNIT -II

SOC Design **(06 Hours)**

Hardware System Structure, Software trends, Current SOC Design Flow, Six Major Issues in SOC Design.

UNIT -III

SOC Architecture **(06 Hours)**

The basics of Processor-Centric SOC architecture, Accelerating Processors for Traditional Software Tasks, System Design with Multiple Processors, New Essentials of SOC Design Methodology

UNIT -IV

System-Level Design of Complex SOCs **(06 Hours)**

Complex SOC System Architecture Opportunities, Major Decisions in Processor-Centric SOC Organization, Communication Design = Software Mode + Hardware Interconnect, Hardware Interconnect Mechanisms, The SOC Design Flow

UNIT -V

Advanced Topics in SOC Design **(06 Hours)**

Pipelining for Processor Performance, Inside Processor Pipeline Stalls, Optimizing Processors to Match Hardware, Multiple Processor Debug and Trace, Issues in Memory Systems

UNIT -VI

Scope of SOC **(06 Hours)**

The designer's dilemma in SOC design, The SOC design transition, future of SOC design, Future applications of complex SOC.

List of Tutorials/Experiments:

1) Study of SOC Components
2) Study of Integration Technology in SOC with standard CMOS process.
3) Study of Technology challenges in SOC design.
4) Study of SOC design requirements
5) Study of SOC architecture
6) Study of SOC test methodology
7) Application of SOC in Communication
8) Application of SOC in Computer
9) Application of SOC in Consumer
10) Case study: Complex SOC

List of Assignments:

1) What are the challenges in SOC design? Describe in brief.
2) List various design elements, tools and methodologies playing an important role in SOC Design.
3) Using diagram, explain SOC design flow.

4) Which are the important issues in SOC design? Explain in detail.
5) Discuss the basics of processor -centric SOC design.
6) Write essentials of SOC design methodology.
7) Define complex SOC system architecture opportunities.
8) Explain major decisions in processor-centric SOC organizations.
9) Discuss pipelining and exceptions.
10) Explain issues in memory system.
11) Describe designer's dilemma wrt SOC.
12) List future applications of complex SOC.

Content Delivery Methods: Chalk & talk, Power point presentation NPTEL videos.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

Text book:

1. Chris Rowen, Engineering the Complex SOC, Prentice Hall, 2004.

Reference books:

1. Rainer Leupers, Olivier Temam, Processor and System-on-Chip Simulation, Springer, 2010
2. Michael J. Flynn, Wayne Luk, Computer System Design System on Chip, Wiley, 2011
3. Bashir M. Al-Hashimi, System-on-Chip: Next Generation Electronics, IET, 2006
4. Steve Furber, ARM System on Chip Architecture, Pearson India, 2000
5. Wayne Wolf, Ahmed Amine Jerraya, Multiprocessor Systems-on-Chips, Elsevier, 2005
6. SudeepPasricha and NikilDutt, On-Chip Communication Architectures System on Chip

7. Interconnect, Elsevier, 2008

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B.Tech (Electronics) Sem: - VIII

SUBJECT: - Elective-II Speech Processing

Teaching scheme	**Examination scheme**
Lecture: 3 Hours/Week	**End Semester Exam: 60 marks**
Tutorial: 1 Hour/Week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignments: 10 marks
	TW& Oral: 50 Marks
	Credits 04

Course Prerequisite:

Engineering Mathematics-III, Signals and Systems, Digital Signal processing

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Course Objective:

1. To introduce acoustic theory and time domain models for speech processing.
2. To give overview of sampling, quantization and different modulation techniques.
3. To enable students to apply STFT analysis and speech synthesis
4. To introduce linear predictive coding a well as different techniques to enhance speech quality

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Course Outcomes: At the end of the course, a student will be able to

1. Describe the mechanisms of human speech production and articulation mode of different classes of speech sounds determiner their acoustic characteristics.
2. Represent the speech signal in time domain and frequency domain.
3. Describe and implement methods & systems for efficient quantization and coding of speech signals.
4. Analyze and synthesize speech using different methods.

5. Distinguish between different speech recognition modes.

Contents

Unit I **[06 Hours]**

Speech Production and Hearing

Anatomy & physiology of speech organs, articulatory, acoustic phonetics. Acoustic theory of speech production, prosody, Anatomy & physiology of ear, sound perception, speech perception, vowel perception, consonant perception.

Unit II **[06 Hours]**

Speech Analysis

Short time speech analysis, time domain parameters, frequency domain parameters, LPC analysis, cepstral analysis, pitches estimation.

Unit III **[06 Hours]**

Coding of Speech Signals

Quantization, redundancies, Time domain, waveform coding Linear delta modulation, Adaptive delta modulation, adaptive differential pulse code modulation, Linear prediction based vocoders, phase vocoders channel vocoders and cepstral vocoders.

Unit IV **[06 Hours]**

Speech Synthesis

Principles of speech synthesis, synthesis methods, text to speech synthesis, Synthesis by rule, applications.

Unit V **[06 Hours]**

Speech Enhancement

Introduction, nature of interfering sounds speech enhancement techniques spectral subtraction & filtering, harmonic filtering, spectral subtraction, Adaptive noise cancellation.

Unit VI **[06 Hours]**

Automatic Speech Recognition

Parametric representation of speech, evaluation of similarity of speech patterns, various modes of speech recognition like MFCC, DTW, HMM Application.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination.

List Tutorials/Experiments:

1. To study spectral analysis of a noisy signal using MATLAB.
2. To obtain LPC coefficients.

3. To study the spectrogram of an audio signal using MATLAB.
4. To study VQ for speech.
5. To perform text to speech synthesis using MATLAB.
6. Estimation of fundamental frequency using Cepstrum.
7. To find Cepstral pitch period using method of autocorrelation.
8. To plot Welch power spectral density estimates for vowels ‘a’ ‘e’.
9. To find Cepstral coefficients of voiced signal.
10. Speech classification on basis of frequency.

List of Assignments:

1. List out different speech processing applications.
2. Implement a Non-stationary nature of speech signal using Virtual laboratory.
3. Write a MATLAB program to find the envelope of the sound for the flute (Bansuri).
4. Describe any two speech recognition models.
5. Discuss different speech features like LPC, Cepstrum, MFCC, and Pitch.
6. Classify the different coders on the basis of waveform, parametric & transform domain coding of speech.
7. List out different applications of speech synthesis.
8. Different classifiers used in speech recognition.
9. Mention a real time application of speech technology.
10. Describe different types of software’s used for speech processing.
11. Discuss different speech enhancement techniques.
12. Classify the different Audio File formats.

Text Books

1. Doulgas O Shaughnessy “Speech Communication”. Human and Machines Second Edition University Press.
2. Dr.Shaila D. Apte “Speech and Audio Processing,” Wiley.

References

1. Lawrence Rabiner & Biing-Hwang Juang “Fundamentals of Speech Recognition Englewood Cliffs NJ:” PTR Prentice Hall (Signal Processing Series), c1993, ISBN 0-13-015157-2
2. L.R. Rabiner and R.W. Schafer **“**Digital Processing of Speech Signals” Prentice Hall.

3. Sadoaki Furui. “Digital Speech Processing: Synthesis and Recognition” CRC Press.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VIII

Subject: - Elective-II Fuzzy Logic & Neural Network

Teaching Scheme

Lecture: 03 Hours/week

Tutorial: 01 Hour/week

Examination Scheme

End semester exam: 60 Marks

Unit Test: 20marks

Attendance: 10 marks

Assignments: 10 marks

TW & Oral: 50 Marks

Credits: 04

Course Prerequisites:
Engineering Mathematics-II, Engineering Mathematics-III, Signals & Systems.

Course Objectives:

1. Introduce a relatively new computing paradigm for creating intelligent machines useful for solving complex real world problems.
2. Insight into the tools that make up the soft computing technique: fuzzy logic, artificial neural networks and hybrid systems Techniques.
3. To create awareness of the application areas of neural network technique
4. Provide alternative solutions to the conventional problem solving techniques in image/signal processing, pattern recognition/classification, control system.

Course Outcomes: On successful completion of this course, students will be able to

1. Design fuzzy system for Electronics applications.
2. Describe the fundamentals of Crisp sets, Fuzzy sets, Fuzzy Relations and Fuzzy Logic Controller.
3. Describe the various architectures of building an ANN and its applications.
4. Design and implement neural network systems to solve real-world problems

5. Develop models for different applications using fuzzy system.

Contents:

Unit I

Fuzzy Logic -I **[05 Hours]**

Concept of Fuzzy number, fuzzy set theory (continuous, discrete), Operations on fuzzy sets, Fuzzy membership functions (core, boundary, support), primary and composite linguistic terms, Concept of fuzzy relation, composition operation (T-norm, T-conorm), Fuzzy if-then rules.

Unit II

Fuzzy Logic -II **[07 Hours]**

Fuzzification, Membership Value Assignment techniques, De-fuzzification (Max membership principle, Centroid method, Weighted average method), Concept of fuzzy inference, Implication rules- Dienes-Rescher Implication, Mamdani Implication, Zadeh Implication, Fuzzy Inference systems -Mamdani fuzzy model, Sugeno fuzzy model, Tsukamoto fuzzy model, Implementation of a simple two-input single output FIS employing Mamdani model Computing.

Unit III

Fuzzy Control Systems **[06 Hours]**

Assumptions in a Fuzzy Control System Design, Fuzzy Logic Controllers, Comparison with traditional PID control, advantages of FLC, Architecture of a FLC: Mamdani Type, Example Aircraft landing control problem, washing machine and vacuum cleaner.

Unit IV

Artificial Neural Network -I **[05 Hours]**

Biological neuron, Artificial neuron model, concept of bias and threshold , Mc Culloch-Pits Neuron Model, implementation of logical AND, OR, XOR functions Soft Topologies of neural networks, learning paradigms: supervised, unsupervised, reinforcement, Linear neuron model : concept of error energy , gradient descent algorithm and application of linear neuron for linear regression, Activation functions : binary , bipolar (linear, signup, log sigmoid, tan-sigmoid) Learning mechanisms: Hebbian, Delta Rule o Perceptron and its limitations Draft.

Unit V

Artificial Neural Network -II **[07 Hours]**

Multilayer perceptron (MLP) and back propagation algorithm, Application of MLP for classification and regression, Self-organizing Feature Maps, k-means clustering, Learning vector quantization Radial Basis Function networks: Cover's theorem, mapping functions (Gaussian, Multiquadrics, Inverse multi quadrics), Application of RBFN for classification and regression, Hopfield network, associative memories.

Unit VI

Adaptive Neuro-Fuzzy Inference Systems (ANFIS) **[06 Hours]**

ANFIS architecture, Hybrid Learning Algorithm, Advantages and Limitations of ANFIS Application of ANFIS/CANFIS for regression

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination.

List of Tutorials/Experiments:

1. Study of Fuzzy sets and operations.
2. Study of concepts of fuzzy sets core, support, alpha cuts..
3. Study of fuzzy relation, Max-min composition.
4. Analyze t-norms and t-conorms.
5. Analyze Fuzzy Inference systems -Mamdani fuzzy model, Sugeno fuzzy model, Tsukamoto fuzzy model.
6. Analyze architecture of a FLC: Mamdani Type with Example Aircraft landing control problem, washing machine and vacuum cleaner.
7. Study of learning mechanisms, approaches and activation functions in ANN.
8. Study of Multilayer perceptron (MLP) and back propagation algorithm.
9. Study of Radial Basis Function networks.
10. Study of ANFIS architecture and Hybrid Learning Algorithm.

List of Assignments:

1. Implement simple logic network using MP neuron model
2. Implement a simple linear regressor with a single neuron model.
3. Implement and test MLP trained with backpropagation algorithm
4. Implement and test RBF network.
5. Implement SOFM for character recognition.
6. Perform fuzzy sets operations.
7. Implement fuzzy membership functions (triangular, trapezoidal, gbell, PI, Gamma, Gaussian).
8. Implement defuzzyfication (Max-membership principle, Centroid method, Weighted average method)
9. Implement FIS with Mamdani inferencing mechanism.
10. Implement Simulink model for Vacuum cleaner, washing machine using Fuzzy Logic tools
11. Implement Fuzzy Logic Controller.
12. Implement perceptron learning, multilayer feed forward neural networks.

Text Books:

1. Fundamentals of Neural Networks: Architectures, Algorithms and Applications, Laurene Fausett, Pearson Education, Inc, 2008.
2. Fuzzy Logic with Engineering Applications, Third Edition Thomas, Timothy Ross, John Wiley & Sons,2010.
3. Neuro- Fuzzy and Soft Computing, J.S. Jang, C.T. Sun, E. Mizutani, PHI Learning Private Limited.
4. Principles of Soft Computing , S. N. Sivanandam, S. N. Deepa, John Wiley & Sons, 2007

Reference Books:

1. Introduction to the theory of neural computation, John Hertz, Anders Krogh, Richard Palmer, Addison –Wesley Publishing Company, 1991
2. Neural Networks A comprehensive foundation,, Simon Haykin,Prentice Hall International Inc- 1999.
3. Neural and Adaptive Systems: Fundamentals through Simulations, José C. Principe Neil R. Euliano , W. Curt Lefebvre, John-Wiley & Sons, 2000
4. Pattern Classification, Peter E. Hart, David G. Stork Richard O.Duda,Second Edition,2000

5. Pattern Recognition, SergiosTheodoridis , Konstantinos Koutroumbas, Fourth Edition, Academic Press, 2008
6. A First Course in Fuzzy Logic, Third Edition, Hung T. Nguyen, Elbert A. Walker, Taylor & Francis Group, LLC, 2008
7. Introduction to Fuzzy Logic using MATLAB, S. N. Sivanandam ,S.Sumathi, S. N. Deepa, Springer Verlag, 2007

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VII

SUBJECT: - Seminar

Teaching Scheme	**Examination Scheme**
Practical: 02 Hours/week	**TW & Oral: 50 marks**
	Total Credits: 01

Course objective:

1. To develop ability of thinking and motivation for seminar
2. To expose the students to the state of the art
3. To develop ability to perform literature survey
4. To develop Seminar presentation and Technical Communication Skills

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Course Outcomes: On successful completion of this course, students will be able to

1. Effectively communicate his technical idea or project
2. Learn master survey and literature survey techniques
3. Write Motivational Statement
4. Present the topic

Seminar Documentation should include

Cover Title page, plagiarism assessment, report Certificate from Guide, Abstract, list of Figures, List of Tables, Abstract, Presentation Slide using Microsoft power point including bibliography/references in IEEE standard format.

The student shall submit the seminar report in standard format, duly certified for satisfactory completion of the work by the concerned Guide and head of the department.

Bharati Vidyapeeth Deemed University College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VIII

SUBJECT: - Project stage - II

Teaching Scheme	**Examination Scheme**
Practical: 08 Hours/week	**TW & Oral: 150 marks Total Credits: 08**

Course prerequisites:

Project Stage -I

Course objective:

1. To familiarize the students with the product development cycle.
2. To impart the importance of working as a team.
3. To introduce the student to literature survey and documentation process.
4. To encourage the students to visualize and formulate a viable solution to practical engineering problems.

Course Outcomes: On successful completion of this course, students will be able to

1. Implement solution for an Engineering problem.
2. Test and troubleshoot the implemented design.
3. Execute the project implementation & financial budget in a timely manner.
4. Student will be able to contribute and work effectively as team member.
5. Generate project report and present it effectively.

Project Stage –II includes various steps such as:

1. System design
2. Testing
3. System documentation
4. Project report