VINAYAKA MISSION'S RESEARCH FOUNDATION, SALEM (Deemed to be University)

.

FACULTY OF ENGINEERING & TECHNOLOGY

SCHOOL OF ELECTRONIC SCIENCES

B.E- ELECTRONICS & COMMUNICATION ENGINEERING

FULL TIME

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR

&

V.M.K.V. ENGINEERING COLLEGE, SALEM

CHOICE BASED CREDIT SYSTEM

2016 REGULATION

(Semester III to VIII)

I SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	English for Engineers (common to ECE,BME,MECT,EEE)	ENGLISH	3	0	0	3
2	Physics for Engineers (common to ECE,BME,MECT,EEE)	PHYSICS	3	0	0	3
3	Calculus for Engineers (common to ECE,BME,MECT,EEE)	MATHS	3	1	0	4
4	Essentials of Computer Science Engineers (common to ECE,BME,MECT,EEE)	CSE	3	0	0	3
5	Essentials of Civil and Mechanical Engineers (common to ECE,BME,MECT,EEE)	CIVIL / MECH	3	0	0	3
PRACTICAL						
6	Physics Lab (common to ECE,BME,MECT,EEE)	PHY	0	0	3	2
7	Workshop Practices (common to ECE,BME,MECT,EEE)	MECH	0	0	3	2
8	Computer Lab (common to ECE,BME,MECT,EEE)	CSE	0	0	3	2
9	Yoga & Meditation (common to ECE,BME,MECT,EEE)	GEN	0	0	2	2
TOTAL						24

II SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Business English (common to ECE,BME,MECT,EEE)	ENGLISH	3	0	0	3
2	Chemistry for Engineers (common to ECE,BME,MECT,EEE)	CHEM	3	0	0	3
3	Transforms & Matrices (common to ECE,BME,MECT,EEE)	MATHS	3	1	0	4
4	C Programming (common to ECE,BME,MECT,EEE)	CSE	3	0	0	3
5	Electronic Devices (common to ECE,BME,MECT,EEE)	ECE	3	0	0	3
PRACTICAL						
6	Engineering Chemistry Lab (common to ECE,BME,MECT,EEE)	CHEM	0	0	3	2
7	Engineering Graphics Lab (common to ECE,BME,MECT,EEE)	MECH	0	0	3	2
8	C Programming Lab (common to ECE,BME,MECT,EEE)	CSE	0	0	3	2
9	Electronic Devices Lab (common to ECE,BME,MECT,EEE)	ECE	0	0	3	2
TOTAL						24

III SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Mathematics for Electronics Engineers	MATHS	3	1	0	4
2	Circuits & Networks	ECE	3	0	0	3
3	Signals & Systems (common to ECE & BME)	ECE	3	0	0	3
4	Electromagnetic Fields & Transmission Lines	ECE	3	1	0	4
5	Electronic Circuits (common to ECE & BME)	ECE	3	0	0	3
6	Digital Electronics(common to ECE, BME & EEE)	ECE	3	1	0	4
PRACTICAL						
7	Circuits & Networks Lab	ECE	0	0	3	2
8	Electronic Circuits Lab (common to ECE & BME)	ECE	0	0	3	2
9	Digital Electronics Lab (common to ECE & BME)	ECE	0	0	3	2
10	Personality Skill Development – I	MGMT/ ENGLISH	0	0	2	1
TOTAL						28

IV SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Numerical Methods & Random Process	MATHS	3	1	0	4
2	Digital Signal Processing	ECE	3	1	0	4
3	Microcontroller & Applications (common to ECE & BME)	ECE	3	0	0	3
4	Digital Communication	ECE	3	0	0	3
5	Control Systems (common to ECE & MECT)	EEE	3	1	0	4
6	Linear Integrated Circuits	ECE	3	0	0	3
PRACTICAL						
7	Microcontroller Lab (common to ECE & BME)	ECE	0	0	3	2
8	Digital Communication Lab	ECE	0	0	3	2
9	Linear Integrated Circuits Lab	ECE	0	0	3	2
10	Personality Skill Development – II	MGMT/ENGLISH	0	0	2	1
TOTAL						28

V SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Environmental Science and Engineering (common to BME)	CHEM	3	0	0	3
2	Antennas & Wave Propagation	ECE	3	1	0	4
3	Digital Image Processing	ECE	3	0	0	3
4	Computer Communication	ECE	3	0	0	3
5	VLSI Design	ECE	3	0	0	3
6	Elective I –	ECE	3	0	0	3
PRACTICAL						
7	Industrial Training I (To be undergone after IV Semester)	ECE	1	0	0	1
8	Image Processing Lab	ECE	0	0	3	2
9	Computer Communication Lab	ECE	0	0	3	2
10	VLSI Design Lab	ECE	0	0	3	2
11	Aptitude I	ECE	0	0	1	1
TOTAL						27

VI SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	RF & Microwave Engineering	ECE	3	1	0	4
2	Optical Communication	ECE	3	0	0	3
3	Embedded & Real Time Systems	ECE	3	0	0	3
4	Remote Sensing	ECE	3	0	0	3
5	Virtual Instrumentation	ECE	3	0	0	3
6	Elective II –	ECE	3	0	0	3
PRACTICAL						
7	RF, Microwave & Optical Communication Lab	ECE	0	0	3	2
8	Embedded & Real Time Systems Lab	ECE	0	0	3	2
9	Virtual Instrumentation Lab	ECE	0	0	3	2
10	Aptitude – II	ECE	0	0	1	1
TOTAL						26

VII SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Professional Ethics and Human Values	GEN	3	0	0	3
2	Disaster Mitigation and Management	CIVIL	3	0	0	3
3	Wireless Communication	ECE	3	0	0	3
4	Medical Electronics	ECE	3	0	0	3
5	RFID	ECE	3	0	0	3
6	Elective – III	ECE	3	0	0	3
PRACTICAL						
7	Medical Electronics Lab	ECE	0	0	3	2
8	Comprehension	ECE	0	0	3	2
9	Mini Project	ECE	0	0	2	2
TOTAL						24

VIII SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Elective - IV	ECE	3	0	0	3
2	Elective - V	ECE	3	0	0	3
3	Elective - VI	ECE	3	0	0	3
PRACTICAL						
4	Project Work & Viva Voce	ECE	0	0	12	6
TOTAL						15

ELECTIVES LIST

S.No.	Course Title	Offering Department	L	T	P	C
1	Satellite Communication & Broadcasting	ECE	3	0	0	3
2	Wireless Sensor Networks	ECE	3	0	0	3
3	Video Processing	ECE	3	0	0	3
4	Advanced Microcontrollers	ECE	3	0	0	3
5	Photonics & Optical Networks	ECE	3	0	0	3
6	Modern Wireless Communication Systems	ECE	3	0	0	3
7	Robotics and Automation	ECE	3	0	0	3
8	Advanced Digital Design	ECE	3	0	0	3
9	Electromagnetic Interference & Compatibility	ECE	3	0	0	3
10	VLSI Signal Processing	ECE	3	0	0	3
11	Total Quality Management	MGMT	3	0	0	3
12	Managerial Economics & Financial Analysis	MGMT	3	0	0	3
13	Nanotechnology	ECE	3	0	0	3
14	Programmable Logic Controller	ECE	3	0	0	3
15	Micro Electro Mechanical Systems	ECE	3	0	0	3
16	Electronics Measurements	ECE	3	0	0	3
17	Computer Organization & Architecture	CSE	3	0	0	3
18	Neural Network & Fuzzy Control	ECE	3	0	0	3
19	Artificial Intelligence and Expert System	ECE	3	0	0	3
20	Grid & Cloud Computing	CSE	3	0	0	3
21	Information Security	CSE	3	0	0	3
22	Cyber Security	CSE	3	0	0	3
23	Global Positioning System	ECE	3	0	0	3
INDUSTRIAL ELECTIVIES						
24	Business Intelligence and its Applications	INFOSYS	3	0	0	3
25	Soft Skills	INFOSYS	3	0	0	3
26	Learning IT Essentials by Doing	INFOSYS	3	0	0	3

Overall Credits

S. No	Semester	Credits

1	I	24
2	II	24
3	III	28
4	IV	28
5	V	27
6	VI	26
7	VII	24
8	VIII	15
Total		**196**

SEMESTER III	L	T	P	C
MATHEMATICS FOR ELECTRONICS ENGINEERS	**3**	**1**	**0**	**4**

AIM:

Give students a solid grounding in mathematical methods and ideas in areas relevant to applications in engineering: Laplace transforms, eigenvalues, eigenvectors and eigenfunctions, complex variable theory, and

partial differential equations.

OBJECTIVES:

- Partial differential equations arise in most of the Engineering discipline when the number of independent variables in the given problem under discussion is two or more.
- Fourier series is used to express even aperiodic functions in terms of periodic functions making them amenable for further processing.
- Fourier series has the wide application in the field of heat diffusion, wave propagation and in signal and systems analysis.

OUTCOMES:

- The understanding of the mathematical principle on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering

UNIT-I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation - Solutions of standard types f(p,q)=0, clairauts form, f(z,p,q)=0,f(p,x)=g(q,y) of first order equations - Lagrange's Linear equation - Linear partial differential equations of second and higher order with constant coefficients.

UNIT-II FOURIER SERIES 12

Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity – Harmonic Analysis.

UNIT-III BOUNDARY VALUE PROBLEMS 12

Classification of second order linear partial differential equations - Solutions of one - dimensional wave equation, one-dimensional heat equation - Steady state solution of two-dimensional heat equation - Fourier series solutions in Cartesian coordinates.

UNIT-IVANALYTIC FUNCTIONS 12

Function of a complex variable – Analytic function – Necessary conditions - Cauchy Riemann equations – Sufficient conditions (excluding proof) – Harmonic conjugate–Constructions of analytic functions-conformal mapping(w=z+c,w=z2,w=1/z)-bilinear transformation

UNIT-V GRAPH THEORY 12

Graphs,sub graphs, complements-Graph isomorphism-vertex degree,- Eulerian graphs-Hamiltonian graphs-Matrix representation of graphs(both directed and undirected graphs).

Lecture Hours: 45, Tutorial Hours: 15

Total hours : 60

TEXT BOOKS:

1. A.Singaravelu,"Transforms and Partial Differential Equations", Meenakshi Agencies,Chennai.
2. A.Singaravelu,Engineering mathematics-II, ", Meenakshi Agencies,Chennai.
3. Veerarajan, T., "Discrete Mathematics, Tata McGraw Hill Publishing Co., NewDelhi.

REFERENCES:

1. T. Veerarajan, "Transforms and Partial Differential Equations", First Edition, Tata McGraw- Hill Publishing Company limited, 2011.
2. Grewal, B.S., "Higher Engineering Mathematics" (35th Edition), Khanna Publishers,Delhi ,2000.
3. Kreyszig, E., "Advanced Engineering Mathematics" (8th Edition), John Wiley and Sons,(Asia) Pte Ltd., Singapore, 2000.
4. Discrete Mathematics by Sundarasen.V, Ganapathy Subramaniam. K.S, Ganesan.K. A.R. Publications, Chennai.

SEMESTER III	L	T	P	C
CIRCUITS AND NETWORKS	3	0	0	3

AIM

To know about basic analysis and synthesis techniques used in electronics and communications.

OBJECTIVES

- To study about various network theorems and the method of application to analyse a circuit.
- To know the concept of transfer function of a network and the nature of response to external inputs.
- To synthesize a network in different forms from the transfer function.

- To know the concept and design of frequency selective filters.

OUTCOMES:

- Ability analyse electrical circuits
- Ability to apply circuit theorems
- Ability to analyse AC and DC Circuits

1. BASICS OF CIRCUIT ANALYSIS **9**

Kirchoff's Laws, DC and AC excitation, series and parallel circuits, sinusoidal steady state analysis, Mesh current and Node Voltage method of Analysis, Matrix method of Analysis.

2. NETWORK THEOREMS AND RESONANCE CIRCUITS **9**

Thevenin's and Norton's theorems, Superposition theorem, Compensation theorem, Reciprocity theorem, Maximum power transfer theorem, series and parallel resonance, Quality factor and Bandwidth.

3. ANALYSIS OF NETWORKS IN 'S' DOMAIN **9**

Network elements, Transient response of RL, RC and RLC Circuits to DC excitation, Natural and forced oscillations, Two-port Networks, Parameters and transfer function, Interconnection of two-ports.

4. ELEMENTS OF NETWORK SYNTHESIS **9**

Network realizability, Hurwitz polynomials, Positive real functions, Properties of RL, RC and LC Networks, Foster and Cauer forms of Realization, Transmission Zeroes, synthesis of transfer functions.

5. FILTER DESIGN **9**

Butterworth and Chebyshev approximation, Normalized specifications, Low passs filter design, Frequency transformations, Frequency and Impedance denormalisation, Types of frequency selective filters, Linear phase filters, Active filter design concepts.

Total =45 PERIODS

TEXTBOOKS:

1. A. Sudhakar, Shyammohan S. Palli, "Circuits and Networks Analysis and Synthesis", Second Edition, Tata McGraw-Hill, 2002. Unit (I – IV)
2. Vasudev. K. Aartre, "Network Theory and Filter Design", Wiley – Eastern Ltd, Second Edition, 1993. (Unit V)

REFERENCES:

1. William H. Hayt and Jack E. Kermmerly, "Engineering Circuit Analysis", McGraw-Hill International Edition, 1993.
2. Joseph Edminister and Mahmood Nahri, "Electric Circuits", Third Edition, Tata McGraw-Hill, New Delhi, 1999.
3. Umesh Sinha, "Network Analysis", Sataya Prakasan, New Delhi, 1986.
4. Franklin. F. Kuo, "Network Analysis and Synthesis", John Wiley, 1996.
5. Vanval Kenburg, "Network Analysis", Prentice Hall of India Pvt. Ltd, New Delhi, 1994.

SEMESTER III		L	T	P	C
SIGNALS AND SYSTEMS		3	0	0	3

(Common to ECE and BME)

AIM

The main objective of this subject is to help the students to mathematically analyze different types of signals and their associated systems.

OBJECTIVES:

At the end of this course, the students will be able to understand the

- Various classifications of both Continuous time and Discrete time Signals and Systems.
- Spectral analysis of Periodic and Aperiodic Signals using Fourier series.
- Analysis and characterization of the CT system through Laplace transform.
- Analysis and characterization of the DT system through Difference equation.
- Analysis and characterization of the DT system through Z transform.

OUTCOMES:

Upon the completion of the course, students will be able to:

- Analyze the properties of signals & systems
- Apply Laplace transform, Fourier transform, Z transform and DTFT in signal analysis
- Analyze continuous time LTI systems using Fourier and Laplace Transforms
- Analyze discrete time LTI systems using Z transform and DTFT

UNIT I-CLASSIFICATION OF SIGNALS AND SYSTEMS 9

Classification of Signals:
Continuous time signals - Discrete time signals – Periodic and Aperiodic signals – Even and odd signals – Energy and power signals –Deterministic and random signals –Complex exponential and Sinusoidal signals .Unit step, Unit ramp, Unit impulse – Representation of signals in terms of unit impulse .

Classification of Systems: Continuous time systems- Discrete time systems - Linear system – Time Invariant system – causal system – BIBO system – Systems with and without memory – LTI system.

UNIT II-ANALYSIS OF CONTINUOUS TIME SIGNALS 9

Fourier series:
Representation of Continuous time Periodic signals – Trigonometric and exponential-Symmetry conditions-Properties of Continuous time Fourier series – Parseval's relation for power signals – Frequency spectrum.

Fourier transform: Representation of Continuous time signals- Properties of Continuous time Fourier transform – Parseval's relation for energy signals – Frequency spectrum –Analysis of LTI system using Fourier methods.

UNIT III-LTI CONTINUOUS TIME SYSTEM 9
System modeling:
Solution of Differential equation with initial conditions- Zero state response and Zero input response– impulse response – Frequency response – Convolution – Analysis and characterization of LTI system using Laplace transform.

UNIT IV-ANALYSIS OF DISCRETE TIME SIGNALS AND SYSTEMS 9
Representation of sequences – Discrete Time Fourier Transform (DTFT) - Discrete Fourier Transform (DFT) and its properties – Solution of linear constant coefficient difference equations with initial conditions-Zero state response and Zero input response–- impulse response – Convolution sum - Frequency response.

UNIT V-LTI DT SYSTEM CHARACTERIZATION AND REALIZATION 9
Z transforms and its properties - Inverse Z transform: Power series expansion and Partial fraction methods - Analysis and characterization of DT system using Z transform-Realization of structures for DT systems - Direct form-I- Direct form II--Parallel-Cascade forms.

Theory-45, Tutorial-15 - (60 Periods)

TEXT BOOKS

1. Alan V Oppenheim, Ronald W. Schafer "Discreate Time Signal Processing" Pearson education , 2nd edition, 2007
2. Simon Haykin and Barry Van Veen, *"Signals and Systems",*John Wiley & Sons Inc, 2nd Edition, 2007.

REFERENCES

1. John G. Proakis and Manolakis, *"Digital Signal Processing, Principles, Algorithms and Applications",* Pearson Education, 4thEdition, 2007.
2. B.P. Lathi, *"Linear Systems & Signals",* Oxford Press, Second Edition, 2009.

3. Rodger E Ziemer, William H. Tranter, D. Ronald Fannin, *"Signals and Systems – continuous and Discrete",* Pearson Education, 4th Edition, 2009.
4. Douglas K Linder, *"Introduction to Signals and Systems",*Mc-Graw Hill, 1st Edition, 1999.

SEMESTER III	L	T	P	C
ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES	3	1	0	4

Aim

To introduce the student to the fundamental theory and concepts of electromagnetic waves and transmission lines, and their practical applications.

OBJECTIVE

- To specify the "constitutive relationships" for fields and understand why they are required.
- To estimate electric and magnetic fields from stationary and dynamic charge and current distributions
- To acquire knowledge for the measurement of basic transmission line parameters, such as the reflection coefficient, standing wave ratio, and impedance.

OUTCOMES:

Upon completion of the course, the students would be able to

- Analyze field potentials due to static changes and static magnetic fields.
- Explain how materials affect electric and magnetic fields.
- Analyze the relation between the fields under time varying situations.
- Discuss the principles of propagation of uniform plane waves**.**

UNIT I STATIC ELECTROMAGNETIC FIELDS 9

Introduction to co-ordinate system, Gradient, Divergence, Curl, Divergence Theorem, Stroke's Theorem, Coulomb's Law, Electric field Intensity, Principle of superposition, Electric Scalar potential, Line charge distribution by Moment method, Electric flux Density, Gauss's Law and its applications, Field Computations and Problems.

UNIT II STATIC MAGNETIC FIELD **9**

Magnetic field of a current carrying element, Ampere's Force law, The Biot-Savart Law, Magnetic Flux density, Gauss law for magnetic fields, Torque on a loop, Magnetic moment, Ampere's Law and Magnetic field intensity, Magneto motive force, Field cells and permeability, Vector potential, Field computation and problems.

UNIT III TIME VARYING ELECTRIC & MAGNETIC FIELDS **9**

Faraday's Law, Transformer and Motional Induction, Maxwell's equation from Faraday's Law, Self and Mutual inductance, Displacement current, Maxwell's equation from Ampere's Law and its in-consistency, Boundary relation, Poynting Vector, Comparison of field and circuit theory, Circuit Application of pointing Vector.

UNIT IV TRANSMISSION LINE THEORY **9**

Introduction - Types of transmission lines – General theory of transmission line – Line constants – Transmission line equation – Physical significance of the equations – The Infinite line – Distortion in a line – Distortion-less line – Telephone cables – Loading of lines – Types of loading – Campbell's formula – General equation for line with any termination – Input impedance – Open and Short circuited line.

UNIT V RADIO FREQUENCY TRANSMISSION LINES **9**

Line approximations – Parameters of open wire line at radio frequency, parameters of coaxial lines at radio frequencies, constants for the line of zero dissipation – Voltages and Currents on the dissipation-less lines – input impedance of a lossless line – Wavelength and velocity of propagation – Reflection – Reflection coefficient, Reflection loss, Reflection factor, Standing wave ratio, Input impedance in terms of reflection coefficient – Practical types – Microstrip line, Microwave Transmission line, Super Conducting transmission line, Characteristics of different printed transmission lines.

Total Hours: 45

TEXT BOOKS:

1. John D. Krauss, "Electromagnetics ", McGraw Hill, 1992.
2. David K. Chang, "Field and Wave Electromagnetics ", Second edition, Addison Wesley, New Delhi,
1. 2004.
2. Umesh Sinha, "Transmission lines and networks", 8th Edition, Sathya Prakasham Publishers, 2003. (Unit IV & V)

REFERENCE:

1. Hayt W.H., "Engineering Electromagnetics", McGraw Hill, 8th Edition, 2012
2. John D. Ryder, Network lines and fields, 2nd Edition, Prentice Hall of India, 2003.
3. Samuel Y. Liao, Microwave devices and circuits, 3rd Edition, Prentice Hall of India, 2003.
4. Seth S.P., Elements of Electromagnetic Fields, 2nd Edition, Dhanpat Rai& Sons, 2007.

SEMESTER III	L		T	P	C
ELECTRONIC CIRCUITS	3		0	0	3

(COMMON TO ECE & BME)

AIM:

The aim of this course is to introduce to the students the rectifiers, power supplies, basics of biasing transistor circuits, low frequency amplifiers, multi stage amplifiers, power amplifiers, tuned amplifiers, feedback amplifiers and oscillators.

OBJECTIVES:

- To study the biasing circuits and anlayse the small signal BJT amplifiers
- To understand the working and to find the efficiency of different types of large signal amplifiers
- To understand the basic concept and working of various types of feedback amplifiers and oscillators.
- To understand the working of different types of tuned amplifiers and multivibrators and their analysis.

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Design circuits with transistor biasing & simple amplifier circuits.
- Analyse the small signal equivalent circuits of transistors.
- Design and analyse large signal amplifiers.

UNIT I-BIASING CIRCUITS AND SMALL SIGNAL MODELS 9

Biasing circuits: DC load line and bias point – BJT biasing circuits – FET biasing circuits. Small-signal models: AC load line, BJT models and parameters – hybrid equivalent model – hybrid π model, FET small-signal model and parameters.

UNIT II-SMALL-SIGNAL AMPLIFIERS - ANALYSIS AND FREQUENCY RESPONSE 9

BJT amplifiers: CE, CB and CC amplifiers – multistage amplifiers - differential amplifier – designing BJT amplifier networks. (Analysis using hybrid –π model) FET amplifiers: CS, CG and CD amplifiers –designing FET amplifier networks Frequency response: low frequency response of BJT and FET amplifiers – Miller effect capacitance – high frequency response of BJT and FET amplifiers.

UNIT III-FEEDBACK AND OSCILLATOR CIRCUITS 9

Feedback circuits: concept of feedback – effects of negative feedback – feedback connection types – practical feedback circuits – phase and frequency considerations – designing feedback amplifier circuits – Applications of feedback circuits. Oscillator circuits: oscillator principles – LC oscillators – RC oscillators – crystal oscillators – designing oscillator circuits – Applications of oscillators in real time circuits.

UNIT IV-POWER AMPLIFIERS AND TUNED AMPLIFIERS 9

Power amplifiers: definitions and amplifier types – Q point placement – maximum dissipation hyperbola – Class A amplifier – Class B and Class AB push-pull amplifiers – Class C amplifiers – Amplifier distortions – heat sink – designing power amplifier circuits. Tuned amplifiers: need for tuned circuits – single tuned – double tuned – synchronously tuned amplifiers – impedance matching to improve gain – design of basic tuned amplifier – Real Time Applications of amplifiers.

UNITV-SOLID STATE SWITCHING CIRCUITS 9

Types of waveforms – transistor switching times – multivibrators – astable multivibrator – monostable multivibrator – bistable multivibrator – schmitt trigger – design of multivibrators and Schmitt trigger – Applications of switching circuits.

TOTAL HOURS: 45

TEXT BOOKS:

1. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, Pearson Education, 9th Edition, 2009.
2. David A Bell, “Fundamentals of Electronic Devices and Circuits”, Oxford University Press, 2009.
3. David A. Bell, “Solid State Pulse Circuits”, Oxford University Press, 2007.

REFERENCES:

1. Jacob Millman, Christos C Halkias, Satyabrata Jit, “Electron Devices and Circuits”, Tata McGraw Hill, 2010.
2. Thomas L. Floyd, “Electronic Devices”, 9th edition, Pearson Education, 2011.
3. Albert P. Malvino, David J. Bates, “Electronic Principles”, 7th edition, Tata McGraw Hill, 2007.

SEMESTER III	L	T	P	C
DIGITAL ELECTRONICS	3	1	0	4

(Common to ECE, BME & EEE)

AIM

The Aim of this course is to develop a strong foundation in analysis and design of digital electronics.

OBJECTIVES

- Understand the basic concepts.
- Understand concepts of logic gates constructional features.
- To understand the concepts of gate-level minimization & combinational logic.
- To analyze synchronous sequential logic.

OUTCOMES:

Students will be able to:

- Analyze different methods used for simplification of Boolean expressions.
- Design and implement Combinational circuits and implement synchronous and asynchronous sequential circuits.
- Write simple HDL codes for the circuits.

UNIT – I: NUMBER SYSTEM **9**

Digital System, Binary Numbers, Number-Base Conversions, Octal & Hexadecimal Numbers, Complements of Numbers, Signed Binary Numbers, Binary Codes, Binary Storage And Registers, Binary Logic

UNIT – II: BOOLEAN ALGEBRA, LOGIC GATES & GATE –LEVEL MINIMIZATION **9**

Introduction, Boolean algebra, basic theorem & properties of Boolean algebra, Boolean functions, canonical & standard forms, logic operations, logic gates, integrated circuits, map method, four variable K-maps, product of sums simplification, don't care conditions, NAND & NOR implementations, Exclusive-OR Function, Hardware Description Language.

UNIT – III: COMBINATIONAL LOGIC **9**

Introduction, Combinational Circuits, Analysis Procedure, Design Procedure ,Binary Adder- Subractor , Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders , Multiplexers , HDL Models Of Combinational Circuits.

UNIT – IV: SYNCHRONOUS SEQUENTIAL LOGIC, REGISTER & COUNTERS **9**

Sequential circuits, storage elements: latches, flip flops, analysis of closed sequential circuits, synthesizable HDL Models of sequential circuits, state reduction assignment, design procedure, shift registers, ripple counters, synchronous counters, HDL for registers and Counters.

UNIT – V: DESIGN AT THE REGISTER TRANSFER LEVEL **9**

Register Transfer Level Notation, Register Transfer Level In HDL, ASM, Sequential Binary Multiplier, Control Logic, HDL Description Of Binary Multiplier, Design With Multiplexers, Race Free Design, Latch Free Design.

TOTAL HOURS: 45

TEXT BOOKS:

1. Morris Mano, “Digital Design(with an introduction to the verilog HDL)", Prentice-Hall of India, (UNITS-I,II,III,IV,V)

REFERENCE BOOKS:

1. William I. Fletcher, “An Engineering Approach to Digital Design ", Prentice-Hall of India, 1980
2. Floyd T.L., “Digital Fundamentals ", Charles E. Merrill publishing Company, 1982.
3. Tokheim R.L., “Digital Electronics - Principles and Applications ", Tata McGraw Hill, 1999.
4. Jain R.P., “Modern Digital Electronics ", Tata McGraw Hill, 1999.

SEMESTER III	L	T	P	C
CIRCUITS AND NETWORKS LAB	0	0	3	2

AIM

This laboratory course will give a thorough knowledge about the basics of circuit analysis.

OBJECTIVES:

- The student should be made to:
- Be exposed to the characteristics of basic electronic devices
- Be exposed to RL and RC circuits
- Be familiar with Thevinin & Norton theorem KVL & KCL, and Super Position Theorems

OUTCOMES:

At the end of the course, the student should be able to:

- Learn the characteristics of basic electronic devices
- Design RL and RC circuits
- Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems

LIST OF EXPERIMENTS:

1. Verification of Ohm's laws and Kirchhoff's laws.
2. Verification of Thevenin's and Norton's Theorem.
3. Verification of Superposition Theorem.
4. Verification of Maximum power transfer theorem.
5. Verification of Reciprocity theorem.
6. Measurement of Self inductance of a coil.
7. Verification of Mesh and Nodal analysis.
8. Transient response of RL and RC circuits for DC input.
9. Frequency response of Series and Parallel resonance circuits.
10. Frequency response of Single tuned coupled circuits.

SEMESTER III	L	T	P	C
ELECTRONIC CIRCUITS LAB	0	0	3	2

(Common to ECE & BME)

AIM:

To provide the ability to design the electronic circuits using the basic electronic components.

OBJECTIVE:

- To study the characteristics of basic amplifiers and power supply.
- To verify practically, the response of various oscillators.
- To study of different Multivibrator circuits.

OUTCOMES:

At the end of the course, the student should be able to:

- Differentiate cascade and cascade amplifier.
- Analyze the limitation in bandwidth of single stage and multi stage amplifier
- Measure CMRR in differential amplifier

LIST OF EXPERIMENTS:

Design

1. Fixed Bias amplifier circuits using BJT.
2. BJT Amplifier using voltage divider bias (self-bias) with un bypassed emitter resistor.
3. Class B Complementary symmetry power amplifier.
4. Differential amplifier using BJT.
5. Power supply Full wave rectifier with simple capacitor filter.
6. Series and Shunt feedback amplifiers Frequency response, Input and output impedance calculation.
7. Design of RC Phase shift oscillator:
8. Design Wein Bridge Oscillator.
9. Design of Hartley and Colpitts Oscillator.
10. Design of Astable and Monostable and Bistable Multivibrators.

SEMESTER III	L	T	P	C
DIGITAL ELECTRONICS LAB	0	0	3	2

(Common to ECE & BME)

AIM:

To provide the student with the capability to use simulation tools in digital electronic circuit analysis and design

OBJECTIVE

- To develop necessary skills to design, analyse and construct the digital circuits
- To design and simulate logic circuits using computing tools

OUTCOMES:

Students will be able to:

- Analyze different methods used for simplification of Boolean expressions.
- Design and implement Combinational circuits.
- Design and implement synchronous and asynchronous sequential circuits

LIST OF EXPERIMENTS

1. Design and implementation of Adder and Subtractor using logic gates.
2. Design and implementation of code converters using logic gates
    a. BCD to excess-3 code and vice versa
    b. Binary to gray and vice-versa.
3. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483.
4. Design and implementation of 2 bit Magnitude Comparator using logic gates 8 Bit Magnitude Comparator using IC 7485
5. Design and implementation of 16 bit odd/even parity checker generator using IC74180.
6. Design and implementation of Multiplexer and De-multiplexer using logic gates.
7. Design and implementation of encoder and decoder using logic gates.
8. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters.
9. Design and implementation of 3-bit synchronous up/down counter.
10. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.
11. Design of experiments 1, 6, 8 and 10 using Verilog Hardware Description Language

SEMESTER IV	L			T	P	C
NUMERICAL METHODS & RANDOM PROCESS	3			1	0	4

AIM:

Analysis and implementation of numerical methods for random processes

OBJECTIVES:

- To find the missing values in a table of data using interpolation
- To study the initial value problems of Ordinary Differential Equation using various numerical methods
- To study the analysis of electrical system, signal processing operation using the concept of Random Processes.
- To apply the concept of correlation in RADAR, fault detection in VLSI circuits.

OUTCOMES:

- The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable.
- Able to analyze the response of random inputs to linear time invariant systems.

UNIT-I: INTERPOLATION AND APPROXIMATION 12

Interpolation with Newton's divided differences, Lagrange's polynomial, Newton forward and backward differences, central difference Formula (Stirling's and Bessel's)

UNIT-II: INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single Step Methods - Taylor Series, Euler and Modified Euler, Runge-Kutta method of fourth order -first and second order differential equations. Multistep Methods - Milne and Adam's-Bash forth predictor and corrector methods.

UNIT-III: RANDOM VARIABLES 12

Discrete and continuous random variables- Probability mass function – Probability density functions - moments, Moment generating functions and their properties.

UNIT-IV: RANDOM PROCESSES 12

Classification, Stationary and Markov process, Binominal process, Poisson process, Sine-wave process, Ergodic processes.

UNIT-V: CORRELATION FUNCTION AND SPECTRAL DENSITIES 12

Auto correlation for discrete and continuous process, Cross correlation functions - properties, Power spectral density, Cross spectral density – properties

Lecture Hours: 45
Tutorial Hours: 15
Total hours: 60

References:

1. T.Veerarajan, T.Ramachandran, "Numerical Methods with Programs in C, Second edition Tata McGraw-Hill (2005).
2. P.Kandasamy, K.Thilagavathy, K.Gunavathy " Probability, Random Variables and Random Processes" (First Edition 2003) : S.Chand &Company Ltd., New Delhi.
3. Kapur.J.N. and Saxena.H.C."Mathematical Statistics",S.Chand & Company Ltd.New Delhi(1997)

SEMESTER IV	L	T	P	C
DIGITAL SIGNAL PROCESSING	3	1	0	4

AIM :

To introduce the concepts of Digital signal processing and DSP Processor. The mathematical analysis of FIR and IIR filter design and simulation using MATLAB are dealt with in detail.

OBJECTIVES

- Structures of Discrete time signals and systems.
- Frequency response and design of FIR and IIR filters.
- Finite word length effect.
- DSP Processor- TMS320C5X.

OUTCOMES:

Upon completion of the course, students will be able to

- Apply DFT for the analysis of digital signals & systems
- Design IIR, FIR filters & Multirate Filters
- Apply Adaptive Filters to equalization

UNIT I-REVIEW OF DISCRETE TIME SIGNALS AND SYSTEMS 12

Overview of signals and systems – DFT–FFT using DIT and DIF algorithms – Inverse DFT-FFT using DIT and DIF algorithms – Applications – Circular convolution – MATLAB programs for DFT and FFT.

UNIT II-DESIGN AND IMPLEMENTATION OF IIR FILTERS 12

Design of analog filters using Butterworth and Chebyshev approximations – IIR digital filter design from analog filter using impulse invariance technique and bilinear transformations – Matlab programs for IIR filters.

UNIT III-DESIGN AND IMPLEMENTATION OF FIR FILTERS 12

Linear phase response – Design techniques for FIR filters – Fourier series method and frequency sampling method –Design of Linear phase FIR filters using windows: Rectangular, Hanning and Hamming windows – Matlab programs for FIR filters.

UNIT IV-FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS 12

Fixed point arithmetic – effect of quantization of the input data due to Finite word length. Product round off – need for scaling – Zero input limit cycle oscillations - Limit cycle oscillations due to overflow of adders – Table look up implementation to avoid multiplications.

UNIT V-PROCESSOR FUNDAMENTALS 12

Features of DSP processors – DSP processor packaging (Embodiments) – Fixed point Vs floating point DSP processor data paths – Memory architecture of a DSP processor (Von Neumann – Harvard) – Addressing modes – pipelining – TMS320 family of DSPs (architecture of C5x).

TOTAL No. OF HOURS: 60

TEXT BOOKS

1. John .G. Proakis and Dimitris C. Manolakis, “Digital Signal Processing Principles, Algorithms and Applications”, Pearson Education, Fourth edition, 2007.
2. B.Venkataramani, M.Bhaskar, “Digital Signal Processors, Architecture, Programming and Application”, Tata McGraw Hill, New Delhi, 2003.

REFERENCES

1. Sanjit Mitra, “Digital Signal Processing – A Computer based approach”, Tata McGraw Hill, New Delhi, 2011.
2. M.H.Hayes, “Digital Signal Processing”, Tata McGraw Hill, New Delhi, Edition, 2009.

SEMESTER IV	L	T	P	C
MICROCONTROLLER & APPLICATION	3	0	0	3

(Common to ECE & BME)

AIM

To understand the principles of microcontrollers and applications towards real world existence.

OBJECTIVES

- To learn the concepts of microprocessors.
- To get knowledge in interfacing devices.

- To know the concepts of microcontroller and its applications.
- To develop skill in simple program writing.

OUTCOMES:

At the end of the course, the student should be able to:

- Design and implement programs on 8086 microprocessor.
- Design I/O circuits & Memory Interfacing circuits.
- Design and implement 8051 microcontroller based systems.

UNIT I – INTEL 8086 MICROCPROCESSOR **9**

Architecture of 8086-Register organization – Signal Description of 8086 - 8086 Instructions set – Addressing modes – Assembler directives and operators- simple programs.

.

UNIT II – PERIPHERAL INTERFACING **9**

Programmable Peripheral Interface 8255 – Programmable Communication Interface 8251 USART – Programmable Interrupt Controller 8259A - Programmable Interval Timer 8253 – Keyboard/Display Controller 8279 – A-to-D converter – D-to-A converter.

UNIT III – INTEL 8051 MICROCONTROLLER **9**

Introduction to 8 bit microcontroller – architecture of 8051- Signal descriptions of 8051- Role of PC and DPTR- Flags and PSW- CPU registers- Internal RAM & ROM- Special Function Register-Counter & Timers- Serial Communication.

UNIT IV – ASSEMBLY LANGUAGE PROGRAM OF INTEL 8051 **9**

Interrupt- Addressing Mode- Data Transfer Instruction- Arithmetic Instruction- Logical Instruction- Jump Loop & Call Instruction- I/O Port Programming.

UNIT V – INTERFACING AND APPLICATION OF INTEL 8051 **9**

LCD Interfacing - A/D and D/A Interfacing- Sensor Interfacing- Relays and Optoisolators- Stepper Motor Interfacing- DC Motor Interfacing.

TOTAL PERIODS: 45

TEXTBOOKS

1. Krishna Kant, “Microprocessors and Microcontrollers Architecture, programming and system Design using 8085, 8086, 8051 and 8096”. PHI2007. (Unit I & II).
2. Muhammad Ali Mazidi and Janica Gilli Mazidi, The 8051 microcontroller and embedded systems, Pearson Education, 5th Indian reprint, 2003. (Unit III to V)

REFERENCE BOOKS

1. Rafiquzzaman M. – Microprocessors – Theory and Applications Intel and Motorola, PHI Pvt. Ltd., New Delhi 2001.
2. Douglas V.Hall – Microprocessors and Interfacing programming and hardware, Tata McGraw Hill Edition 1997.
3. A.K Roy, K.M Bhurchandi, Intel Microprocessors Architecture, Programming and Interfacing McGraw Hill International Edition – 2001

SEMESTER IV	L	T	P	C
DIGITAL COMMUNICATION	3	0	0	3

AIM:

To introduce the basic concepts of Digital Communication in baseband and passband domains and to give an exposure to error control coding techniques.

OBJECTIVES:

- To study signal space representation of signals and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals.
- To understand baseband and bandpass signal transmission and reception techniques.
- To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.

OUTCOMES:

Upon completion of the course, students will be able to

- Design and implement base band transmission schemes & band pass signaling schemes
- Analyze the spectral characteristics of band pass signaling schemes and their noise performance
- Design error control coding schemes

UNIT I WAVEFORM CODING TECHNIQUES 9

Pulse Code Modulation- Channel Noise and Error Probability- Quantization Noise and Signal-to-noise Ratio- Differential Pulse-Code Modulation- Delta Modulation- Coding Speech at Low Bit Rates- Applications.

UNIT II BASEBAND SHAPING FOR DATA TRANSMISSION 9

Discrete PAM Signals- Power Spectra of Discrete PAM Signals- Intersymbol Interference- Nyquist's Criterion for Distortionless Baseband Binary Transmission- Correlative Coding- Eye Pattern- Baseband M-ary PAM Systems- Adaptive Equalization for Data Transmission.

UNIT III DIGITAL MODULATION TECHNIQUES 9

Digital Modulation Formats- Coherent Binary Modulation Techniques- Coherent Quadrature Modulation Techniques- Noncoherent Binary Modulation Techinques- Comparison of Binary and Quaternary Modulation Techniques- M-ary Modulation Techniques-Effect of Intersymbol Interference- Bit Versus Symbol Error Probabilities.

UNIT IV ERROR-CONTROL CODING 9

Rationale for Coding and Types of Codes- Discrete Memoryless Channels- Linear Block Codes- Cyclic Codes- Convolution Codes-Maximum Likelihood Decoding of Convolution Codes-Distance Properties of Convolution Codes- Sequential Decoding of Convolutional Codes-Trellis Codes.

UNIT V SPREAD-SPECTRUM MODULATION 9

Pseudonoise Sequences- A Notion of Spread Spectrum- Direct-Sequence Spread Coherent Binary Phase-Shift Keying- Signal-Space Dimensionality and Processing Gain- Probability of Error- Frequency-Hop Spread Spectrum-Applications.

TOTAL HOURS: 45

TEXT BOOK

1. Simon Haykin, "Digital Communications", John Wiley, 2006.

REFERENCES:

1. John G. Proakis, MasoudSalehi, "Digital Communication", McGraw Hill 5th edition, 2007.
2. Bernard Sklar, "Digital Communication, Fundamentals and Application", Pearson Education Asia, 2nd Edition, 2012.

SEMESTER IV	L	T	P	C
CONTROL SYSTEMS	3	1	0	4

(Common to ECE, MECHATRONICS & Solar)

AIM

To provide sound knowledge in the basic concepts of linear control theory and design of control system.

OBJECTIVE

- To understand the methods of representation of systems and to desire their transfer function models.
- To provide adequate knowledge in the time response of systems and steady state error analysis
- To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
- To understand the concept of stability of control system and methods of stability analysis.
- To study the three ways of designing compensation for a control system

OUTCOMES:

Upon completion of the course, students will be able to:

- Perform time domain and frequency domain analysis of control systems required for stability
- analysis.
- Design the compensation technique that can be used to stabilize control systems.

UNIT - I: SYSTEMS AND THEIR REPRESENTATION **12**

Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT - II: TIME RESPONSE **9**

Time response – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – P, PI, PID modes of feedback control.

UNIT - III: FREQUENCY RESPONSE **9**

Frequency response – Bode plot – Polar plot – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications.

UNIT - IV: STABILITY OF CONTROL SYSTEM **9**

Characteristics equation – Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of pole, zero addition – Gain margin and phase margin –Nyquist stability criterion.

.**UNIT - V: COMPENSATOR DESIGN** **6**

Performance criteria – Lag, lead and lag-lead networks – Compensator design using bode plots.

Lecture Hours : 45, Tutorial Hours : 15

Total Hours : 60

TEXT BOOKS

1. I.J. Nagrath and M. Gopal, 'Control Systems Engineering', New Age International Publishers, 2003.
2. Benjamin C. Kuo, Automatic Control systems, Pearson Education, New Delhi, 2003.

REFERENCES

1. K. Ogata, 'Modern Control Engineering', 4th edition, PHI, New Delhi, 2002.
2. Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi, 2007.
3. Samarajit Ghosh, Control systems, Pearson Education, New Delhi, 2004
4. M. Gopal, 'Control Systems, Principles and Design', Tata McGraw Hill, New Delhi, 2002.

SEMESTER IV	L	T	P	C
LINEAR INTEGRATED CIRCUITS	3	0	0	3

AIM

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

OBJECTIVES

- To introduce the basics of Integrated Circuits and its fabrication.
- To familiarize with operational amplifiers and its Characteristics.
- To introduce the applications of Operational Amplifier
- To Introduce about the regulator and filters.
- To introduce ADC/ DAC and PLL.

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Design linear and nonlinear applications of op – amps.
- Design applications using analog multiplier and PLL.
- Design ADC and DAC using op – amps.

UNIT – I: Integrated Circuit Fabrication **9**

Classifications of ICs – IC chip size and Circuit Complexity – Fundamentals of Monolithic IC Technology – Basic Planar Process – Fabrication of Typical Circuit – Active and Passive Components of ICs – Fabrication of FET – Thick and Thin Film Technology – Technology Trends.

UNIT – II: Operational Amplifier and its Characteristics **9**

Basic Information of operational Amplifier – Ideal Operational Amplifier - Operational Amplifier Internal Circuits – Examples of IC Op Amps – FET Operational Amplifiers – DC Characteristics – AC Characteristics – Analysis of Data Sheets of an Op Amp.

UNIT – III: Operational Amplifier Applications **9**

Basic Op Amp Applications – Instrumentation Amplifiers – AC Amplifiers – V to I and I to V Converters – Op Amp Circuits Using Diodes – Sample and Hold Circuits – Log/Antilog Amplifiers – Adder/ Sub tractor – Multiplier and Divider – Differentiator and Integrator – Operational Transconductance Amplifier – Comparators – Multivibrators – Square, Triangular and Sawtooth wave Generators.

UNIT – IV: Regulators and Filters **9**

Series Op Amp Regulators – IC Voltage Regulators – 723 General Purpose Regulators – Switching regulators – RC Active Filters – Transformation – State variable Filter – Switched Capacitor Filters – Active Filters using OTA's.

UNIT – V: D/A and A/D Converters, Timers and PLL **9**

Timer – Description of Functional Diagram – Monostable and Astable Operation – Schmitt Trigger – PLL – Basic Principles – Phase Detectors/ Comparators – Voltage Controlled Oscillator – Low Pass Filter – Monolithic PLL – PLL Applications – Basic DAC Techniques – A–D Converters – DAC/ ADC Specifications.

TUTORIAL: 15

TOTAL HOURS: 60

Text Book:

1. D. Roy Choudhury, Shail B. Jain, "Linear Integrated Circuits", New Age International Publishers, 3rd Edition 2007.

Reference Books:

1. Segio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", McGraw Hill, 2008.
2. Ramakant A. Gayakwad, "OP – AMP and Linear ICs", Prentice Hall, 1994.

SEMESTER IV	L	T	P	C
MICROCONTROLLER LAB	0	0	3	2

(Common to ECE & BME)

AIM

To provide the knowledge of assembly language programming of microprocessor and microcontroller and interfacing peripheral devices with microcontroller.

OBJECTIVE

- To write the assembly language program for 8086 and 8051.
- To write the programs for communication between microcontroller and peripheral devices.
- To interface ADCs, DACs with microcontroller and learn the real time applications like stepper motor control, key board etc

OUTCOMES:

At the end of the course, the student should be able to:

- Write ALP Programmes for fixed and Floating Point and Arithmetic
- Interface different I/Os with processor
- Generate waveforms using Microprocessors
- Execute Programs in 8051

LIST OF EXPERIMENTS

1. 8085 & 8086 Assembly Language Program (ALP) for Arithmetic Operations.
2. 8051 Assembly Language Program (ALP) for Arithmetic Operations.
3. 8051 Assembly Language Program (ALP) for Logical Operations.
4. 8051 Assembly Language Program (ALP) for Bit Manipulation Operations.
5. 8051 Assembly Language Program (ALP) for arrange the numbers in Ascending and Descending order.

6. 8051 Assembly Language Program (ALP) for Interrupt & UART Operations.
7. Interfacing an ADC to 8051 Controller.
8. Interfacing DAC to 8051 Controller and generate Square, Triangular & Saw-tooth waveform.
9. Interfacing a Stepper motor to 8051 Controller and operate it in clockwise and anti-clockwise directions.
10. Interfacing a Keyboard & Display controller (8279) to 8051 Controller.

SEMESTER IV	L	T	P	C
DIGITAL COMMUNICATION LAB	0	0	3	2

AIM:

To acquire the knowledge to construct and realize the basic communication circuits and interpret the obtained results

OBJECTIVES:

The student should be made to:

- To visualize the effects of sampling and TDM
- To Implement AM & FM modulation and demodulation
- To implement PCM & DM
- To implement FSK, PSK and DPSK schemes
- To implement Equalization algorithms
- To implement Error control coding schemes

OUTCOMES:

At the end of the course, the student should be able to:

- Simulate end-to-end Communication Link
- Demonstrate their knowledge in base band signaling schemes through implementation of FSK, PSK and DPSK
- Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of communication system
- Simulate & validate the various functional modules of a communication system

LIST OF EXPERIMENTS

1. Signal Sampling and reconstruction.
2. Amplitude modulation and demodulation
3. Frequency modulation and demodulation.
4. Pulse code modulation and demodulation.
5. ASK, FSK and PSK Modulation and Demodulation.
6. TDM and FDM
7. Line Coding Schemes
8. FSK, PSK and DPSK schemes (Simulation)

9. Error control coding schemes (Simulation)
10. Spread spectrum communication (Simulation).

SEMESTER IV	L	T	P	C
LINEAR INTEGRATED CIRCUITS LAB	0	0	3	2

AIM:

To acquire the knowledge to construct and realize the real time integrated circuits and evaluate its response.

OBJECTIVE:

To learn the characteristics of integrated circuits through op-amp

OUTCOMES:

At the end of the course, the student should be able to:

- Design oscillators and amplifiers using operational amplifiers.
- Design filters using opamp and perform experiment on frequency response.
- Analyse the working of PLL and use PLL as frequency multiplier.
- Analyse the performance of oscillators and multivibrators

LIST OF EXPERIMENTS:

1. Measurement of op-amp parameters-CMRR, slew rate, open loop gain, input and output impedances
2. Inverting and non-inverting amplifiers, integrators, and differentiators Frequency response, Comparators-Zero crossing detector Schmitt trigger-precision limiter
3. Instrumentation amplifier-gain, CMRR & input impedance
4. Single op-amp second order LFF and HPF
5. Active notch filter realization using op-amps
6. Wein bridges oscillator with amplitude stabilization
7. Generation and demodultiaon of PWM and PPM
8. Multipliers using op-amps - 1,2 & 4 quadrant multipliers
9. Square , triangular and ramp generation using op-amps
10. Astable and monostable multivibrators using op-amps
11. Log and Antilog amplifiers
12. Volatage regulation using IC 723
13. Astable and monostable multivibrators using IC 555
14. Design of PLL for given lock and capture ranges& frequency multiplication
15. Realisation of ADCs and DACs

SEMESTER V	L	T	P	C

ENVIRONMENTAL SCIENCE AND ENGINEERING	3	0	0	3

(COMMON TO ECE & BME)

AIM:

To provide professional education to train students to be knowledgeable in environmental science and engineering.

OBJECTIVE:

- To create awareness on the various pollutions and their impact.
- To provide comprehensive insight in natural resources.
- To educate the ways and means to protect natural resources.
- To impart fundamental knowledge on human welfare measures.

OUTCOMES:

- Public awareness of environment at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions.
- Development and improvement in standard of living has lead to serious environmental disasters.

UNIT - I - ENVIRONMENT AND NATURAL RESOURCES 9

Environment - Definition, scope & importance - Public awareness- Forest resources, mineral resources , water resources, food resources , energy resources (uses, over -exploitation & adverse effects in each case) - Scope & role of environmental engineers in conservation of natural resources - Sustainability development.

UNIT - II - ECOSYSTEMS AND BIO – DIVERSITY 9

Ecosystem - Definition, structure and function - Energy flow -Ecological succession - food chain, food web, ecological pyramids- Introduction, types, characteristics, structure and function of forest, grassland, desert and Aquatic ecosystems - Bio - Diversity :values and uses, hotspots, threats and conservation.

UNIT - III - ENVIRONMENTAL POLLUTION 9

Pollution - Definition , manmade impacts and control measures of air, water and land pollution - Water quality standards & characterization - Importance of sanitation -Nuclear hazards – Hazardous waste management : Solid waste, waste water and biomedical waste - Prevention of pollution and role of individual – Disasters management : Floods, earthquake, cyclone and landslides - Clean technology options.

UNIT - IV - SOCIAL ISSUES AND ENVIRONMENT 9

Urban problems related to energy - Water conservation – Resettlement and rehabilitation of people - Environmental ethics - Climate change - Global warming - Acid rain - Ozone depletion- Waste land reclamation, Environment Protection Act for air, water, wild life and forests - Pollution Control Board.

UNIT - V - HUMAN POPULATION AND ENVIRONMENT 9

Population growth - Population explosion - Family welfare programme - Environment & human health - Human rights – Value education - Women and child welfare, Role of information technology in environment and human health.

Total: 45 hours

TEXT BOOKS:

1. Environmental Science and Engineering by Dr.A. Ravikrishnan, Sri Krishna Publications, Chennai.

REFERENCES:

1. Wager K.D. "Environmental Management", W.B. Saunders Co. Philadelphia, USA, 1998.
2. Bharucha Erach "The Biodiversity of India" Mapin Publishing Pvt Ltd, Ahmedabad, India
3. Trivedi R.K. "Handbook of Environmental Laws", Rules, Guidelines, Compliances and Standards Vol I & II, Enviro media.

4. Environmental Science and Engineering by Dr. J. Meenambal, MJP Publication, Chennai Gilbert M. Master: Introduction to Environmental Engineering and Science, Pearson Education Pvt Ltd., II Edition, ISBN 81-297-0277-0, 2004
5. Miller T.G. Jr Environmental Science Wadsworth Publishing Co.
6. Townsend C. Harper J. and Michael Begon, Essentials of Ecology,Blackwell Science.

SEMESTER V	L	T	P	C
ANTENNAS & WAVE PROPAGATION	3	1	0	4

AIM:

To study the course on antenna theory and propagation of waves.

OBJECTIVES:

- To study the EM theory and radiation fundamentals
- To study about wire antenna and arrays
- To study about the aperture antennas
- To study about the antenna measurements
- To study about the wave propagation

OUTCOMES:

Upon completion of the course, students will be able to:

- Explain the various types of antennas and wave propagation.
- Write about the radiation from a current element.
- Analyze the antenna arrays, aperture antennas and special antennas such as frequency
- independent and broad band

UNIT I ELECTROMAGNETIC RADIATION AND ANTENNA BASICS 9

Review of electromagnetic theory: Vector potential, Solution of wave equation, retarded case, Hertizian dipole. Antenna characteristics: Radiation pattern, Beam solid angle, Directivity, Gain, Input impedance, Polarization, Bandwidth, Reciprocity, Equivalence of Radiation patterns, Equivalence of Impedances, Effective aperture, Vector effective length, Antenna temperature.

UNIT II POINT SOURCES AND THEIR ARRAYS 9

Wire antennas: Short dipole, Radiation resistance and Directivity, Half wave Dipole, Monopole, Small loop antennas. Antenna Arrays: Linear Array and Pattern Multiplication, Two-element Array, Uniform Array, Polynomial representation, Array with non-uniform Excitation-Binomial Array.

UNIT III LOOP, SLOT and HORN ANTENNAS 9

Aperture Antennas: Magnetic Current and its fields, Uniqueness theorem, Field equivalence principle, Duality principle, Method of Images, Pattern properties, Slot antenna, Horn Antenna, Pyramidal Horn Antenna, Reflector Antenna-Flat reflector, Corner Reflector, Common curved reflector shapes, Lens Antenna.

UNIT IV SPECIAL ANTENNAS and ANTENNA MEASUREMENTS 9

Special Antennas: Long wire, V and Rhombic Antenna, Yagi-Uda Antenna, Turnstile Antenna, Helical Antenna- Axial mode helix, Normal mode helix, Biconical Antenna, Log periodic Dipole Array, Spiral Antenna, Micro strip Patch Antennas. Antenna Measurements: Radiation Pattern measurement, Gain and Directivity Measurements, Anechoic Chamber measurement.

UNIT V PROPAGATION OF RADIO WAVES 9

Basics of wave Propagation, classification of electromagnetic waves, Ground Wave Propagation, Space Wave Propagation Free-space Propagation, Ground Reflection, Surface waves, Diffraction, Wave propagation in complex Environments, Tropospheric Propagation, Tropospheric Scatter. Sky Wave Propagation Ionosphere propagation: Structure of ionosphere, Sky waves, skip distance, Virtual height, Critical frequency, MUF, Electrical properties of ionosphere, Effects of earth's magnetic fields, Faraday rotation, Whistlers.

TUTORIAL: 15

TOTAL HOURS: 60

TEXTBOOK

1. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, "Antennas and Wave Propagation", McGraw-Hill Education, 4ed, 2013.

REFERENCE BOOKS

1. E.C.Jordan and Balmain, "Electromagnetic waves and Radiating Systems", Pearson Education / PHI, 2006.
2. A.R.Harish, M.Sachidanada, "Antennas and Wave propagation", Oxford University Press, 2007.
3. Constantine A. Balanis, Antenna Theory Analysis and Design, John Wiley, 2nd Edition, 2007.
4. R.E.Collins, "Antenna and Radio wave propagation", McGraw-Hill
5. W.L Stutzman and G.A. Thiele, "Antenna analysis and design", John Wiley, 2000.

SEMESTER V	L	T	P	C
DIGITAL IMAGE PROCESSING	3	0	0	3

AIM:

To introduce the student to various image processing techniques.

OBJECTIVES:

- To study the image fundamentals
- To study the mathematical transforms necessary for image processing.

- To study the image enhancement techniques.
- To study image restoration procedures.
- To study the image compression techniques.

OUTCOMES:

Upon successful completion of this course, students will be able to:

- Discuss digital image fundamentals.
- Apply image enhancement and restoration techniques.
- Use image compression and segmentation Techniques.
- Represent features of images.

UNIT I-DIGITAL IMAGE FUNDAMENTALS **9**

Introduction-Elements of Digital Image Processing system- elements of visual perception – image sensing and acquisition – Image sampling and quantization - image representation -Some basic relationship between pixels.

UNIT II-IMAGE TRANSFORMS **9**

Introduction - 2D Discrete Fourier Transform – Properties- Importance of Phase -Walsh – Hadamard – Discrete Cosine Transform, Haar, –KL transforms –Singular Value Decomposition.

UNIT III-IMAGE ENHANCEMENT **9**

Enhancement through point operation- Histogram manipulation – Gray level transformation- Neighbourhood operation – Median filter - Image Sharpening- Bit plane slicing - Homomorphic Filtering – Zooming operation.

UNIT IV-IMAGE RESTORATION **9**

Model of Image Degradation/restoration process –Inverse filtering -Least mean square (Wiener) filtering – Constrained least mean square restoration – Singular value decomposition-Recursive filtering.

UNIT V-IMAGE COMPRESSION AND SEGMENTATION **9**

Image compression schemes – Information theory – Run length, Huffman and arithmetic coding –Vector quantization - JPEG. Image Segmentation – Classification – Thresholding – edge based segmentation – Hough transform – Active contour.

Total Hours: 45

TEXT BOOKS:

1. Rafael C Gonzalez and Richard E Woods, “Digital Image Processing”, Pearson Education, 3rd Edition, 2003.
2. S. Jayarman, S. Esakkirajan and T. Veerakumar, “Digital Image Processing”, Tata McGraw Hill, 2010.
3. A.K. Jain, “Fundamentals of Digital Image Processing”, Pearson Education, 1995.

REFERENCE BOOKS:

1. William K Pratt, “Digital Image Processing”, John Willey, 2001.
2. Millman Sonka, Vaclav Hlavac, Roger Boyle, and Broos Colic, “Image Processing Analysis and Machine Vision”, Thompson learning, 1999.

SEMESTER V	L	T	P	C
COMPUTER COMMUNICATION	3	0	0	3

AIM:

To understand the architecture, recent advances, current prac-tices and trends in computer network, analyze the networking pro-tocols and the contemporary issues in computer networks

OBJECTIVE

- To know about the concepts of Data communication and net-works and Physical Layer and different protocols.
- To impart knowledge on Medium Access Layer
- To impart knowledge on Networks Layer
- To impart knowledge on transport protocol.
- To impart knowledge on Application Layer.

OUTCOMES:

At the end of the course, the student should be able to:

- Identify the components required to build different types of networks
- Choose the required functionality at each layer for given application
- Identify solution for each functionality at each layer
- Trace the flow of information from one node to another node in the network

UNIT I INTRODUCTION & PHYSICAL LAYER **9**

Introduction: uses of computer networks - Network H/W, Net-work S/W, OSI reference Model, TCP/IP reference model, comparison of OSI & TCP/ IP model, Network Standardization. Physical Layer: Theoretical basics of data communication, guided trans-mission media, wireless transmission, PSTN, Mobile Telephone Systems, Cable Televisions.

UNIT II DATA LINK LAYER **9**

Data link layer design issues - framing, error control, flow control - Error detecting codes and Error Correcting codes, Elemen-tary data link protocols -stop-and wait protocol for error free and noisy channel - sliding window protocol - one bit, go back-N and selective repeat.

UNIT IIINETWORK LAYER **9**

The Network Layer: Network Layer Design Issues, Routing Algorithms - optimality principle, shortest path, flooding, distance vector routing, Congestion Control Algorithms, Quality of Service, Integrated Services, internetworking, Network layer in the Internet.

UNITIV TRANSPORT LAYER **9**

Transport Service, Elements of transport protocol, Congestion Control Algorithms, Internet Transport Protocol - UDP, Internet Transport Protocol - TCP, Performance issues,

UNIT V APPLICATION LAYER **9**

DNS-(Domain Name System), Electronic Mail, World Wide Web, Real Time Audio and Video, Content Delivery and Peer-to-peer,

TOTAL HOURS: 45

TEXT BOOKS:

1. Andrew S Tanenbaum, David J. Wetherall, "Computer Net-works", 5thEdition. Pearson Education/PHI/2012
2. Behrouz A. Forouzan, Data Communications and Networking, 4thEdition, McGraw Hill Higher Education 2007.

REFERENCE BOOKS:

1. Michael A.Gallo, William Hancock.M, Computer Communica-tions and Networking Technologies, BROOKS/COLE/2001
2. Richard Lai and Jirachiefpattana, "Communication Protocol Specification and Verification", Kluwer Publishers, Boston, 1998.

SEMESTER V	L	T	P	C
VLSI DESIGN	3	0	0	3

Aim

To provide the knowledge on VLSI fabrication and circuit design procedures

Objective

- To understand the MOS transistor theory, CMOS technologies and the Layout
- To understand the circuit concepts and scaling of MOS Circuits.
- To understand the concepts of designing combinational and sequential circuit using CMOS logic configuration
- To understand the subsystem design of IC's
- To understand the concepts of CMOS testing

OUTCOMES:

Upon completion of the course, students should

- Explain the basic CMOS circuits and the CMOS process technology.
- Discuss the techniques of chip design using programmable devices.
- Model the digital system using Hardware Description Language.

Unit – I: Introduction to MOS Technology **9**

A brief History-MOS transistor, Ideal I-V characteristics, C-V characteristics, Non ideal I-V effects, DC transfer characteristics - CMOS technologies, Layout design Rules, CMOS process enhancements, Technology related CAD issues, Manufacturing issues.

Unit – II: Concepts and Scaling of MOS Circuits **9**

Sheet resistance – Area capacitances of layers – Delay: Inverter Delays – Driving Large Capacitance loads – Propagation Delay – Wiring Capacitances – Choice of Layers – Scaling of MOS Circuits: Scaling models and factors – Scaling factors of device parameters – Limitation of Scaling.

Unit – III: Combinational and Sequential Circuit design **9**

Circuit families –Low power logic design – comparison of circuit families – Sequencing static circuits, circuit design of latches and flip flops, Static sequencing element methodology- sequencing dynamic circuits – synchronizers

Unit – IV: Datapath and Array Subsystems **9**

Addition/ Subtraction – one/Zero Detectors – Comparators – Boolean Logical Operations – Coding – Shifters – Multiplication – Division – Parallel Prefix Computations – SRAM – DRAM – ROM – Serial Access Memory – Programmable Logic Arrays – Array yield, Reliability and Self-test.

Unit – V: Testing **9**

Need for testing- Testers, Text fixtures and test programs- Logic verification- Silicon debug principles- Manufacturing test – Design for testability – Boundary scan

Total Hours: 45

Text Books:

1. Weste and Harris: CMOS VLSI DESIGN (Third edition) Pearson Education, Third edition, 2006.
2. D.A Pucknell & K. Eshraghian Basic VLSI Design, Third edition, PHI, 2003

Reference Books:

1. Wayne Wolf, Modern VLSI design, Pearson Education, 3rd edition 2003
2. M. J. S. Smith: Application specific integrated circuits, Pearson Education, 1997
3. J. Bhasker: Verilog HDL primer, BS publication, 2001.

SEMESTER V	L	T	P	C
IMAGE PROCESSING LAB	0	0	3	2

AIM

To impart knowledge on Image processing Techniques

OBJECTIVE:

To expertise in writing the program for generalized image pro-cessing and to understand its utilization in real time applications.

OUTCOMES:

Upon successful completion of this course, students will be able to:

- Discuss digital image fundamentals.
- Apply image enhancement and restoration techniques.
- Use image compression and segmentation Techniques.
- Represent features of images.

LIST OF EXPERIMENTS:

1. Image types - acquisition and display
2. Image Transforms - fourier and inverse fourier
3. Image Transforms - DCT,
4. Image Transforms – Hadamard
5. Image Enhancement - Histogram Equalisation
6. Image Smoothening
7. Image Sharpening
8. Edge detection
9. Image restoration - Noise removal
10. Image Restoration - Inverse filtering
11. Image Compression - Lossy compression
12. Image Compression - Wavelet coding

SEMESTER V	L	T	P	C
COMPUTER COMMUNICATION LAB	0	0	3	2

AIM

To know and understand communication networks using NETSIM Software and LAN Trainer kit.

OBJECTIVES

To study the communication networks characteristics and to analyze various MAC and routing layer Protocols.

OUTCOMES:

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

- Communicate between two desktop computers.
- Implement the different protocols
- Program using sockets.
- Implement and compare the various routing algorithms

LIST OF EXPERIMENTS:

PC to PC/peripherals communication

1. Establish RS232 communication
2. Establish Parallel port communication

MAC Layer LAN Protocols Observe the behavior & measure the throughput, compare the per-formance with other MAC Layer protocols.

3. CSMA/CD at MAC Layer
4. Token Bus at MAC Layer
5. Token Ring at MAC Layer
6. CSMA/CA at MAC Layer

LLC (Logical Link Control) Layer LAN Protocols observe the behavior & measure the throughput of reliable data transfer protocols. Compare the performance with other LLC Layer protocols.

7. Stop & Wait at LLC Layer
8. Sliding Window - Go-Back-N at LLC Layer
9. Sliding Window - Selective Repeat at LLC Layer

Routing Algorithm Performance Study of Routing Algorithms through simulation

10. Distance Vector Routing
11. Link State Routing Introduction to Socket Communication in Linux & Windows
12. Socket programming concept in Windows & Linux platforms
13. File Transfer between PC's through sockets
14. Study of Data Encryption & Decryption techniques by using them in a File Transfer

SEMESTER V	L	T	P	C
VLSI DESIGN LAB	0	0	3	2

AIM

To impart knowledge on design of Digital Circuits using VLSI Techniques

OBJECTIVE:

- To gain expertise in design and development and simulation of digital circuits with VHDL and Verilog

OUTCOMES:

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

- Write HDL code for basic as well as advanced digital integrated circuits.
- Design, Simulate and Extract the layouts of Analog IC Blocks.

LIST OF EXPERIMENTS

1. Design of all logic gates
2. Design of adders
3. Design of subtractors
4. Design of Encoder and Decoder
5. Design of Multiplexer and Demultiplexer
6. Design of Comparator
7. Design of Flip Flop
8. Design of Code converters
9. Design of Magnitude Comparator
10. Design of registers using latches and flip flops
11. Design of Synchronous Counters
13. Design of State machines
14. Design of Microprocessor parts

SEMESTER VI	L	T	P	C
RF & MICROWAVE ENGINEERING	3	1	0	4

AIM

To enable the student to become familiar with active & passive microwave devices & components used in RF & Microwave communication systems.

OBJECTIVE

- To study RF and passive microwave components and their S- Parameters.
- To study Microwave Components.
- To study Microwave Tubes.
- To study Microwave Semiconductor Devices.
- To Study Microwave Antennas.

OUTCOMES:

Upon completion of the course, students will be able to:

- Explain the active & passive microwave devices & components used in Microwave
- communication systems.
- Generate Microwave signals and design microwave amplifiers.
- Measure and analyze Microwave signal and parameters.

UNIT I INTRODUCTION TO MICROWAVES AND RF 9

Microwave spectrum and bands-characteristics of microwaves-a typical microwave system. Traditional, industrial and biomedical applications of microwaves. Microwave hazards.S-matrix – significance, formulation and properties. S-matrix representation of a multi port network, S-matrix of a two port network with mismatched load. Introduction to RF, General applications, Freuency band definitions, Overview.

UNIT II MICROWAVE COMPONENTS and their S-parameters 9

Waveguide Attenuators- Resistive card, Rotary Vane types. Waveguide Phase Shifters: Dielectric, Rotary Vane types. Waveguide Multi port Junctions- E plane and H plane Tees, Magic Tee, Hybrid Ring. Directional Couplers- 2hole, Bethe hole types. Ferrites-Composition and characteristics, Faraday Rotation. Ferrite components: Gyrator, Isolator, Circulator. S-matrix calculations for 2 port junction, E & H plane Tees, Magic Tee, Directional Coupler, Circulator and Isolator

UNIT III MICROWAVE O-type and M-type TUBES 9

Microwave tubes: O-type – Two cavity Klystrons: structure, resonant cavities, velocity modulation and Apple gate diagram, bunching process. Reflex Klystrons- structure, modes and o/p characteristics, electronic and mechanical tuning. M-type – cross-field effects, Magnetrons- types, 8-cavity Cylindrical Travelling Wave Magnetron- Hull cut-off and Hartree conditions, modes of resonance and PI-mode operation, o/p characteristics. HELIX TWT- types and characteristics of slow wave structures, structure of TWT and amplification process (qualitative treatment), Backward
Wave Oscillators

UNIT IV MICROWAVE SEMICONDUCTOR DEVICES AND IC'S 9

Avalanche Transit Time Devices- principle of operation and characteristics of IMPATT and TRAPATT diodes, Point Contact Diodes, Schottky Barrier Diodes, Parametric Devices, Detectors and Mixers. Monolithic Microwave Integrated Circuits (MMIC), MIC materials- substrate, conductors and dielectric materials. Types of MICs, hybridMICs(HMIC)

UNIT V MICROWAVE MEASUREMENTS 9

Horn antenna and its types, micro strip and patch antennas. Network Analyzer, Measurement of VSWR, Frequency, Power, Noise, cavity Q, Impedance, Attenuation, Dielectric Constant and antenna gain.

TEXT BOOKS:

1. Mike Golio,"RF and Microwave Passive Technologies", CRC Press, 2ed, 2008.
2. Samual Y.Liao, "Microwave Devices and Circuits", PHI, 3rd Edition, 2003.
3. Collin R.E., "Foundation of Microwave Engineering", McGraw Hill, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Microwave Principles – Herbert J.Reich, J.G.Skalnik, P.F.Ordung and H.L.Krauss, CBS Publishers and Distributors, New Delhi, 2004.
2. Peter A.Rizzi, "Microwave Engineering – Passive Circuits", PHI Publications.
3. Chatterjee.R, "Elements of Microwave Engineering", Affiliated East-West Press Pvt. Ltd.

SEMESTER VI	L	T	P	C
OPTICAL COMMUNICATION	**3**	**0**	**0**	**3**

AIM

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

OBJECTIVES

- To know the basics of solid state physics and understand the nature and characteristics of light.
- To understand different optical sources.
- To learn the principle of optical detection and mechanism in different detection devices.

- To understand different light modulation techniques and the concepts and applications of optical switching.
- To study optical networks and their applications

OUTCOMES:

Upon completion of the course, students will be able to:

- Discuss the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- Explain the various optical sources and optical detectors and their use in the optical communication system.
- Analyze the digital transmission and its associated parameters on system performance.

UNIT I - INTRODUCTION: OPTICAL FIBRES - STRUCTURES, WAVEGUIDES AND FABRICATION 9

Introduction to vector nature of light, Basic optical Laws and Definitions, Optical Fiber Modes and Configurations, Single Mode Fibers and Graded- Index Fiber Structures, Fiber Materials, Fiber Fabrication

UNIT II - ATTENUATION AND DISPERSION AND OPTICAL SOURCES 9

Attenuation- Absorption, Scattering Losses, Bending Losses, Core and Cladding Losses. Signal distortion in Single-Mode Fiber - Optical sources - LED and LASER diode - Principles of operation, concepts of line width, phase noise, switching and modulation characteristics.

Power Launching and Coupling and Optical Connectors

UNIT III - OPTICAL DETECTORS 9

Physical Principal of Photodiodes, Types of Optical detectors –PN Photodiode, PIN Photodiode, Avalanche photodiode, Phototransistor - Principles of operation, concepts of Responsivity, Sensitivity and quantum efficiency, noise in detection.

Multichannel Transmission Technique- Multichannel Amplitude Modulation -Multichannel Frequency Modulation, WDM Concepts and Components.

UNIT IV OPTICAL AMPLIFIERS 9

Basic concepts, semiconductor Laser Amplifiers, Erbium-Doped Fiber Amplifier, Raman Fiber amplifier, Brillouin Fiber amplifier ,Applications of Optical Amplifiers, Noise in Optical Amplifiers, Noise Figure of Amplifier.

UNIT V OPTICAL NETWORKS AND OPTICAL SPACE COMMUNICATION 9

Network Concepts, Network Topologies, SONET/SDH, High Speed Light wave Links, Optical Add/Drop Multiplexing, Optical Switching, WDN Networks, Passive Optical Networks, Optical Ethernet.

Introduction and application of Optical Space Communication.

TEXT BOOKS:

1. Keiser. G, “Optical fiber communications”, 4th Edition Tata McGraw-Hill, New Delhi, 2008.(Unit I , II & III)
2. Franz & Jain, “Optical communication, Systems and Components”, Narosa Publications, New Delhi, 2000. (Unit IV & V)

REFERENCE BOOKS:

1. John Gowar, “Optical Communication Systems”, 2nd Edition Prentice Hall, 1993.
2. Karminvov & T. Li “Optical Fibre Telecommunications”, Vol A & B, Academic Press, 2002.
3. Agrawal. G.P, “Fiber-Optic Communication Systems” 3rd Edition John Wiley & Sons, 2002.

SEMESTER VI	L	T	P	C
EMBEDDED & REAL TIME SYSTEMS	**3**	**0**	**0**	**3**

AIM

To design, describe, validate and optimize embedded electronic systems in different industrial application areas.

OBJECTIVE

- To understand the concept and Devices of Embedded Systems
- To understand the basic programming tool for embedded systems
- To learn about various RTOS available
- To understand the basic real time systems and databases

OUTCOMES:

Upon completion of the course, students will be able to:

- Outline the concepts of embedded systems
- Explain the basic concepts of real time Operating system design.

- Use the system design techniques to develop software for embedded systems
- Model real-time applications using embedded-system concepts

Unit – I Embedded Devices **9**

Introduction to Embedded Systems – Microcontroller 8051 – Advanced Processor Architecture – Memory Organization – Real World Interfacing – Devices for embedded Systems – Communication Buses for Device network.

Unit – II Embedded Programming **9**

Programming concepts and Embedded Programming in C, C++ and Java – Program modeling – Inter-process Communication – Synchronization of Processes – Threads - Tasks.

Unit – III Real Time Operating Systems **9**

OS Services – Process Management – Time and Even Functions – Memory Management – Device, file and IO subsystems – Interrupts – Design and Scheduling – OS Security Issues – Microc/OS-II and Vx Works – Windows CE, OSEK - RTLinux

Unit – IV Real Time Systems and Tasks **9**

Performance Measures – Estimating Program run Times – Task Assignment and Scheduling: Classical uniprocessor Scheduling Algorithms – Uniprocessor Scheduling of IRIS Tasks – Task Assignment – Mode Changes – Fault Tolerant Scheduling.

Unit – V Databases and Communication **9**

RT Databases – Real-time Vs General Purpose Databases – Main memory Databases – Transaction Priorities and Aborts – Concurrency Control Issues – Disk Scheduling Algorithms – Maintaining Serialisation Consistancy – Databases for Hard Real Time Systems – Communication Media – Network Topologies – Protocols.

Text Books

1. Raj Kamal, “Embedded Systems, Architecture, Programming and Design”, Tata McGraw Hill Education Private Limited, 2012.
2. C. M. Krishna, Kang G. Shin, “Real Time Systems”, McGraw Hill International Editions, 2012.

Reference Books:

1. Shibu K. V, “Introduction to Embedded Systems”, McGraw Hill Internationals, 2014.
2. Wayne Wolf, “Computers as Components, Principles of Embedded Computing Design”, Elsevier 2005.
3. Jane W. S. Liu, Real Time Systems”, Pearson Education, Seventh Impression, 2008.

SEMESTER VI	L	T	P	C
REMOTE SENSING	3	0	0	3

AIM

To make students to understand the Concept and applications of Remote Sensing.

OBJECTIVE

- To study the process of remote sensing.
- To study about characteristics of EMR.
- To understand the various satellites and microwave remote sensing.
- To understand the use of Geographic Information System.
- To learn about the recent application of remote sensing.

OUTCOMES:

Upon successful completion of this course, students will be able to:

- understand the concepts of remote sensing
- learn about satellite imaging techniques & recent applications of remote sensing

UNIT I REMOTE SENSING AND TYPES OF REMOTE SENSING & SENSOR CHARACTERISTICS 9

Introduction-Definition – Remote Sensing Process –Sources of Energy – Interaction with Atmosphere and Target.

Types of Remote Sensing-Characteristics of Images-Orbit of Remote Sensing Satellites-Remote Sensing Satellites.– Black Body Radiation, Sensor parameters- Atmospheric Sensors-Active remote sensors-Planck's law – Stefan-Boltzman law.

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Materials – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces- Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface: Imaging spectrometry and spectral characteristics.

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING 9

Satellites - Classification – Based on Orbits and Purpose – Satellite Sensors –Factors affecting Microwave Measurements-Radar wave bands-Speckle Noise - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar – Interpreting SAR Images – Geometrical characteristics.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

GIS – Architecture of GIS – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters

UNIT V MISCELLANEOUS TOPICS 9

Visual Interpretation of Satellite Images – Elements of Interpretation – Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing

Urban & Municipal Application- Forest Resources Management - Watershed Management – Natural Disaster Management. Global positioning system – an introduction.

TOTAL HOURS: 45

TEXT BOOKS

1. Basudeb Bhatta, Remote Sensing and GIS, Second Edition,Published in India Oxford University Press,2011. (Unit 1)
3. M.G. Srinivas (Edited by), Remote Sensing Applications, Narosa Publishing House, 2001. (Units 2).
4. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001 (Units 3, 4 & 5).

REFERENCE BOOKS

1. Jensen, J.R., Remote sensing of the environment, Prentice Hall, 2000.
2. Kang-Tsung Chang,"Introduction to Geographic Information Systems", TMH, 2002
5. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley and Sons, Inc, New York, 1987.
6. Burrough P A, "Principle of GIS for land resource assessment", Oxford
7. Mischael Hord, "Remote Sensing Methods and Applications", John Wiley & Sons, New York, 1986.
7. Singal, "Remote Sensing", Tata McGraw-Hill, New Delhi, 1990.
8. Floyd F. Sabins, Remote sensing, "Principles and interpretation", W H Freeman and Company 1996.

SEMESTER VI	L	T	P	C
VIRTUAL INSTRUMENTATION	3	0	0	3

AIM:

Enable students to understand basics, programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications

OBJECTIVE

- To understand what is Virtual instrumentation and to realize the architecture of VI.
- To familiarize with the VI software and learn programming in VI.
- To study various Instrument Interfacing and data acquisition methods.
- To understand various analysis tools and develop programs for Process control applications.

OUTCOMES:

Upon successful completion of this course, students will be able to:

- Understand the concept of VI & familiarize with the VI software and learn programming in VI
- understand various analysis tools and develop programs for Process control applications

UNIT I –INTRODUCTION TO REVIEW OF VIRTUAL INSTRUMENTATION 9

History of Instrumentation systems, Evolution of Virtual Instrumentation, Premature Challenges, Virtual Instrumentation - Programming Requirements, Drawbacks of Recent Approaches, Conventional Virtual Instrumentation, Distributed Virtual Instrumentation, Virtual Instruments Versus Traditional Instruments, Advantages of VI

UNIT II – PROGRAMMING TECHNIQUES 9

Introduction, Virtual Instruments, Dataflow Programming, Control Structures, Selection Structures, Arrays, Clusters, Waveform Charts and Graphs, tables, File I/O

UNIT III – DATA ACQUISITION BASICS **9**

Introduction, Components of Measuring System, Origin of Signals, Transducer, Sensors, General Signal Conditioning Functions, Analog-to-Digital Control

UNIT IV – COMMON INSTRUMENT INTERFACES **9**

Introduction, Current Loop, RS232, RS422 and RSS485, GPIB, VISA, Interface Buses, Data Transmission Concepts

UNIT V –APPLICATIONS OF VI **9**

Fiber-Optic Component Inspection, Data Acquisition and User Interface of Beam Instrumentation System, Virtual Instrumentation and CAD Tool for Electronic Engineering Learning, The Virtual Instrument Control System, Distributed Multiplatform Control System, Implementation of a Virtual Factory Communication System, Neural Networks for Measurement and Instrumentation in Virtual Environments.

TOTAL HOURS: 45

TEXT BOOKS

1. Dr. Sumathi. S and Prof. Surekha. P, “LabVIEW Based Advanced Instrumentation Systems”, 2nd edition, 2007.

REFERENCE BOOKS

1. Lisa .K, Wells and Jeffrey Travis, “LABVIEW for Everyone”, Prentice Hall, 2009.
2. Skolkoff, “Basic concepts of LABVIEW 4”, PHI, 1998.

SEMESTER VI	L	T	P	C
RF, MICROWAVE & OPTICAL COMMUNICATION LAB	0	0	3	2

AIM

To know and understand how communication is being established at RF, microwave frequencies and using fiber in optical communication.

OBJECTIVES

- To have a detailed practical study on RF circuits, microwave equipments
- To study the optical devices and to use in the appropriate application

OUTCOMES:

At the end of the course, the student should be able to:

- Analyze the performance of simple optical link.
- Test microwave and optical components.
- Analyze the mode characteristics of fiber
- Analyze the radiation of pattern of antenna.

LIST OF EXPERIMENTS

Experiments pertaining to RF, Microwave, Fiber optics, Optical Communication and Fiber optic sensors

RF

1. Characteristics of RF Amplifier.
2. Characteristics of RF Filter.

MICROWAVE:

1. Characteristics of Gunn diode Oscillator.
2. Characteristics of Reflex Klystron.
3. Characteristics of Directional Coupler
4. Characteristics of E / H Plane Tee, Magic Tee.
5. Horn Antenna – Gain and directional Characteristics

OPTICAL COMMUNICATION

1. Numerical aperture determination for fibers
2. D.C. Characteristics of LED and PIN Photo Diode
3. Optical transmission using Analog Modulation
4. Data transmission through Fiber Optic Link.
5. PI Characteristics of LASER diode.

SEMESTER VI	L	T	P	C
EMBEDDED AND REAL TIME SYSTEMS LAB	**0**	**0**	**3**	**2**

AIM:

To know and understand the concepts of micro controller functioning and to study about various RTOS and their functioning

OBJECTIVE:

- To study about the programming concept of embedded systems

OUTCOMES:

At the end of the course, the student should be able to:

- Interface memory and write programs related to memory operations
- Write programs for interfacing keyboard, display, motor and sensor.
- Formulate a mini project using embedded system

LIST OF EXPERIMENTS

1. Design with 16 Bit Processor of Led flash using Msp430.
2. Design with 16 Bit Processor of Timer using Msp430.
3. Design with 16 Bit Processor of Interrupt using Msp430.
4. Design with 16 Bit Processor of Serial communication-RS 232 using Msp430.
5. Design a Led with 8 Bit Microcontrollers-8051.
6. Design a Buzzer with 8 Bit Microcontrollers-8051.
7. Design a Serial port programming with 8 Bit Microcontrollers-8051.
8. Design a LCD with 8 Bit Microcontrollers-8051.
9. Design a Dc motor with 8 Bit Microcontrollers-8051.
10. Design a Timer with 8 Bit Microcontrollers-8051.
11. Study of Real Time Operating System.
12. Switch Interfacing Using 8 Bit Microcontroller-8051.
13. ADC Interfacing Using 8 Bit Microcontroller-8051.

SEMESTER VI	L	T	P	C
VIRTUAL INSTRUMENTATION LAB	**0**	**0**	**3**	**2**

AIM:

To get practical knowledge in programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications.

OBJECTIVE

- To familiarize with the VI software and learn programming in VI.

OUTCOMES:

Upon successful completion of this course, students will be able to:

- Understand the concept of VI & familiarize with the VI software and learn programming in VI
- understand various analysis tools and develop programs for Process control applications

LIST OF EXPERIMENTS

2. Verification of Arithmetic Operations.
2. Verification of Half Adder and Full adder.
2. Program to find Addition of First n natural numbers using for and while loop.
3. Implementation of Array functions.
4. Program for implementing seven segment display.
9. Program to perform Traffic light control.
10. Calculation of BMI using cluster.
11. Program to control Temperature by using RTD and DAQ .
12. Program to control Temperature by using Thermocouple and DAQ
13. Program to control Temperature by using Thermister and DAQ
14. Program for controlling the Flow of water using DAQ.
15. Program for controlling the Level of water using DAQ.
16. Program for Pressure control using DAQ.
17. Program for controlling the speed of a DC motor using PID tool box.

REFERENCES

1. Dr. Sumathi. S, Prof. Surekha. P, "LabVIEW Based Advanced Instrumentation Systems", 2nd edition, 2007.

SEMESTER VII	L	T	P	C
PROFESSIONAL ETHICS AND HUMAN VALUES	3	0	0	3

(COMMON TO ECE, BME & MECHATRONICS)

AIM*:*

To create an awareness on Ethics and Human Values in engineering professions and to inspire moral and social values and Loyalty to appreciate the rights of others

OBJECTIVE:
After completing the course, the learner should know how to maintain code of conduct in work places and respect to each other.

OUTCOMES:
Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

Unit – I: HUMAN VALUES **9**
Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

Unit – II: ENGINEERING ETHICS **9**
Senses of Engineering Ethics - variety of moral issues - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

Unit – III: ENGINEERING AS SOCIAL EXPERIMENTATION **9**
Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

Unit – IV: SAFETY, RESPONSIBILITIES AND RIGHTS **9**
Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island and Chernobyl case studies.
Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

Unit – V: GLOBAL ISSUES **9**
Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE),India, etc.

TOTAL HOURS: 45

TEXT BOOKS

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

REFERENCE BOOKS

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics: Concepts and Cases”, Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
5. Naagarazan. R. S, A Textbook on Professional Ethics and Human Values , New Age Publications.

SEMESTER VII	L	T	P	C
DISASTER MITIGATION AND MANAGEMENT	3	0	0	3

(COMMON TO ECE, BME, MECHATRONICS, EEE & SOLAR)

AIM

To impart awareness on disasters and preparedness during disasters.

OBJECTIVES

- To Understand basic concepts in Disaster Management
- To Understand Definitions and Terminologies used in Disaster Management
- To Understand the Challenges posed by Disasters
- To understand Impacts of Disasters

OUTCOMES:

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management

UNIT 1 INTRODUCTION **9**

Concept of disaster; Different approaches; Concept of Risk; Levels of disasters; Disaster phenomena and events *(Global, national and regional)*; Natural and man-made hazards

UNIT 2 RISK ASSESSMENT AND VULNERABILITY ANALYSIS **9**

Response time, frequency and forewarning levels of different hazards; Characteristics and damage potential of natural hazards; hazard assessment ;Dimensions of vulnerability factors; vulnerability assessment; Vulnerability and disaster risk; Vulnerabilities to flood and earthquake hazards

UNIT 3 DISASTER MANAGEMENT MECHANISM **9**

Concepts of risk management and crisis management -Disaster management cycle; Response and Recovery; Development, Prevention, Mitigation and Preparedness-Planning for relief

UNIT 4 DISASTER RESPONSE **9**

Mass media and disaster management-Disaster Response Plan; Communication, Participation, and Activation of Emergency Preparedness Plan-Logistics Management-Psychological Response-Trauma and Stress Management-Rumour and Panic Management-Minimum Standards of Relief-Managing Relief-Funding

UNIT 5 DISASTER MANAGEMENT IN INDIA **9**

Strategies for disaster management planning; Steps for formulating a disaster risk reduction plan; Disaster management Act and Policy in India; Organisational structure for disaster management in India; Preparation of state and district disaster management plans

Total Hours: 45

TEXT BOOKS

1. Alexander, D. *Natural Disasters,* ULC press Ltd, London, 1993.
2. Carter, W. N. *Disaster Management: A Disaster Management Handbook,* Asian Development Bank, Bangkok, 1991.
3. Chakrabarty, U. K. *Industrial Disaster Management and Emergency Response,* Asian Books Pvt. Ltd., New Delhi 2007.

REFERENCE BOOKS

1. Abarquez I. & Murshed Z. *Community Based Disaster Risk Management: Field Practitioner's Handbook,* ADPC, Bangkok, 2004.
2. Goudie, A. *Geomorphological Techniques,* Unwin Hyman, London 1990.
3. Goswami, S. C. *Remote Sensing Application in North East India,* Purbanchal Prakesh, Guwahati, 1997.
4. *Manual on Natural Disaster Management in India,* NCDM, New Delhi, 2001.
5. *Disaster Management in India,* Ministry of Home Affairs, Government of India, New Delhi, 2011.
6. *National Policy on Disaster Management,* NDMA, New Delhi, 2009.
7. *Disaster Management Act. (2005),* Ministry of Home Affairs, Government of India, New Delhi, 2005.

SEMESTER VII	L	T	P	C
WIRELESS COMMUNICATION	3	0	0	3

AIM

To introduce the concepts of wireless / mobile communication using cellular environment and to make the students to know about the various wireless network systems and standards are to be introduced.

OBJECTIVES:

- It deals with the fundamental cellular radio.
- It presents different ways to radio propagation models
- It provides idea about analog and digital modulation techniques used in wireless communication.
- It also deals with the different types of equalization techniques and diversity concepts
- It deals with advanced transceiver schemes and second generation and third generation wireless networks.

OUTCOMES:

At the end of the course, the student should be able to:

- Characterize wireless channels
- Design and implement various signaling schemes for fading channels
- Design a cellular system

- Compare multipath mitigation techniques and analyze their performance

UNIT I SERVICES AND TECHNICAL CHALLENGES **9**

Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.

UNIT II WIRELESS PROPAGATION CHANNELS **9**

Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models.

UNIT III WIRELESS TRANSCEIVERS **9**

Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying, π/4-Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels.

UNIT IV SIGNAL PROCESSING IN WIRELESS SYSTEMS **9**

Principle of Diversity, Macrodiversity, Microdiversity, Signal Combining Techniques, Transmit diversity, Equalisers- Linear and Decision Feedback equalisers, Review of Channel coding and Speech coding techniques.

UNIT V ADVANCED TRANSCEIVER SCHEMES **9**

Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Orthogonal Frequency Division Multiplexing – Principle, Cyclic Prefix, Transceiver implementation, Second Generation(GSM, IS–95) and Third Generation Wireless Networks and Standards

TOTAL HOURS: 45

TEXT BOOKS:

1. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.
2. Simon Haykin & Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.

REFERENCES:

1. Rappaport. T.S., “Wireless communications”, Pearson Education, 2003.
2. Gordon L. Stuber, “Principles of Mobile Communication”, Springer International Ltd., 2001.
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.

SEMESTER VII	L	T	P	C
MEDICAL ELECTRONICS	3	0	0	3

AIM:

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

OBJECTIVE

- To study the methods of recording bio-potentials
- To study how to measure biochemical and various physiological information
- To understand the working of units which will help to restore normal functioning
- To understand the use of radiation for diagnostic and therapy
- To learn about the recent trends in medical field and also the electrical safety in Hospitals

OUTCOMES:

Upon completion of the course, students will be able to:

- Discuss the application of electronics in diagnostic and therapeutic area.
- Measure biochemical and various physiological information.
- Describe the working of units which will help to restore normal functioning.

UNIT I - ELECTRO-PHYSIOLOGY AND BIOPOTENTIAL RECORDING 9

The Cell: the Basic Unit of Life - Molecular Components of Cells, The origin of Biopotentials, Biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.

2. BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENTS 9

Measurement of Blood pH, pO2 and pCO2, Electrophoresis, colorimeter, photometer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Method of cell counting.

3. THERAPEUTIC EQUIPMENT **9**

Cardiac pacemakers, DC Debrillators, Dialyzer, Artificial Kidney, Artificial Heart, Artificial Ventilation and Ventilators.

4. PHYSICAL MEDICINE AND BIO-TELEMETRY **9**

Diathermies – its type and their applications, Bio telemetry – Elements and design of Bio telemetry system, Multi-patient Telemetry, Implantable Telemetry, Tele-stimulation.

Medical imaging-X-ray generation, Magnetic Resonance Imaging system, Image Intensifiers-Computer Aided Tomography,

5. RECENT TRENDS IN MEDICAL INSTRUMENTATION **9**

Thermograph, endoscopy unit, Laser in medicine, surgical diathermy, Foetal Monitoring Instruments, Patient Monitoring System, Electrical safety.

TOTAL HOURS: 45

TEXT BOOKS:

2. Khandpur, R.S, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 1997. (All Five Units)
3. Leslie Cromwell, "Biomedical instrumentation and measurement", Prentice Hall of India New Delhi, 1997. (All Five Units)

REFERENCEBOOKS:

1. John G.Webster, "Medical Instrumentation Application and Design", John Wiley and Sons, New York, 1998.
2. Joseph J.Carr and John M.Brown, "Introduction to Biomedical equipment technology", John Wiley and Sons, New York, 1997.

SEMESTER VII	L	T	P	C
RFID	3	0	0	3

AIM:

This course is offered to students to gain basic knowledge on RF Identification and various techniques involved in RFID, Applications in Various fields.

OBJECTIVE:

- To Know the basic concepts in RF Identification
- To learn the Fundamental of RFID Tags
- To learn the RFID authenticity of goods and RFID privacy and regulation.
- To learn the RFID Applications in healthcare, Pharmacy and in Library
- To study about the threats in RFID, hacking and its Technical Solutions.

OUTCOMES:

Upon Completion of the course, the students will be able to

- Understand the functions of the RFID transceiver systems
- Use the systematic design methods of receivers and transmitters

Unit-I RFID Principles **9**

Introduction-Automatic Identification-Bar Codes-Magnetic stripes and MICR, RF Identification-Benefits in manufacturing, Distribution and inventory, retail, Document Tracking, security, Food supplies, Healthcare, RFID-Elements-Coupling, Range and penetration, RFID Implants, Verichip and Mark of the Beast.

Unit-II RFID Global and Private Policies **9**

Definitions of Privacy-Personal Information-Current Privacy Paradigm-Privacy through Data protection Law and Fair Information Practices-Understanding RFID's Privacy threats-current state of RFID Policy-issues – privacy, Integrity, security of the system, Health impact-Labour impact, Current EPC global policy

Unit-III RFID in Authenticity of Goods and Interaction Design for Wireless **9**

Important concepts in Authentication-Key Distribution problem-stolen keys and revocation-Authenticity of Tags and Goods. Anticounterfeiting Measures of Goods, Authentication of Readers and Users Across the supply chain-Role of Interaction Design-Designing and Modifying WID Systems-Disclosure at read and Read ange, Identifiable Reqaders, permissions based Tags, Physical remedies

Unit-IV RFID Applications **9**

RFID Payments at ExxonMobil-RFID Transformation in battlefield-RFID in Pharmacy-in Health care – Wireless Tracking in the Library-System Components and their Effects in Libraries-US Libraries-Tracking Livestock with RFID-Livestock Marketing-Auction Markets-World Live Stock round up

Unit-V RFID Technical Solutions, Hacking Problem, threats **9**

Reverse Engineering the protocol-Security Implications-protect against these tyes of Attacks-Bluetooth's background-Bluetooth security and Privacy Attacks-Cracking Bluetooth-Bluetapping-Locational Surveillance Technical Challenges of RFID Privacy-Blocker Tags-Soft Blocking-Signal to Noise Measurement-Tags with Pseudonyms-Corporate Privacy-Technology and Policy-Robust RFID Security

Total Hours:45

Text Book:

1. RFID –Applications,Security and Privacy- Simson Garfinkel ,Beth Rosenberg,Pearson Education,2006

Reference Books:

1. RFID Essentials-Bill Gover and Himansu Bhat- O'Reilly Media Edition,2006
2. RFID Implementation-Dennis E.Brown,Tata McGraw Hill Edition,2007

SEMESTER VII	L	T	P	C
MEDICAL ELECTRONICS LAB	0	0	3	2

AIM

To enable the students to know about the measurements and recording of Bioelectric Signals.

OBJECTIVES

- Record the various Bio Signals and Analysis it.
- To study the different preamplifiers used for amplifying the Bio Signals.
- To measure various physiological parameters using patient monitoring units.

OUTCOMES:

Upon completion of the course, students will be able to:

- Recording biological signals.
- Measure biochemical and various physiological information.

LIST OF EXPERIMENTS

1. Study of Operational amplifier IC741 with its Characteristics.
2. Inverting and Non-Inverting mode of operation.
3. Construction and testing of Instrumentation amplifier
4. Recording and analysis of ECG signals.
5. Recording and analysis of EEG signals.
6. Recording and analysis of EMG signals.
7. Measurement of Heart Beat Rate
8. Measurement of Respiration Rate
9. Measurement of Pulse Rate
10. Study of biotelemetry

SEMESTER VII	L	T	P	C
COMPREHENSION	0	0	3	2

AIM:

The objective of "Comprehension" is to provide opportunity for the student to apply the knowledge acquired during the earlier semesters to real-life problems which he/she may have to face in future as an engineer. While learning as to how to solve real life problems, the student will receive guidance from teachers and also review various courses (subjects) learnt earlier. The comprehension assessment will consist of 100 to 5 tests in each Streams covering all the subject of study in the respective streams under B.E. Electronics and Communication Engineering Course

SEMESTER VII	L	T	P	C
MINI PROJECT	0	0	2	2

OBJECTIVES:

1. The students in batches (not exceeding three in a batch) have to take up a project in the area of their own interest related to their specialization.

2. Each batch is guided by a faculty member. The students have to select suitable problems, design, prepare the drawings, produce the components, assemble and commission the project.

3. The students have to prepare and present a detailed project report at the end of the VI semester.

4. The evaluation will be made for the continuous internal assessment for the Project by a committee nominated by the Head of the Department.

Total Hours : 45

SEMESTER VIII	L	T	P	C
PROJECT WORK & VIVA VOCE	0	0	12	6

OBJECTIVE

The objective of the project work is to enable the students to form the groups of not more than 3 members on a project involving theoretical and experimental studies related to the branch of study.

- Formation of Group as follows
- Group A: 8.5 CGPA and above
- Group B: 7 to 8.49 CGPA
- Group C: 5 to 6.9 CGPA

Group A Student will have a choice to take 2 students from Group B&C

- Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, com-puter analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.
- The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.
- The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department.
- Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion.
- This final report shall be typewritten form as specified in the guidelines.
- The continuous assessment shall be made as prescribed in the regulations

ELECTIVE	L	T	P	C
SATELLITE COMMUNICATION & BROADCASTING	3	0	0	3

AIM:

To understand the basic concept in the field of satellite communication

OBJECTIVE

- To obtain knowledge on orbital aspects involved in satellite communication.
- To obtain knowledge on Power budget calculation.
- To obtain knowledge on Satellite system and services provided

OUTCOMES :

Upon Complétion of the course, the students will be able to:

- Analyze the satellite orbits.
- Analyze the earth segment and space segment.
- Design various satellite applications

UNIT I-SATELLITE ORBIT **9**

Satellite orbits: Kepler's laws – Earth satellite orbiting satellite terms-Orbital elements – Orbital perturbations –Inclined Orbits – Sun synchronous orbit. **Constellation:** Geo stationary satellites – Non geostationary constellation – Launching of Geostationary satellites.

UNIT II-INK DESIGN **9**

EIRP – Transmission Losses – Power Budget equation – System Noise Carrier to noise ratio – Uplink – Downlink –Effects of rain – Inter modulation noise.

UNIT III-SPACE AND EARTH SEGMENT **9**

Space Segment: Power Supply – Altitude control – Station keeping – Thermal Control – TT&C – Subsystems – Antenna subsystem –Transponders – Wideband Receiver. **Earth Segment:** receive only home TV system – Community antenna TV system.

UNIT IV-SATELLITE ACCESS **9**

Single Access- Pre assigned FDMA – Demand Assigned FDMA – SPADE system- TWT amplifier operation – Downlink analysis – TDMA – reference bursts – Preamble – Postamble – Carrier recovery – Network synchronization – Pre assigned TDMA – Assigned –CDMA introduction.

UNIT V-BROADCAST AND SERVICES **9**

Broadcast: DBS – Orbital Spacings- Power ratings – Frequency and Polarization – Transponder Capacity – Bit rate – MPEG – Forward Error Correction. ODU-IDU – Downlink Analysis – Uplink – Satellite Mobile services: VSAT–GPS.

Total Hours: 45

TEXT BOOK

1. Dennis Roddy, *"Satellite Communications",* Tata Mc-Graw Hill Publications, 4th Edition, 2008.

REFERENCES

1. Madhavendra Richharia, Leslie David, *"Satellite Systems for Personal Applications Concepts and Technology",* Wiley- Blackwell, 2010.
2. Wilbur L.Prichard, Henry G. Suyerhood, Ropert A. Nelson, *"Satellite Communication System Engineering",* 2nd Edition, Pearson Education, 1993.

3. Pratt, Timothy, Charles W. Bostian, *"Satellite Communication",* John Wiley and Sons, 2nd Edition, New York, 1986.

ELECTIVE	L	T	P	C
WIRELESS SENSOR NETWORKS	3	0	0	3

AIM:

To impart knowledge on the wireless sensors and its network communications

OBJECTIVE

- To study the basic wireless sensor networks
- To study the architecture of WSN
- To study the networking sensors
- To study about infrastructure establishment
- To study the sensor network platforms and tools

OUTCOMES:

Upon completion of the course, students will be able to:

- Understand the concept of wireless sensors.
- study about infrastructure establishment and sensor network platforms and tools

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UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS **9**

Challenges for Wireless Sensor Networks-Characteristics requirements-required mechanisms, Difference between mobile ad-hoc and sensor networks, Applications of sensor networks- Enabling Technologies for Wireless Sensor Networks.

UNIT II ARCHITECTURES **9**

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III NETWORKING SENSORS **9**

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT IV INFRASTRUCTURE ESTABLISHMENT **9**

Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS **9**

Operating Systems for Wireless Sensor Networks, Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node level Simulators, State-centric programming.

TOTAL HOURS: 45

TEXT BOOKS

1. Holger Karl & Andreas Willig, “Protocols And Architectures for Wireless Sensor Networks”, John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, And Applications”, John Wiley, 2007.
2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.
3. Bhaskar Krishnamachari,”Networking Wireless Sensors”, Cambridge Press,2005.

ELECTIVE	L	T	P	C
VIDEO PROCESSING	3	0	0	3

AIM

The purpose of Video Processing course is to cover the fundamentals of digital video signal generation and further processing over the communication systems.

OBJECTIVE

- To learn the basic concepts of video processing
- To learn about the various methodologies for motion estimation
- To learn the basic concepts of coding systems
- To understand about the waveform based video coding techniques
- To understand about the content dependent and scalable video coding techniques

OUTCOMES:

Upon completion of the course, students will be able to:

- Various methodologies for motion estimation
- Basic concepts of coding systems
- Understand about the content dependent and scalable video coding techniques

UNIT I VIDEO FORMATION, PERCEPTION AND REPRESENTATION 9

Color Perception and Specification, Video Capture and Display, Analog Video Raster, Analog Color Television Systems, Digital Video.

UNIT II TWO-DIMENSIONAL MOTION ESTIMATION 9

General Methodologies, Pixel-Based Motion Estimation, Block Matching Algorithm, Mesh-based Motion estimation, Global Motion Estimation, Region Based Motion Estimation, Multi resolution Motion Estimation, Application of Motion Estimation in Video Coding. Feature based Motion Estimation.

UNIT III FOUNDATIONS OF VIDEO CODING 9

Overview of Coding Systems, Basic Notions in Probability and Information Theory, Information Theory for Source Coding, Binary Encoding, Scalar Quantization , Vector Quantization.

UNIT IV WAVEFORM-BASED VIDEO CODING 9

Block Based Transform Coding, Predictive Coding, Video Coding Using Temporal Prediction and Transform Coding.

UNIT V CONTENT DEPENDENT & SCALABLE VIDEO CODING 9

Two Dimensional Shape Coding, Texture coding for Arbitrarily Shaped Regions, Joint Shape & Texture Coding, Region-Based Video Coding, Object-based Video Coding. Basic Modes of Scalability, Object Based Scalability, Wavelet-transform Based Coding.

TOTAL HOURS: 45

TEXT BOOKS:

1. YaoWang, JornOstermann, Ya-Qin Zhang, "Video Processing & Communication", Pearson Education - India, New Delhi, Prentice Hall, 2002.

REFERENCES:

1. M. Tekalp, Digital Video Processing, Prentice Hall, 1995.

ELECTIVE	L	T	P	C
ADVANCED MICROCONTROLLERS	3	0	0	3

AIM

To learn the architecture and programming of advanced Intel family microprocessors and microcontrollers.

OBJECTIVES

- To introduce the concepts in internal programming model of Intel family of microprocessors.

- To introduce the programming techniques using MASM, DOS and BIOS function calls.
- To introduce the basic architecture of Pentium family of processors.
- To introduce the architecture programming and interfacing of 16 bit microcontrollers.
- To introduce the concepts and architecture of RISC processor and ARM.

OUTCOMES:

- The student will be able to work with suitable microprocessor / microcontroller for a specific real World application

UNIT I ADVANCED MICROPROCESSOR ARCHITECTURE 9

Internal Microprocessor Architecture-Real mode memory addressing – Protected Mode Memory addresses –Memory paging - Data addressing modes – Program memory addressing modes – Stack memory addressing modes – Data movement instructions – Program control instructions- Arithmetic and Logic Instructions.

UNIT II MODULAR PROGRAMMING AND ITS CONCEPTS 9

Modular programming –Using keyboard and Video display –Data Conversions- Disk files- Interrupt hooks- using assembly languages with C/ C++

UNIT III PENTIUM PROCESSORS 9

Introduction to Pentium Microprocessor – Special Pentium registers- Pentium memory management – New Pentium Instructions –Pentium Processor –Special Pentium pro features – Pentium 4 processor – Intelligent Processors and its successors.

UNIT-IV 16-BIT MICRO CONTROLLER 9

8096/8097 Architecture-CPU registers –RALU-Internal Program and Data memory Timers-High speed Input and Output –Serial Interface-I/O ports –Interrupts –A/D converter-Watch dog timer –Power down feature – Instruction set- External memory Interfacing –External I/O interfacing.

UNIT V RISC PROCESSORS AND ARM 9

The RISC revolution – Characteristics of RISC Architecture – The Berkeley RISC – Register Windows – Windows and parameter passing – Window overflow – RISC architecture and pipelining – Pipeline bubbles – Accessing external memory in RISC systems – Reducing the branch penalties – Branch prediction – The ARM processors – ARM registers – ARM instructions – The ARM built-in shift mechanism – ARM branch instructions – sequence control – Data movement and memory reference instructions – Real Time Applications of RISC and ARM.

Total Hours: 45

TEXT BOOK

1. Barry B.Brey, The Intel Microprocessors 8086/8088, 80, 86, 80286, 80386 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming and interfacing, Prentice Hall of India Private Limited, New Delhi, 2003. (UNIT I, II and III).
2. John Peatman, Design with Microcontroller McGraw Hill Publishing Co Ltd, New Delhi. (UNIT IV).
3. Alan Clements, "The principles of computer Hardware", Oxford University Press, 3rd Edition, 2003. (UNIT V)

REFERENCE BOOKS

1. Rajkamal, The concepts and feature of micro controllers 68HC11, 8051 and 8096; S Chand Publishers, New Delhi.

ELECTIVE	L	T	P	C
PHOTONICS & OPTICAL NETWORKS	3	0	0	3

AIM

To study about different sensors system designed and developed using optical fiber and there uses. Latest trends in optical fiber communication.

OBJECTIVE

- To provide a comprehensive understanding of optical communication systems and networks.
- Should get aware of the criteria of selection of optical fiber cable in an optical link Should get the knowledge about difference in video, voice and data transmitter system.
- Should get the concepts of other optoelectronics techniques like acousto-optics, electro optics and Integrated Optics.

OUTCOMES

- The student will be able to design transmitter circuits, receiver circuit and selection of optical fiber cable for a given conditions of the optical fiber link.
- Should have the knowledge about selection of optical fiber and optical fiber cable for different type of an optical link, with having application for voice, video or data transmission.
- Will have knowledge of other optoelectronics techniques like acousto-optic acousto - optic, electro optics and Integrated Optics.

UNIT I-INTRODUCTION TO PHOTONICS **9**

Review of wave nature and particle nature of light, Interaction of light with matter emission and absorption of radiation. Review of optics- Reflection and refraction of plane waves; Fresnel's formulas, Interference and interferometers, Diffraction, Optical coherence, Polarization of light.

UNIT II-OPTICAL FIBER WAVEGUIDES, SOURCES AND DETECTORS **9**

The propagation of light in optical waveguides, Classification of optical fibers, Single mode fiber, Material and Waveguide Dispersion, Dispersion shifted fiber, Signal Attenuation. Introduction to Non linear fiber optics. Laser Fundamentals: Stimulated and spontaneous Emission, Einstein relations, Optical feedback, threshold condition, Injection Laser Diode (ILD), Laser Modes. Photo detection, PIN and Avalanche Photo diode (APD), Quantum Efficiency, Responsivity and Speed of Response , Noise mechanism in photo detectors.

UNIT III-OPTICAL COMPONENTS AND SYSTEM DESIGN **9**

Principle and Operation of couplers/splitters, WDM MUX/DEMUX - AWG, Isolators, Circulators, Fabry Perot Filters, Mach-Zehnder Interferometer, optical switches, EDFA, Semiconductor Optical Amplifier. Optical Link Design: Power penalty -Point- to- point links – System considerations – Link Power budget – Rise time budget.

UNIT IV-OPTICAL NETWORKS ARCHITECTURE **9**

Optical network concepts – Topology – Metropolitan – Area Networks - SONET/SDH: – Optical specifications – SONET frame structure –Optical transport network - Broadcast and Select networks.

UNIT V-WDM NETWORK DESIGN **9**

WDM network elements, WDM network design - Cost tradeoffs, virtual Topology design, Routing and wavelength assignment, statistical dimensioning models.

TEXT BOOKS

1) Rajiv Ramaswamy, Kumar N. Sivaranjan and Galen H. Sasaki, “Optical Networks – A practical perspective”, 3rd edition, Elsevier, 2010.
2) Keiser, “Optical Fiber Communication Systems”, 4th edition, Tata McGrawHill. Edition, 2010.
3) Joseph C.Palais “Fiber Optic Communications”, Fifth edition, Seventh impression, Pearson, 2012. 4) 4) Djafar.K. Mynbaev Lowell and Scheiner, “Fiber Optic Communication Technology”, Sixth impression, Pearson Education Asia, 9th impression, 2011.

ELECTIVE	L	T	P	C
MODERN WIRELESS COMMUNICATION SYSTEMS	3	0	0	3

AIM:

To provide comprehensive background knowledge of wireless, mobile communication and to introduce all the most important wireless technologies

OBJECTIVES

- To discuss the fundamentals of cellular mobile wireless networks
- To provide an overview of various approaches to communication networks
- To study the numerous different-generation technologies with their individual pros and cons
- To discuss about the principles of operation of the different access technologies like FDMA, TDMA, SDMA and CDMA and their pros and cons.

OUTCOMES:

Upon completion of the course, students will be able to:

- Understand the fundamentals of cellular mobile wireless networks

UNIT I-TRANSMISSION FUNDAMENTALS **10**

Cellphone Generations: 1G, 2G, 2.5G, 3G & 4G Transmission Fundamentals: Time domain & Frequency domain concepts, Radio, Analog Vs Digital, channel capacity, transmission media, carrier-based signaling, spread-spectrum signaling.

UNIT II-NETWORK CONCEPTS **12**

Communication Networks: LANs, MANs, WANs, circuit switching, packet switching, ATM Cellular Networks: Cells, duplexing, multiplexing, voice coding Multiple Access Techniques: FDMA, TDMA, SDMA, CDMA, spectral efficiency.

UNIT III-PERSONAL COMMUNICATION SERVICES **8**

GSM, HSCSD, GPRS, D-AMPS, CDMA One, CDMA Two, Packet Data Systems.

UNIT IV - 3G & BEYOND **7**

IMT-2000, W-CDMA, CDMA 2000, EDGE, Wi-Fi, WiMAX, OFDM.

UNIT V-MOBILE DATA SERVICES & SHORT-RANGE NETWORKS **8**

Mobile Data Services: Messaging, wireless web, WAP, site design Short-Range Wireless Networks: Unlicensed spectrum, WLANs, cordless telephony, IrDA, Bluetooth Smart Phones: Future phones, mobile OSs, smart phone applications.

TEXT BOOKS:

1. Andy Dornan, “The essential guide to wireless communications applications: from cellular systems to Wi-Fi”, 2nd Edition, Prentice Hall, 2002.
2. Misra, “Wireless Communications and Networks: 3G & Beyond”, Tata McGraw-Hill, 2009.

REFERENCE BOOKS:

1. Theodore S. Rappaport, “Wireless Communications: Principles and Practice”, 2nd Edition, Pearson Education, 2009. 2. William Stallings, “Wireless communications and networking”, Prentice Hall, 2002.

ELECTIVE	L	T	P	C
ROBOTICS AND AUTOMATION	3	0	0	3

AIM

To learn the fundamentals of Robotics and implementation aspects of real time concepts.

OBJECTIVES

- To learn about the Basic concepts of Robots
- To study the Sensor and Vision Systems.
- To learn the Grippers and robot dynamics.
- To know about kinematics and path planning.
- To learn about Robot Programming Languages and applications

OUTCOMES:

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

- Explain the basic concepts of working of Robot
- Analyze the function of sensors in the Robot
- Write program to use a Robot for a typical application
- Use Robots in different applications

UNIT I BASIC CONCEPTS **9**

Origin & various generation of Robots - Robot definition - Robotics system components – Robot classification - Coordinate frames - Asimov's laws of robotics – degree of freedom – work volume - Need for Automation – types of automation – fixed, programmable and flexible automation.

UNIT II SENSORS AND VISION SYSTEM **9**

Sensing - Range, proximity, position, velocity, acceleration, Touch, Force, Torque, Optical & laser sensors. Machine vision - Introduction, Image acquisition, Illumination Techniques, Image conversion, Cameras, Image processing and analysis – image data reduction – segmentation feature extraction – Object recognition.

UNIT III GRIPPERS AND ROBOT DYNAMICS 9

Introduction - various types of grippers-design considerations. Construction of Manipulator – Introduction to Robot - Dynamics – Lagrange formulation – Newton Euler formulation – Properties of robot dynamic equations.

UNIT IV KINEMATICS AND PATH PLANNING 9

Forward Kinematics – Denavit Hartenberg Representation. Inverse Kinematics – Geometric approach.

UNIT V PROGRAMMING LANGUAGES AND APPLICATIONS 9

Robot programming - Fixed instruction, sequence control, General programming language, Specific programming languages. Robots for welding, painting and assembly – Remote Controlled robots – Robots for nuclear, thermal and chemical plants.

Total Hours: 45

TEXT BOOKS:

1. Mikell P. Groover ,Weiss G.M. Nagel R.N. Odraj . N.G. , “Industrial Robotics”, Tata Mc Graw Hill, 3rd Reprint, Edition 2008.
2. Deb.S.R. “Robotics Technology and flexible Automation”, Tata Mc Graw Hill, 9th Reprint 2004.
3. K.S Fu, R C.Gonzalez, CSG Lee- “Robotics”, McGraw Hill, Edition 2008.

REFERENCE BOOKS:

1. John J Craig “Introduction to Robotics Mechanics & control, Low price Edition, 7th Reprint, 2005.
2. Ghosh, “Control in Robotics and Automation : Sensor Based Integration”, Allied Publishers.
3. Juan Manuel Ramos Arreguin, “Automation and Robotics”, I-Tech Education and Publishing, 2008.

ELECTIVE	L	T	P	C
ADVANCED DIGITAL DESIGN	3	0	0	3

AIM:

Learning design of digital circuits is a fundamental necessity for designing embedded systems. This subject provides necessary instruments to achieve that goal.

OBJECTIVE:

The objective of the course is to explain how digital circuit of large complexity can be built in a methodological way, starting from Boolean logic and applying a set of rigorous techniques

OUTCOMES:

- To Understand the role of programmable logic devices in the design of modern electronic systems
- Able to design moderately complex digital circuitry using programmable logic.
- Able to use effectively a modern hardware description language (VHDL) and computer aided design tools to implement designs in programmable chips.

1. ADVANCED TOPICS IN BOOLEAN ALGEBRA **9**

Shannon's expansion theorem, Consensus theorem, Octal designation, Run measure, INHIBIT / INCLUSION / AOI / Driver / Buffer gates, Gate expander, Reed Muller expansion, Synthesis of multiple output combinational logic circuits by product map method, Design of static hazard free and dynamic hazard free logic circuits.

2. THRESHOLD LOGIC **9**

Linear separability, Unateness, Physical implementation, Dual comparability, reduced functions, various theorems in threshold logic, Synthesis of single gate and multigate threshold Network.

3. SYMMETRIC FUNCTIONS **9**

Elementary symmetric functions, partially symmetric and totally symmetric functions, Mc Cluskey decomposition method, Unity ratio symmetric ratio functions, Synthesis of symmetric function by contact networks.

4. SEQUENTIAL LOGIC CIRCUITS **9**

Mealy machine, Moore machine, Trivial / Reversible / Isomorphic sequential machines, State diagrams, State table minimization, Incompletely specified sequential machines, State assignments, Design of synchronous and asynchronous sequential logic circuits working in the fundamental

mode and pulse mode, Essential hazards Unger's theorem.

5. PROGRAMMABLE LOGIC DEVICES 9

Basic concepts, Programming technologies, Programmable Logic Element (PLE), Programmable Logic Array (PLA), Programmable Array Logic (PAL), Structure of Standard PLD's, Complex PLD's (CPLD). System Design Using PLD's - Design of combinational and sequential circuits using PLD's, Programming PAL device using PALASM, Design of state machine using Algorithmic State Machines (ASM) chart as a design tool. Introduction To Field Programmable Gate Arrays - Types of FPGA, Xilinx XC3000 series, Logic Cell array (LCA), Configurable Logic Blocks (CLB) Input/Output Block (IOB)- Programmable Interconnect Point (PIP), Introduction to Actel ACT2 family and Xilinx XC4000 families, Design examples.

Reference

1. William I. Fletcher, “An Engineering Approach to Digital Design" , Prentice Hall of India, 1996.
2. James E. Palmer, David E. Perlman, “Introduction to Digital Systems", Tata McGraw Hill, 1996.
3. N.N. Biswas, "Logic Design Theory", Prentice Hall of India, 1993.
4. S. Devadas, A. Ghosh and K. Keutzer, "Logic Synthesis", Mc Graw Hill, 1994.

ELECTIVE	L	T	P	C
ELECTROMAGNETIC INTERFERENCE & COMPATIBILITY	3	0	0	3

AIM:

The aim of the course is to give concepts of Electromagnetic Compatibility (EMC), and to teach the relevant methods and strategies to design electromagnetic compatible system and circuits.

OBJECTIVES:

- To tutor the basics of EMI, EMC
- To instill knowledge on the EMI coupling mechanism and its mitigation techniques
- To impart comprehensive insight about the current EMC standards and about various measurement techniques

OUTCOMES:

Upon completion of the course, students will be able to:

- Find solution to EMI Sources, EMI problems in PCB level / Subsystem and system level design.
- To measure emission immunity level from different systems to couple with the prescribed EMC
- standards

UNIT I INTRODUCTION 9

EMI-EMC Definitions- Prectical experiences and concerns- Frequency Spectrum Conservation- Celestial Electromagnetic Noise- Lightning Discharge- Electrostatic Discharge- Electromagnetic Pulse- Noise from Relays and Switches- Nonlinearities in circuits- Cross-talk in Transmission Lines- Transients in power supply lines- Electromagnetic interference.

UNIT II INTERFERENCE MEASUREMENT 9

Introduction to Radiated Interference measurement- Anechoic chamber- Transverse electromagnetic cell- Reverberating chamber- Giga-Hertz TEM cell-Comparison of test facilities- Introduction to Conducted Interference measurement- Characterization of conduction currents/voltages- Conducted EM noise on power supply lines- Conducted EMI from equipment.

UNIT III EMI FILTERS AND COMPONENTS 9

Introduction to EMI filters- Characteristics of filters- Power line filter design- Introduction to cables,connectors and components- EMI suppression cables- EMC connectors- EMC gaskets- Isolation transformer- Opto-isolators- Transient and surge suppression devices- EMI accessories.

UNIT IV SPECTRUM CONSERVATION AND EMC COMPUTER MODELING 9

Introduction to Frequency allocation and frequency assignment- Modulation techniques- Introduction to spectrum conservation- Introduction to EMC computer modeling and simulation- EMC analysis of complex systems- Illustrating an automated system level EMC analysis procedure- Future of EMC computer modeling and simulation.

UNIT V SIGNAL INTEGRITY AND EMC STANDARDS 9

Introduction to signal integrity- SI problems and analysis- SI issues in design- Modeling and simulation- Introduction to standards for EMI- MIL-STD-461/462- IEEE/ANSI standards- CISPR/IEC standards- CISPR/IEC standards- FCC regulations- British standards- VDE standards- Euro norms- EMI/EMC standards in japan- Performance standards and comparisons

TOTAL HOURS: 45

TEXT BOOK:

1. Prasad Kodali.V, “Engineering Electromagetic Compatability”, Second Edition, Wiley India Pvt.Ltd.

ELECTIVE	L	T	P	C
VLSI SIGNAL PROCESSING	3	0	0	3

AIM:

To learn the VLSI Signal Processing Techniques.

OBJECTIVE:

- To study about Iteration Bound and parallel processing
- To study about Retiming and Unfolding
- To study about Systolic Architecture Design
- To study about Scaling and Lattice Filter
- To study about pipelining and power reduction techniques

OUTCOME:

- Understand VLSI design methodology for signal processing systems.
- Be familiar with VLSI algorithms and architectures for DSP.
  Be able to implement basic architectures for DSP using CAD tools.

UNIT-I **9**

Introduction to DSP system-Iteration bound, Algorithm for computing Iteration Bound-Loop bound algorithm for computing-Iteration bound-Iteration band of multi rate data- flow graphs-pipelining and parallel processing-pipelining of digital FIR filter.

UNIT-II **9**

Retiming-Unfolding-critical path-retiming properties of unfolding transformation-algorithmic strength reduction in filters & transforms-Discrete cosine transform & Inverse DCT.

UNIT-III **9**

Systolic architecture design-FIR systolic arrays-Systolic design for Space representation containing delays-fast convolution-Pipelined & parallel recursive and adaptive filters.

UNIT-IV **9**

Scaling and round off noise-Digital lattice filter structure-Schur Algorithm-Derivation of one multiplier lattice filter-Normalized lattice filter-Bit level arithmetic Architecture-Bit-serial multipliers-Bit-serial filter design and implementation-Redundant arithmetic-Redundant number representation.

UNIT-V **9**

Numerical strength reduction-synchronous pipelining and clocking styles-Wave pipelining-Asynchronous pipelining-Low power design-Scaling versus power consumption-Power reduction techniques-Programmable digital signal processors.

TOTAL HOURS: 45

TEXT BOOKS:

1. Keshab K.Parhi, “VLSI Digital Signal Processing Systems”, Design and implementation, Wiley, Inter science, 1999.

REFERENCES:

1. Mohammad Ismail and Terri Fiez , “Analog VLSI Signal and information Processing” , McGraw Hill,1994.

2. S.Y. Kung,H.J. white house, T. kailath , “VLSI and Modern Signal processing” ,Prentice Hall , 1985.
3. Jose E. france , Yannis Tisividis , “Design of analog digital VLSI circuits for Telecommunication and signal Processing “ ,Prentice hall ,1994 .

ELECTIVE	L	T	P	C
TOTAL QUALITY MANAGEMENT	3	0	0	3

AIM

To understand the total quality management principles, frameworks, tools and techniques for effective real-life applications in both manufacturing and services.

OBJECTIVE:

To facilitate the understanding of Quality Management principles and process.

OUTCOMES:

- Develop an understanding on quality management philosophies and frameworks.
- Develop in-depth knowledge on various tools and techniques of quality management.
- Learn the applications of quality tools and techniques in both manufacturing and service industry.

UNIT I – INTRODUCTION **9**

Definition of quality – Dimensions of quality – Quality planning – Quality costs – Analysis techniques for quality costs – Basic concepts of total quality management – Historical review – Principles of TQM – Leadership – Concepts – Role of senior management – Quality council – Quality statements –Strategic planning – Deming philosophy – Barriers to TQM implementation.

UNIT II – TQM PRINCIPLES **9**

Customer satisfaction – Customer perception of quality – Customer complaints – Service quality – Customer retention – Employee involvement – Motivation, empowerment, teams, recognition and reward – Performance appraisal – Benefits – Continuous process improvement – Juran trilogy – PDSA cycle – 5S – Kaizen – Supplier partnership – Partnering – Sourcing – Supplier selection – Supplier rating – Relationship development – Performance measures – Basic concepts – Strategy –Performance measure.

UNIT III – STATISTICAL PROCESS CONTROL (SPC) **9**

The seven tools of quality – Statistical fundamentals – Measures of central tendency and dispersion – Population and sample – Normal curve – Control charts for variables and attributes – Process capability – Concept of six sigma – New seven management tools.

UNIT IV – TQM TOOLS **9**

Benchmarking – Reasons to benchmark – Benchmarking process – Quality Function Deployment(QFD) – House of quality – QFD process – Benefits – Taguchi quality loss function – Total Productive Maintenance (TPM) – Concept – Improvement needs – FMEA
– Stages of FMEA.

UNIT V – QUALITY SYSTEMS **9**

Need for ISO 9000 and other quality systems – ISO 9000:2000 Quality system – Elements – Implementation of quality system – Documentation – Quality auditing – TS 16949 – ISO 14000 –Concept – Requirements and benefits.

Total Hours: 45

TEXT BOOKS

1. Besterfiled, D.H. “Total Quality Management”, Pearson Education, Inc. 2003.
2. Zeiri., “Total Quality Management for Engineers”, Wood Head Publishers, 1991.

REFERENCES

1. Evans, J. R., and Lidsay, W.M., "The Management and Control of Quality", 5th Edition, South-Western (Thomson Learning), 2002.
2. Oakland.J.S. "Total Quality Management", Butterworth – Hcinemann Ltd., Oxford, 1989.
3. Narayana V. and Sreenivasan, N.S., "Quality Management – Concepts and Tasks", New Age International, 1996.

ELECTIVE	L	T	P	C
MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	3	0	0	3

AIM:

In order to effectively manage and operate a business, managers and leaders need to understand the market characteristics and economic environment they operate in this Specialization, you will build a solid understanding of the operation of markets and the macro-economic environment with real-world

OBJECTIVES:

To enable the student to understand and appreciate, with a particular insight, the importance of certain basic issues governing the business operations namely; demand and supply, production function, cost analysis, markets, forms of business organizations, capital budgeting and financial accounting and financial analysis.

OUTCOMES:

At the end of the course, the student will

- Understand the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures.
- Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
- Develop an understanding of Analyze how capital budgeting decisions are carried out.
- Understanding the framework for both manual and computerized accounting process

UNIT - I Introduction to Managerial Economics **9**

Definition, Meaning, Nature and Scope Managerial Economics-Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT - II Theory of Production and Cost Analysis **10**

Production Function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA) - Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

UNIT III Introduction to Markets & Pricing strategies **8**

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing Strategies

UNIT IV Capital and Capital Budgeting **9**

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (only theory)

UNIT V Introduction to Financial Accounting & Ratios **9**

Introduction to Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments only). Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt-Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TOTAL HOURS: 45

TEXT BOOK

1. A R Aryasri: Managerial Economics and Financial Analysis, Tata Mc Graw Hill, 2006
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCES

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2004.
2. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson, 2003.
3. Narayanaswamy: Financial Accounting-A Managerial Perspective, Prienceton Hall of India, 2005

ELECTIVE	L	T	P	C
NANOTECHNOLOGY	3	0	0	3

AIM:

This course is offered to students to gain basic knowledge on Nano electronics and various fabrication techniques involved in Nano science.

OBJECTIVE:

- To Know basic concepts in Nanotechnology
- To learn the Fundamental of Nano electronics
- To learn the silicon MOSFET and Quantum Transport Devices
- To learn the fabrication of Carbon Nanotubes
- To study about the Molecular Electronics in Nanotechnology

OUTCOMES:

At the end of the course, the student will

- Describe the basic science behind the properties of materials at the nanometer scale, and the principles behind advanced experimental and computational techniques for studying nanomaterials.
- Communicate clearly, precisely and effectively using conventional scientific language and mathematical notation.
- Systematically solve scientific problems related specifically to nanotechnological materials using conventional scientific and mathematical notation

UNIT I INTRODUCTION TO NANOTECHNOLOGY 9

Background to nanotechnology: Types of nanotechnology and nanomachines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size – surface and dimensional space – top down and bottom up; Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope – scanning tunnelling microscope – nanomanipulator – nanotweezers – atom manipulation – nano dots – self assembly – dip pen nanolithography. Nanomaterials: preparation– plasma arcing – chemical vapor deposition – sol-gels – electrodeposition – ball milling – applications of nanomaterials;

UNIT II FUNDAMENTALS OF NANOELECTRONICS 9

Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata – quantum computing – DNA computer; performance of information processing systems;- basic binary operations, measure of performance processing capability of biological neurons – performance estimation for the human brain. Ultimate computation:- power dissipation limit – dissipation in reversible computation – the ultimate computer.

UNIT III SILICON MOSFETS& QUANTUM TRANSPORT DEVICES 9

Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices- scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts. Quantum transport devices based on resonant tunneling, Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices – applications of single electron devices to logic circuits.

UNIT IV CARBON NANOTUBES **9**

Carbon Nanotube: Fullerenes - types of nano tubes – formation of nano tubes – assemblies – purification of carbon nanotubes – electronic propertics – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications – prospects of all carbon nanotube nanoelectronics.

UNIT V MOLECULAR ELECTRONICS **9**

Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices.

TOTAL HOURS: 45

TEXTB OOKS

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and BurkhardRaguse, “Nanotechnology: Basic Science and Emerging Technologies”, Chapman & Hall / CRC, 2002
2. Rainer Waser (Ed.), “Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices”, Wiley-VCH, 20032. T.Pradeep, NANO:“The Essentials–Understanding Nanoscience and Nanotechnology”, TMH, 2007

REFERENCES:

1. T.Pradeep, “NANO:The Essentials–Understanding Nanoscience and Nanotechnology”, TMH, 2007.

ELECTIVE	L	T	P	C
PROGRAMMABLE LOGIC CONTROLLER	3	0	0	3

AIM

To learn about Programmable logic Controllers.

OBJECTIVES

- To study about programmble logic.
- To study about PLCs and operation of PLC
- To study about PLC programming.
- To study about Timers and counters
- To get an idea about PLC applications

OUTCOMES

At the end of the course, the student will

- Describe the function of and the relationship between the various hardware components of a programmable logic controller.
- Design logic circuits to perform industrial control functions of medium complexity.
- Develop coded programs for the programmable logic controller.

UNIT I PROGRAMMABLE LOGIC **9**

Programmable logic introduction, Programmbale logic structures, Programmbale Logic Arrays (PLAs), Programmable Arrary Logic (PALs). Field Programmable Gate Array(FPGA). Sequential network design with Programmable logic devices. Design of sequential networks using ROMs and PLAs. Traffic light controller using PAL.

UNIT II PROGRAMMABLE LOGIC CONTROLLERS (PLCS) **9**

Programmable Logic Controller. Introduction part of PLC- Principles of operation. PLC sizes, PLC hardware components, I/O section, Analog I/O section, Analog I/O modules, digital I/O modules. CPU, Processor memory module, Programming devices, Diagnostics of PLCs with computers.

UNIT III PLC PROGRAMMING **9**

PLC programming, simple instructions, Programming EXAMINE ON and EXAMINE OFF instructions , Electromagnetic control relays, Motor starters, Manually operated switchs, Mechanically operated and proximity switches, Output control devices, Latching relays, PLC ladder diagram, Converting simple relay ladder diagram into PLC relay ladder diagram.

UNIT V TIMERS **9**

Timer instructions, ON DELAY timer and OFF DELAY timer , counter instructions, UP/DOWN counters, Timer and counter applications, Program control instructions, Data manipulating instructions, math instructions.

UNIT V APPLICATIONS OF PLC **9**

Automatic control of warehouse door, Automatic lubricating oil supplier, Conveyor belt motor control, Automatic car washing machine, Bottle label detection, Process control applications.

TOTAL HOURS : 45

TEXT BOOKS:

1. Charles H. Roth, Jr “Fundamentals of Logic Design”, 4th edition, Jaico publishing house, 1999

2. Frank D. Petruzella, “Programmable Logic Controllers”, McGraw Hill book company, 1989.

REFERENCE BOOKS:

1. William I. Fletcher, “ An Engineering Approach to Digital Design” Prentice Hall of India Ltd., New Delhi, 1999

ELECTIVE	L	T	P	C
MICRO ELECTRO MECHANICAL SYSTEMS	3	0	0	3

AIM

To students to gain basic knowledge on MEMS (Micro Electro Mechanical System). This enables them to design, analyze, fabricate and test the MEMS based components.

OBJECTIVES

- Introduction to MEMS.
- To study the Mechanics for MEMS Design.
- To study Electro Static Design and System Issues.
- To know various MEMS Applications

OUTCOMES

- Understand basics of microfabrication, develop models and simulate electrostatic and electromagnetic sensors and actuators, understand material properties important for MEMS system performance, analyze dynamics of resonant micromechanical structures.
- Understand the design process and validation for MEMS devices and systems, and learn the state of the art in optical micro systems.

UNIT I INTRODUCTION TO MEMS 9

MEMS and Microsystems, Typical products of MEMS and Microsystem products, Micro sensors, Micro actuator, Evolution of Micro fabrication, Microsystems and Microelectronics, MEMS materials.

UNIT II PRINCIPLES OF MICROSYTEMS 9

Micro sensors- Acoustic wave sensors, Biomedical Sensors and Biosensors, Optical Sensors, Pressure sensors, Micro actuation- Actuation using Thermal Forces, Piezoelectric Crystals, Electrostatic Forces, MEMS with Micro actuators- Micro grippers , Micro motors , Micro valves , Micro accelerometers

UNIT III MICROMACHINING 9

Introduction, Photolithography, Bulk Micromachining, Thin Film Deposition, Etching, surface Micromachining, LIGA

UNIT IV MICRO-OPTO-ELECTROMECHANICAL SYSTEMS 9

Fundamental Principle of MOEMS Technology, Review Properties of Light, Light Modulators, Beam Spliotter, Micro lens, Micro mirrors, Digital Micro mirror Device(DMD),Light Detectors, Grating Light Valve, Optical Switch

UNIT V MEMS APPLICATION 9

Application – Health Care, Micro fluid Dispenser, Micro needle, Micro pumps, Chem-Lab-On-A-Chip(CLOC), E-Nose, DNA sensors, Surface Acoustic Wave(SAW) Sensors.

TOTAL HOURS: 45

TEXT BOOKS:

1. Tai Ran Hsu," MEMS & Micro systems Design and Manufacture" Tata McGraw Hill, New Delhi, 2002. Liu,"MEMS", Pearson education, 2000(Unit-I,II)
2. N. P. Mahalik, "MEMS",Tata McGraw hill, Sixth reprint, 2012.(Unit-III,IV,V)

REFERENCE BOOKS:

1. Nadim Maluf," An introduction to Micro electro mechanical system design", ArtechHouse, 2000.

2. Mohamed Gad-el-Hak, editor," The MEMS Handbook", CRC press Baco Raton,2000.
3. Stephen Santeria," Microsystems Design", Kluwer publishers, 2000.

ELECTIVE	L	T	P	C
ELECTRONICS MEASUREMENTS	3	0	0	3

AIM

To provide adequate knowledge in Electrical and electronic measurements and instrumentation

OBJECTIVES

- To make the students to gain a clear knowledge of the fundamental elements of an instrument and static and dynamic characteristics.
- Emphasis is laid on the meters used to measure current & voltage and instrument transformers.
- To have an adequate knowledge in the measurement techniques for power and energy meters are included.
- To have basic knowledge about output display devices.
- Elaborate discussion about transducer and its classification.

OUTCOMES

At the end of the course, the student will

- Develop an understanding of construction and working of different measuring instruments.
- Develop an ability to use measuring instruments and AC and DC bridges for measurement

UNIT I -INTRODUCTION **6**

Functional elements of an instrument - static and dynamic characteristics – errors in measurement - statistical evaluation of measurement data - standard and calibration**.**

UNIT II-ELECTRICAL AND ELECTRONICS INSTRUMENTS **12**

Principle and types analog and digital ammeters and voltmeters – single and three phase Wattmeters and Energy meter– instrument transformers – instruments for measurement of frequency and phase.

UNIT III -SIGNAL CONDITIONING CIRCUITS **9**

Bridge circuits – differential and Instrumentation amplifiers - filter circuits - V/f and f/V converters – A/D and D/A converters - multiplexing and demultiplexing - data acquisition systems – grounding techniques.

UNIT IV -STORAGE AND DISPLAY DEVICES **8**

Magnetic disc and tape recorders – digital plotters and printers – CRT displays – digital CRO – LED, LCD and Dot matrix displays. Data Logger

UNIT V - TRANSDUCERS **10**

Classification of transducers – selection of transducers – resistive, capacitive and inductive transducers – piezo electric transducers – optical and digital transducers. - transducers for measurement of displacement, temperature, level, flows, pressure, velocity, torque, speed. Smart sensor.

Total Hours = 45

TEXT BOOKS

1. Doebeling, E.O., 'Measurement Systems – Application and Design', McGraw Hill Publishing Company, 1990.
2. H.S. Kalsi, 'Electornic Instrumentation', TMH Co., 1995.

REFERENCES

1. John P. Bentley, 'Principles of Measurement Systems', III Edition, Pearson Education, 2000.
2. Stout M.B., 'Basic Electrical Measurement', Prentice Hall of India, 1986.
3. Dalley, J.W., Riley, W.F. and Meconnel, K.G., 'Instrumentation for Engineering Measurement', John Wiley & Sons, 1993
4. Moorthy, D.V.S., 'Transducers and Instrumentation', Prentice Hall of India Pvt. Ltd., 1995.

ELECTIVE	L	T	P	C
COMPUTER ORGANISATION & ARCHITECTURE	3	0	0	3

AIM:

To study the internal organization and the architecture of computer.

OBJECTIVE:

- To learn about the design of the processors.
- To learn about the data transfer

OUTCOMES:

At the end of the course, the student will

- Ability to understand basic structure of computer.
- Ability to perform computer arithmetic operations.
- Ability to understand control unit operations.

UNIT I: INTRODUCTION **9**

Computer Organization- Main memory – CPU operation – Interrupt concept – I/ O techniques – Bus concept – Computer performance factors – System performance measurement- High performance techniques – Comparison of Architecture and Organization – Study of Salient features and architectures of Advanced processors (80286, 80386, 80486, Pentium)

UNIT II: PROCESSOR DESIGN AND CONTROL UNIT **9**

Goals – Design process –Data path organization – Main memory interface – Data path for single instructions- Floating point unit data path – Role of control unit – Reset sequence – Interrupt recognition and servicing – Abnormal situation handling – Hardwired control unit – Micro programmed control unit

UNIT III: MEMORY DESIGN & MEMORY MANAGEMENT **9**

Memory types – Functional and usage modes – Memory allocation- Multiple memory decoding – Memory hierarchy – Instruction pre fetch – Memory interleaving – Write buffer – Cache memory –Virtual memory – Associative memory

UNIT IV: INTRA SYSTEM COMMUNICATION AND I/O **9**

I/O controller & driver- Case study : Hard disk controller in IBM PC – I /O ports and bus concepts – Case study : Keyboard interface – Bus cycle – Asynchronous and Synchronous Transfer – Interrupt handling in PC – I/O techniques in PC – Case Study : RS 232 interface – Modern serial I/O interface – Bus arbitration techniques – Hard disk interface in PC

UNIT V: ADVANCED ARCHITECTURE **9**

Classification of parallelism – Multiple functional units – Pipelining – Vector computing – array processors – High performance architecture – RISC systems – Super scalar architecture – VLIW architecture – EPIC architecture – Multiprocessor systems – Cache coherence problem – Fault tolerance

TOTAL HOURS: 45

TEXT BOOKS

1. B.Govindarajulu, " Computer Architecture and Organization – Design principles and applications" , Tata McGrawHill publications, New Delhi
2. Carl Hamacher, Zvonko Vranesic And Safwat Zaky, "Computer Organization", Fifth Edition,Tata Mcgraw Hill, 2002.

REFERENCE BOOKS

1. William Stallings, "Computer Organization And Architecture – Designing For Performance", Sixth Edition, Pearson Education, 2003.
2. David A. Patterson And John L. Hennessy, "Computer Organization And Design: The Hardware/Software Interface", Second Edition, Morgan Kaufmann, 2002.
3. John P. Hayes, "Computer Architecture And Organization", Third Edition, Tata McGraw Hill, 1998.
4. A.K.Ray & K.M.Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing", TMH, 2002 reprint.

ELECTIVE	L	T	P	C
NEURAL NETWORK & FUZZY CONTROL	3	0	0	3

AIM:

To learn the basic concepts of Neural Networks & Fuzzy Logic and learn to design and use them for biomedical applications

OBJECTIVES

- To understand the basic concepts of artificial neural networks
- To study the various ANN Models
- To familiarize about the Self organizing maps and competitive networks
- To study the basic concepts of fuzzy Logic systems
- To apply the concepts of ANN and Fuzzy Logic in Biomedical applications

OUTCOMES

- To Expose the students to the concepts of feed forward neural networks
- To provide adequate knowledge of application of fuzzy logic

UNIT I - ARTIFICIAL NEURAL NETWORKS-AN OVERVIEW 9

Neural Networks Basics-Biological Neural nets, Processing elements-Mc Culloh Pitts Model, Types of Learning, Network Parameters-Weights, Activation, Threshold Functions, Hebb Rule, Delta Rule, Perception learning Algorithm.

UNIT II - ANN MODELS 9

Mapping, training of Feed forward networks-Perception, Mapping, training of Recurrent Networks-Hopfield Network, Radial Basis Function Network, Training of Feed Forward Back Propagation Network, Applications of BPN-Implementation of neural models

UNIT III - SELF ORGANIZING MAPS (SOM) 9

Self-organizing maps-Pattern clustering, SOM-Topological Mapping, Kohonen"s SOM, K-means clustering algorithm, competitive models-Min, Max Net, Adaptive Resonance Theory (ART)-Introduction, Network and Processing in ART, Associative memory model, Implementation of SOM using soft computing tools.

UNIT IV - INTRODUCTION TO FUZZY LOGIC 9

Fuzzy logic-Basic concepts -Fuzzy Vs Crisp set, Linguistic variables, Membership functions, Fuzzy IF-THEN rules, Variable inference techniques, De-fuzzification techniques, Basic fuzzy inference algorithm,. Implementation

UNIT V - NEURAL NETWORK AND FUZZY LOGICAPPLICATIONS IN MEDICINE 9

Neural Networks in Biomedical Applications, Cancer, Cardiovascular Applications, Medical Image Analysis using neural networks, Image Analysis –Case Study, Fuzzy Logic Applications, Fuzzy Logic Controller, Neuro fuzzy systems- Applications in medicine

Total Hours:45

TEXT BOOKS

1. Mohamad H, Hassoun, "*Fundamentals of Artificial Neural Network"*, Cambridge, The MIT Press, First edition, 1995.
2. Laurene Fausett, "*Fundamentals of Neural Networks: Architectures, Algorithms, and Applications",* Pearson Education India, Third edition, 2008.

REFERENCE BOOKS

1. Bishop C M, "*Pattern Recognition and Machine Learning",* Springer-Verlag, 2006.
2. Timothy J, Ross, "*Fuzzy Logic with Engineering Applications",* John Wiley and Sons, Second edition, 1995.
3. Yegnanarayana B, "*Artificial Neural Networks"*, Prentice Hall of India, Third edition 2006.

ELECTIVE	L	T	P	C
ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	3	0	0	3

AIM:

To represent the concepts of intelligent agents, search techniques, knowledge, reasoning and planning and applications in expert systems.

OBJECTIVE

- To study the ideas of intelligent agents and search methods.
- To study about knowledge representation.
- To study about planning and learning methodologies.
- To construct plans and methods for designing controllers.
- To study the concepts of expert systems

Outcomes

Upon successful completion of this course student will:

- Able to design a knowledge based system,
  familiar with terminology used in this topical area,
- Read and analyzed important historical and current trends addressing artificial intelligence.

UNIT I –INTRODUCTION TO ARTIFICIAL INTELLIGENC 8

Overview of AI – History and developments in AI – general concepts – production systems and examples – Intelligent agents – Perception – Introduction to natural language processing.

UNIT II – SEARCHSTRATEGIES AND ALGORITHMS. 9

Structures and strategies for state space search – Data and Goal driven search – search techniques– BFS, DFS, DFS with iterative deepening, best first search and Heuristic search – A* algorithm – AO* algorithm – constraint satisfaction.

UNIT III – KNOWLEDGE REPRESENTATION AND REASONING. 10

Representing knowledge – propositional calculus – predicate calculus – AI representational schemes – semantic networks, conceptual dependency, scripts and frames – theorem proving by resolution refutation –Basic probability notation – Axioms of probability – Baye's rule – Probabilistic reasoning.

UNIT IV – PLANNING AND LEARNING 10

Planning: Planning problem – Partial order planning – Planning and acting in non- deterministic domains – Learning: Learning decision trees – Knowledge in learning – Neural networks – basic architectures and types – Reinforcement learning – Passive and active.

UNIT V – EXPERT SYSTEMS 8

Definition – Features of an expert system – Organization – Characteristics – Prospector – Knowledge Representation in expert systems – Expert system tools – MYCIN – EMYCIN.

TEXT BOOKS

1. George. F, Luger, "Artificial Intelligence – Structures and Strategies for Complex Problem Solving", Fourth Edition, Pearson Education, 2002.
2. Elain Rich and Kevin Knight, "Artificial Intelligence", Second Edition Tata McGraw Hill, 2004.

REFERENCE BOOKS

1. Stuart Russel and Peter Norvig, “Artificial Intelligence - A Modern Approach”, Second Edition, Pearson Education, 2003.
2. Donald. A, Waterman, “A Guide to Expert Systems”, Pearson Education.2009.
3. Oliver Pourret, PatrikNaim and Bruce Marcot, “Bayesian Networks-A Practical guide to applications”, 2008.

ELECTIVE	L	T	P	C
GRID & CLOUD COMPUTING	3	0	0	3

AIM

To Study about Grid and Cloud Computing.

OBJECTIVES

- Understand how Grid computing helps in solving large scale scientific problems.
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing.
- Learn how to program the grid and the cloud.
- Understand the security issues in the grid and the cloud environment.

OUTCOMES

- Understand the fundamental principles of distributed computing.
- Understand how the distributed computing environments known as Grids can be built from lower level services.
- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.

UNIT I INTRODUCTION **9**

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

UNIT II GRID SERVICES **9**

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

UNIT III VIRTUALIZATION **9**

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

UNIT IV PROGRAMMING MODEL **9**

Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and unning a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT V SECURITY **9**

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TOTAL HOURS: 45

TEXT BOOKS:

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

REFERENCES

1. Jason Venner, "Pro Hadoop- Build Scalable, Distributed Applications in the Cloud", A Press, 2009
2. Tom White, "Hadoop The Definitive Guide", First Edition. O'Reilly, 2009.
3. Bart Jacob (Editor), "Introduction to Grid Computing", IBM Red Books, Vervante, 2005
4. Ian Foster, Carl Kesselman, "The Grid: Blueprint for a New Computing Infrastructure", 2nd Edition, Morgan Kaufmann.
5. Frederic Magoules and Jie Pan, "Introduction to Grid Computing" CRC Press, 2009.
6. Daniel Minoli, "A Networking Approach to Grid Computing", John Wiley Publication, 2005.
7. Barry Wilkinson, "Grid Computing: Techniques and Applications", Chapman and Hall, CRC, Taylor and Francis Group, 2010.

ELECTIVE	L	T	P	C
INFORMATION SECURITY	3	0	0	3

AIM

To study the critical need for ensuring Information Security in Organizations

OBJECTIVES

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

OUTCOMES:

- students have firm understanding on basic terminology and concepts related to network and system level security.
- Understand the policies as a tool to effectively change an organization's culture towards a better secure environment.

UNIT 1 INTRODUCTION 9

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV LOGICAL DESIGN 9

Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V PHYSICAL DESIGN 9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TOTAL HOURS: 45

TEXT BOOK

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003

REFERENCE BOOKS

1. Micki Krause, Harold F. Tipton, “ Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw-Hill, 2003
3. Matt Bishop, “ Computer Security Art and Science”, Pearson/PHI, 2002.

ELECTIVE	L	T	P	C
CYBER SECURITY	3	0	0	3

AIM

To study the critical need for ensuring Cyber Security in real time problems

OBJECTIVES

- To understand the basics of Cyber Security
- To know the legal, ethical and professional issues in Cyber Security
- To know the various attacker techniques

OUTCOMES:

Upon Completion of the course, the students should be able to:

- Compare various defense analysis Techniques
- Design Secure applications
- Inject secure coding in the developed applications

UNIT I CYBER SECURITY FUNDAMENTALS **9**

Network and security concepts – basic cryptography – Symmetric encryption – Public key Encryption – DNS – Firewalls – Virtualization – Radio Frequency Identification – Microsoft Windows security Principles.

UNIT II ATTACKER TECHNIQUES AND MOTIVATIONS **9**

Antiforensics – Tunneling techniques – Fraud Techniques - Threat Infrastructure.

UNIT III EXPLOITATION **9**

Techniques to gain a foot hold – Misdirection, Reconnaissance, and disruption methods.

UNIT IV MALICIOUS CODE **9**

Self Replication Malicious code – Evading Detection and Elevating privileges – Stealing Information and Exploitation.

UNIT V DEFENSE AND ANALYSIS TECHNIQUES **9**

Memory Forensics – Honeypots – Malicious code naming – Automated malicious code analysis systems – Intrusion detection systems – Defense special file investigation tools.

TEXT BOOK

1. James Graham, Richard Howard and Ryan Olson, “Cyber Security Essentials”, CRC Press, Taylor & Francis Group, 2011.

REFERENCE BOOKS

1. By Dan Shoemaker, Ph.D., William Arthur Conklin, Wm Arthur Conklin, “Cybersecurity: The Essential Body of Knowledge**”,** Cengage Learning, 2012.

2. Ali Jahangiri, “Live Hacking: The Ultimate Guide to hacking Techniques & Counter measures for Ethical Hackers & IT Security Experts”, 2009.

ELECTIVE	L	T	P	C
GLOBAL POSITIONING SYSTEM	3	0	0	3

AIM:

To impart the knowledge on basic functioning of GPS and its calibration.

OBJECTIVE:

- To understand Global Positioning systems
- To analyse and calibrate GPS devices
- To learn about various types of communication in GPS

OUTCOMES:

After completing the course, the candidate shall have an in-depth understanding of satellite positioning and navigation, especially GPS.

Unit – I: Overview of GPS **9**

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

Unit II GPS Signals **9**

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

Unit III GPS coordinate frames **9**

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

Unit IV GPS orbits and satellite position determination **9**

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

Unit V GPS Errors **9**

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

Total Hours: 45

TEXTBOOKS:

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

REFERENCE BOOKS:

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

INDUSTRIAL ELECTIVE	L	T	P	C
BUSINESS INTELLIGENCE AND ITS APPLICATIONS	3	0	0	3

AIM

To learn about the building up of a successful BI strategy.

OBJECTIVES

- Introduce students to various business intelligence concepts
- To learn the concepts of data integration
- To introduce enterprise reporting

OUTCOMES

- Apply principles and skills of economics, marketing, and decision making to contexts and environments in data science.
- Analyze legal and ethical principles applied to contexts and environments of data science and decision making.

UNIT-I INTRODUCTION TO BUSINESS INTELLLIGENCE 9

Introduction to OLTP AND OLAP – BI Definition and BI Concepts – Business Applications of BI - BI Framework- Role of Data Warehousing in BI –BI Infrastructure Components- BI Process – Developing Data Warehouse – Management Framework – Business driven approach –BI Technology –– BI Roles & Responsibilities.

UNIT - II BASICS OF DATA INTEGRATION 9

Concepts of Data Integration need and advantages of using Data Integration – Introduction to common data integration approaches – Introduction to ETL using SSIS – Introduction to Data Quality – Data Profiling Concepts and Applications.

UNIT - III INTRODUCTION TO MULTIDIMENSIONAL DATA MODELING 9

Introduction to Data and Dimensional Modeling – Multi Dimensional Data Model – ER modeling Vs Multi Dimensional Model – Concepts of Dimensions - facts - cubes- attributes- hierarchies- star and snowflake schema – Introduction to Business Metrics and KPIs – Creating Cubes using SSAS.

UNIT - IV BASICS OF ENTERPRISE REPORTING 9

Introduction to Enterprise Reporting - Concepts of dashboards - balanced scorecards – Introduction to SSRS Architecture– Enterprise Reporting using SSRS reporting service

UNIT - V BI ROAD AHEAD 9

BI and Mobility – BI and cloud computing – BI for ERP systems - Benefits of BI in ERP-NorthWind_Traders Data-Data Analyses through Excel-Kettle Tool – Conversion of data using Kettle Tool.

TOTAL HOURS: 45

TEXT BOOKS

1.RN Prasad, Seema Acharya, "Fundamentals Of Business Analytics" Wiley India,2011

REFERENCES

1.Soumendra Mohanty, “Data Warehousing Design, Development and Best Practices”, Tata McGraw-Hill, New Delhi, 2007.
2.David Loshin, “Business Intelligence”, Morgan Kaufmann Publishsers, San Francisco, Fifth edition, 2007.
3.Larissa Terpeluk Moss and Shaku Atre, “Business Intelligence Roadmap”, Pearson Education, 2007.

INDUSTRIAL ELECTIVE	L	T	P	C
SOFT SKILLS	3	0	0	3

ELECTIVE	L	T	P	C
LEARNING IT ESSENTIALS BY DOING	3	0	0	3

AIM

An emphasis is on providing students with basic skills and knowledge to pass the industry certification exams and to embark on a successful career in the field of information technology

OBJECTIVES:

- Develop critical thinking skills
- Demonstrate essential workplace skills
- Demonstrate essential customer service skills for use in industry
- Demonstrate effective ethical behavior and communication skills in the workplace

OUTCOMES:

- Develop working knowledge of how computers and mobile devices operate.
- Identify common security threats and vulnerabilities like malware, phishing, spoofing and social engineering.
- Apply skills and procedures to install, configure, and troubleshoot computers, mobile devices, and software.

UNIT I

Fundamentals of Computer architecture-introduction-organization of a small computer, Central Processing Unit - Execution cycle - Instruction categories - measure of CPU performance Memory - Input/output devices - BUS-addressing modes. System Software - Assemblers - Loaders and linkers - Compilers and interpreters, Operating system - introduction - memory management schemes Process management Scheduling - threads.

UNIT II

Problem solving with algorithms- Programming styles, Coding Standards and Best practices - Introduction to C Programming, Testing and Debugging. Code reviews, System Development Methodologies - Software development Models, User interface Design - introduction - The process - Elements of UI design & reports.

UNIT III

RDBMS- data processing - the database technology - data models, ER modeling concept -notations - Extended ER features, Logical database design – normalization, SQL - DDL statements - DML statements - DCL statements, Writing Simple queries - SQL Tuning techniques - Embedded SQL – OLTP

UNIT IV

Objected oriented concepts - object oriented programming, UML Class Diagrams- relationship - Inheritance - Abstract classes –polymorphism, Object Oriented Design methodology - Common Base class, Alice Tool - Application of OOC using Alice tool.

UNIT V

Client server computing - Internetworking - Computer Networks ,Working with TCP/IP - IP address - Sub netting - DNS - VPN - proxy servers World Wide Web - Components of web application - browsers and Web Servers, URL - HTML - HTTP protocol - Web Applications - Application servers - Web Security.

TOTAL: 45 PERIODS