Department of Electronics Engineering

THIRD SEMESTER

BAML201 Mathematical Applications in Electronics & Communication Engineering (4-0-0-4) Total Hrs: 45

Pre-requisite: --

Course Objectives:

1. To develop skills to use Laplace Transform and Z- Transform and its applications in the field of Electronics engineering.
2. To introduce Partial Differential Equations and Fourier Series and its applications in the field of Electronics engineering.
3. To introduce complex variables and its application in the field of Electronics engineering.
4. To develop skills to solve problems on Calculus of Variation in the field of Electronics engineering.

Course Outcomes:

1. Effectively apply concepts of Laplace Transform in a clear and concise manner. This will be assessed through class assignments and exams
2. Effectively apply concepts of Z- Transform for analyzing the stability of systems and signal processing. This will be assessed through assignments and exams.
3. Demonstrate ability to think critically by proving mathematical conjectures and establishing theorems from complex variables. This will be assessed through tests and a final exam.
4. Apply concepts of Calculus of Variation to solve engineering problems.
5. Compute the Fourier series representation of a periodic function, in both exponential and sine-cosine forms, evaluate the Fourier transform of a continuous function, and are familiar with its basic.
6. Effectively apply concepts of Partial Differential Equationfor analyzingnet work theory and micro engineering

Unit I: Laplace Transforms (8 Hrs)

Laplace transform: definition and their simple properties, transform of derivatives and integrals, evaluation of integrals by L.T., inverse L.T. &its properties , convolution theorem, Laplace transforms of periodic function & unit step function, applications of Laplace transforms to solve ordinary differential equations & partial differential equations.

Unit II: Z-Transforms (7 Hrs)

Z transform- definition & properties, inverse Z & relation with Laplace Transform. Application to z-transform to solve difference equations with constant coefficients.

Unit III: Complex Variables (8 Hrs)

Analytic Functions, Cauchy Riemann conditions, Conjugate functions, singularities. Cauchy's integral theorem and integral formula (Statement only). Taylor's and Laurentz's Theorem (Statement only). Residue theorem, contour integration.

Unit IV: Calculas of Variation (7 Hrs)

Maxima and minima of functionals, Variation and its properties, Euler's equations, functionals dependent on first and second order derivatives, Simpler applications.

Unit V: Fourier Series and Fourier Transforms (8 Hrs)

Introduction, the Fourier theorem, Evaluation of Fourier Coefficients. Consideration of symmetry (odd, even rotational) exponential form, Fourier series, Fourier integral theorem, Fourier transforms.

Unit VI: Partial Differential Equation (7 Hrs)

Partial Differential equation of first order first degree i. e. Lagrange's form. Linear non homogeneous Partial Differential equation of nth order with constant coefficient method of separation of variables. Application to transmission lines.
Advanced topics on the subject.

Text Books:

1. Grewal B.S., 'Higher Engineering Mathematics',Thirty eighth Edition, Khanna Publishers; 2004.
2. Kreyszig, E., 'Advanced Engineeing Mathematics',Eighth Edition, John Wiley & Sons; 2000.

Reference Book:

1. Spiegel, M. R., 'Advanced Mathematics for Engineers and Scientists',McGraw-Hill Book Company ; 2000.
2. J. N. Wartikar & P. N. Wartikar ,'Applied Mathematics',Volume 1:
3. H. K. Dass, 'Engineering Mathematics',S. Chand, Publication, New Delhi, 2000
4. Chandrika Prasad, 'Mathematics for Engineers'
5. Chandrika Prasad , 'Advances Mathematics for Engineers',e book
6. Jain, R.K. and Iyengar, S.R.K., 'Advanced Engineering Mathematics',Narosa Publishers; 2003.
7. Bali Iyengar , 'Text book of Engineering Mathematics', Laxmi Prakashan

BECL201 ELECTRONICS DEVICES & CIRCUITS (3-1-0-4) Total Hrs : 45

Prerequisites: Basic Electronics

Course Objectives:

1. To gain knowledge of electronics devices and semiconductor physics.
2. To study need of electronics devices and its applications.
3. To familiarize the students with the analysis and design of analog circuits.
4. To use appropriate experimentation techniques to evaluate circuit performance.

Course Outcome:

Student shall be able to:

1. Understand operation of diodes, types of diodes and their role in design of various electronic applications.
2. Develop the capability to analyze and design simple circuits containing non-linear elements such as transistors using the concepts of load

lines, operating points for various biasing methods and perform small signal analysis.
3. Understand the concepts of feedback and apply the concepts for improvement of performance of amplifier and oscillator;
4. Understand , analyze anddesign different types of power amplifiers and use methods for reduction of distortions
5. Understand the operation of the Field Effect Transistor (FET), Metal Oxide Semiconductor Field Effect Transistor (MOSFET) and design FET circuits
6. To understand the characteristics of CMOS circuit construction and perform AC & DC Analysis

Unit I: PN Junction Diode (8 Hrs)
PN junction, forward and reverse bias, VI Characteristics, Dynamic Resistance, Temperature dependence, Avalanche and Zener Break Down, Photo Diode, LED's, LCD's, Varactor Diode, Tunnel Diodes, Half and full wave rectifiers with filters .
Unit II: Bi-Polar Junction Transistors (10 Hrs)
Theory of operation, Static Characteristics, Break down voltages, Current voltage, Power Limitations, Ebers-moll Model, Continuity Equation, Biasing BJT, Different Biasing arrangement, Stability factor, thermal runaway, Power Transistors. CE, CB, CC Classification and Characteristics, Small Signal Analysis, Regulators: Design of Shunt & Series regulators, Introduction to SMPS ,
Unit III: Feedback Amplifiers & Oscillators (6 Hrs)
Feedback Amplifiers, Classification of Oscillators, Stability, Bark Hausen Criteria, Design of RC, LC and Crystal Oscillators.
Unit IV: Power Amplifier (8 Hrs)
Classification A, B, AB, C, Efficiency, Push Pull Configuration (A, B, AB) Complementary symmetry, Second Harmonic and Cross over Distortion., Design of Power Amplifiers (Class A and Class AB),Design of class A Small signal amplifiers, Emitter follower, Applications .
Unit V: Unipolar Devices (7 Hrs)
Field Effect Transistor, MOSFET, NMOS, PMOS Principles of operation and characteristics, Biasing arrangement, small signal analysis of CG, CB and CD
Unit VI: CMOS Circuits (6 Hrs)
An introduction to CMOS, Diode and MOSFET , Transistors, MOSFET Switches, Transmission Gate, Inverter - DC, AC Analysis.

Advanced topics on the subject.
Text Books:
1. Millman And Halkies : Electronics Devices And Circuits
2. Millman and Halkies : Integrated Electronics.

Reference Books:
1. Kang : CMOS Integrated Circuits
2. R.J.Bekar : Fundamentals of CMOS Design
3. Theraja & Sedha : Electronics Devices And Ckts
4. Schilling. And Beloove: Electronics Circuit Discrete and Integrated, Mc Graw Hill.
5. Bapat : Theory and Problem in Circuit Analysis, McGraw Hill

BECP 201 ELECTRONICS DEVICES & CIRCUITS (0-0-2-1) Total Hrs: 20
List of Practicals:
1. Design full wave rectifier with and without filter & calculate ripple factor.
2. Design Clipper circuit and plot the characteristics & perform simulation on Micro-cap.
3. Design clamper circuit and plot the characteristics & perform simulation on Micro-cap.
4. Design Zener Diode as a Voltage Regulator & perform simulation on Micro-cap
5. Design emitter follower type of voltage regulator using darlington pair and simulate it on microcap.
6. Design push-pull class A power amplifier and simulate it on microcap.
7. Design a Wein Bridge Oscillator and simulate it on microcap.
8. Design circuit to verify the characteristic of varactor diode.
9. Design series voltage regulator.
10. Open Ended Experiments [Design of CMOS Inverter & NAND Gate using Tanner tool]

BEEL201 NETWORK THEORY (3-1-0-4)
Total Hrs : 45
Prerequisite- --
Course Objectives:
1. To introduce the concept of circuit elements lumped circuits, circuit laws and reduction.
2. To study the loop and nodal analysis of networks in ac and dc systems.
3. To study the transient response of series and parallel A.C. circuits.
4. To study the concept of coupled circuits and two port networks.

Course Outcomes:
Student shall be able to:
1. Analyze circuits with ideal, independent, and controlled voltage and current sources. using Mesh & Nodal analysis.
2. Determine the equivalent circuits of a network that include passive devices, dependent sources, and independent sources in combination using network theorems.
3. Understand the analysis techniques of electrical networks and also waveform synthesis.
4. Understand and measure the transient and sinusoidal Steady- state Responses of simple RC and RLC circuits

5. Simplify circuits using network reduction approach.
6. Determining two port network parameters and one parameter in terms of other parameters.

Unit I: Nodal & Mesh Analysis (08 Hrs.)
Nodal and Mesh analysis basic equilibrium equations, matrix approach for complicated network, containing voltage, current sources , Mutual Inductances, source transformations , Duality.

Unit II: Network Theorems (08 Hrs.)
Superposition, Reciprocity, Thevenin's, Norton's, maximum power transfer, compensation, Tellegen's theorem as applied to A.C. circuits.

Unit III: Fourier Analysis (07 Hrs)
Trigonometric and exponential Fourier series. Discrete spectra and symmetry of waveforms, synthesis, steady state response of a network to non sinusoidal periodic inputs. Fourier transforms and continuous spectra.

Unit IV: Laplace Transformation (08 Hrs)
Laplace transformation and its properties, partial fractions, singularity functions, waveform synthesis. Analysis of RC & RL network with and without initial conditions with Laplace transformation, evaluation of initial& final conditions.

Unit V: Network Function (07 Hrs.)
Transient behaviors, concept of complex frequency, Driving points and transfer functions, poles, zeros of admittance function, their properties, sinusoidal response from Pole-zero locations, convolution theorem and integral solution.

Unit VI: Two Port Network (07 Hrs)
Two port network parameters and inter connections study of series and parallel resonance in A.C. Three Phase unbalanced circuits and power calculations.
Advanced topics on the subject

Text Books : -

1. Van Valkenburg : Network Analysis, 3rd Edition Prentice Hall of India,2001
2. Kelkar and Pandit : Linear Network Theory, 1st Edition,Pratibha Publication,1995.

Reference Books:

1. A. Sudhakar and S.P. Shyam Mohan : Circuit and Network , 2nd Edition,Tata Mc Graw Hill,2002.
2. D. Roy Choudhary : Network and System, 1st Edition, New Age International Publication, 1998.
3. G.K. Mittal : Network Analysis , 11th Edition , Channa Publication.
4. B.R. Gupta : Network Systems & Analysis, 2nd Edition, S.Chand publication 2005.

BECL202 COMMUNICATION ELECTRONICS
(3-1-0-4) Total Hrs : 45
Pre-requisite: - --
Co-requisite: - --

Course Objectives:
1. To understand the basic concept of communication and different modulation systems based on basic parameters.
2. To understand the concept of multiplexing.
3. To understand theory of digital modulation.
4. To understand working of radio receivers.

Course Outcome:
Student shall be able to:
1. Understand the propagation of waves and Evaluate the influence of noise on communications signals.
2. Demonstrate knowledge and understanding basic concepts in amplitude modulation and demodulation of analog communication systems
3. Assess and evaluate angle modulation and demodulation of analog signals and the performance of FM receivers
4. Apply sampling theorem to design analog pulse modulation techniques.
5. Understand the need and limitations of various multiplexing techniques
6. Understand the practical implementation and limitations of digital modulation techniques like PCM, DM and ADM.

Unit I: Introduction To Communication, Radiation And Propagation (8 Hrs.)
Block Schematic of Communication System, Base Band Signals and their bandwidth requirements, RF Bands, Concept of Radiation and Electromagnetic waves, Mechanism of Propagations: Ground Wave, Sky Wave, Space Wave, Duct, Tropospheric Scatter and Extraterrestrial Propagation. Concept of Fading and diversity reception, Noise Figure Calculations

Unit II: Amplitude Modulation And Detection (8 Hrs.)
AM Modulators series plate modulated class C amplifiers, efficiency & power calculations ,SSB modulation SSB-SC modulation AM demodulators ,square law detector, diode peak detector, envelop detector, detectors for SSB and SSB-SC-AM signals, AM using transistors, Block Diagram of AM Receiver, AM Detection : Envelope detection, Synchronous detection, Practical diode detection, AGC, SSB and DSB detection methods.

Unit III: Frequency Modulation And Radio Receivers (8 Hrs.)
Angle modulation, frequency modulation spectrum reactance tube and FET modulators, Armstrong method, FM transmitters, frequency stabilization methods, FM discriminator, foster Seeley, PLL detectors, stereo phonic FM, Super heterodyne Receiver, Performance characteristics: Sensitivity, Selectivity, Fidelity, Image Frequency Rejection, IFRR, Tracking, De-emphasis, Mixers.

Unit IV: Pulse Modulation Techniques (7 Hrs.)
Introduction to Sampling, Sampling theorem, Sampling Techniques, Analog Pulse Modulation methods, Pulse amplitude modulation (PAM) ,

Demodulation of PAM, Transmission of PAM, Drawbacks. Pulse time modulation: Pulse width modulation (PWM), Modulation and Demodulation of PWM, Pulse position modulation (PPM), Modulation and Demodulation of PWM.

Unit V: Digital Multiplexers (7 Hrs.)

Frequency Division multiplexing, Time Division Multiplexing. PAM/TDM System: Signaling rate, transmission bandwidth, advantages and disadvantages. Introduction to Digital multiplexers and their classification, Multiplexing Hierarchy for Digital Communication.

Unit VI: Digital Modulation Techniques (7 Hrs.)

Pulse code modulation (PCM): PCM systems, Delta modulation, ADPCM, matched filter receiver, Digital Modulation formats, Coherent Binary modulation technique, Coherent Binary: PSK, FSK, QPSK, MSK, and DPSK.

Advanced topics on the subject

Text Books:

1. Frenzel Louis.E, Communication Electronics Principles and Applications, Third Edition, TataMcGraw HILLS, 2011
2. B. P. Lathi, Modern Digital and Analog. Communication Systems, First Edition, Oxford press Publication, 1998

Reference Books:

1. Bruuce Carlson, Communication System, Third Edition, TataMcGraw HILLS,2008
2. Denenis Roddy, Electronics Communication, Pearson Publication

BECP202 COMMUNICATION ELECTRONICS (0-0-2-1) Total Hrs: 20

1. List of Practicals:

1. Generation of Amplitude Modulation using transistor BC 548 and Calculate modulation index. Perform simulation in MATLAB.
2. Generate Amplitude Demodulation using Envelope Detector and observe the result on Spectrum Analyzer.
3. Generation of Frequency Modulation and demodulation using VISIM and MATLAB.
4. Generation of Pre-emphasis and De-emphasis circuit on breadboard system & to plot pre-emphasis and de-emphasis curve.
5. To generate Pulse Amplitude Modulation (PAM) and plot the waveforms. Observe the demodulated output.
6. Generation of Pulse Width Modulation (PWM) signal using IC 555 on breadboard and Verify Simulation in Micro-cap.
7. Generation of Pulse Position Modulation (PPM) signal using IC 555 on breadboard. And Verify Simulation in Micro-cap.
8. Verify Amplitude Shift Keying (ASK) using MATLAB
9. Generation of Frequency Shift Keying (FSK) and observation of mark and space frequencies using MATLAB.
10. Verify Pulse Code Modulation (PCM) using Simulation in MATLAB.
11. An open end project

BCSL201 DATA STRUCTURES USING C

(3-1-0-4) Total Hrs: 45

Pre-requisite: --

Course Objectives:---

1. To understand the way of developing programs based on well defined approach.
2. To develop proficiency in the specification, representation, and to implement Data Types and Data Structures in C language.
3. To understand the analysis of various Algorithms.
4. To get a good understanding of applications of Data Structures in C language.

Course Outcome:

Student shall be able to:

Upon successful completion of the course, students

1. CO1:Acquire and Apply basic concepts of data type and array data structure.
2. CO2:Implement linked list data structure to find solution for given engineering applications.
3. CO3:Implement data structure such as stacks and queues to solve various computing problems using C-programming language.
4. CO4Design tree data structure to solve various computing problems.
5. CO5:Design graph data structure to solve various computing problems.
6. CO6:Design and analyze standard algorithms for searching and sorting.

Unit I: Arrays, Records and Pointers (7 Hrs)

Introduction, Linear Arrays, Arrays as ADT, Representation of Linear in Memory, Traversing Linear Arrays, Inserting and deleting, Sorting; Bubble Sort, Searching; Linear Search, Binary Search, Multidimensional Arrays, Representation of Polynomials Using Arrays, Pointers; Pointer Arrays, Dynamic Memory Management, Records; Record Structures, Representation of Records in Memory; Parallel Arrays, Matrices, Sparse Matrices

Unit II: Linked List (9 Hrs)

Introduction,Linked Lists ,Representation of Linked Lists in Memory,Traversing a Linked List,Searching a Linked List, Memory Allocation; Garbage Collection ,Insertion into a Linked List ,Deletion from a Linked List , Header Linked List, Circularly Linked Lists, Two-Way Lists (or Doubly Linked Lists), Josephus Problem and its Solution, Buddy Systems

Unit III: Stacks, Queue and Recursion (9 Hrs)

Introduction,Stacks ,Array Representation of Stacks ,Linked Representation of Stacks, Stack as ADT ,Arithmetic Expression; Polish Notation ,Application of Stacks, Recursion,Towers of Hanoi, Implementation of Recursive Procedures by Stacks ,Queue,Linked Representation of Queues ,Queues as ADT , Circular of Queues, Deques,Priority Queues ,Applications of Queues

Unit IV: Trees (10 Hrs)

Introduction,Binary Trees ,Representing Binary Tree in Memory ,Traversing Binary Trees,Traversal Algorithms Using Stacks,Header Nodes; Threads ,Threaded Binary Trees ,Binary Search Trees ,Searching and Inserting in Binary Search Trees ,Deleting in a Binary Search Tree,Balanced Binary Trees,AVL Search Trees,Insertion in an AVL Search Tree ,Deletion in an AVL Search Tree, m-way Search Trees ,Searching, Insertion and Deletion in an m-way Search tree,B-Trees ,Searching, Insertion and Deletion in a B-tree,B+-Trees

Unit V: Graphs and their Applications (6 Hrs)

Introduction ,Graph Theory Terminology ,Sequential Representation of Graphs; Adjacency Matrix; Path Matrix ,Warshall's Algorithm; Shortest Paths ,Linked Representation of a Graph ,Operations on Graphs, Traversing a Graph ,Posets; Topological Sorting ,Spanning Trees

Unit VI: Sorting and Searching (4 Hrs)

Introduction, Sorting, Insertion Sort, Selection Sort, Merging, Merge-Sort, Shell Sort, Radix Sort, Searching and Data Modification, Hashing
Advanced topics on the subject

Text Books:

1. Seymour Lipschutz, Schaums : Data Structures with C, Tata Mc Graw Hill

Reference Books:

1. S. Sahani, Data Structures in C,
2. D.Samantha, Classic Data Structure, PHI Publications

BCSP201 DATA STRUCTURES USING C
(0-0-2-1) Total Hrs: 20

List of Practicals:

1. Write and execute a program in C to implement an array and find out greatest and smallest number from the array.
2. Write and execute a program in C to merge two sorted arrays.
3. Write and execute a program in C to implement 2-dimentional array and perform the multiplication of two matrices.
4 Write and execute a menu driven program in C to
   Find factorial of a number.
   Print first n numbers from Fibonacci series.
5 Write and execute a program in C to implement the Binary search algorithm
6 Write and execute a program in C to implement Insertion sort.
7 Write and execute a program in C to implement selection sort.
8 Write and execute a program in C to implement merge sort.
9. Write and execute a program in C to implement the Bubble Sort.
10. Write and execute a program in C to implement stack using arrays.
11. Write and execute a program in C to implement queue using arrays.
12. Write and execute a program in C to implement simple linked list.
13. Write and execute a program in C to insert a node in a linked list in a sorted fashion.
14. Write a program in c to implement binary trees.
15. Write and execute a program in C to find mirror image of a binary tree.
16. Open ended practical

MBL102 : GENERAL PROFICIENCY:-II : German / French/ Spanish Language

Course Objectives: -

1. To learn foreign languages to improve inter personal skills.
2. To enable improving business communications and having access to literature in globally recognized languages.
3. To help communicate at international forums and explore opportunities for employment.

Course Outcomes:

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

1. Communicate effectively in more than one globally recognized language like French, Spanish, German, Japanese, etc.
2. Interact with technical and business communities at international forums.

Topic	Learning Goals	Activities
The Alphabets and accents	Pronunciations techniques	Worksheet and charts
Number 1 to 20		
Greetings & Salutations	Articles , Personal Pronoun	Day timing , Daily routines forms of respects , Vocabulary
Family and relations	Shapes and colors , Possessive Pronouns , Gender , Negative Sentence	Relations, Day of week
Weather and Seasons	Climate , Fabrics & Clothes , sizes , interrogatives , Basic verbs	Group Activities , Paragraph writing including , Names of months , Seasons , Sky , Stars
House & Household things	Describing neighborhood. Present Tense	Furniture , Household articles, Colors
Visit to supermarket	Learning the shopping etiquettes , vocabulary of food items , conversing with shopkeepers etc , Plurals	Project on vocabulary of vegetables and fruits , Bakery products , Group Activity / Role play
Timing , Telephonic Conversions	How to Ask time , converse on telephone	Timing and clock (Hours & Minutes)

Visit to city , Prominent places and park	Nature , Directions , Means of transportations, Tenses contd….	Self introductions , Role-play , preparing charts
In Restaurant / Hotel	Ordering eatables , Table manner .Verbs	Enhancing vocabulary of food Dishes , cutlery
Visit to Doctor	Health matters, illness. Commonly used verbs contd..	Worksheets , projects
French / German /Spanish culture – monuments , delicacies , wines visa vis Indian culture Diwali festival	Vocabulary of clothes , Accessories , Cuisines , Beverages , Adjectives	Presentations by students , situation based conversations
Receiving Guests/ Entertaining people / Good Bye's	Customs , Traditions ,, Manners , welcome & Audieu's	Activities , Role play ,, Assignments

FOURTH SEMESTER

BCSL202 COMPUTER ARCHITECTURE & ORGANIZATION (3-1-0-4)

Total Hrs: 45

Pre-requisite: - ---

Course Objectives: ---

1. To make the students acquainted with the organization and architecture issues of digital computers.
2. To understand the design and working of various organizational blocks.
3. To study in detail the operation of the arithmetic units, control units and the concept of pipelining.
4. To study the different ways of communicating with I/O devices and standard I/O interfaces

Course Outcome:

Student shall be able to:

1. To analyze the basic structure and operation of a digital computer.
2. Ability to think critically, independently, and quantitatively about computer processing and sequencing of the instructions.
3. Analyze the arithmetic unit by studying various algorithms for number operations.
4. Be familiar with organization and design of memory Concept, structure and operation of Cache memory and virtual memory.
5. Reason systematically about impact of design and ways of communicating with I/O devices and interfaces.
6. Apply the concept of pipelining to improve the performance of Computer architecture

Unit I: Basic Structure Of Computers (7 Hrs)

Functional units, Basic operational concepts, Bus structures Addressing modes, subroutines: parameter passing, Instruction formats, expanding opcodes method.

Unit II: Basic Processing Unit (8 Hrs)

Bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Microprogrammed Control, microinstruction format, Bit slice concept.

Unit III: Arithmetic Unit (8 Hrs)

Number representations and their operations, Design of Fast Adders, Signed multiplication, Booth's Algorithm, bit-pair recoding, Integer Division, Floating point numbers and operations, guard bits and rounding.

Unit IV: The Memory System (8 Hrs)

Various technologies used in memory design, higher order memory design, multimodal memories and interleaving, Associative Memory, Cache memory, Virtual Memory

Unit V: Input/Output Organization (7 Hrs)

I/O mapped I/O and memory mapped I/O, interrupts and interrupts handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Direct Memory Access COMPUTER PERIPHERALS: I/O devices such as magnetic disk, magnetic tape, CDROM systems.

Unit VI: RISC Philosophy: (7 Hrs)

Pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, influence of pipelining on instruction set design, multiple execution units, performance considerations, Basic concepts in parallel processing & classification of parallel architectures. Vector Processing, Array Processors. Recent trends in Computer Architecture & Organization,
Advanced topics & its Application.

Text Books:

1. V.C.Hamacher,Z.G.Vranesic and S.G.Zaky, Computer Organisation, McGraw Hill,5th ed,2002.
2. J.P.Hayes Computer Architecture & Organization McGraw Hill III Ed

References Books:

1. A.S.Tanenbaum, "Structured Computer Organization" 4th Edition, Pearson Education
2. M Mano, "Computer System and Architecture", Pearson Education
3. W. Stallings, "Computer Organization & Architecture", Pearson Education

BEEL310 POWER ELECTRONICS (4-0-0-4)

Total Hrs: 45

Pre-requisite: - Basic Electrical

Course Objectives:

1. To study characteristics of modern power electronic devices.
2. Design and application of power electronics circuits in the field of AC /DC power generation.
3. To study transmission and energy conversion using switching devices.
4. To study the design procedure for protection circuits

Course Outcome:

Student shall be able to

1. Understand the components of power electronics devices, characteristics and practical issues in power electronics circuit design.
2. Understand the need &operation of power converter and design AC to DC converter for given specification.
3. Apply skill to design converter for drive control and AC-AC converters for given specification.
4. Understand the theory and operation of high-frequency switching circuits for different power conversion applications and able to design protection circuits.
5. Understand the need, working principle and design & analyze DC-DC converter for given specification.
6. Apply knowledge and analysis techniques to design AC-DC power converter with given specification and use methods for reduction of harmonics distortions.

Unit I: SCR and Its Characteristics (07 Hrs.)

Gate characteristics, SCR turn off, ratings, series and parallel connections of SCRs. Triac and its applications, Uni- junction transistors, Triggering circuits and opto couplers.

Unit II: Line Commutated Converters (08 Hrs.)

Working of single pulse converter, two pulse mid point converter. three pulse midpoint converter and' 3 phase six pulse bridge converter, effect of source inductance in converters, effect of tree wheeling diode.

Unit III: Single Phase And Three Phase Half Controlled Converters (08 Hrs.)

Speed control of d.c. motors using line commutated converters. Cycloconverters (single phase).

Unit IV: Static Controllable Switches (08 Hrs.)

Characteristic and working of MOSFET Gate turn off Thyristers and insulated gate bipolar transistor, protection of SCR gate circuit protection, over voltage and over current protection, snubber circuit design, converter circuit faults and their protection.

Unit V: D.C. Choppers (07 Hrs.)

Principles of step down chopper, step up chopper classification, impulse commutated and resonant pulse choppers. Multi phase choppers. Application of choppers, Inverters: Basic series resonant. Inverter, half bridge and full bridge series resonant inverters.

Unit VI: Single Phase And Three Phase Invertors (07 Hrs.)

Single phase and three phase bridge invertors, commutation and trigger-circuits for forced com mutated thyristor inverters. Output voltage control, Harmonics in output voltage waveform, Harmonic attenuation by filters. Harmonic reduction by pulse width modulation techniques. Analysis for single pulse width, modulation. Working of current source inverters few applications of inverters.

Advanced topics on the subject

Text Books:

1. M. H. Rashid : Power Electronics circuits Devices and Applications by, 3rd Edition, Pearson Education Publication.
2. C.W. Lander : Power Electronics, 3rd Edition, Paper Back Publication.

Reference Books:

1. Dr. M.Ramamoorthy : An Introduction to Thyristers and their Applications, 2nd Edition, East-West Press.
2. P.C. Sen : Power Electronics, 30th Reprint Tata McGraw Hill Publication.

BEEP310 POWER ELECTRONICS (0-0-2-1) Total Hrs: 20

List of Practicals:

1. Design a circuit to verify V-I characteristics of SCR and determine the break over voltage on state resistance holding current & Latching current.
2. Design a circuit to verify V-I characteristics of TRIAC for both forward and reverse conduction
3. Design a circuit to verify V-I characteristics of UJT
4. Implement a triggering circuit for SCR using UJT as Relaxation Oscillator.
5. Design a circuit and obtain output characteristics and transfer characteristics of IGBT
6. Design series inverter using SCR and Record the frequency of operation & observe its waveforms
7. Design a circuit for Class A commutation of a Thyristor
8. Design a circuit to convert variable DC voltage from fixed DC input voltage & plot a graph of Output voltage v/s Duty cycle
9. Design a 1-phase full wave converter using MATLAB Software & Plot the characteristics.
10. Design a 3-phase bridge inverter using PSim Software & Plot the characteristics.
11. Design a circuit to control the speed of induction motor using thyristor & Plot speed v/s α
12. Design a circuit to control the speed of DC shunt Motor using thyristor
13. Design a single Phase half wave converter using SCR with RC triggering
14. Design Parallel Inverter using SCR and Record the frequency of operation & observe its waveforms
15. Open Ended experiment

BECL301 DIGITAL SYSTEM DESIGN (3-1-0-4) Total Hrs: 45

Pre-requisite : Basic Electronics

Course Objectives:

1. To impart fundamentals of digital system design
2. To study system modeling using VHDL.
3. To study CPLD and FPGA Architecture.

Course Outcomes:

Student shall be able to:

1. Demonstrate basic knowledge in the hardware describing language VHDL
2. Able to modify system to remove delay in the sequence of generation by introducing signal driver concept.
3. Able to apply standardization while writing code with standard, package, programs, sub-programs for easy test-simulation
4. Able to write VHDL code for block generation of complex and simple Circuits of digital systems.
5. Able to understand and develop new methods of operation in digital system in finite and infinite loop of iteration cycle for said limit.
6. Design, Simulate and synthesize programming models for digital circuits using Simulator.

Unit I: Introduction (8 Hrs)

Introduction to VHDL, Methodologies, design units, data objects, VHDL data types, Attributes.

Unit II: VHDL Statements and Concept of Delays. (7 Hrs)

Concurrent and sequential statements, inertial and transport delays, delta delay, signal drivers.

Unit III: Programming Concepts. (7 Hrs)

Subprograms – Functions, Procedures, generic, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.

UnitIV:Combinational System Design (8 Hrs)

Combinational logic circuit design and VHDL implementation of following circuits – fast adder, Subtractor , decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits.

Unit V: Sequential System Design (8 Hrs)

Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (Pseudorandom and CRC).

Unit VI: Introduction to PLDS (7 Hrs)

Introduction to place & route process, Introduction to ROM, PLA, PAL, Architecture of CPLD (Xilinx / Altera). Advanced trends in digital system design. Advanced topics on the subject

Text Books:

1. Stephen Brown, Zvonko Vranesic : Fundamentals of Digital Logic with VHDL design, TMH.
2. S.S. Limaye : VHDL A Design Oriented Approach, The Mc Graw Hill

Reference Books:

1. J Bhasker : VHDL Primer Pearson Education
2. J Bhasker : VHDL Synthesis.
3. Chales H. Roth : Digital System Design Using VHDL
4. John Wakerley : Digital System Design.
5. Zainalabedin Navabbi : VHDL
6. D. Smith : VHDL
7. Douglas Perry : VHDL, 3rd Edition, TMH

BECP301 DIGITAL SYSTEM DESIGN
(0-0-2-1)
Total Hrs : 20

List of Practicals:

1. Design 4:1 multiplexer and write a VHDL code for same using data flow style of modeling.
2. Design Arithmetic and Logic Unit for 16 bit operation (Addition,Subtraction,Multiplication,Division,ORing,ANDing,XORing,XNORing)
3. Design BCD to seven segment decoder & display “GHRCE”.
4. Design half adder and full adder and write a VHDL code for same using dataflow style of modeling.
5. Design & write Test bench for an 8 bit adder having range 0 to 255 decimal.
6. Design 4-to-16 decoder by combining two 3-to-8 decoders and write a VHDL code for same using structural style of modeling.
7. Write a VHDL code for to design Flip-Flop (D, T, and SR) using behavioral style of modeling.
8. Write a VHDL code for 3-bit up-down counter using sequential style of modeling.
9. Write a VHDL code for high speed two-pole switch for power controlling on FPGA using sensitivity list.
10. Design of Finite state machine to detect a sequence “1011”using Mealy model and write VHDL code for the same.
11. Open ended :Write a VHDL code for to divide clock frequency of 50 Mhz.

BECL205 FIELD THEORY (3-1-0-4)
Total Hrs : 45

Pre-requisite: Applied Physics

Course Objectives:

1. To study electric and magnetic fields from stationary and dynamic charge and current distributions.
2. To study and understand properties of waves its propagation and waveguides.
3. To impart the knowledge of radiations, dipoles and potentials in Electromagnetic fields.
4. To inculcate the fundamentals of Antennas and its parameters

Course Outcomes:

Student shall be able to:

1. Use Gauss’s Law, Coulomb’s law to find fields and potentials for a variety of situations including charge distributions and Understand the meaning of divergence to calculate line integrals, surface and volume integrals.
2. An ability to analyze and classify magnetic materials, and solve magnetostatic field problems using Biot-Savart law and Ampere’s circuit law with the associated boundary conditions.
3. Understand Maxwell’s Equations for time-harmonic fields and the boundary conditions across media boundaries.
4. Analyze electromagnetic wave propagation and attenuation in various medium and propagation through boundaries between media be able to compute the Poynting vector and identify the power flow direction.
5. Understand the definition of waveguide and how waveguide modes are formed.
6. Understand antenna characteristics including gain, beamwidth, polarisation and near and far field patterns.

Unit I: Electrostatics (7 Hrs)

Introduction to Cartesian,cylindrical and spherical coordinate systems.Electric field intensity, flux

density, Gauss's law,divergence,divergence theorem,Electric potential and potential gradient.

Unit II: Magnetostatics (7 Hrs)

Current density and continuity equation, B-S law, Ampere's circuital law and applications,Magnetic flux and Flux density,Scalar and Vector magnetic potentials.

Unit III: Maxwell's Equations And Boundary Conditions (6 Hrs)

Maxwell's equations for steady fields. Maxwell's equations for time varying fields. Electric and magnetic boundary conditions.

Unit IV: Electromagnetic Waves (9 Hrs)

Electromagnetic wave equation, wave propagation in free space, in a perfect dielectric, and perfect conductor, skin effect, Poynting vector and Poynting theorem, reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle

Unit V: Waveguides (9 Hrs)

Introduction, wave equation in Cartesian coordinates, Rectangular waveguide, TE, TM, TEM waves in rectangular guides, wave impedance, loses in wave guide, introduction to circular waveguide.

Unit VI: Radiation . (**7 Hrs)**

Retarded potential, Electric and magnetic fields due to oscillating dipole (alternating current element), power radiated and radiation resistance, application to short monopole and dipole. Antenna Efficiency, Beamwidth, Radiation Intensity, Directive Gain Power Gain & Front To Back Ratio.

Advanced topics on the subject

1. W.H Hayt. and J.A. Buck, Engineering Electromagnetics, Seventh Edition, Tata Mc-Graw Hill, 2006
2. A.U.Tinguria, Fundamentals of Electromagnetic Fields, Third Edition, Denett & Co., 2010

Reference Books:

1. K. D. Prasad, Antenna & wave propogation, Third Edition, PHI Publication, 2009
2. E.C. Jordan and K.C. Balamin, Electromagnetic Waves and Radiating System, Second Edition, Prentice Hall of India Private Limited, 1985
3. J.D Krauss, Electromagnetics, Third Edition, Mc-Graw Hill, 1984
4. Rao, Elements of Engineering Electromagnetics, Sixth Edition, Pearson education, 2006

BECL302 ANALOG SYSTEMS & DESIGN (3-1-0-4) Total Hrs : 45

Pre-requisite: Basic Electronics

Course Objectives:

1. To understand analog circuits and systems.
2. To know linear and nonlinear applications of operational amplifier ICs.
3. To study frequency response of different circuits based on operational amplifier applications.
4. To study and use different ICs such as timers for applications.

Course Outcome:

Student shall be able to:

1. Understand fundamentals, electrical parameters and specifications of operational amplifier
2. Design op amp circuits for linear applications.
3. Infer the DC and AC characteristics of operational amplifiers and its effect on output
4. Design filters (up to 6thorder) and oscillators (sine, triangular, square and saw tooth) using op amp for real time applications.
5. Develop an intuition for analog circuit behavior in nonlinear operation
6. Use special ICs in analog system design

Unit I: Operational Amplifier Fundamentals (8 Hrs)

Operational Amplifier, Basic Op-Amp Configuration, an Op-Amp with Negative Feedback, Voltage Series and Voltage Shunt Configurations, Difference amplifiers, Instrumentation Amplifier, Specification of an Op-Amp, Offset Voltages and Currents, CMRR, Slew Rate

Unit II: General Linear Applications (8 Hrs)

Constant Current Source and Voltage Source, Summing, Scaling and Averaging Amplifiers, Voltage To Current Converter with Floating And Grounded Load, Current To Voltage Converter, Integrator and Differentiator

Unit III: Structure Of Op-Amp (7Hrs)

Differential Amplifier, Cascaded Differential Amplifier Stages and Level Translator, AC and DC Analysis of Cascade Amplifier, Design of two stage direct-coupled amplifier.

Unit IV: Active Filters And Oscillators (7 Hrs)

Classification of Filters , Active Filters, First to Sixth –Order Butterworth filter , Multiple–Feedback Filters (Band Pass And Band Reject Filters) IGMF configuration, All Pass Filter, Cascade Design Of Filters, Classification of Oscillators, Design of Op-amp based Phase Shift And Wein Bridge Oscillators, Square, Triangular And Saw Tooth Wave Generators

Unit V: Non-Linear Circuits (8 Hrs)

Schmitt Trigger, Voltage Comparator, Voltage Limiters And Window Detector, Clippers And Clampers, Peak Detector, Precision Rectifiers, Analog Switches

Unit VI: Special Ics Applications (7 Hrs)

The 555 Timer, Phase Locked Loops IC565, ICL8038 & XR2206 Function Generator, Voltage Controlled Oscillator Basic Operation, IC based Voltage Regulator Circuits, Dual Track Voltage Regulator, Three - Terminal Regulator(Fixed Regulator) Voltage Adjustment And Current Boosting Of Fixed Regulator , Merits And Drawbacks Of Linear Regulators

Advanced topics on the subject

Text Books:

1. Ramakant A. Gayakwad, OP-AMPS And Linear Integrated Circuits, Fourth Edition, PHI Publications, 2004
2. Roy Choudhury.D., Shail Jain, Linear Integrated Circuits, Third Edition, New age international publications, 2007

Reference Books:

1. Jacob Millman, Christos C.Halkias, Integrated Electronics - Analog and Digital circuits system, Second Edition, Tata McGraw Hill, 2003
2. Coughlin.Frand.Driscoll.F.F, Operational Amplifiers & Linear IC's, Sixth Edition, PHI Publications, 2001
3. Franco, Design With Operational Amplifier And Analog Integrated Circuits, Third Edition, TMH, 2001
4. Robert F.Coughlin, Fredrick F.Driscoll, Op-amp and Linear ICs, Second Edition, Pearson Education, 1998
5. David A.Bell, Op-amp & Linear ICs, Second Edition, Prentice Hall of India, 2007

BECP302 ANALOG SYSTEMS & DESIGN
(0-0-2-1) Total Hrs : 20

List of Practicals:

1. Design opamp as Adder & Differential Amplifier. Verify its simulation results on microcap.
2. Design opamp as Integrator circuit. Plot frequency response for the same. Verify its simulation results on microcap.
3. Design opamp as Differentiator circuit. Plot frequency response for the same. Verify its simulation results on microcap.
4. Design 1st order & 2nd Low Pass Filter. Plot frequency response characteristics. Verify its simulation results on microcap.
5. Design Clipper Circuit using IC 741. Verify its simulation results on microcap.
6. Design Positive Clamper Circuit using IC 741. Verify its simulation results on microcap.
7. Design opamp as Wein Bridge Oscillator. Plot frequency response for the same. Verify its simulation results on microcap.
8. Design Square Wave Generator using IC 741. Verify its simulation results on microcap.
9. Design Astable Multivibrator circuit using IC 555. Verify its simulation results on microcap.
10. Design Low Voltage Regulator using IC 723. Simulate and observe the regulated waveform on microcap.
11. Design opamp TL082 as an amplifier using ASLKv2010 starter kit of Texas Instrument.

B**ECP206 MODELING & SIMULATION**
(0-0-2-1) Total Hrs : 20
Pre-requisite: Basic Electronics
Course Objectives:

1. To select and apply appropriate simulation tools and techniques.
2. To study the modeling of systems using various tools.
3. To obtain and study the results of models designed on advanced simulation tools.

Course Outcomes:

Student shall be able to:

1. Can analyze the structure and characteristics of Basic CMOS design(Invertor, logic gates)
2. Design and analyze memory systems using CMOS technology.
3. Use industry-standard EDA tools for IC design.
4. Design various combinational circuits using Gates and Transistors.
5. Design digital and nalog circuits at transistor level and develop the corresponding mask layout
6. Perform AC and DC analysis for measuring response

Practical List

1) Introduction of T Spice & Tanner tool
2) Design current mirror using tanner tool,
3) Design sample and hold circuit using tanner.
4) Design cascade current mirror using tanner.
5) Design Differential amplifier using tanner.
6) Design Three MOSFET voltage divider using tanner
7) Design common source amplifier using tanner.
8) Design Feedback amplifiers.
9) Design a Pulse Code Modulation System using simulink
10) Digital Waveform Generation (Approximating a Sine Wave) using Simulink
11) Design of Signal processing blockset using MATLAB
12) Design of multi-order system using MATLAB and plot its time domain & Frequency domain response
12) Open Ended modeling experiments

MBL103: GENERAL PROFICIENCY-III: Hobby classes

Course Objectives :

1. To enhance the inherent qualities of oneself and provide a platform to show hidden talent.
2. To nurture one's special capability and interest in activities like sports, drama, singing.
3. To help express oneself and be more compatible with outer world in the hobby domain.

Course Outcomes :

Student shall be able to

1. Explore and demonstrate the inherent talents within.
2. Fruitfully engage themselves in creative activities during spare time.
3. Provide logical solution as a result of hobby activity exhibited.

FIFTH SEMESTER

BECL303: MICROPROCESSOR BASED SYSTEMS

(3-1-0-4) Total Hrs : 45

Pre-requisite: --

Course Objectives:

1. To study concepts of microprocessors family
2. To study interfacing of microprocessors with peripheral devices.
3. To understand the design of microprocessor based systems

Course Outcome:

Student shall be able to:

1. Identify and explain functionality of various blocks of microprocessor.
2. Design, code and debug the assembly language programs that demonstrate concepts of processor architecture and program development environment
3. Design and implement floating point operations using co processor.
4. Interface IO devices such as 8255 PPI, A/D, D/A converter and 8253 Timer IC.
5. Design and develop complete microprocessor based real time systems.
6. Understand working prototype for advanced microprocessor.

Unit I: Introduction to 8086 Microprocessor (07 Hrs)

Building Concepts of Microprocessor, Introduction to 16, 32, 64 bit Microprocessor, Comparison of 8086 / 8088 CPU Architecture, Microprocessor Evolution - INTEL 8086 to Pentium with focus on- Clock Speed, Concurrent operation of EU and BIU, Memory Organization & Interfacing.

Unit II: 8086 Programming (08 Hrs)

Addressing modes, Instruction set, Programming examples, Pseudo Opcodes, Assembler Directives. Introduction to Software and Hardware tools. [Cross assemblers, Logic analysers, Emulators, Simulators], Architecture.

Unit III: Co-processor Interfacing (07 Hrs)

8086 / 88 Maximum Mode, Architecture and Programming of 8087 and its Interfacing with 8086/8088

Unit IV: 8255 Interfacing (08 Hrs)

Interfacing and programming of Peripheral 8255, Interfacing of ADC, DAC & applications. Interfacing and programming of Peripheral 8253

Unit V: Special Peripheral Interfacing (07 Hrs)

Architecture, Interfacing and programming of Peripherals, 8251 & DMA Controllers 8237.

Unit VI: Advanced Microprocessor Stu(08 Hrs)

80386 Architecture, Real and Protected Mode, Register Model, Memory Management Unit, Latest trends in microprocessors systems.

Advanced topics on the subject

Text Books:

1. A.K. Ray & K.M. Bhurchandi, Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing, Third Edition, McGraw-Hill Education India Pvt.Ltd., 2007
2. Yu-cheng Liu, Glenn A.Gibson, Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design, Second Edition, Prentice-Hall, 2007

Reference Books:

1. Kenneth Ayala, The 8086 Microprocessor : Programming & Interfacing the PC, Second Edition, Cengage Delmar Learning, 1992
2. Barry B. Brey, The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4 and Core2 with 64 - bit Extensions, Eighth Edition,Pearson Education, 2009
3. Walter A. Triebel, Avtar Singh, The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, and Applications, Fourth Edition, Pearson, 2002
4. Roy W. Goody, Programming and Interfacing the 8086/8088 Microprocessor : A Product-Development Laboratory Process, Second Edition, Prentice Hall, 1992
5. Thomas P. Skinner, An Introduction to 8086/8088 Assembly Language Programming, Second Edition
6. Wiley, John & Sons, Incorporated, 1987

BECP303 MICROPROCESSOR BASED SYSTEMS (0-0-2-1)

Total Hrs : 20

List of Practicals:

1. To study the architecture of µc 8086 micro-processor & do some examples program
   a) Addition of two 8-bit numbers
   b) Multiplication of two 16-bit numbers
2. Write a program (WAP) to identify smallest/largest number from given string of 10 bytes data.
3. WAP to arrange a given 6-byte string in ascending/descending order.
4. To write program to convert a 16 bit binary number into equivalent BCD numbers.
5. WAP to find square and cube of number
6. Write assembly program to generate Fibonacci series.
7. WAP to reverse a string from given string of 10 bytes data.
8. WAP to perform inverse of 3X3 matrix & store result in memory location
9. WAP to display “GHRCE”, on monitor screen by using DOS functions.
10. Write assembly program to interface stepper motor with 8086 using dos function.
11. An open end project

BHUL301 ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT (4-0-0-4)

Total Hrs : 40

Pre-requisite: -- Communication Skills

Course Objectives:

1. To deal with the concepts of economics and management with and engineering perspective
2. To produce graduates with the ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.
3. To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modern society.
4. To cultivate the practices of independent learning on the part of the students that will prepare them to function effectively for diverse careers and lifelong learning.
5. To enable students to understand their role as engineers and their impact to society at the national and global context.

Course Outcome:

Student shall be able to:

1. Understand the interaction between engineering , business management, technological environmental spheres in modern society
2. Practice basic principles of managerial economics, accounting and financial management technique for effective business decision making

Unit I (7 Hrs)

Demand Utility and indifference curves, Approach to Analysis of demand, elasticity of demand, Measure of demand elasticity, Factors of Production, Advertising elasticity, Marginalism

Unit II (7 Hrs)

Laws of Return and costs, price and output determination under perfect competition, monopoly, monopolistic, competition, oligopoly, Depreciation and methods for its determination.

Unit III (7 Hrs)

Functions of central and commercial banks Inflation, Deflation, Stagflation, Direct and Indirect Taxes, Monetary and cycles, New economic policy, Liberalization, Globalization, Privatization, Market friendly state. Fiscal policy of the government, Meaning and phases of business.

Unit IV (6 Hrs)

Definition, Nature and scope of management, Functions of management- Planning, organizing, Directing, Controlling, Communicating

Unit V (7 Hrs)

Meaning of marketing management, Concept of marketing, Marketing Mix, Administrative and cost plus pricing, Channel of distribution, Advertising and sales promotion.

Unit VI (6 Hrs)

Meaning, Nature and scope of financial management, Brief outline of profit and loss account, Balance sheet, Budget and their importance, Ratio Analysis, Principles of costing.

Advanced topics on the subject

Text Books:

1. K.K.Dewett, Modern Economics Theory, S Chand & Co, 2006
2. Dr D. M. Mithani, Managerial Economics: Theory & Applications, Himalaya publication, 2008

Reference Books:

1. Prasanna Chandra, Financial Management : Theory and Practice, Eight Edition, Tata McGraw Hill, 2012
2. L M Prasad, Principles and Practice of Management:, Fourth Edition, Sultan Chand & Co, 2009
3. Namakumari, Ramaswamy, Marketing Management, Sixth Edition, McGraw-Hill, 2006

BECL304 SIGNALS & SYSTEMS (3-1-0-4)

Total Hrs : 45

Pre-requisite:

Co-requisite: Digital Communication

Course Objectives:

1. To introduce the fundamental characteristics, concept and technique of signal and systems.
2. To familiarize with time and frequency domain representation of linear systems and understanding the inter-relationship between two domains.
3. To study development of mathematical skills like Fourier series, Transforms, Random Theory are analyze using signal & System with transform techniques.
4. To familiarize with techniques suitable for analyzing and synthesizing both continuous-time and discrete time systems.

Course Outcomes:

Student shall be able to

1. To derive the probability density functions of transformations of random variables and use these techniques to generate data from various distributions.
2. Classify signals and systems based on their properties and to evaluate and analyze Linear Time Invariant systems.
3. To understand the nature of the Fourier Transform of a signal and predict the general nature of a signal in the time domain, via knowledge of their properties and spectrum.
4. To understand and apply Discrete Time Fourier Transform for the analysis of discrete time systems.
5. To demonstrate the effect of sampling on continuous time signals by the Nyquist Criterion and to understand aliasing.
6. To define channel capacities and properties using Shannon's Theorem and calculate the information content from its probability distribution.measures.

Unit I: Probability (9 Hrs)

Random process, probability, random variables, processes stationary, mean correlation covariance functions, time average and ergodicity, transmission of random process through a linear filter, spectral density, Guassian process noise, narrow band noise, envelope of sine wave plus narrow band noise.

Unit II: Linear Time-Invariant System (8 Hrs)

Different Types Of Signals; Linearity, Time Invariance And Causality; Impulse Sequence, Impulse Functions And Other Singularity Functions Time-Domain Representation And Analysis Of LTI Systems Based On Convolution And Differential Equations, Convolution Sum, Convolution Integral And Their Evaluation, Properties Of LTI Systems

Unit III: Continuous Time Fourier Transform (Ctft) (6 Hrs)

Representation Of Aperiodic Signal, Fourier Transform For Periodic Signals, Properties Of CTFT, Properties Of CTFT, Convolution Property

Unit IV: Discrete Time Fourier Transform (8 Hrs)

Representation Of Aperiodic Signal, Fourier Transform For Periodic Signals, Properties Of CTFT, Properties Of CTFT, Convolution Property.

Unit V: Sampling (6 Hrs)

Sampling Theorem, Effect Of Under Sampling, and Sampling Of Discrete -Time Signals.

Unit VI: Information Theory (8 Hrs)

Information measures, Entropy, Chaney capacity of discrete & continuous channels,Shannon Hartley Theorem Huffmann Coding(upto 3rd Order).

Advanced topics on the subject

Text Books:

1. Alan V. Oppenheim,Alan S. Willsky,S. Hamid, Signals and Systems, Second Edition, Pearson new International Edition, Feb 2009
2. Fawwaz Ulaby Andrew Yagle, Engineering Signals and Systems, First Edition, Hardcover, 2012

Reference Books:

1. James H. McClellan, Signal Processing First,Volume 1, First Edition, Pearson/Prentice Hall, Feb 2006
2. P.Ramesh Babu, R.ananda Natrajan, Signals and System, Third Edition, Scitech, June 2008
3. B.P. Lathi, Principles of Signal Processing and Linear Systems, First Edition, Oxford University Press, July 2009

BEEL312 CONTROL SYSTEM ENGINEERING (4-0-0-4) Total Hrs : 40

Pre-requisite: Mathematics – III

Course Objectives:

To impart the knowledge of fundamental concepts of control systems and mathematical modeling of the system,

1. To understand the concept of time response and frequency response of the system and to use for stability & analysis of the system
2. To study and design compensators and controllers for control systems.
3. To model systems and signal flow graph and evaluate the properties of the overall systems.

Course Outcomes:

Student shall be able to:

1. Develop the mathematical model for electromechanical system used in the analysis and design of control system
2. Determine Transient and Steady State behavior of first and second order systems using standard test signals.
3. Analyze linear time invariant systems for absolute stability and relative stability using Routh –Hurwitz criterion.
4. Apply root locus technique to design feedback control systems and analyze effect of adding poles and zeros.
5. Apply different frequency response methods to analyze the stability of linear system in terms of gain and phase margins
6. Analyze the behavior and structure of a state-space model and obtain transfer-function models using state space approach

UNIT I : Mathematical Modeling And Control System Components. (7 Hrs.)

Introduction to need for automation and automatic control ,use of feedback, broad spectrum of system application, Mathematical modeling,(Electrical & Electromechanical) diff. Equations., transfer functions, block diagram, signal flow graphs, application to elementary systems, simplifications, effect of feedback on parameter variations, disturbance signal servomechanism and regulators, Control system components, electrical electromechanical, their functional analysis and input output representation.

Unit II : Time Response Analysis (06 Hrs.)

Time response of system, first order and second order system, standard inputs, concept of gain and time constants, Steady state error, type of control system, approximate methods for higher order system.

Unit III: Stability Of Control Systems. (06 Hrs.)

Stability of control systems, conditions of stability, characteristics equations, Routh- Hurwitz criterion, special cases for determining relative stability.

Unit IV :Root Locus Analysis (07 Hrs.)

Root location and its effect on time response, elementary idea of root locus, effect of addition of pole and zero on proximity of imaginary axis.

Unit V : Frequency Response Analysis (7 Hrs.)

Frequency response method of analyzing linear system, Nyquist and Bode Plots, Stability and accuracy analysis from frequency response, open loop and close loop frequency response, Nyquist Criterion, Effect of variation of gain and addition of pole and zero on response plot, stability margin in frequency response.

Unit VI :State Variable Techniques (07 Hrs.)

State variable method of analysis, characteristics of system state, choice of state variables,

representation of vector matrix differential equation, standard form, relation between transfer function and state variables.
Advanced topics on the control system.

Text Books :

1. B. C. Kuo : Automatic Control Systems (P.H.I.),7th Edition,2009.
2. Nagrath /Gopal : Control System Analysis, New Age International,2010.

Reference Books:

1. Norman S. Nise, Control System Engineering, Sixth Edition, Wiley, 2011

BEEP312 CONTROL SYSTEM ENGINEERING

List of Practicals:

1. To Plot the characteristics between position and phase of synchro transmitter
2. To measure basic step angle of stepper motor.
3. To plot speed-torque characteristics and speed vs back emf characteristics of ac servomotor.
4. To obtain the time response on a linear simulator kit.
5. To plot characteristics between the position and voltage of potentiometer.
6. To plot the graph between angular position of transmitter and receiver by using synchro transmitter and receiver pair.
7. To determine the transient response of mechanical system by using MATLAB/SIMULINK.
8. Write a program to plot root locus of a any system by using MATLAB software.
9. To find the transient response of second order RLC series circuit by using MATLAB/SIMULINK
10. Write a program to plot Bode plot of any system by using MATLAB software.
11. To implement P, PI and PID controller for a system in MATLAB/SIMULINK
12. To determine the characteristics of positional error detector by using potentiometer

BECL403 DIGITAL COMMUNICATION (4-0-0-4)

Total Hrs : 45

Pre-requisite: Communication Electronics

Course Objectives:

1. To understand the basic knowledge of digital communication system.
2. To study the issues such as coding, multiple access, error probability, algorithms etc for analog and digital communication.
3. To impart the knowledge of design, analysis & comparison of digital communication systems.

Course Outcome:

Student shall be able to:

1. Understand baseband systems, sampling, quantization and source coding for digital transmission and able to conduct a Matlab-based design project
2. Validate different techniques of modern digital communication systems such as line coding, multiplexing, ISI, correlative coding.
3. Analyse different digital modulation & demodulation techniques and evaluate their performance in terms of Bit Error rate by demonstrating it using MATLAB/Simulink.
4. Design digital systems using appropriate mathematical techniques such as Grahm-Schmidt Procedure and signal-space concept.
5. Solve various source/channel coding and error-control coding techniques.
6. Understand spread spectrum Techniques and its performance parameters for any digital communication system.

Unit I (8Hrs)

Digital base band modulation techniques : Bandwidth of digital Data, Base band system, Formatting textual Data, Messages, characters, and symbols, Formatting Analog Information, Sources of Corruption, , Uniform and non uniform quantization, Base band Modulation, Correlative Coding, Formatting analogue information.

Unit II (7Hrs)

Digital data transmission systems and transmission media: Digital Communication system, Line coding, Pulse shaping, Scrambling, Regenerative repeater, Detection- Error Probability, M-ary communication, Digital carrier systems, Digital multiplexing, Transmission media, Inter symbol Interference.

Unit III (8Hrs)

Baseband Modulation and demodulation techniques: Digital Band pass Modulation techniques, Detection of signals in Gaussian noise, Coherent detection, Non coherent detection, Complex envelop, Error performance for Binary system, M-Ary signaling and performance, Symbol error performance for M-ary Systems, Bit error Rate calculations.

Unit IV (7Hrs)

Advanced Modulation Method Gram – Schmitt procedure, signal space representation of modulated signals nonlinear modulation methods with memory error probability and optimum receivers for AWGN channels. The signal space concept

Unit V (7Hrs)

Block and convolutional channel codes Linear block codes, generator matrix and parity check matrix, some specific linear block codes, cyclic codes, transfer function of a convolution code, optimum decoding of convolutional codes- Viterbi algorithm distance properties of binary convolutional codes

Unit VI (8Hrs)

Spread Spectrum techniques: Spread Spectrum Overview, Pseudo noise Sequences, Direct-Sequence Spread Spectrum systems, Frequency hopping systems, Synchronization, Jamming consideration, Orthogonality between codes Multiple access techniques Commercial Applications, Cellular Systems.
Advanced topics on Digital Communication

Text Books:

1. Bernard Sklar, 'Digital Communications (Fundamentals and applications)', Second Edition, Pearson Education Asia, 2013

2. B. P. Lathi, 'Modern Digital and Analog Communication Systems', Third edition, Oxford University press, 1998

Reference Books:

1. Simon Haykin, 'Digital Communication', Student Edition, Wiley Eastern, 2004

BECP305 ELECTRONIC WORKSHOP PRACTICE-I (0-0-2-2)

Total Hrs: 20

Pre-requisite: - --

Course Objectives:

1. To use & analyze and identify the different types of Integrated Circuits
2. To understand the identification and computer aided design of PCB layout using different software tools.
3. To enable firsthand experience of components, their purchase, assembly, testing and trouble shooting.
4. To perform single sided and double sided PCB design using TFT machine by using a various method (Etching, Drilling, Mounting and Soldering of Components).
5. To do Mini Projects using Analog and Digital IC's, active and passive components for Linear and Non-linear electronics circuits by organizing and managing time and resources effectively.
6. To familiarize students with modern engineering software tools and equipment to analyze Electronics and Telecommunication engineering problems

Course Outcomes:

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

1. Demonstrate familiarity with electronic components and related measurement equipments
2. Understand use of meters and test equipment to measure electrical quantities.
3. Identitfy practical issues that arise in circuits and design PCB using artwork.
4. Understand & demonstrate different kinds of PCB soldering and desoldering methods for problem solving
5. Design PCB using exposing & Etching methods.
6. Apply the basic principles of embedded system design and development, including using a contemporary computer environment and development board to implement a microcontroller-based embedded system design

List of Practicals:

1. Study of electronics and Surface Mounting Devices (SMD) components and their identifications
2. Study of operation of CRO and Multi-meter
3. Pattern identification and working test of electronics components using CRO, Multi-meter, LCR-Q-meter.
4. Study of printed circuit board (PCB) layout designing and preparation of PCB artwork using Graph
5. Perform soldering and disordering on dot printed circuit board.
6. Measuring value for different type of Transformers, Switches, and Relays. Using multimeter.
7. Preparing of PCB artwork using OrCAD.
8. Knowing various Cables, & Connectors. used in electronics system design.
9. Design and learning PCB Exposing methods & Etching methods.
10. Understand 8051 Microcontroller & downloading program using Power lab.

BECP 311 Self study :

CO1.Analyse recent trends and advanced topics in the Electronics & allied areas to meet desire needs with appropriate consideration for societal applications.

CO2.Understand the technological enhancement in the Electronics & allied areas and proposed solution for advancement.

CO3.Select and use appropriate techniques, skill & modern software simulation tools for advanced engineering practices.

CO4.Design & develop real time applications.

CO5.Apply knowledge to demonstrate electronics engineering practices.

CO6.Assembled E-learning resources like MOOC's, NPTEL, Virtual Labs etc. with application development

SIXTH SEMESTER

BECL306 MICROWAVE ENGINEERING (3-0-0-3)
Total Hrs : 45

Pre-requisite: -Field Theory

Course Objectives:

1. To understand the concepts of microwave engineering
2. To study of microwave components, and microwave circuits.
3. To study and understand microwave test bench using Klystron amplifier and oscillator and its applications
4. To study carcintron and magnetron.

Course Outcomes:

Student shall be able to:

1. Developing an understanding the fundamental principles of Microwave antenna and its characteristics.
2. Able to describe microwave vacuum tubes such as klystron, TWT, magnetron amplifier and oscillator
3. Be able use S parameter to determine circuit properties of passive/active microwave devices
4. Able to describe characteristic of various diodes and transistors at microwave frequency.
5. Able to apply analysis method to determine circuit property of MIC
6. Able to handle microwave equipment and Measure VSWR, attenuation, frequency and other parameter

Unit I: Antenna (8 Hrs)

Two elements arrays and their directional characteristics, linear arrays analysis, broadside and end fire arrays pattern multiplication, binomial arrays, design of broadest array for a specific pattern Basic principles of parabolic reflectors, analysis and power pattern, lens antennas folded dipole turnstile and Yagi antenna, log –periodic antennas horn antennas, traveling wave antennas and case grain antennas Microstrip antenna – Basic Characteristics, Feeding Methods, Method of analysis Smart Antenna : Introduction, Benefits of Smart Antennas

Unit II: Microwave Tubes (8 Hrs)

Limitations and Losses of conventional tubes at microwave frequencies. O-type tubes : 2 Cavity Klystrons, Reflex Klystrons, Electronic and Mechanical Tuning. Related Problems. HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Nature of the four Propagation Constants, Gain Considerations.M-type Tubes Introduction, Cross-field effects, Magnetrons 8-Cavity Cylindrical Travelling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

Unit III: Waveguide Components And Applications (8 Hrs)

Coupling mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide attenuators - Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types. Waveguide Multiport Junctions – E plane and H plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2 Hole, Bethe Hole types. Ferrites [3] – Composition and Characteristics, Faraday Rotation; Ferrite Components – Gyrator, Isolator, Circulator. Scattering Matrix [3] – Significance, Formulation and Properties. S Matrix Calculations for – 2 port Junction, E plane and H plane Tees, Magic Tee, Directional Coupler, Circulator and Isolator. Related Problems.

Unit IV: Microwave Solid State Devices (8 Hrs)

Transit time limitation in transistor , microwave bipolar junction transistor ,Power frequency limitation, Microwave FET, HEMT. TEDs – Introduction, Gunn diode & its modes of operation. Avalanche Transit Time Devices– Introduction, IMPATT and TRAPATT Diodes – Principle of operation and characteristics. Comparison , parametric amplifier

Unit V: Strip Lines & Monolithic Microwave Integrated Circuits (8 Hrs)

Microstrip lines : Introduction , Hybrid Model Analysis, characteristic impedance ,losses, quality factor of Microstrip lines . Slot line and coplanar strip lines. Microstrip circuit design – Impedance transformers, Filters, Isolator and Phase-shifter ,parallel strip lines , distributed lines

MMIC : Introduction , substrate materials, conductor materials, dielectric materials , resistive materials , MMIC growth , Fabrication technique , examples

Unit VI : Microwave Measurements (5 Hrs)

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

Advanced topics on microwave Engineering.

Text Books:

1. Monojit Mitra, Microwave Engineering
2. Sanjeeva Gupta, Microwave Engineering, Second Edition, Khanna Publication, 2000

Reference Books:

1. K.D.Prasad, Antenna And Wave Propagation, Third Edition, Smt.Sumitra Handa, 2002
2. A.K.Maini, Microwave And Radar Principal And Application, First Edition, Dhanpat Rai &Co.(P)Ltd Publication, 2002

BECP306 MICROWAVE ENGINEERING
(0-0-2-1) Total Hrs : 20

List of Practicals:

1. To verify relationship between power & repellar voltage in Reflex Klystron
2. To verify relationship between frequency & repellar voltage in Reflex Klystron.
3. To measure and verify power distribution of E-plane and H-plane Tee & determine isolation and coupling co-efficient.
4. To verify power distribution of Magic Tee .
5. To determine coupling factor and directivity of directional coupler.

6. To determine isolation & Insertion loss of Circulator.
7. To plot standing wave ratio using Slotted line section & find out guide wavelength.
8. To determine the frequency and wavelength in a rectangular wave guide working on TE10 mode
9. To measure the polar pattern and gain of a wave guide horn antenna.
10. To plot the V-I Characteristics of the PIN diode.
11. An open end project

BCSL410 SOFT COMPUTING (3-0-0-3)
Total Hrs : 45

Course Objectives:

1. To introduce the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.
2. Introduce students to soft computing concepts and techniques and foster their abilities in designing and implementing soft computing based solutions for real-world problems.
3. To familiarize with soft computing concepts.
4. To introduce the ideas of Neural networks, fuzzy logic and use of heuristics based on human experience.
5. To introduce the concepts of Genetic algorithm and its applications to soft computing using some application

Course Outcome:

Students shall be able to

1.Understand and evaluate the soft computing technique, Recognize it's feasibility for design of models.

2.Apply neural network learning to pattern classification and regression problems along with mathematical background for carrying out the optimization .

3.Understand basics of fuzzy logic and apply it for reasoning to handle uncertainty and solve engineering problems

4.Evaluate and compare solutions by various soft computing approaches for a given problem

5.Identify and apply existing software tools of Fuzzy logic to solve real problems and their roles in building intelligent machines.

6.Familiarize with genetic algorithms and other random search procedures and apply it to combinatorial optimization problems

Unit I Comparison Of Soft Computing Methods (7 Hrs)

Neural networks, Fuzzy Logic, Genetic Algorithm with Conventional Artificial Intelligence[hard computing], Least-Square methods for System Identification, recursive least square estimator, LSE for Nonlinear Models.

Unit II Neural Networks (8 Hrs)

Different Architectures, Back-propagation Algorithm, Hybrid Learning Rule, Supervised Learning-Perceptrons, Adaline, Back-propagation Multilayer Perceptrons, Radial Basis function Networks. Unsupervised Learning – Competitive Learning Network, Kohonen Self-Organizing Networks, Hebbian Learning, The Hopfield Network.

Unit III Fuzzy Set Theory (8 Hrs)

Basic Definition and terminology, Basic Concepts of Fuzzy Logic, Set Theory Operators, Membership functions- formulation and parameterization. Fuzzy Union, Intersection, and Complement. Fuzzy Rules and Fuzzy Reasoning. Fuzzy Inference Systems-Mamdani and Sugeno Fuzzy models. Fuzzy Assocaitive Memories, Fuzzy Arithmatics.

Unit IV Neuro-Fuzzy Modelling (7 Hrs)

Adaptive Neuro-fuzzy Inference Systems, Neuro-Fuzzy Controller- Feedback control, Expert control, Back propagation t**o**ugh time and real-time recurrent learning, Gradient-free optimization.

Unit V Neuro-Fuzzy Controller In Engineering Applications (8 Hrs)

Fuzzy Logic in Control Engineering- Mamdani and Sugeno Architecture for Fuzzy Control, Analytical Issues in Fuzzy Logic Control, Fuzzy Logic in Intelligent Agents, Fuzzy Logic in Mobile Robot Navigation, Applications of Fuzzy Logic in Medical Image segmentation.

Unit VI Genetic Algorithm (7 Hrs)

Basics of Genetic Algorithms, Design issues in Genetic Algorithm, Genetic Modelling, Hybrid Approach, GA based Fuzzy Model Identification. Fuzzy Logic controlled Genetic Algorithm, Neuro-Genetic Hybrids & Fuzzy – Genetic Hybrids, latest applications of soft computing.

Advanced topics on the subject.

Text Books:

1. George Klir, Yan, Fuzzy Sets and Fuzzy Logic-Theory and Application, Prentice Hall of India Pvt.Ltd.
2. S. Rajsekharan, S.A.Vijayalakshmi Pai, Neural Network, Fuzzy Logic and Genetic Algorithm, Prentice Hall of India Pvt.Ltd.

Reference Books:

1. Jack N. Zurada, Introduction to Neural Network, Jaico Publishers
2. Krishna Mehrotra, Sanjay Ranka,Chilukuri Mohan, Elements of Artificial Neural Networks, Penram International Publishing Pvt. Ltd.
3. David E. Goldberg, Genetic Algorithm, Pearson Education
4. Amritvalli, Neural Networks and Fuzzy System, Prentice Hall of India Pvt.Ltd.

BECL404 SWITCHING THEORY & AUTOMATA
(3-0-0-3) Total Hrs: 45

Pre-requisite: - Digital system Design

Course Objectives:

1. To provide adequate knowledge of Switching theory & automata
2. Students must show mastery in the three basic areas of mathematics: analysis, algebra, and topology /geometry on a basic level in lower division courses
3. To understand design of combinational logic.

Course Outcome:
Student shall be able to:
1. Use Boolean algebra in performing computations and simplification of algebraic expressions.
2. Design minimum contact network by using different methods
3. Design Threshold elements of the network
4. Design,identify and detect fault detection in combinational logic circuits using various methods
5. Design state elements and finite state machine (FSMs) for various applications
6. Analyze and design sequential digital systems for various sequential machine

Unit I: (8 Hrs)
Switching algebra and functions, Boolean algebra, Boolean functions, Minimization of Booleans function using tabulation method, sets, relation and lattices, venn diagram
Unit II: (8 Hrs)
Design of combinational logic circuits, contact networks, functional decomposition and symmetric functions
Unit III: (8 Hrs)
Threshold logic, threshold elements, capabilities and limitations of threshold logic, elementary properties, linear seperability, unite functions, synthesis of threshold functions, cascading of threshold elements.
Unit IV: (8 Hrs)
Reliable design and fault diagnosis, fault detection in combinational circuits, fault location experiments, fault detection by Boolean differences, path, sensitizing method, multiple fault detection using map method failure- tolerant design.
Unit V: (8 Hrs)
Finite state machine- Mealy and Moore synchronous sequential circuits, Design capabilities, Minimization and transformation of sequential machine, Design of fundamental mode and pulse mode circuits
Unit VI: (5 Hrs)
Structure of sequential machine, lattice of closed partitions, state assignment using partitions, Reduction of output dependency, Input Independence and autonomous clock, homing sequence, synchronizing sequence, Adaptive Distinguishing experiments
Practical: Minimum 8 experiments based on above – syllabus. Practical should include experiments on fault – finding and trouble – shooting.

Advanced topics on Switching theory.
Text Books:

1. Zvi Kohavi, Niraj K. Jha, Switching and Finite Automata Theory, Third Edition, Cambridge University Press
2. S. Rajsekharan, S.A.Vijayalakshmi Pai, Neural Network, Fuzzy Logic and Genetic Algorithm, Prentice Hall of India Pvt.Ltd.

Reference Books:

1. S.C Lee, Modern Switching Theory, First Edition, Prentice Hall College Div, 1978
2. Radomir S. Stanković, Jaakko Astola, From Boolean Logic to Switching Circuits and Automata, Springer
3. Adesh K. Pandey, An Introduction to Automata Theory & Formal Languages, S. K. Kataria & Sons

BECL405 DIGITAL SIGNAL PROCESSING
(4-0-0-4) Total Hrs : 45
Pre-requisite: -Signal & System
Course Objectives:
1. To study signals for different kinds of applications in general and infer information from deterministic and random signals.
2. To understand the implementation and design digital filters.
3. To analyze signals using the discrete Fourier transform.
4. To understand circular convolution, its relationship to linear convolution.

Course Outcomes:
Student shall be able to:
1. Plot,identify and evaluate discrete-time signals.(CO1)
2. Perform mathematical analysis of discrete signals using Fourier transform and Z transforms.
3. Apply appropriate filters(IIR,FIR) for discrete signal processing for various applications
4. Design different filters using various methods in simulation environment
5. Apply different methods for faster computation of dsp processor.
6. Understand the basic architecture and functioning of TMS320 DSP processors with its functioning & applications.

Unit I (7Hr)
Discrete time signals and systems, classification of discrete time systems and its properties, Linear convolution,Cross Correlation, Autocorrelation of discrete signals, sampling theorem & sampling process.

Unit II (8Hr)
Frequency domain representation of discrete time signals and systems, Fourier transform of discrete time signals, properties of discrete time, Fourier transform.
The Z–transform, Definition, properties of ROC for the Z–transform, Properties of Z–transform, Inverse Z–transform using contour integration, complex convolution theorem, Unilateral Z – transform.
Unit III (8Hr)
Transform analysis of LTI system & structure for discrete – time system. Frequency response of LTI system, Relationship between magnitude & phase response, Block diagram representation & signal flow graph representation of IIR and FIR systems. Linear constant coefficient difference equations, Basic structures for IIR systems, transposed forms,

basic network structures for FIR systems, lattice structures.

Unit IV (7Hr)

Filter design Techniques: Design of discrete time IIR filters from continuous time filters, Frequency transformation of low pass IIR filters, Design of FIR filters by windowing, FIR filter design by Kaiser and Hamming window method.

Unit V (8Hr)

Discrete Fourier Transform: Discrete Fourier series, properties of discrete fourier series, Discrete fourier transform, properties of DFT, Inverse DFT, circular convolution using DFT-IDFT method. Fast fourier transform, Decimation in time FFT algorithm, decimation in frequency FFT algorithm, FFT of long sequences using overlap add and overlap save method.

Unit VI (7Hr)

Digital signal processors: Introduction, DSP Processor Memory Architecture, Some examples of DSP processors, Overview of TMS320 Family DSP processors. Applications of Digital Signal Processing: Introduction, Application of DSP in Biomedical Engineering, voice processing, Applications to radar, Introduction to wavelets.

Advanced topics on DSP

Text Books:

1. S. Salivahanan Vallavaraj, Digital Signal Processing, Second Edition, Tata McGraw-Hill Education, 2000
2. John G. Proakis Dimitris K Manolakis, Digital Signal Processing, Fourth Edition, Pearson Publications, 2006

Reference Books:

1. Alan V. Oppenheim, Digital Signal Processing, Second Edition, Prentice-Hall, 1975

BECP405 DIGITAL SIGNAL PROCESSING
(0-0-2-1) Total Hrs.: 20

List of Practicals:
DIGITAL SIGNAL PROCESSING
List of Practicals:

1. Write a MATLAB program to plot standard Discrete time signals(unit sample, unit step, unit ramp, exponential, sine & cosine signals)
2. Write a MATLAB program to Evaluate the linear convolution between given discrete time sequences x(n) and h(n)n
3. Write a MATLAB program to perform Auto Correlation & cross correlation of the given discrete time sequences
4. Write a MATLAB program to obtain frequency response of the first order system with transfer function H[z]=1/[(Z-1)(Z+0.8)]
5. Write a MATLAB program to verify the sampling theorem.
6. Write a MATLAB program to find the impulse response of a given system.
7. To study and verify the convolution property of Z-transform using MATLAB given that X1[z]=Z+2+Z-1 and X2[z] =2Z2+4Z+5Z-1
8. Write a matlab program to design & implement IIR Butter worth filter to meet given specifications.
9. Use the partial fraction expansion method to compute the inverse Z-transform of F[z]=1/[(1-0.5 Z-1)(1-0.75 Z-1)(1- Z-1)]
10. Write a matlab program to find the linear convolution using DFT and IDFT using circular convolution.
11. Open Ended Experiments:
    To analyze the spectrum of audio signals in MATLAB.
    To find the edges in an image data using Convolution.

BECL401 TELEVISION ENGINEERING [3-0-0-3] (Elective –I) Total Hrs.: 45

Pre-requisite: - --

Course Objectives:

1. To introduce the study and analyze of transmission & reception for audio and video systems.
2. To study the principle of monochrome and color TV.
3. To study the principle of CCTV, MATV. CATV, HDTV.
4. To study the principle of LED TV and LCD TV.

Course Outcomes:

Student shall be able to:

1. Understand the fundamental concepts of Television Transmitter & Receiver Systems
2. Compare performance of various camera tubes.
3. Demonstrate Television Receiver & justify the importance of troubleshooting & repair
4. 4.Understand the different types of picture tubes
5. To study the various Color Television systems with a greater emphasis on PAL system
6. Co-relate the fundamentals with modern television technologies Trouble-shoot, test & Align television systems

Unit I: [8 Hrs]

Brief Introduction to TV transmission and reception , Interlaced scanning , TV picture : resolution , brightness , Video Bandwidth , Line and frame wave frequency , blanking synchronizing ad equalizing pulses , complete composite video signal , VSB transmission and Reception.

Unit II: [8Hrs]

Monochrome TV camera tubes: image Orthicon, Vidicon and Plumbicon tubes, Monochrome TV transmitter block diagram, and TV transmitting and receving antenna.

Unit III: **[8 Hrs]**

Monochrome TV Receiver block diagram, Balun, RF tuner, Video IF amplifier, Video detector, Intercarrier sound system, Sound take off circuit, Sound IF and FM detector, Transistorized Keyed AGC circuit, Horizontal and Vertical deflection circuits, EHT generator.

Unit IV: **[7 Hrs]**

Essential of color TV, Compatibility, Three – colors theory, chromaticity diagram, color TV camera, production of luminance and color – difference signals color TV picture tubes: Delta gun, P.I.L. and Trinitron tubes.

Unit V: **[7 Hrs]**

Color signal transmission and reception, frequency interleaving, modulation of color – difference signals. PAL color TV system, choice of sub – carrier frequency, PAL color receiver, comparison of PAL with NTSCa and SECAM system.

Unit VI: **[7 Hrs]**

Satellite TV technology- Cable TV ,digital television – Transmission and reception, projection Television – Flat panel display TV receiver , Stereo sound in TV ,3D TV, HDTV ,Digital equipments for TV studios. Introduction to Plasma, LED TV

Advanced topics on the subject.

Text Books:

1. R.R. Gulati, Monochrome & Color TV, Third Edition, PHI Learning, 2014
2. M. Dhake, TV and Video Engineering, Second Edition, Tata McGraw-Hill Education, 2001

Reference Books:

1. R G Gupta, Television Engineering and Video Systems, Second Edition, Tata McGraw-Hill Education, 2011

BECL416 MOBILE COMMUNICATION (3-0-0-3) (Elective –I) Total Hrs: 45

Course Objectives:

1. To understand the radio wave propagation and interference in mobile communications.
2. To understand the basic knowledge about the generations of mobile communication.
3. To study different architectures of mobile communication and its related parameters.
4. To impart the knowledge about applications of mobile communication

Course Outcomes:

Student shall be able to:

1. Understand basics of mobile communication and developments towards modern systems.
2. Analyze Propagation characteristics like attenuation, fading of Mobile Communication system
3. Apply Modulations techniques & Multiple access technologies for resource sharing with TDMA, FDMA, CDMA & SDMA
4. Apply the knowledge of different diversity, Equalization & Channel coding techniques to improve the performance of mobile communication.
5. Design GSM and CDMA systems and apply concepts of GPS technology for various applications.
6. Understand & apply the knowledge of new trends in mobile technology like 3G & above.

Unit I: **(7Hrs)**

The cellular concept, Evolution of mobile radio communication, Cellular telephone system, frequency reuse concept, channel assignment and handoff strategies, interference and system capacity, trunking and grade of service, improving capacity in cellular system.

Unit II: **(7 Hrs)**

The mobile radio environment ,causes of propagation path loss, causes of fading – long term and short term, definition of sample average, probability density function, cumulative probability distribution, level crossing rate and average duration of fade, delay spread, coherence bandwidth, inter symbol interference.

Unit III: **(8 Hrs)**

Modulation techniques and multiple access technique for mobile communication: BPSK, QPSK. Transmission and detection techniques in mobile, 4 QPSK transmission and detection techniques. QAM, GMSK Technique. Multiple access Techniques: Introduction to multiple access, FDMA, TDMA, spread Spectrum Multiple Access, Frequency Hope Multiple access (FHMA) ,Code Division multiple access (CDMA),Space Division Multiple access (SDMA).

Unit IV: **(7 Hrs)**

Equalization, diversity and channel coding: fundamentals of equalization, space polarization, frequency and time diversity techniques, space diversity, polarization diversity, frequency and time diversity , fundamentals of channel coding.

Unit V: **(8 Hrs)**

GSM – Global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM frame structure, signal processing GSM, introduction to CDMA, digital cellular standard. GPS Technology, GPS Receiver..

Unit VI: **(7 Hrs)**

Introduction to 3G: UMTS ,CDMA (IS-95) Frequency and channel specification ,forward CDMA channel ,Reverse CDMA channel,

Advanced topics on mobile Communication and Generations

Text Books:

1. T. S. Rappaport, 'Wireless Communication – Principles and practice', Second Edition, Prentice all PTR, upper saddle river, New Jersey, 1996
2. William C. Y. Lee, Mobile Communication – Design fundamentals', Second Edition, John Willey

Reference Books:

1. Kamilo Feher, 'Wireless digital communication', Second Edition, Prentice all PTR, upper saddle river, New Jersey

BECL417 SENSORS & TRANSDUCERS

(3-0-0-3) (Elective –I)

Total Hrs.: 45

Course Objectives:

1. To impart knowledge about the measuring instruments and the methods of measurement
2. To understand different Sensors, Transducers and Bus Architectures.
3. To study and practice calibration and testing of different instrumentation systems.
4. To understand transducers types and ranges its selection for particular applications.

Course Outcome:

Student shall be able to:

1. Understand the characteristics of Instrumentation system and transducers.
2. Select and make use of appropriate sensors and transducers for various applications.
3. Design system for measurement of physical Quantities using various Sensors & transducers.
4. Apply and perform various Signal conditioning techniques using standards for system design.
5. Detect & identify faults in various test equipments.
6. Perform testing, Modeling and Calibration of measuring Instruments with multiple method.

Unit I (7 Hrs)

Generalized Instrumentation system, Active and Passive transducers, Digital and Analog mode of operation static and dynamic characteristics and performance of instruments. Stastical treatment of measurement of errors, caussian error distribution, probability tables, Combination of errors.

Unit II (7 Hrs)

Resistance type Transducers - potentiometer, strain gauge; Inductive type – LVDT; piezoelectric transducer Sensing elements: Temperature sensing elements – RTD, thermistor, thermocouple, cold junction compensation;

Unit III (8 Hrs)

Motion measurement: relative and absolute motion measurement of displacement, velocity and acceleration; Pressure sensing elements – manometers, elastic elements, Bourdon tube, diaphragm, bellows; electrical type, McLeod gauge, Pirani gauge; Flow sensing type – head meters (orifice, venturi), area meters, rotameters, electromagnetic flowmeter, Coriolis flow meter, Ultrasonic flowmeter; pH measurement

Unit IV (8 Hrs)

Pyrometers, Piezoelectric transducer, Magnetostrictive, IC sensor, Digital transducers, Smart
sensor, Fiber optic transducer, Signal conditioning techniques used in various transducers, Linearization, gain, clipping, filtering, differential amplification, shielding techniques, various standards for signal transmission like4-20mA current loop converter etc

Unit V (8 Hrs)

Recording of data CRO, data acquisition system, Industry Standard Bus architecture: PCI Bus, ISA Bus, EISA Bus, protocols, test equipments like Multimeter, signal generator, signal analyzer

Unit VI (7 Hrs)

Calibration of measuring Instruments, Theory and Principles (absolute and secondary or comparison method), Setup, Modeling. Sensor calibration and testing. Analytical methods in calibrating. Realization in standard laboratories, maintenance and reproduction, test and review.

Advanced topics on sensor technology.

Text Books:

1. A.K. Sawhney, Puneet Sawhney, A Course In Electrical And Electronic Measurements And Instrumentation, First Edition, Dhanpat Rai Publications, 2012
2. Patranabis D, Sensors and Transducers, Second Edition, Prentice Hall of India, 2003

Reference Books:

1. B.E.Jones, Instrumentation, measurement and feed back, Second Edition, McGraw Hills, 1997
2. M.G. Joshi, Transducers for Instrumentation, First Edition, Laxmi Publications Pvt. Ltd., 2001
3. B. C. Nakra, K. K. Chaudhry, Instrumentation, Measurement And Analysis, Second Edition, Tata McGraw-Hill Education, 2004
4. Ian Sinclair, Sensors and Transducers, Third Edition, Newnes, 2000
5. R.Y. Borse, Sensors and Transducers Principles and Applications, First Edition, Adhyayan Publishers & Distributors, 2008

B**ECL418 BIOMEDICAL ENGINEERING**

(3-0-0-3) (Elective –I)

Course Objectives

1. To understand ECG, EMG,
2. To study biomedical electronics
3. To understand medical instrumentation

Course Outcomes:

Student shall be able to:

1. Understand & design basic model of bio signal measurements by using skin contact sensor.
2.model on stress and strain measurement in blood vessels and heart tissue
3.Understand the effect of mechanical forces on various cardiovascular cells
4.Analyse pulsatile blood flow in devices and systems.
5.Formulate and design to apply signal processing, algorithms to be used in neural engineered systems.
6.Integrate knowledge of materials properties and biological responses for rational design of biomaterials for medical applications.

Unit I Introduction To Biomedical System (07 Hrs)

Introduction to Biomedical System, Man Machine Interface, Bio-electric Signals, Types of Electrodes, Electrodes for ECG, EMG, EEG, Transducers and

sensors related to biomedical measurements including respiration, Skin contact impedance, Motion artifacts.

Unit II Cardiovascular System (08 Hrs)

Basics of Cardiovascular System, Heart Anatomy, Functioning of System, ECG Amplifiers, ECG Machine, B. P., Heart Rate, Heart Sound, Blood Flow Measurements.

Unit II Electrocardiography (08 Hrs)

Electrocardiography,Phonocardiography, Echocardiography, Vector Cardiography, Stress Testing System, Beside Monitors, Central Monitoring System, Pacemakers, Defibrillators, Grounding and Shielding, Patient Safety

Unit IV Laboratory Equipments (08 Hrs)

Colorimeter, Spectrophotometer, Autoanalyser, Flamephotometer, PH/Blood Gas Analyzer, Pulse Oximeter, Hemodialisis, Blood Cell Counter.

Unit V Electroencephalography (07 Hrs)

Nervous System-Anatomy, Human Brain Recording of EEG Signal, EEG Amplifier, Analysis of Diseases using EEG Electromyography

Unit VI Medical Imaging (07 Hrs)

Diagnostic Medical instruments such as CT Scan, MRI, Ultrasonic Doppler Machine, Lasers in Medicine- Vision Correction, Dermatological.

Advanced topics on Biomedical .

Text Books:

1. Cromwell, “Biomedical Instrumentation and Measurement”, PHI.
2. R. S. Khandpur, “Biomedical Instrumentation”.

Reference Books:

1. Carr and Brown, “Biomedical Instrumentation”.
2. Webster, “Application and Design of Medical Instruments".

BECL419 VERILOG HDL (3-0-0-3)
(Elective –I) Total Hrs: 45.

Course Objectives:

1. To provide adequate knowledge in Verilog HDL.
2. To understand programming technologies
3. To understand system design with PLD’s

Course Outcomes:

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

1. Apply the concepts of HDL, structural, data flow and behavioral models
2. Design of PAL ,PLA Synthesis methods for FPGA
3. Design of complex PLDs CPLD Altera Max 7000 series
4. Design control path of a digital system and implement it using Finite State Machines (FSMs)
5. Describe the architecture, programming and use of FPGAs, and distinguish appropriate areas of application for each technology
6. Use basic skill to design application specific model

Unit I: (10 Hrs)

Introduction to Verilog, Module, delays, descriptions, Language elements, Expressions, Gate-level modeling User defined primitives, Dataflow modeling, Behavious modeling, Structural modeling, Tasks and functions

Unit II: (6 Hrs)

Programming Technologies – ROMs & EPROMs PLA . PAL gate Arrays Programmable gate arrays and applications, Antifuse FPGA, Synthesis methods for FPGA

Unit III: (6 Hrs)

Programmable Logic Devices: Basis concept, structure of standard PLD’s, complex PLDs CPLD. Altera Max 7000 series. AMD Match 4 structure.

Unit IV: (8 Hrs)

System Design with PLD’S : Design of combinational and sequential circuits using PLD’s, Programming PAL devices, using PALASM, Design of state machines using algorithmic state machines ASM chart as a design tool

Unit V: (10 Hrs)

Introduction to FPGA: types of FPGA, Xilinx XC3000 series, Logic Cell Array (LCA), Configurable Logic Blocks (CLB), Input/Output Blocks (I/OB), Programmable interconnection Points (PIP)

Unit VI: (5 Hrs)

Introduction to ACT 2 family and Xilinx4000 families, Design example.

Advanced topics on System Modeling and Devices.

Books:

1. Palmer J.E. Perlman D.E., “Introduction to digital System”. McGraw Hill
2. Nelson, Nagale, Carroil, Irwin, “Digital Logic Circuit Analysis and Design”, Prentice Hall
3. John Oldfield, Richard Dorf. “Field Programmable Gate Array: Re configurable logic for rapid prototyping and implementation of Digiatl System”, John Wiley
4. “Programmable Logic Devices Data book and Design Guide”. National Semiconductors
5. Pradnan D.K., “Fault-Tolerant-Theory and Techniques. Vol and II, Prentice Hall
6. J.Bhasker “A Verilog HDL Prime 2e”. BS Publications. 2001
7. Navabi. “Verilog Digital system Design” McGraw Hill, 1999
8. Stuart Sutherland, “Verilog 2001, Kluwer. 2002
9. Surherland, “The Verilog PLI Handbook” Kluwer. 1999

BCSL312 COMPUTER GRAPHICS & VISUALIZATION (3-0-0-3) (Elective –I)
Total Hrs: 45

Course Objectives :

1. To impart basic fundamentals of computer graphics
2. To aim at developing fundamental data structures and algorithm for modeling.

3. To understand the programming in Video Games, Virtual Reality Applications, Computer Simulations, CAD and web design.
4. To impart the skills necessary for the generation of polygons and implementation of various polygon filling algorithms.

Course Outcomes :

Student shall be able to:

1. Be familiar with the fundamentals of computer graphics, various display devices and able to perform basic object generation.
2. Implement various filling and clipping algorithms for objects
3. Implement various transformation techniques for animation
4. Apply various projection and hidden surface removal techniques
5. Be familiar with curve generation techniques and visualization techniques
6. Be familiar with advanced modeling techniques and tools in the area of computer graphics

Unit-I Introduction (7 Hrs)

Introduction to Computer Graphics and Image Processing, Basic fundamentals of random scan, raster scan devices, Stereoscopic and Virtual Reality Systems, line and circle drawing algorithms

Unit-II Polygon Filling Methods (8 Hrs)

seed fill, fence fill, edge flag algorithm, scan conversion techniques, aliasing and antialiasing techniques, clipping algorithms

Unit-III Transformations (9 Hrs)

Basic 2D transformation, composite transformations- translation, rotation, scaling, reflection, shear views, windowing, Introduction to 3D transformation

Unit-IV Projections And Eliminations (8Hrs)

Three dimensional display methods, parallel, perspective projections and types, hidden line and surface elimination techniques, shading and rendering.

Unit-V Curve Generation (8 Hrs)

Curve Generation: Cubic Spine, Braziers, B-Spline, blending of curves and other interpolation techniques, Introduction to Visualization, Applications, Visualization Techniques- parallel coordinates – a, charts (pie chart, bar chart, histogram, function graph, scatter plot, etc., graphs (tree diagram, network diagram, flowchart, existential graph, etc.) Venn diagram Euler diagram etc

Unit-VI Trends and Applications (5 Hrs)

Recent trends in Computer Graphics and Visualization,

Advanced topics & its Application

Text Books:

1. Procedural Elements of Computer Graphics: Rogers –Mc Graw Hill
2. Principles of Interactive Computer Graphics- Newman & Sproull- Mc Graw Hill
3. Computer Graphics: Hearn & Baker- PHI India
4. Peter Shirley, et al. “Fundamentals of Computer Graphics,” 2nd Edition, A K Peters, 2005.

BECL313 Transmission Lines and Antennas (3-0-0-3) (Elective –I) Total Hrs: 45

Course Objectives:

1. To understand transmission line fundamentals and apply them to the basic problem.
2. To analyze and understand the Uniform plane wave propagation in various media
3. To analyze and understand the fundamental of antenna
4. To solve the electric field and magnetic fields for various antenna

Course Outcomes :

At the end of the course the student shall be able to:

1. understand the concepts like skin effect, wavelength, velocity of propagation, of transmission line
2. Apply techniques for the measurement of basic transmission line parameters, such as the reflection coefficient , standing wave ratio, and impedance.
3. Analyze the Smith chart, its application to matching, and experimental verification
4. Apply knowledge of antenna including: directivity, antenna gain, effective area, radiation resistance, and far-field calculation
5. Apply and analyze dipole antenna for various application
6. Analyze radiation pattern, specifications, features and applications of various array antenna

Unit I : Transmission Lines (7 Hr)

Line parameters, inductance of a line of two parallel round conductors, coaxial line, skin effect, A line of cascaded T sections, general solution, physical significance of the equations; the infinite line, wavelength, velocity of propagation,

Unit II : The Line at Radio Frequency (7 Hr)

The distortion less line, Inductance loading of telephone cables, Reflection on a line not terminated in Z0, reflection coefficient, open and short circuited lines, reflection factor and reflection loss, T and pi sections equivalent to lines.

Voltages and currents on the dissipation less line, standing wave ratio, Input impedance of dissipation less line, Input impedance of open- and short-circuited lines, Power and impedance measurement on lines, Reflection losses on the unmatched line, quarter wave line;

Unit III : Impedance Matching and Smith Chart (7 Hr)

Impedance matching, Single-stub impedance matching on a line, The circle diagram for the dissipation less line, Application of the circle diagram, The Smith circle diagram, Application of the Smith chart for calculating impedance and admittance

Unit IV : Antenna Fundamentals (8 Hr)

Introduction, Types of Antenna, Radiation Mechanism. Antenna Terminology: Radiation pattern, radiation power density, radiation intensity, directivity, gain, antenna efficiency, half power beam width, bandwidth, antenna polarization, input impedance, antenna radiation efficiency, effective length, effective area, reciprocity. Radiation Integrals: Vector potentials A, J, F, M, Electric and magnetic fields electric and magnetic current sources, solution of inhomogeneous vector potential wave equation, far field radiation

Unit V : Wire Antennas (8 Hr)
Analysis of Linear and Loop antennas: Infinitesimal dipole, small dipole, and finite length dipole half wave length dipole, small circular loop antenna. Complete Analytical treatment of all these elements.

Unit VI : Antenna Arrays (8 Hr)
Antenna Arrays: Two element array, pattern multiplication N-element linear array, uniform amplitude and spacing, broad side and end-fire array, N-element array: Uniform spacing, non uniform amplitude, array factor, binomial. Planar Array, Circular Array, Structural details, imensions, radiation pattern, specifications, features and applications of Log Periodic Antenna, Yagi Uda Antenna Hertz & Marconi antennas

Text Books

1. Robert E. Collin,"Foundation for microwave engineering',Wiley Student Edition
2.K. D. Prasad, "Antenna & Wave Propagation", SatyaPrakashan, New Delhi.
3. C.A. Balanis, "Antenna Theory - Analysis and Design", John Wiley.

Reference Books

1. John D Kraus, Ronald J Marhefka, Ahmad S Khan, Antennas for All Applications, 3rd Edition, TheMcGraw Hill Companies.
2.U.A. Bakshi, A.V. bakshi,"Transmission Lines & Waveguides", Technical publication Pune
3. John D Kraus, " Antenna & Wave Propagation", 4th Edition, McGraw Hill, 2010.
4. Vijay K Garg, Wireless Communications and Netwoking, Morgan Kaufmann Publishers, An Imprint of Elsevier, 2008.

MBL105- General Proficiency –V (2-0-0-2)
Course Objectives: -
1. To make students communicate their knowledge and feelings with a purpose.
2. To perform effectively in one to one and group discussion meetings and in public.
3. To make students more focused for enhancing employability prospects.

Course Outcomes :
Student shall be able to:
1. Write more accurate and effective technical reports.
2. Create favorable environment for better recruitment.
3. Perform better in group discussion and interview.

- GD (Group discussion)
- PI (Personal Interview)
- Technical report writing
- CV (Curriculum Vitae

MBL106- General Proficiency -VI
Research Methodology Workshop
Course Objectives: -
1. To orient the students for research in the area of interest.
2. To provide step wise procedure for carrying out research.
3. To introduce various mathematical, analytical and simulation tools useful for research.
4. To learn methods for safeguarding the intellectual property rights.

Course Outcomes :
Student shall be able to:
1. Understand the need and importance of research.
2. Carry out research in a scientific manner.
3. Prepare research report and publish research findings.

BECP 307 -Minor Project
Pre-requisite: Electronics Workshop - I
Course Objectives :-
- To provide hands on practice for Electronic application

Course Outcomes:-
- An ability to work as a member of diverse technical team and to develop products

OPEN ELECTIVE: Please refer the syllabus provided in the last

BECL 417 SENSORS & TRANSDUCERS (3-0-0-3)
Course Objectives:
1. To gain knowledge about the measuring instruments and the methods of measurement
2. To use different Sensors transducers and Bus Architecture.
3. To be able to calibrate and testing of different sensors
4. To differentiate between the types of transducers available

Course Outcome
Student shall be able to
1. To do error analysis associated with measurement.
2. To analyze and use the functions of various instrumentation systems.
3. To identify and Measure the sensors output for various applications.

Unit I Generalized Instrumentation system, Active and Passive transducers, Digital and Analog mode

of operation, Static and Dynamic characteristics and Performance of instruments. Stastical treatment of measurement of errors, Caussian error distribution, Probability tables, Combination of errors.

Unit II. Resistance type Transducers - Potentiometer, Strain gauge; Inductive type - LVDT; Piezoelectric Transducer; Sensing elements: Temperature sensing elements - RTD, Thermistor, Thermocouple, Cold Junction Compensation.

Unit III. Motion measurement: Relative and Absolute motion measurement of displacement, Velocity and Acceleration; Pressure sensing elements - Manometers, Elastic elements, Bourdon tube, Diaphragm, Bellows; Electrical type, McLeod gauge, Pirani gauge; Flow sensing type - Head meters [Orifice, Venturi], Area meters, Rotameters, Electromagnetic Flowmeter, Coriolis Flowmeter, Ultrasonic Flowmeter; pH measurement.

Unit IV. Pyrometers, Piezoelectric transducer, Magnetostrictive, IC sensor, Digital transducers, Smart
sensor, Fiber optic transducer, Signal conditioning techniques used in various transducers, Linearization, Gain, Clipping, Filtering, Differential amplification, Shielding techniques, Various standards for signal transmission like 4 - 20mA current loop converter etc.

Unit V Recording of data CRO, Data Acquisition System, Industry Standard Bus architecture: PCI Bus, ISA Bus, EISA Bus, Protocols, Test equipments like Multimeter, Signal generator, Signal analyzer.

Unit VI. Calibration of measuring Instruments, Theory and Principles [Absolute and Secondary or Comparison method], Setup, Modeling. Sensor calibration and testing. Analytical methods in calibrating. Realization in standard laboratories, Maintenance and Reproduction, Test and Review, Recent advancement in Sensors and Transducer.technology.

Books:

1. Measurement system, application and design: E.D.doeblin, McGraw Hill Kogalcusha
2. Electrical & Electronic Measurements and Instrumentation: A.K. Sawhney
3. Instrumentation, measurement and feed back : B.E.Jones, McGraw hills
4. Sensors and Transducers: Patranabis D, Prentice Hall of India
5. Bus Architecture Manuals.

BMEL401 NANOTECHNOLOGY (3-0-0-3)

Total Hrs. 36

Course Objectives:

1. To create awareness about interdisciplinary issues.
2. To create awareness regarding emerging trend for cutting edge technology.
3. Introduce students to Fuzzy Logic concepts and techniques and foster their abilities in designing and implementing for real-world problems.

Course Outcomes

Students shall be able to

1. Understand the fundamentals and basics of nanotechnology.
2. Understand significance and potential opportunities to create better materials and products.

Unit I Fundamentals And Overview Of Nanoscience (5Hrs)

Nanorevolution of the XX century, Basic concepts of Nano science and technology ,Properties at nanoscale (optical, electronic and magnetic). Theory, definitions and scaling.

Unit IIDifferent Classes Of Nanomaterials (5 Hrs)

Carbon based nano materials and other nanomaterials, Metal and Semiconductor Nanomaterials, Quantum Dots, Wells and Wires, Molecule to bulk transitions, Bucky balls and Carbon Nanotubes. Introduction to Nano composites

Unit III :

Synthesis Of Nanomaterials (7 Hrs)

Top-down (Nanolithography, CVD),Bottom-up (Sol-get processing, chemical synthesis). Wet Depositiontechniques, Self-assembly (Supramolecular approach), Molecular design. Microwave Synthesis of materials

Unit IV Characterization Of Nano Materials (7 Hrs)

TEM, SEM and SPM technique, Fluorescence Microscopy and Imaging.

Unit VProperties Of Nano Materials (6 Hrs)

Properties and technological advantages of nano materials in different industrial sectors such as semi conductors, sensors, nanostructured bioceramics and nanomaterials for drug delivery applications etc.

Unit VI Diversified Applications
(6 Hrs)

Applications of Nanotechnology in different industrial sectors such as chemical industries, Biology and Medicines, Electrical and Electronics etc.

Advance topic on the subject

Text Book

1. 1.Hari Singh Nalwa, 'Nanostructured Materials and Nanotechnology', Academic Press, 2002
2. Pradeep T 'Nano: The Essentials', Mc Graw Hill Publishing Co. Ltd., 2007
3. Mick Wilson et al, 'Nanotechnology', Overseas Press (India) Pvt. Ltd., 2005.
4. Charles P. Poole, Jr., Frank J. Owens, 'Introduction to nano technology', Wiley, 2003.

5. Gunter Schmid, ‘Nanoparticles: From Theory to Applications’, Wiley-VCH Verlag GmbH & Co., 2004.
6. Joel I. Gersten, ‘The Physics and Chemistry of Materials’, Wiley, 2001.
7. A. S. Edelstein and R. C. Cammarata, ‘Nanomaterials: Synthesis, Properties and Applications’, Institute of Physics Pub., 1998.
8. Nanostructures & Nanomaterials Synthesis, Properties & Applications, Published by Imperial College Press 57 Shelton Street Covent Garden London WC2H 9HE

Reference Books

1. A.Nabok, ‘Organic and Inorganic Nanostructures’, Artech House, 2005
2. C.Dupas, P.Houdy, M.Lahmani, ‘ Nanoscience: Nanotechnologies and Nanophysics’, Springer-Verlag Berlin Heidelberg, 2007
1. 3.K.W. Kolasinski, ‘Surface Science: Foundations of Catalysis and Nanoscience’, Wiley, 2002.
3. S.Yang and P.Shen: ‘Physics and Chemistry of Nanostructured Materials’, Taylor & Francis, 2000.
4. G.A. Ozin and A.C. Arsenault, ‘Nanochemistry : A chemical approach to nanomaterials’, Royal Society of Chemistry, 2005.

SEVENTH SEMESTER

BECL406 CMOS VLSI DESIGN (3-0-0-3)
Total Hrs: 45

Pre-requisite: Analog System Design

Course Objectives:

1. To study fundamental concepts in VLSI systems design.
2. To understand computer-aided techniques used in the design verification of VLSI systems using CMOS technology
3. To study evaluation procedure and the performance parameters of CMOS designs
4. To learn different processing technologies used for VLSI design.

Course Outcome:

Students shall be able to

1. Ability to understand the structure of MOS , NMOS,PMOS and CMOS transistor.
2. Able to describe the structure and operating characteristics of CMOS inverter with delays.
3. Understand the structure and operating characteristics of CMOS combination logic (logic gates, latches) and design styles (static CMOS, dynamic CMOS, Domino & Zipper)
4. Understand the parasitic effects and able to estimate complementary CMOS circuit performance, size and noise margin.
5. To reproduce the cross section and layout of a CMOS inverter, and relate this information to CMOS layout design rules and design rules check (DRC) methods;
6. Evaluate and apply the performance limitations of CMOS circuits, impact of scaling, variability, fan-in, fan-out and future technology trends.

Unit I: (8 Hrs)

Review of MOS devices, MOS transistor models. PMOS, NMOS, CMOS

Unit II: (8 Hrs)

CMOS Inverter- Basic electrical properties & ckt concepts: The NMOS inverter & transfer characteristics, pull up & pull down ratios of NMOS, alternative forms of pull up the CMOS inverter & transfer characteristics CMOS inverter delays

Unit III: (7 Hrs)

Study of CMOS logic- Combination logic, gates, Compound gates, Multiplexers, memory elements. Static & Dynamic logic ckts ,Domino & Zipper logic

Unit IV: (8 Hrs)

Circuit characterization and performance, resistance and capacitance estimation, switching characteristics, power dissipation

Unit V: (7 Hrs)

CMOS processing technology- basic CMOS technology, layout design rules, stick diagram representation, latch up.

Unit VI: (7 Hrs)

CMOS circuit and logic design – transistor sizing, fan in, fan out, physical design of simple logic gates, CMOS logic structures, clocking strategies.
Advanced topics on Transistor design

Text Books:

1. Neil H.E.Weste, Principles of CMOS VLSI Design, Second Edition, Pearson Publications, 1993
2. Pucknell, K.Eshraghian, CMOS VLSI Design, Third Edition, Illustrated, Prentice Hall, 1994

Reference Books:

1. John P. Uyemura, CMOS Logic Circuit Design, Illustrated, Springer Science & Business Media, 1999
2. Sung-Mo Kang & Yusuf Leblebici, CMOS Digital Integrated Circuits Analysis & Design, Illustrated, Tata McGraw-Hill Education, 2003
3. Jan M. Rabaey, Anantha P. Chandrakasan, Borivoje Nikolic, Digital integrated circuits: a design perspective, Second Edition, Illustrated, Pearson Education, 2003

BECL409 DIGITAL IMAGE PROCESSING
(4-0-0-4) Total Hrs: 45

Pre-requisite:

Course Objectives:

1. To study the basic theory & algorithms used in digital image processing
2. To expose students to current technologies and issues those are specific to image processing systems.
3. To understand and study the issues like segmentation, transforms etc used for the image processing.
4. To understand MATLAB tool boxes and their uses for applications of image processing.

Course Outcome:

Student shall be able to

1. Understand the fundamentals of the human visual system and perception with knowledge of imaging systems and processing units.
2. Demonstrated understanding of spatial filtering techniques, including linear and nonlinear methods, image enhancement algorithms such as histogram modification, contrast manipulation, and edge detection.
3. Demonstrated understanding of 2D Fourier transform concepts, including the 2D DFT and FFT, and other transforms (DCT, Haar, WHT) and their use in frequency domain filtering.
4. To recognise degradation problem in digital image processing, and to decide upon appropriate methodologies in their solution and to understand the principles of image compression.
5. Able to employ morphological filtering techniques to clean up and cluster image for further analysis.
6. Detect/Extract regions of interest from an image using various thresholding and segmentation techniques and apply these techniques to solve real-world image processing problems.

Unit I:

Origins of digital image processing, Various Imaging techniques, components of an image processing system, Image sensing and acquisition, Image sampling and quantization, neighbors of a pixel, Adjacency, Connectivity, Regions and boundaries.

Unit II:
Basic intensity transformation and spatial filtering, Image negatives, log transforms, power-law transformations, median filtering, Histogram equalization, Histogram matching spatial correlation and convolutions

Unit III:
Two-dimensional orthogonal and Unitary Transforms, properties of unitary transforms 2D-DFT, Cosine transforms, Sine transforms, Hadamard transform, Haar transforms, Slant transforms.

Unit IV:
Model of image Degradation/Restorations process, Noise models, Restoration in the presence of noise only, periodic noise reduction by Frequency domain filtering, Image reconstruction from Projections, Image compression models, Huffman coding, LZW coding, Run length coding, Bit-plane coding.

Unit V:
Some basic morphological algorithms, Boundary extraction, convex hull, thinning, skeletons, morphological Reconstruction. Color image processing, color models, RGB color models, CMY and CMYK color models the HSI color models.

Unit VI:
Image segmentation, Fundamentals, Point, Line and edge detection, of segmentation, Thresholding, Region-based segmentation, watershed segmentation algorithm Applications of segmentation.
Advanced topics on Image processing technology and algorithms.

Text Books:
1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing. Third Edition, Prentice Hall, 2002
2. A K Jain, Fundamentals of Digital Image Processing, Prentice Hall

Reference Books:
1. S. Jayaraman, S. Esakkirajan, T. Virakumar, Digital Image Processing, McGraw Hill
2. Chanda Mazumdar, Digital Image Processing, Third Edition, Prentice Hall, India.

BECP409 DIGITAL IMAGE PROCESSING (0-0-2-1) Total Hrs: 20

List of Practicals:
1. To Read image from MATLAB tool box.
2. To adjust GRAY LEVEL of image by using MATLAB tool box.
3. To study Brighten of Darken image by using MATLAB tool box.
4. To adjust CONTRAST of an image by using MATLAB tool box.
5. To study INTENSITY of transform image by using MATLAB tool box.
6. To change the enhancement of an image using Histogram.
7. To remove salt and pepper noise by using filter.
8. To remove the Gaussian noise from image by using adaptive filter.
9. To study Rayleigh noise distribution on the image by using MATLAB.
10. Edge detection using sobel & prewitt operation.
11. Open Ended experiments

BECL410 EMBEDDED SYSTEMS (4-0-0-4) Total Hrs: 45

Pre-requisite: Microprocessor Based System

Course Objectives:
1. To study and understand various embedded systems.
2. To understand the design parameters of embedded systems applications.
3. To study and impart different tools for embedded system design.

Course Outcome:
Student shall be able to
1. Select Appropriate Microcontroller, Techniques & understand the Architecture of 8051.
2. Design 8051 Programs For Embedded Applications.
3. Design and Interface memory for Real Time applications using LED & LCD.
4. Understand & design Programs for ARM base applications.
5. Make Use Of ARM7 Controller For Designing Of Embedded Applications
6. Select And Make Use of Appropriate Bus Standard for Design application of Embedded systems..

Text Books:
1. Mazidi M. A., Mazidi J. G., 8051 Microcontroller & Embedded Systems, Second Edition, Pearson Education, 2008
2. Kenneth Ayala, Microcontroller & Embedded Systems using Assembly & C, Second Edition, Cengage Delmar Learning, 2010

Unit I: (8 Hrs)
Microcontrollers : Microprocessors and Micro-controllers, Types of Micro-controllers, External memory, Processor Architecture – Harvard v/s Van Neumann; CISC v/s RISC, Micro-controller, Memory types, Software development tools like assembler, cross- compiler, emulator, and simulator, 8051 controller, Block Diagram &Architecture.

Unit II: (7 Hrs)
8051 Instruction Set, Addressing modes & programming. 8051 Timers, Serial I/O

Unit III: (8 Hrs)
Memory Interfacing. Programming, Real time interfacing with LED, LED display, LCD display

Unit IV: (7 Hrs)
RISC Controller : ARM Micro-controllers – overview; features, ARM 7 –architecture, Thumb, Register Model, Addressing modes, Instruction set.

Unit V: (8 Hrs)
Real-time Versus Conventional Software, Software Engineering Issues, Study of Embedded OS-Win CE, RTLINUX

Unit VI: (7 Hrs)

Industrial Interfacing Buses: PCI, ESA, EISA, I2C, USB, RS232.

Advanced topics on embedded system

Reference Books:

1. Ayala, Kenneth J., Microcontroller : Architecture, Programming & Application, Second Edition, Prentice Hall, 1996
2. Dhananjay Gadre, The AVR Microcontroller, Second Edition, Tata McGraw-Hill Education India Pvt.Ltd, 2003
3. Mazidi M. A., R. Mckinlay & D. Causey, PIC Microcontroller & Embedded Systems: Using Assembly & C, Third Edition, Pearson, 2008
4. Davies J H, MSP 430 Microcontroller Basics, Second Edition, Elsevier, 2010
5. Subrata Ghoshal, 8051 Microcontroller-Internals, Instructions, Programming & Interfacing, First Edition, Pearson, 2010

BECP410 EMBEDDED SYSTEMS (0-0-2-1)
Total Hrs: 20

List of Practicals:

1. Study of Microcontroller tools
2. Write a program to perform arithmetic Operation using 8051 Microcontroller.
3. Write a program to perform addition of two arrays using 8051 Microcontroller
4. Write a program to perform Array Sorting
5. Write a program to perform Interrupt Operation
6. Write a program to interface with LED Display
7. Write a program to perform arithmetic Operation using PIC Microcontroller
8. Write a program to perform addition of two arrays using PIC Microcontroller
9. Write a program to perform arithmetic Operation using ARM7 Microcontroller
10. Write a program to perform addition of two arrays using ARM7Microcontroller
11. Write a program in C for interfacing the Display using PIC Microcontroller
12. Open Ended Mini Project

Elective-II (3-0-0-3)
BECL414 OPTICAL COMMUNICATION
BCSL308 LANGUAGE PROCESSORS
BEEL420 PLC & SCADA
BECL421 PROGRAMMABLE DEVICES & TESTING
BECL428 WIRELESS SENSOR NETWORKS (E-II)

Elective-II (3-0-0-3)
BECL414 OPTICAL COMMUNICATION (3-0-0-3)
(E-II) Total Hrs:48

Course Objectives:

1. To understand the basic concepts of fiber optical Communication.
2. To understand photonic systems, modulation formats and multiplexing technologies
3. To study and understand optical switching and fiber optical measurement.

Course Outcome:

Student shall be able to

1. Ability to demonstrate an understanding of optical fibre propagation characteristics and transmission properties.
2. Demonstrate basic fiber handling skills, including connectors and splicing
3. Calculate the attenuation and signal degradation due to intermodal and intramodal distortion.
4. Develop capacity of understanding of light sources including the principles of laser action in semiconductors, the characteristics of optical sources based on semiconductor.
5. Ability to describe the principles of photo detectionand optical receiver
6. Ability to apply relevant scientific and engineering principles to solve real world optical engineering

Unit I: (8 Hrs)

Overview of Optical fiber Communications, Principle of optical communication – Attributes and structures of various fibers such as step index, graded index mode and multi mode fibers. Propagation in fibers – ray mode, Numerical aperture and multi path dispersion in step index and graded index fibers. Material dispersion and frequency response. Self phase modulation, combined effect of dispersion and self phase modulation

Unit II: (08 Hrs.)

Electromagnetic wave equation in step index and graded index fibers modes and power flow in fibers. Manufacture of fibers and cables, fiber joints, splices and connectors.

Unit III: (08Hrs)

Signal degradation in fibers – Attenuation, material dispersion, wave guide dispersion, pulse broadening, mode coupling. Dispersion shifted and dispersion flattened fibers. Attenuation and dispersion limits in fibers.

Unit IV: (06 Hrs)

Optical sources – LED and laser diode, principles of operation, concepts of line width, phase noise, switching and modulation characteristics – typical LED and LD structures.

Unit V (08 Hrs.)

Photo detector – Pn detector, pin detector, avalanche photodiode – Principles of operation, concepts of responsivity, sensitivity and quantum efficiency, noise in detection.

Unit VI: (08 Hrs.)

Optical switching Fiber Optical Measurements. ANALOG AND DIGITAL LINKS: Analog links –

Introduction, overview of analog links, CNR, multichannel transmission techniques, RF over fiber, key link parameters, Radio over fiber links, microwave photonics. Digital links – Induction, point–to–point links, System considerations, link power budget, resistive budget, short wave length band, and transmission distance for single mode fibers, Power penalties, nodal noise and chirping.

Advanced topics on Optical Communications

Text Books:

1. Gerd Keiser, Optical Fiber Communication, Fourth Edition, Mc Graw Hill, 2011
2. John M. Senior, Optical Fiber Communication, Second Edition, Pearson Education, 2007

Reference Books:

1. J. Gower, Optical fiber Communication, Second Edition, Prentice Hall of India(PHI), 2001
2. Abdul Al-Azzawi, Fiber Optics: Principles and Practices, Second Edition, CRC Press, 2006
3. Binh, Digital Optical Communications, First Edition, (Taylor & Francis), Yesdee, Publications, Indian Reprint, 2013.

BCSL308 : LANGUAGE PROCESSORS
(3-0-0-3) (E-II) Total Hrs: 45
Pre-requisite: --
Course Objectives:

1. To provide adequate knowledge in Language processors
2. To understand syntax analysis.
3. To gain knowledge of code optimization
4. To understand storage allocation & error handling

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

1. Apply and analyse basic concepts of language processors.
2. Design and analyse different parsing techniques
3. Apply knowledge of semantic analysis and construct three address code .
4. Acquire the knowledge concept of storage Management.
5. Apply and analyse various optimization techniques
6. Acquire the knowledge of runtime evironment for code generation

Unit I (8 Hrs)
Introduction to Compilers: Compilers and translators, Phases of compiler design, cross compiler, Bootstrapping, Design of Lexical analyzer, LEX.
Unit II (7 Hrs)
Syntax Analysis: Specification of syntax of pogramming languages using CFG, Top-down parser, design of LL (1) parser, bottom up parsing technique, LR parsing algorithm, Design of SLR, LALR, CLR parsers.
Unit III (8 Hrs)
Syntax directed translation: Study of syntax directed definitions & syntax directed translation schemes, implementation of SDTS, intermediate notations: postfix, syntax tree, TAC, translation of expression, controls structures, declarations, procedure calls, and Array reference.
Unit IV (7 Hrs)
Storage allocation & Error Handling: Run time storage administration, stack allocation, symbol table management, Error detection and recovery: lexical, syntactic, semantic.
Unit V (8 Hrs)
Code optimization: Important code optimization techniques, loop optimization, control flow analysis, data flow analysis, Loop invariant computation, Induction variable removal, Elimination of Common sub expression, Code generation – Problems in code generation, Simple code generator, Register allocation and assignment, Code generation from DAG, Peephole optimization.
Unit VI (7 Hrs)
Recent trends in Language Processor.
Advanced topics & its Application

Text Books:

1. Steven Bird, Ewan Klein & Edward Loper, Natural Language processing with python, O'Reilly Media Final Release, June 2009
2. Christopher Manning, Foundations of Statistical Natural Language Processing, The MIT Press Cambridge, Massachusetts, May 1999

Reference Books:

1. Daniel Jurafsky and James H. Martin, Speech and Language Processing, Prentice Hall, Englewood Cliffs, New Jersey 07632
2. Daniel Jurafsky and James H. Martin, Principles of Programming Languages, Kadambri Agarwal

BEEL420 PLC & SCADA (3-0-0-3)
(E-II) Total Hrs: 45
Pre-requisite: --
Course Objectives:

1. To develop understanding and application skills for the programming of PLCs.
2. Demonstrate knowledge of systems associated with PLCs
3. Demonstrate and apply knowledge of PLC hardware/software concepts

Course Outcomes:
Student shall be able to

1. Understand the basics of PLC Controllers and SCADA system
2. Learn the monitoring and supervisory function of SCADA and Data acquisition in the Industry
3. Learn SCADA system components
4. Study of Architecture of IEC 61850
5. Learn communication technology of SCADA
6. Learn application of SCADA

Unit I; (07 Hrs)

Introduction: Introduction to automation tools PLC, DCS, SCADA, Hybrid DCS/PLC.

Unit II: (07 Hrs)

Data acquisition systems, Evolution of SCADA, Communication technologies, Monitoring and supervisory functions, SCADA applications in Utility Automation, Industries.

Unit III (07 Hrs)

SCADA System Components**:** Schemes- Remote Terminal Unit [RTU],Intelligent Electronic Devices [IED],Programmable Logic Controller [PLC], Communication Network, SCADA Server, SCADA/HMI Systems.

Unit IV: (08 Hrs)

SCADA Architecture**:** Various SCADA architectures, advantages and disadvantages of each system - single unified standard architecture -IEC 61850

Unit V: (08 Hrs)

SCADA Communication**:** various industrial communication technologies -wired and wireless methods and fiber optics. open standard communication protocols

Unit VI (08 Hrs)

SCADA Applications**:** Utility applications- Transmission and Distribution sector -operations, monitoring, analysis and improvement. Industries - oil, gas and water. Case studies, Implementation, Simulation Exercises.

Latest developments in PLC & SCADA.

Text Books:

1. Gary Dunning, , Introduction to Programmable logic Controllers, Delmar Publisher, 2006
2. Webb & Reis, Programmable logic Controllers, Prentice Hall of India, 2003

Reference Books:

1. Jose A. Romagnoli, Ahmet Palazoglu, Introduction to process Control, Second Edition, CRC Tylor and Francis group

BECL421 PROGRAMMABLE DEVICES & TESTING (E-II) (3-0-0-3)

Total Hrs: 45

Pre-requisite:

Course Objectives:

1. To give sufficient background for understanding programmable devices
2. To give knowledge of system design
3. To make aware students to test devices and find out fault in the system

Course Outcome:

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

1. Understand basic programmable logic architectures.
2. Design and analyze Combinatorial logic and Sequential logic circuits using PLD's.
3. Use skills, and techniques ofXilinx logic families to design, implement and test digital systems on FPGAs.
4. Test and perform fault finding in digital electronics circuits.
5. Design a digital system to be fault-tolerant and avoidance.
6. Know the different forms of redundancy and different classes of digital systems

Unit I: (8 Hrs)

Programmable Logic Devices: Basic concept, Programming technologies, Programmable logic elements, programmable logic array, programmable array logic, structure of standard PLD's, complex PLD's CPLD, Altera Max 7000 series, AMD Mach 4 structure

Unit II: (8 Hrs)

System Design with PLD's : Design of combinational and sequential circuits using PLD's, Programming PAL devices using PALASM, Design of state machines using algorithmic state machines ASM chart as a design tool.

Unit III: (8 Hrs)

Introduction to FPGA: types of FPGA, Xilinx XC3000 series, Logic Cell Array (LCA), Configurable Logic Blocks (CLB), Input/Output Blocks (I/OB), Programmable Interconnection Points (PIP), Introduction to ACT 2 family and Xilinx4000 families, Design example

Unit IV: (7 Hrs)

Fault Testing in Digital Circuits: Detection and Location of fault in combinational logic circuit, Path sensitizing method, Boolean difference method, Fault detection and location in synchronous sequential circuit, Design for testability, built in self-test

Unit V: (7 Hrs)

Fault Tolerant system: Fault avoidance and fault tolerance, technique for fault tolerance, Hardware fault tolerance.

Unit VI: (7 Hrs)

Static, Dynamic and Hybrid redundancy, fault tolerance in memories, software fault tolerance, design for fault tolerant software.

Advanced topics on Programming Devices.

Text Books:

1. Palmer J.E., Perlman D.E, Introduction to digital System, Third Edition, McGraw Hill, 1993
2. Nelson, Nagale, Carroll, Irwin, Digital Logic Circuit Analysis and Design, Third Edition, Prentice Hall, 1995

Reference Books:

1. John Oldfield, Richard Dorf, Field Programmable Gate Array : Reconfigurable logic for rapid prototyping and implementation of Digital System, Second Edition, John Wiley, 2008
2. Pradhan D.K,Fault-Tolerant – Theory and Techniques, Vol I and II, Prentice Hall,1993

BCSL415 CLOUD COMPUTING(E-II)

(3-0-0-3) Total Hrs : 45

Course Objectives:

1. Understand the current technologies in Internet world

2. Explain Public and Private Cloud
3. Discuss Cloud and (new) Service Level Management
4. Discuss how to approach and evaluate a Cloud business case
5. Describe Cloud and Risk Management
6. Discuss the case studies and learn recent trends in computing

Course Outcome:

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

1. Understand the importance of virtualization, components and characteristics of cloud computing.
2. Use Cloud as the infrastructure for existing and new services.
3. Understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS
4. Design and develop various applications using cloud platforms
5. Understand non trivial issues in the Cloud, such as load balancing, identity and authorization management.
6. Design the business models that underlie Cloud Computing.

Unit- I: Introduction to Cloud Computing CO1 (8 Hrs)

Virtualization Concepts, Cloud Computing Fundamental: Overview of Computing Paradigm, Evolution of cloud computing, Defining cloud computing, Components of a computing cloud, Essential Characteristics of Cloud Computing, Cloud Taxonomy.

Unit – II: Cloud Computing Architectural FrameworkCO2 (7 Hrs)

Cloud architectural principles, Role of Networks in Cloud computing, Role of Web services, Benefits and challenges to Cloud architecture, Cloud Service Models, cloud computing vendors. Cloud Services Management, Performance and scalability of services, tools and technologies used to manage cloud services deployment.

Unit – III: Exploiting Cloud ServicesCO3 (8 Hrs)

Software as a Service(SaaS): Introduction to SaaS, Inspecting SaaS technologies, Implementing web services, Deploying Infrastructure as a Service(IaaS): Introduction to IaaS, Scalable server clusters, Machine Image, Virtual Machine (VM). Elastic storage devices, Data storage in cloud computing, Delivering Platform as a Service(PaaS): Introduction to PaaS, Service Oriented Architecture (SOA), Cloud Platform and Management, Hardware-as-a-service: HaaS.

Unit – IV: Cloud Application Development CO4 (7 Hrs)

Role of business analyst, Technical architecture considerations, Service creation environments to develop cloud based applications, Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages, Cloud Economics,

Unit – V: Cloud Security and Risk Management CO5 (8 Hrs)

Cloud Security: Understanding cloud based security issues and threats, Data security and Storage, Identity & Access Management, Risk Management in cloud, Governance and Enterprise Risk Management.

Unit – VI: Analysis on Case study CO6 (7 Hrs)

Business Case: Business case evaluation criteria, Business outcomes examples, Case Studies: Case Study on Open Source & Commercial Cloud: Eucalyptus, Microsoft Windows Azure, Amazon EC2, Amazon Elastic Block Storage – EBS. Google Cloud Infrastructure, MapReduce. AWS, Simple Storage Service – S3, Recent trends in Computing/ advanced topic.

Text Books:

1. Distributed and Cloud Computing: Clusters, Grids, Clouds, and the Future Internet by Kai Hwang, Jack Dongarra & Geoffrey C. Fox., Morgan Kaufmann Publishers, 2012.
2. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
3. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
4. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012

References:

1. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010
2. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications [ISBN: 978-0521137355]
3. Dimitris N. Chorafas, Cloud Computing Strategies [ISBN: 1439834539]

BECL428 WIRELESS SENSOR NETWORKS (E-II) (3-0-0-3) Total Hrs : 45

Pre-requisite:

Course Objectives:

1. To learn the basics of wireless sensor network
2. To understand the concepts of ad-hoc and sensor networks, their applications and typical node and network architectures.
3. To study protocol design issues (especially energy-efficiency) and protocol designs for wireless sensor networks
4. To understand the applications of WSN

Course Outcomes:

Student shall be able to

1. Understand different ad-hoc and sensor network in terms of application and architecture.
2. Design and customize MAC and routing protocols for various applications of wireless sensor networks.

3. Understand importance of clock Synchronization in wireless sensor networks
4. Understand and analyze wireless sensor networks with proper power management for node and system.
5. Design set up and evaluate measurements of protocol performance in wireless sensor networks.
6. Design wireless sensor networks applications.

Unit I: (8Hrs)

Introduction – motivation, applications, sensors, architectures, platforms for WSN, Actual Systems - Berkeley motes, TinyOS and nesC.

Unit II: (8Hrs)

How to program actual WSN. Wireless Radio Realities – radio irregularities and impact on protocols, MAC protocols – B-MAC, multi-channel MAC, Routing,

Unit III: (8Hrs)

Directed Diffusion, Clock Synchronization, Localization – TDOA, Walking GPS, range free solutions

Unit IV: (7Hrs)

Power Management – per node, system-wide, sentry services, sensing coverage, Data Services and Databases – architectures, queries (SQL),

Unit V: (7Hrs)

Data dissemination, Programming Abstractions – programming models, EnviroTrack, new APIsSecurity and Privacy – problems, attacks, solutions.

Unit VI: (7Hrs)

Case Study: A Complete System – surveillance and tracking application

Advanced topics on WSN.

Text Books:

1. F. Zhao and L. Guibas, Wireless Sensor Networks, Second Edition, Morgan Kaufmann, 2004
2. C. S. Raghavendra, Krishna M. Sivalingam, Taieb F. Znati Contributor C. S. Raghavendra, Edition, Wireless sensor networks, Second Edition, Springer, 2004
3. Robert Faludi, Wireless Sensor Network, First Edition, O'Reilly Media, 2010

Reference Books:

1. Kazem Ssoharaby,Daniel Minoli, Wireless Sensor Network-Protocol, First Edition, John Willey, 2007
2. Waltenegus Dargie,Christian Poellabauer, Fundamentals of wireless Sensor Networks,
3. First Edition, John Willey, 2010
4. Jun Zheng, Wireless Sensor Network-Protocol, First Edition, John Willey, 2009

BECP 408 : Project Phase-I: Project Seminar

Pre-requisite: Minor Project

Course Objectives:-

1. To understand and study the process of literature review and to put forward the findings.
2. To get the detailed practical knowledge about latest technology by designing any system or prototypes by using acquired technical knowledge and skills.

Course Outcome:-

The student shall able to

1. Use the acquired technical knowledge to solve any problem related engineering, environmental, social.
2. Propose and convince design method through effective presentation
3. Participating as a member of a team.
4. Search and study literatures from conference , journals in concern area
5. Make proper documentation of project via project report.
6. Implement propose design trough prototype or software

Elective-III (3-0-0-3)

[1] BMEL403 Mechatronics
[2] BECL401 Radar and Satellite Engineering
[3] BECL422 MEMS
[4] BECL424 ASIC Design
[5] BECL425 RTOS
[6] BITL 302 Computer Networks

BMEL403 MECHATRONICS (3-0-0-3)
(E-III) Total Hrs: 45

Pre-requisite:

Course Objectives:

1. To impart and demonstrate how mechatronics integrates knowledge from different disciplines in order to realize engineering and consumer products.
2. To understand continuous-time control design using software, for the manipulation, transmission, and recording of data.
3. To study parameters of actuators and sensors their suitability for applications.

Course Outcome:

Student shall be able to

1. Understand the concept of mechanical, electronics, control and computer engineering in the design of mechatronics systems.
2. Identify the basic element used in an electrical actuation system and explain their underlying principles of operation.
3. Apply knowledge about the working principle of hydraulic pumps and actuators.
4. Integrate the various sensor and actuation systems using Adon cards and various communication mode for development of mechatronic system.
5. Use techniques, skills, and modern engineering tools necessary for engineering practice.
6. Use neural network to integrate and develop various applications of mechatronics system.

Unit I [7 Hrs]

Need and scope of the subject recent trend of designing machine units along with electronic circuits for operation and supervision of mechanisms. Techniques of interfacing mechanical

device with computer hardware and development of software for driving them.

Unit II [8 Hrs]

Basic principles and specific applications of armature and field and control of D.C. Motors, Variable voltage and variable frequency control of 3 phase and single phase Induction motors, speed control of Synchronous motors. Different types of stepper motors , hold on torques and position control of stepper motors.

Unit III [8 Hrs]

Common and commercial Ics used for amplification , timing and digital indication. Different types of actuators, working of synchro transmitter and receiver set, pair of P/I, pressure to current and I/P type for pneumatic position control, Electrical and hydraulic servomotors. Design of AC and DC solenoid plungers and pressure and force amplification devices.

Unit IV [7 Hrs]

Adon cards for sampling and actuation , 4-20 MA ports, AD-DA Conversion, Peripheral interface organization, general layout of data bus and data transfer through serial and parallel modes of communication, schemes of computer networking and hierarchy in supervisory control.

Unit V [8 Hrs]

Working of integrated systems by using combined block diagrams. Study of systems used in Ink Jet Printers, Photo copying . Washing Machines. IC Engine fuel injection system etc.

Unit VI [7 Hrs]

General philosophy of Artificial Neural Network simulations. Fuzzy logic for operation and control of mechatronic systems.

Advanced topics on Mechatronics

Text Books:

1. Horacio Martinez-Alfaro, Mia Devic, Janeza Trdine 9, Advances in Mechatronics, Rijeka, Croatia
2. Singh M. D., Joshi J. G., Mechatronics Prentice-Hall of India Pvt.Ltd (September 2006)

Reference Books:

1. Ganesh S. Hegde, Mechatronics, Jones & Bartlett Learning, 2010
2. Appukuttan K.K., Introduction to Mechatronics (Oxford Higher Education), Oxford University Press (2 August 2007)

BECL415 RADAR & SATELLITE COMMUNICATION. (3-0-0-3) (E-III)

Total Hrs: 45

Pre-requisite:

Course Objectives:

1. To impart working principles and concepts of radar and satellite communication system.
2. To impart knowledge of different components in Radar and satellite communication.
3. To understand the orbital aspects and components of a satellite communication system.
4. To study the link budget of a satellite communication system and study of satellite orbits and launching.

Course Outcome:

Student shall be able to

1. Understand the basic concepts, operation and application of modern radar system and able to specify the subsystem performance requirements in radar system.
2. Comprehend radar measurements and fundamentals of radar tracking
3. Evaluate overallperformance and operationunder the environment effectsand techniques to confront itand top level measure ofperformance.
4. Develop specializedinsight in the field of satellitecommunication
5. Use relevant methods tounderstand and reduceatmospheric effects on satellite communication.
6. 6.Understand and UseSatellite navigation system for day to day applications.

Unit-I (8Hrs)

RADAR Range Equation, CW and FM modulated RADAR, MTI and Pulse Doppler RADAR, Tracking RADAR.

Unit-II (8Hrs)

RADAR antennas, parabolic reflector, Scanning field reflector, Lens antennas.

RADAR Receivers, Displays and Duplexer, Detection of RADAR; signals in noise.

Unit-III (8Hrs)

RADAR clutter, Effects of weather on RADAR, Detection of targets in Precipitation, Synthetic Aperture RADAR, HF over the Horizon RADAR.

Unit-IV (7Hrs)

Introduction: Origin of Satellite communication, Current state of satellite communication. Orbital aspect of satellite communication: Orbital mechanism, equation of orbit, locating satellite in orbit, orbital elements, and orbital perturbation. Space craft subsystem: Attitude and orbit control system, Telemetry tracking and command power system, and communication subsystem. Satellite link design: System noise temperature and T / T ratio, down link design, domestic satellite system, uplink design, design of satellite link for specified (C / N).

Unit-V (7Hrs)

Propagation on satellite: Earth's path – propagation effects, atmospheric absorption, Scintillation effects, Land and Sea multipath, Rain and ice effects, Rain drop distribution, calculation of attenuation. Rain effects on Antenna noise temperature.

Unit-VI (7Hrs)

Earth Station technology: Earth Station design; antennas tracking, LNA, HPA, RF multiplexing,

factors affecting orbit utilization, tracking, equipment for earth station.

Advanced Study on Radar Technology

Text Books:

1. Skolnik, Introduction of RADAR system, Second Edition, Tata McGraw-Hill Education, 2003
2. T. Pratt., Satellite Communication, Second Edition, Wiley, 2003

Reference Books:

1. Donald G. Fink, Radar Engineering, Second Edition, McGraw-Hill 1947, 2008

BECL422 MEMS (MICRO-ELECTRO-MECHANICAL SYSTEM (3-0-0-3) (E-III) Total Hrs : 45

Pre-requisite: --

Course Objectives:

1. To study functionality of Micro Electro Mechanical systems
2. To understand design of sensors and actuators.
3. To impart the knowledge of interfacing mechanical systems with computer and electronics systems.

Course Outcome:

Student shall be able to

1. understand Microelectromechanical systems and devices.
2. Qualitatively describe surface and bulk micromachining technologies for MEMS.
3. Describe the basics of different MEMs Sensors & Actuators.
4. Analyze microsystem technology for technical feasibility as well as practicality.
5. Design MEMS using simulators for RF applications.
6. Apply the various packaging techniques for different MEMS devices and systems.

Unit I: (08Hrs)

An introduction to Microsensors and MEMS, Evolution of Microsensors & MEMS, Microsensors & MEMS applications.

Unit II: (08Hrs)

Microelectronic technologies for MEMS, Micromachining Technology, Surface and Bulk Micromachining, Micromachined.

Unit III: (08Hrs)

MEMS sensors and actuators, Micro sensors, Mechanical, Inertial, Biological, Chemical, Acoustic,

Unit IV: (07Hrs)

Microsystems Technology, Integrated Smart Sensors and MEMS, Interface Electronics for MEMS.

Unit V: (07Hrs)

MEMS Simulators, MEMS for RF Applications.

Unit VI: (07Hrs)

Bonding & Packaging of MEMS, RF MEMS, and Optical MEMS.

Advanced topics on MEMS.

Text Books:

1. Gregory T.A. Kovacs, Micromachined Transducers Sourecbook, The McGraw-Hill, Inc, 1998
2. Stephen D. Senturia, Microsystem Design Kluar Publishers, 2001

Reference Books:

1. Nadim Maluf, An Introduction to Microelectromechanical Systems Engineering, Artech, House, 2000
2. M.H. Bao, Micro Mechanical Transducers, Volume 8, Handbook of Sensors and Actuators, Elsevier, 2000
3. H. J. De Los Santos, Introduction to Microelectromechanical (MEM) Microwave, Systems, Artech, 1999

BECL424 ASIC DESIGN (3-0-0-3) (E-III) Total Hrs: 45

Pre-requisite:

Course Objectives:

1. To study the need and requirements of application specific integrated circuits
2. To understand different techniques of application specific integrated circuits
3. To impart a thorough understanding of the concepts of design of application specific integrated circuits.

Course Outcomes:

Student shall be able to

1. Analyze the application specific integrated circuits with their design constraints and distinguish different desgning tools,compilers,standard cell,cell libraries etc.
2. Ability to use modern hardware and software design tools to develop digital systems.
3. Differentiate between VHDL,Verilog and ASIC Design techniques and their designing constraints.
4. The ability to code and simulate any digital function in Verilog HDL.
5. Ability to carry optimized routing
6. Demonstrate the asic design successfully.

Unit I: (15 Hrs)

Design flow – Economics of ASICs – ASIC cell libraries – CMOS logic cell data path logic cells – I/O cells – cell compilers.

Unit II: (10 Hrs)

Transistors as resistors – parasitic capacitance – logical effort programmable ASIC design software: Design system – logic synthesis.

Unit III: (10 Hrs)

Half gate ASIC, Low level design entry: Schematic entry – low level design languages – PLA tools – EDIF – An overview of VHDL and Verilog.

Unit IV: (10 Hrs)

Logic synthesis in Verilog and VHDL simulation. ASIC Construction – Floor planning & placement – Routing.

Advanced topics on VLSI Design.

Text Books:

1. J.S. Smith, "Application specific Integrated Circuits", Addison Wesley, 1997.

Reference Books:

2. Bakoglu, H. B. Circuits, Interconnections, and Packaging for VLSI. Reading, MA: Addison-Wesley, 1990.
3. Einspruch N. G., and J. L. Hilbert (Eds.). Application Specific Integrated Circuit (ASIC) Technology, CA: Academic Press, 1991.

BECL425 RTOS (3-0-0-3)(E-III)
Total Hrs: 45

Pre-requisite: ---

Course Objectives:

1. To understand the characteristics and issues in real time operating systems
2. To study the timing requirements of real-time systems
3. To understand the different architectures and design specifications of real time operating systems and real time applications.
4. To impart hard and soft real-time systems
5. To describe scheduling algorithms for hard real-time system

Course Outcome:

Student shall be able to

1. Orientation in the area of design cycle of real-time applications
2. Design applications based on real-time operating systems.
3. Distinguish a real-time system from other systems And Identify the functions of operating system
4. Evaluate the need for real-time operating system and Implement the real-time operating system principles
5. Analyse real time systems with regard to keeping time and resource restrictions.
6. Approp use of architectures and behaviors of embedded systems.

Unit I: (8 Hrs)

INTRODUCTION: Real-time Versus Conventional Software, Computer Hardware for Monitoring and Control, Software Engineering Issues.

Unit II: (8 Hrs)

REQUIREMENTS AND DESIGN SPECIFICATIONS: Classification of Notations, Data Flow Diagrams, Tabular Languages, State Machine, Communicating Real Time State Machine- Basic features, Timing and clocks, Semantics Tools and Extensions, State charts-Concepts and Graphical Syntax, Semantics and Tools.

UnitIII: (7 Hrs)

DECLARATIVE SPECIFICATIONS: Regular Expressions and Extensions, Traditional Logics-Propositional Logic, Predicates, Temporal logic, Real time Logic.

DETERMINISTIC SCHEDULING: Assumptions and Candidate Algorithms, Basic RM and EDF Results, Process Interactions-Priority Inversion and Inheritance.

Unit IV: (8 Hrs)

EXECUTION TIME PREDICTION : Measurement of Software by software, Program Analysis with Timing Schema, Schema Concepts, Basic Blocks, Statements and Control, Schema Practice, Prediction by optimization, System Interference and Architectural Complexities

Timer Application, Prosperities of Real and ideal clocks, Clock Servers – Lamport's Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization- Centralized Synchronization, Distributed Synchronization.

Unit V: (7 Hrs)

PROGRAMMING LANGUAGES: Real Time Language Features, Ada-Core Language, Annex Mechanism for Real Time Programming, Ada and Software Fault Tolerance, Java and Real-time Extensions, CSP and Occam.

Unit VI: (7 Hrs)

OPERATING SYSTEMS: Real Time Functions and Services, OS Architectures-Real Time UNIX and POSIX, Issues in Task management- Processes and Threads, Scheduling, Synchronization and communication.

Advanced topics on RTOS

Text Books:

1. Richard Barry, Using the free RTOS Real Time Kernal (Standard Edition), Paperback, 172 pages Published January 1st 2010 by Real Time Engineers Ltd (Standard Copyright License)
2. By Chowdary Venkateswara Penumuchu, Simple Real-time Operating System, Publisher: Trafford Publishing (7 August 2007)

Reference Books:

1. Edward L. Lamie, Real-Time Embedded Multithreading, Pap/Cdr Edition, CRC Press (1 January 2005).
2. Qing Li, Caroline Yao, Real-Time Concepts for Embedded Systems, Published by CMP Books an imprint of CMP Media LLC.

BITL302 COMPUTER NETWORKS (3-0-0-3)
(Elective-III) Total Hrs: 45

Pre-requisite: --

Course Objectives:

1. To understand the computer network architectures.
2. To make aware of design and performance perspective of network architectures.
3. To discuss current trends in communication

Course Outcome:

Student shall be able to

1. Understand circuit switching and packet switching technologies and their pros and cons with respect to different traffic types.

2. Apply and interpret different types of addressing and routing techniques in computer networks
3. Understand how a data-packet is transmitted from source to destination
4. Apply basic probability models of network phenomena.
5. Interpret Internet addressing, naming, and routing, congestion control, and QoS
6. Analyze key networking algorithms in simulation.

Unit-I:Introduction (9Hrs)

The use of computer networks. Network hardware. LAN's, Man's, WAN's, internet works, Network software, protocol hierarchies, design issues for layers, interfaces and services, Connectionless oriented and connectionless services, service primitives, relationship of Services to protocols, the OSI reference model, TCP/IP reference model, comparison of OSI And TCP/IP reference model.

Unit-II: Physical Layer (8 Hrs)

The theoretical basis for data communication-Fourier analysis, bandwidth-limited signals, Maximum data rate of a channel, transmission media-magnetic media, and twisted pair coaxial Cable, fiber optics. Wireless transmission, microwave transmission. Multiplexing, switching, Narrow and ISDN - services, architecture, interface, perspective on N-ISDN, broadband ISDN & ATM-virtual circuits versus circuit switching, transmission in ATM networks, ATM Switches.

Unit-III: Data Link Layer (8 Hrs)

Design issues - services provided to the network Layer, framing, error control, flow control, Error correcting & detecting codes, elementary data link protocols, simplex stop and wait Simplex protocols for noisy channel, sliding window protocols-one bit protocol, go back Protocol, selective repeat protocol. The medium access sub layer - static and dynamic channel Allocation in LANs and MANs, Multiple access protocols - ALOHA. CSMA, collision free Protocols, limited contention protocols, IEEE 802.11 wireless LAN protocols, IEEE Standards 802 for LAN and MANs-802.3 & Ethernet, token bus. Token ring,

Unit-IV: The Network Layer (9 Hrs)

Design issues, services provided to the transport layer, internal organization, comparison of Virtual circuit and datagram subnets, routing algorithms. Optimality principle, shortest path Routing, flooding, flow-based routing, distance vector routing, link state routing, hierarchical Routing, broadcast & multicast routing, congestion control algorithms, general principles Prevention policies, traffic shaping. flow specifications, congestion control in virtual circuit Subnets. choke packets, load shedding, jitter control. IP protocol, IP address. Subnets, internet Control protocols, OSPF. BGP.

Unit V: Transport and Application Layer (8 Hrs)

Transport and Application Layer - services provided to the upper layer, Quality of Service, Transport service primitives, elements of transport protocols, addressing, establishing a Connection, releasing a connection, flow control & buffering, multiplexing, crash recovery

Unit VI: Trends And Applications (3 Hrs)

Bluetooth protocol stack, Bluetooth connections, piconets and scatternets, WiFi and WiMAX Standard

Recent trends and advanced topics.

Text Books:

1. Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, Fifth Edition, Pearson
2. Data Communication And Networking, Behrouz A. Forouzam, Fourth Edition, McGraw Hill

Reference Books:

1. Jean Walrand , Pravin Varaiya, High-Performance Communication Networks (The Morgan Kaufmann Series in Networking), Second Edition, Morgan Kaufmann Publishers
2. Fayez Gebali, Analysis of Computer and Communication Networks, First Edition, Springer
3. V.S.Bagad, I.A.Dhotre, Computer Communication Networks, Third Edition, Technical Publications, Illustrated
4. Norman Abramson, Franklin F. Kuo, Computer-communication networks, Fourth Edition, Prentice-Hall, 1973, Illustrated
5. R.S. Rajesh, Computer Networks: Fundamental and Application, Fifth Edition, VIKAS PUBLISHING HOUSE PVT LTD, Illustrated

BITL417 INTERNET OF THINGS (3-0-0-3)
(Elective-III) Total Hrs: 45

Course Objectives :

1. Understand IoT Market perspective.
2. Understand State of the Art – IoT Architecture.
3. Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Course Outcome:

1. Understand the evolution of IOT from M2M & Market perspective of IoT.
2. Apply IoT in Industrial and Commercial Building Automation and Real World Design Constraints.
3. Apply IoT design constraints to hardware for device integration.
4. Building IoT architecture with standard considerations.
5. Building the Web of Things from the Cloud of Things for industrial automation.

Unit-I:M2M to IoT **CO1**

The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.

Unit-II:M2M to IoT A Market Perspective **CO2**

Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Unit-III: M2M and IoT Technology Fundamentals- **CO3**

Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

Unit-IV: IoT Architecture-State of the Art – **CO4**

Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model

Unit-V: IoT Reference Architecture- **CO5**

Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints-Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. Industrial Automation- Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things, Commercial Building Automation- Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

Reference Books:

1.Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.

2.Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013

Textbook:

1.Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

BECP 408 : Project Phase-I: Project Seminar

Pre-requisite: Minor Project

Course Objectives:-

1. To understand and study the process of literature review and to put forward the findings.
2. To get the detailed practical knowledge about latest technology by designing any system or prototypes by using acquired technical knowledge and skills.

Course Outcomes:

The student shall able to

1. 1.Use the acquired technical knowledge to solve any problem related engineering, environmental, social.
2. 2.Propose and convince design method through effective presentation
3. 3.Participating as a member of a team.
4. 4.Search and study literatures from conference , journals in concern area
5. 5.Make proper documentation of project via project report.
6. Implement propose design trough prototype or software

Semester VIII

BECP 411 - Project Internship (Phase-II)

Total Hrs: 30

Course Objectives :-

1. To provide opportunity for working on projects, prepare a prototype and conclusions in the form of reports.
2. To provide opportunity for selection of projects considering their usability to the industry and society with environmental aspects.
3. To undertake innovative and research based projects.

Course Outcomes:-

The student shall able to

1. Apply the knowledge gained in theory and to integrate theory with practice followed in industry
2. Realize sense of responsibilities in view of project implementation
3. To understand the functional behavior of organization
4. Work as a member of diverse technical team and to develop project/product
5. Use software , hardware, testing and simulation tools and platforms used in industry for project/product design and development
6. Present, prepare and deliver seminar as a member of project team and Interpret results to present conclusions.