KARANATAKA STATE OPEN UNIVERSITY

M Tech in ELECTRICAL (Electrical Drives And Embedded Control)

SEMESTER SYSTEM

SYLLABUS

M Tech in Electrica (Electrical Drives and Embedded Control)

Subject Code	Subject Title	Max Marks	Max Credits
Semester-I			
ET1001	Applied Mathematics for Embedded Engineers	100	6
ET1002	Design of DC Drives	100	6
ET1003	Micro Controller Based System Design	100	6
ET1004	Advanced Digital Circuits Design	100	6
	Elective-I	100	6
ETP001	Embedded Systems Lab	100	3
Semester -II			
Subject Code	Subject Title	Max Marks	Max Credits
ET2001	Design of AC Drives	100	6
ET2002	Control of Electrical Drives	100	6
ET2003	Embedded System Design	100	6
	Elective-II	100	6
	Elective-III	100	6
ETP002	Electrical Drives Lab	100	3

III Semester

Subject Code	Subject Title	Max Marks	Max Credits
ET3001	Advanced Control System	100	6
ET3002	Advanced Embedded Systems	100	6
ET3003	VLSI Architecture	100	6
	Elective-IV	100	6
	Elective-V	100	6
ETP003	Project Phase-I	100	3

IV Semester

Subject Code	Subject Title	Max Marks	Max Credits
ET4001	Advanced Electrical Machines	100	6
	Elective-VI	100	6
ETP004	Project Phase-II	400	12

Total Marks = 2400
Total Credits = 123

List of Electives

Subject Code	Subject Title
ETE001	Advanced Power Semiconductor Devices
ETE002	Real Time Operating Systems
ETE003	Design of Embedded Control System
ETE004	Flexible AC Transmission System
ETE005	Transducers and Measurements
ETE006	Soft Computing
ETE007	Principles of Robotics
ETE008	Computer Networks
ETE009	VHDL
ETE010	Embedded Communication for Software Design
ETE011	Embedded Networking
ETE012	Real Time Systems
ETE013	CAD of Power Electronic Circuits
ETE014	MEMS
ETE015	Software Technology for Embedded Systems

SEMESTER : I
Subject Code : ET1001
Subject Title : Applied Mathematics for Embedded Engineers
Structure of the Course Content

BLOCK 1 Matrix Theory

Unit 1: Eigen values and Eigen Vectors
Unit 2: Canonical Forms
Unit 3: Pseudo Inverse
Unit 4: Least Square Approximations

BLOCK 2 Linear Programming

Unit 1: Graphical Solution
Unit 2: Simplex method
Unit 3: Two phase method
Unit 4: Transportation Problems

BLOCK 3 Random Variables

Unit 1: Probability Function
Unit 2: Moment Generating Function
Unit 3: Binomial and Poisson Distributions
Unit 4: Geometric and Exponential Distributions

BLOCK 4 Queuing Theories

Unit 1: Poisson Process
Unit 2: Markovian Queues
Unit 3: Single Server Model
Unit 4: Multi Server Model

BLOCK 5 Boundary Value Problems

Unit 1: Solution of Wave Equation
Unit 2: Solution of Laplace Equation
Unit 3: Solution of Poisson Equation
Unit 4: Boundary Value Problems for ODE

Books:

1. Grewal, B.S., Numerical methods in Engineering and Science, 7th edition, Khanna Publishers, New Delhi
2.Donald Gross and Carl M. Harris, Fundamentals of Queuing theory, 2nd Edition, John Wiley and Sons, New York
3.Bronson, R, Matrix Operation, Schaum's outline series, McGraw Hill
4.Taha.H.A.OperationsResearch: An Introduction, Pearson Education,
5. R. E. Walpole, R. H. Myers, S. L. Myers, and K. Ye, Probability and Statistics for Engineers & Scientists, Asia, 8th Edition
6.Sundarapandian, Probability, Statistics and Queuing Theory, PHI Learning Pvt Ltd, New Delhi
7.Bathul, Text book of Engineering Mathematics: Special Functions and Complex Variables, PHI Learning Pvt Ltd, New Delhi
8. Mathur and Jaggi, Advanced Engineering Mathematics, Khanna Publishers,
9.Bronson, Theory and Problems of Differential Equations,Tata McGraw Hill,
10.Veerarajan, Probability, Statistics and Random Process, Tata McGraw Hill,

SEMESTER : I
Subject Code : ET1002
Subject Title : Design of DC Drives
Structure of the Course Content

BLOCK 1 Selection of DC Drives

Unit 1: Fundamental Load Characteristics
Unit 2: Stability
Unit 3: Heating and Cooling Effects
Unit 4: Selection of Electric Drives for Applications

BLOCK 2 Electromagnetic Energy Conversions

Unit 1: Magnetic Energy Storage
Unit 2: Force and Torque Calculations
Unit 3: Excited Systems
Unit 4: Air Gap Calculations

BLOCK 3 DC Machine Modelling

Unit 1: Fundamental Equations
Unit 2: Characteristics of DC Motors
Unit 3: State Equations
Unit 4: Simulation Techniques

BLOCK 4 DC Motor Control using Converter

Unit 1: Single Phase Converter Control
Unit 2: Three Phase Converter Control
Unit 3: Regenerative Braking of DC Drives using Converter Circuit
Unit 4: Closed Loop Control using Converter Circuit

BLOCK 5 DC Motor Control using Chopper

Unit 1: Types of Choppers Control
Unit 2: CLC and TRC Strategies
Unit 3: Regenerative Braking of DC Drives using Chopper Circuit
Unit 4: Closed Loop Control using Chopper Circuit

Books:

1. Generalized theory of Electrical Machines, P.S.Bimra, Khanna Publishers
2.Samuel Seely, "Electromechanical Energy Conversion", Tata McGraw Hill Publishing Company
3.R.Krishnan, "Electric Motor Drives, Modelling, Analysis and Control" Prentice Hall of India
4.Paul C.Krause, OlegWasyzczuk, Scott D.Sudhoff 'Analysis of Electric Machinery and Drive Systems" IEEE Press, Second Edition
5.Buxbaum, A. Schierau, and K.Staughen, "A design of control systems for DC drives", Springer-Verlag, Berlin
6.Dubey,G.K. "Power Semiconductor controlled devices", Prentice Hall International, New Jersey
7. A.E.Fitzgerald,Charles Kingsley,Jr. and Stephen D.Umans, "Electric Machinery", Tata McGraw Hill, Fifth Edition
8. Bin Wu, "High Power Converters and AC Drives", IEEE Press, A John Wiley and Sons, Inc

SEMESTER : I
Subject Code : ET1003
Subject Title : Micro Controller Based System Design
Structure of the Course Content

BLOCK 1 8 Bit Microcontroller (8051)

Unit 1: Architecture and Memory Organization
Unit 2: Addressing Modes and Instruction Sets
Unit 3: Timer and Interrupts
Unit 4: Interfacing of I/O Devices

BLOCK 2 Programming

Unit 1: Assembly Language Programming
Unit 2: Arithmetic and Logical Instructions
Unit 3: Timer and Counter Programming
Unit 4: Interrupt Programming

BLOCK 3 16 Bit Microcontroller (PIC)

Unit 1: Architecture and Memory Organization
Unit 2: Addressing Modes and Instruction Sets
Unit 3: Timer and Interrupts
Unit 4: Interfacing of I/O Devices

BLOCK 4 Peripherals

Unit 1: Timers and Interrupts
Unit 2: Ports and Communications
Unit 3: ADC and DAC
Unit 4: Memories

BLOCK 5 Case Studies

Unit 1: LED Interfacing
Unit 2: LCD Display Interfacing
Unit 3: Keypad Interfacing
Unit 4: DC Motor Control

Books:

1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey ‘ PIC Microcontroller and Embedded Systems using Assembly and C for PIC18’, Pearson Education
2. Myke Predko, “Programming and customizing the 8051 microcontroller”, Tata McGraw Hill
3. John Iovine, ‘PIC Microcontroller Project Book ’, McGraw Hill

SEMESTER : I
Subject Code : ET1004
Subject Title : Advanced Digital Circuits Design
Structure of the Course Content

BLOCK 1 Design of Synchronous Sequential Circuit

Unit 1: Analysis of CSSN
Unit 2: State Stable Assignment
Unit 3: Design of CSSN
Unit 4: ASM Chart and ASM Realization

BLOCK 2 Design of Asynchronous Sequential Circuit

Unit 1: Analysis of ASC
Unit 2: Flow Table Reduction
Unit 3: Design of ASC
Unit 4: Hazards

BLOCK 3 Testing Algorithms

Unit 1: Fault Table Method
Unit 2: Path Sensitization Method
Unit 3: Boolean Difference Method
Unit 4: Kohavi Algorithm

BLOCK 4 Programmable Devices Design

Unit 1: Programming Techniques
Unit 2: Function Blocks
Unit 3: I/O Blocks, Interconnects
Unit 4: PAL

BLOCK 5 Programmable Logic Devices

Unit 1: Fold back Architecture with GAL, EPLD
Unit 2: Fold back Architecture with PML, PROM
Unit 3: Realization State Machine using PLD, FPGA
Unit 4: Realization State Machine using Xilinx FPGA, Xilinx 2000

Books:

1. Charles H. Roth Jr., "Fundamentals of Logic design", Thomson Learning
2. Donald G. Givone, "Digital principles and Design", Tata McGraw Hill
3.Stephen Brown and Zvonk Vranesic, "Fundamentals of Digital Logic with VHDL Design", Tata McGraw Hill,
4.Mark Zwolinski, "Digital System Design with VHDL", Pearson Education
5.Parag K Lala, "Digital System design using PLD", BS Publications
6.John M Yarbrough, "Digital Logic applications and Design", Thomson Learning
7.Nripendra N Biswas, "Logic Design Theory", Prentice Hall of India

SEMESTER : I
Subject Code : ETP001
Subject Title : Embedded Systems Lab
Structure of the Course Content

List of Experiments

1. Design with 8 bit Microcontroller (8051) using I/O Programming
2. Design with 8 bit Microcontroller (8051) using Timer Programming
3. Design with 8 bit Microcontroller (8051) using Interrupt Programming
4. Design with 8 bit Microcontroller (8051) using Serial Port Programming
5. Design with 8 bit Microcontroller (8051) using PWM Generation Programming
6. Design with 8 bit Microcontroller (8051) using DC Motor Control Programming
7. Design with 8 bit Microcontroller (8051) using ADC/DAC Programming
8. Design with 8 bit Microcontroller (8051) using LCD Interfacing Programming
9. Design with 8 bit Microcontroller (8051) using RTC Interfacing Programming
10. Design with 8 bit Microcontroller (8051) using Sensor Interfacing Programming
11. Design with 16 bit Microcontroller (PIC) using I/O Programming
12. Design with 16 bit Microcontroller (PIC) using Timer Programming
13. Design with 16 bit Microcontroller (PIC) using Interrupt Programming
14. Design with 16 bit Microcontroller (PIC) using Serial Port Programming
15. Design with16 bit Microcontroller (PIC) using PWM Generation Programming
16. Design with16 bit Microcontroller (PIC) using DC Motor Control Programming
17. Design with 16 bit Microcontroller (PIC) using ADC/DAC Programming
18. Design with 16 bit Microcontroller (PIC) using LCD Interfacing Programming
19. Design with 16 bit Microcontroller (PIC) using RTC Interfacing Programming
20. Design with 16 bit Microcontroller (PIC) using Sensor Interfacing Programming
21. Design with PLD using Xilinx
22. Design and Implementation of Simple Combinational Circuit

SEMESTER : II
Subject Code : ET2001
Subject Title : Design of AC Drives
Structure of the Course Content

BLOCK 1 Transformation Theory

Unit 1: Basics of Transformation
Unit 2: Phase Transformation and Commutator Transformation
Unit 3: Static and Rotating Reference Frame Theory
Unit 4: Voltage and Torque Equations using Transformation Theory

BLOCK 2 Induction Machine Modelling

Unit 1: Equivalent Circuit
Unit 2: Speed-Torque Characteristics
Unit 3: Voltage and Torque Equations
Unit 4: Simulation Techniques

BLOCK 3 Synchronous Machine Modelling

Unit 1: Equivalent Circuit
Unit 2: Speed-Torque Characteristics
Unit 3: Voltage and Torque Equations
Unit 4: Simulation Techniques

BLOCK 4 Design of Induction Motor Drive

Unit 1: Variable Voltage and Frequency Operation
Unit 2: Torque-Slip Characteristics
Unit 3: VSI Fed Drives
Unit 4: Design of Closed Loop Control

BLOCK 5 Design of Synchronous Motor Drive

Unit 1: Power Factor Control
Unit 2: Torque Control
Unit 3: VSI Fed Drives
Unit 4: Design of Closed Loop Control

Books:

1. Generalized theory of Electrical Machines, P.S.Bimra, Khanna Publishers
2. Ned Mohan, Advanced Electric Drives, Analysis, Control and Modelling using Simulink
3. Samuel Seely, "Electromechanical Energy Conversion", Tata McGraw Hill
4. Paul C.Krause, OlegWasyzczuk, Scott D.Sudhoff 'Analysis of Electric Machinery and Drive Systems" IEEE Press, Second Edition
5. R..Krishnan, " Electric Motor Drives, Modeling, Analysis and Control" PHI
6. Bose.B.K., Power Electronics and Motor Drives - Advances and Trends, IEEE Press
7. Murphy J.M.D.,Turnbull F.G., "Thyristor control of AC Motors", Peragamon Press,Oxford
8. A.E.Fitzgerald,Charles Kingsley, Jr. and Stephen D.Umans, "Electric Machinery", Tata McGraw Hill,5th Edition
9.Dubey,G.K."Power Semiconductor controlled devices", Prentice Hall International,
10. . Bin Wu, "High Power Converters and AC Drives", IEEE Press, A John Wiley and Sons, Inc

SEMESTER : II
Subject Code : ET2002
Subject Title : Control of Electrical Drives
Structure of the Course Content

BLOCK 1 Converter Based DC Drives

Unit 1: Single Phase Converter DC Drive
Unit 2: Three Phase Converter DC Drive
Unit 3: Dual Converter DC Drive
Unit 4: Single Phase and Three Phases Fully Controlled Converter DC Drive

BLOCK 2 Chopper Based DC Drives

Unit 1: Microcontroller hardware Circuits
Unit 2: Flow Charts and Wave Forms
Unit 3: Various Modes of Operation of Chopper Fed DC Drive
Unit 4: Simulation Technique

BLOCK 3 Inverter Based AC Drive

Unit 1: VSI Fed Induction Motor Drive
Unit 2: Power Circuit Design
Unit 3: Firing Circuit Design
Unit 4: PWM Control of AC Drives

BLOCK 4 Frequency Controlled Drive

Unit 1: V/F Control
Unit 2: Steady State Behaviour
Unit 3: Dynamic State Behaviour
Unit 4: Simulation Techniques

BLOCK 5 Micro Computer Based Drives

Unit 1: Voltage, Speed, Torque Measurements
Unit 2: Position and Velocity Measurements
Unit 3: Types of Controllers
Unit 4: Closed Loop Control

Books:

1. Dubey G.K., Power semiconductor controlled drives, Prentice-HALL
2.R.Krishnan, "Electric Motor Drives, Modelling, Analysis and Control" Prentice Hall of India
3.Bose.B.K., Power Electronics and Motor Drives - Advances and Trends, IEEE Press
4. Buxbaum, A. Schierau, and K.Staughen, "A design of control systems for DC drives", Springer- Verlag, Berlin
5. Thyristor control of Electric drives, Vedam Subrahmanyam, Tata McGraw Hill
6. R.Krishnan, "Electric Motor Drives, Modeling, Analysis and Control" Prentice Hall of India
7. Bin Wu, "High Power Converters and AC Drives", IEEE Press, A John Wiley and Sons, Inc
8. Control of Electric Drives, Leonard W, Springer Verlag, NY
9. Bose B.K., Microcomputer control of power electronics and drives, IEEE Press
10. Bose B.K., Adjustable Speed A.C. drives, IEEE Press

SEMESTER : II
Subject Code : ET2003
Subject Title : Embedded System Design
Structure of the Course Content

BLOCK 1 Embedded Design Life Cycle

Unit 1: Hardware / Software Partitioning
Unit 2: Hardware and Software Design
Unit 3: Selection Processes
Unit 4: Performance Tools

BLOCK 2 Partitioning Decisions

Unit 1: Hardware / Software Duality
Unit 2: ASIC Revolution
Unit 3: Memory Organization
Unit 4: Memory Mapped Access

BLOCK 3 Interrupt Service Routines

Unit 1: Watch Dog Timers
Unit 2: Host Based Debugging
Unit 3: ROM Emulators
Unit 4: Computer Optimisation

BLOCK 4 In Circuit Emulators

Unit 1: Bullet Proof Run Control
Unit 2: Hardware Break Points
Unit 3: Overlay Memory
Unit 4: Usage Issues

BLOCK 5 Testing

Unit 1: Unit Testing
Unit 2: Regression Testing
Unit 3: Functional Tests
Unit 4: Testing Embedded Software

Books:

1. Arnold S. Berger – "Embedded System Design", CMP books, USA
2. Sriram Iyer, "Embedded Real Time System Programming"
3. Arkin, R.C., Behaviour-Based Robotics, The MIT Press,

SEMESTER : II
Subject Code : ETP002
Subject Title : Electrical Drives Lab
Structure of the Course Content

List of Experiments

1. Micro Controller Based Speed Control of Converter Fed DC motor.
2. Micro Controller Based Speed Control of Chopper Fed DC motor
3. Micro Controller Based Speed Control of VSI Fed Three-Phase Induction Motor.
4. Micro Controller Based Speed Control of Stepper Motor.
5. DSP Based Speed Control of BLDC Motor.
6. DSP Based Speed Control of SRM Motor.
7. Self Control Operation of Synchronous Motors.
8. Condition Monitoring of Three-Phase Induction Motor under Fault Conditions.
9. Re-Programmable Logic Devices and Programming
10. VHDL Programming
11. Verilog HDL Programming
12. Realisation of Control Logic for Electric Motors using FPGA.
13. Simulation of Four Quadrant Operation of Three-Phase Induction Motor.
14. Simulation of Automatic Voltage Regulation of Three-Phase Synchronous Generator

SEMESTER : III
Subject Code : ET3001
Subject Title : Advanced Control System
Structure of the Course Content

BLOCK 1 State variable Representation

Unit 1: State Equation for Dynamic Systems
Unit 2: Time Invariance and linearity
Unit 3: State Diagrams
Unit 4: Physical System and State Assignment

BLOCK 2 Solution of State Equation

Unit 1: Existence and Uniqueness of Solutions to Continuous
Unit 2: Time State Equations
Unit 3: Solution of Nonlinear and Linear Time Varying State Equations
Unit 4: System Modes

BLOCK3 Controllability

Unit 1: Controllability and Observability
Unit 2: Stabilizability and Delectability
Unit 3: Time Varying and Time Invariant Case
Unit 4: System Realizations

BLOCK 4 Stability

Unit 1: Stability in the Sense of Lyapunovy
Unit 2: BIBO Stability
Unit 3: Stability of LTI Systems
Unit 4: Time Autonomous Systems

BLOCK 5 Modal Controls

Unit 1: Controllable and Observable Companion Forms
Unit 2: SISO and MIMO Systems
Unit 3: The Effect of State Feedback on Controllability
Unit 4: Full Order and Reduced Order Observers

Books:

1. M. Gopal, “Modern Control System Theory”, New Age International
2. K. Ogatta, “Modern Control Engineering”, PHI
3.D. Roy Choudhury, “Modern Control Systems”, New Age International
4.John S. Bay, “Fundamentals of Linear State Space Systems”, McGraw-Hill
5.John J. D’Azzo, C. H. Houpis and S. N. Sheldon, “Linear Control System Analysis and Design with MATLAB”, Taylor Francis
6.Z. Bubnicki, ”Modern Control Theory”, Springer

SEMESTER : III
Subject Code : ET3002
Subject Title : Advanced Embedded Systems
Structure of the Course Content

BLOCK 1 Embedded Hardware and Software

Unit 1: Memory
Unit 2: Direct Memory Access
Unit 3: Interrupt Latency
Unit 4: Shared Data Problems

BLOCK 2 Hardware and Software Partitioning

Unit 1: Hardware/Software Co-Design
Unit 2: Single-Processor Architectures &, Multi-Processor Architectures
Unit 3: Models of Computation
Unit 4: Embedded System Specification

BLOCK 3 Hardware and Software Co-Synthesis

Unit 1: The Co-Synthesis Problem
Unit 2: State-Transition Graph
Unit 3: Refinement and Controller Generation
Unit 4: Distributed System Co-Synthesis

BLOCK 4 Memory Interfacing

Unit 1: Memory Writes ability and Storage Performance
Unit 2: Advance RAM Interfacing Communication Basic
Unit 3: Arbitration Multilevel Bus Architecture
Unit 4: Serial Protocol and Parallel Protocols

BLOCK 5 Concurrent Process Models

Unit 1: Finite State Machines
Unit 2: HCFSL and State Charts
Unit 3: State Machine Models
Unit 4: Hardware Software Co-Simulation

Books:

1. Frank Vahid and Tony Gwargie, “Embedded System Design”, John Wiley & sons
2. Raj Kamal, “Embedded Systems- Architecture, Programming and Design”
3. David. E. Simon, “An Embedded Software Primer”, Pearson Education
4. Tammy Noergaard, ”Embedded System Architecture, A comprehensive Guide for Engineers and Programmers”, Elsevier
5. Steve Heath, “Embedded System Design”, Elsevier, Second Edition
6. Ralf Niemann, “Hardware/Software Co-Design for Data Flow Dominated Embedded Systems”, Kluwer Academic Pub
7. Jorgen Staunstrup, Wayne Wolf, “Harware/Software Co-Design:Principles and Practice”, Kluwer Academic Pub
8. Giovanni De Micheli, Rolf Ernst Morgon, “Reading in Hardware/Software Co-Design” Kaufmann Publishers

SEMESTER : III
Subject Code : ET3003
Subject Title : VLSI Architecture
Structure of the Course Content

BLOCK 1 CMOS Design

Unit 1: Overview of Digital VLSI Design Methodologies
Unit 2: Logic Design with CMOS
Unit 3: Dynamic CMOS Circuits and Bi-CMOS Circuits
Unit 4: Layout Diagram and Stick Diagram

BLOCK 2 Programmable Logic Devices

Unit 1: Programming Techniques
Unit 2: SRAM and EPROM and EEPROM Technology
Unit 3: Function Blocks, I/O Blocks, Interconnects
Unit 4: Xilinx and Altera MAX 7000

BLOCK 3 ASIC

Unit 1: System Partition
Unit 2: FPGA Partitioning
Unit 3: Partitioning Methods
Unit 4: Physical Design Flow

BLOCK 4 Analog VLSI Design

Unit 1: Introduction to Analog VLSI
Unit 2: Design of CMOS 2stage and 3 stage Op-Amp
Unit 3: Super MOS-Analog Primitive Cells
Unit 4: Realization of Neural Networks

BLOCK 5 Logic Syntheses and Simulation

Unit 1: Overview of Digital Design with Verilog HDL
Unit 2: Gate Level Modelling
Unit 3: Data Flow Modelling
Unit 4: Design Examples of Ripple carry Adders, Multiplier and ALU

Books:

1.M.J.S Smith, “Application Specific integrated circuits”, Addition Wesley Longman Inc
2.Wayne Wolf, “ Modern VLSI design “ Prentice Hall India
3.Samir Palnitkar, “Veri Log HDL, A Design guide to Digital and Synthesis” 2nd Ed, Pearson
4. Kamran Eshraghian,Douglas A.pucknell and Sholeh Eshraghian,”Essentials of VLSI circuits and system”, Prentice Hall India
5.Mohamed Ismail ,Terri Fiez, “Analog VLSI Signal and information Processing”, McGraw Hill International Editions

SEMESTER : III
Subject Code : ETP003
Subject Title : Project Phase-I
Structure of the Course Content

SEMESTER : IV
Subject Code : ET4001
Subject Title : Advanced Electrical Machines
Structure of the Course Content

BLOCK 1 Stepper Motor

Unit 1: Constructional Features and Principle of Operation
Unit 2: Modes of Excitation
Unit 3: Dynamic Characteristics
Unit 4: Closed Loop Control of Stepping Motor

BLOCK 2 Switched Reluctance Motor

Unit 1: Constructional Features and Principle of Operation
Unit 2: Torque Equation of Switched Reluctance Motor
Unit 3: Characteristics of Switched Reluctance Motor
Unit 4: Control of Switched Reluctance Motor

BLOCK 3 Synchronous Reluctance Motors

Unit 1: Constructional Features and Principle of Operation
Unit 2: Axial and Radial Air Gap Motors
Unit 3: Reluctance Torque and Phasor Diagram
Unit 4: Characteristics of Synchronous Reluctance Motor

BLOCK 4 Permanent Magnet Synchronous Motor

Unit 1: Constructional Features and Principle of Operation
Unit 2: Speed Torque Characteristics
Unit 3: Phasor Diagram
Unit 4: Control of Permanent Magnet Synchronous Motor

BLOCK 5 Permanent Magnet Brushless DC Motor

Unit 1: Commutation in DC motors
Unit 2: Multiphase Brushless Motor
Unit 3: Square Wave Permanent Magnet Brushless Motor Drives
Unit 4: Torque Speed Characteristics

Books:

1. Miller, T.J.E. “Brushless permanent magnet and reluctance motor drives”, Clarendon Press, Oxford
2. Kenjo, T, “Stepping motors and their microprocessor control”, Clarendon Press, Oxford
3. R.Krishnan, “Switched Reluctance Motors Drives: Modelling, Simulation, Analysis Design and Applications”, CRC Press, New York,

SEMESTER : IV
Subject Code : ETP004
Subject Title : Project Phase-II
Structure of the Course Content

ELECTIVE
Subject Code : ETE001
Subject Title : Advanced Power Semiconductor Devices
Structure of the Course Content

BLOCK 1 Power Switching Devices

Unit 1: Basics of Power Switching Devices
Unit 2: Device Selection Strategy
Unit 3: On-State and Switching Losses
Unit 4: Power Diodes

BLOCK 2 BJT and SCR

Unit 1: BJT Construction and Characteristics
Unit 2: Two Transistor Analogy
Unit 3: Converter Grade and Inverter Grade and Other Types
Unit 4: Steady State and Dynamic Models of BJT & Thyristor

BLOCK 3 MOSFET and IGBT

Unit 1: MOSFET construction and Characteristics
Unit 2: Steady State and Dynamic Models of MOSFET
Unit 3: MOSFET construction and Characteristics
Unit 4: Steady State and Dynamic Models of MOSFET

BLOCK 4 Firing Circuits

Unit 1: Necessity of Isolation
Unit 2: Gate Drives Circuit
Unit 3: Pulse Transformer
Unit 4: SCR, MOSFET, IGBTs and Base Driving for Power BJT

BLOCK 5 Protecting Circuits

Unit 1: Over Voltage, Over Current and Gate Protections
Unit 2: Conduction, Convection and Radiation
Unit 3: Heat Sink Types and Design
Unit 4: Design of Snubbers

Books:

1. MD Singh and K.B Khanchandani, “Power Electronics”, Tata McGraw Hill
2.Mohan, Undcland and Robins, “Power Electronics – Concepts, applications and Design, John Wiley and Sons, Singapore
3.B.W Williams ‘Power Electronics Circuit Devices and Applications’
4.Rashid M.H., " Power Electronics Circuits, Devices and Applications ", Prentice Hall India, Third Edition, New Delhi

ELECTIVE
Subject Code : ETE002
Subject Title : Real Time Operating Systems
Structure of the Course Content

BLOCK 1 Basic of Operating Systems

Unit 1: Operating System Structure
Unit 2: System Calls
Unit 3: Process
Unit 4: Scheduling

BLOCK 2 Basics of RTOS

Unit 1: Task and Task States
Unit 2: Process Synchronisation
Unit 3: Critical Section and Semaphores
Unit 4: Deadlocks

BLOCK 3 Real Time Models

Unit 1: Event, Process, Graph Based Models
Unit 2: Real Time Languages
Unit 3: RT scheduling
Unit 4: Control Blocks

BLOCK 4 Real Time Kernels

Unit 1: Principles and Design Issues
Unit 2: Polled Loop Systems
Unit 3: RTOS Porting a Target
Unit 4: Study of Various RTOS

BLOCK 5 RTOS Applications

Unit 1: RTOS for Image Processing
Unit 2: RTOS for Voice over IP
Unit 3: RTOS for Control Systems
Unit 4: RTOS for Fault Tolerant Applications

Books:

1. Charles Crowley, "Operating Systems-A Design Oriented approach" McGraw Hill
2.Raj Kamal, "Embedded Systems- Architecture, Programming and Design" Tata McGraw Hill
3..C.M. Krishna, Kang, G.Shin, "Real Time Systems", McGraw Hill,
4.Herma K., "Real Time Systems – Design for distributed Embedded Applications", Kluwer Academic
5. Raymond J.A.Bhur, Donald L.Bailey, "An Introduction to Real Time Systems", PHI
6.Mukesh Sighal and N G Shi "Advanced Concepts in Operating System", McGraw Hill

ELECTIVE

Subject Code : ETE003

Subject Title : Design of Embedded Control System

Structure of the Course Content

BLOCK 1 Embedded System Concepts

Unit 1: Embedded Computing
Unit 2: Embedded System Design Challenges
Unit 3: Real Time Embedded System
Unit 4: Bus Communications

BLOCK 2 RTOS

Unit 1: Basics of RTOS
Unit 2: Process
Unit 3: Interrupts
Unit 4: Threads

BLOCK3 Protocols

Unit 1: Design Flow
Unit 2: Hardware and Software design
Unit 3: System Integration
Unit 4: Interfacing Protocol

BLOCK 4 Software Design for Embedded Control

Unit 1: Mealy-Moore FSM Controller
Unit 2: Device Driver
Unit 3: Interfacing and Porting
Unit 4: Debugging

BLOCK 5 Embedded Controllers – Case Studies

Unit 1: ADC and DAC Interface
Unit 2: Digital Voltmeter
Unit 3: ROBOT System
Unit 4: PWM Motor Speed Control

Books:

1. Raj Kamal, "Embedded Systems- Architecture, Programming and Design" Tata McGraw Hill

2.Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey, "PIC Microcontroller and Embedded Systems- Using Assembly and C for PIC18", Pearson Education

3.Jack R Smith "Programming the PIC microcontroller with MBasic" Elsevier

4.Steven F. Barrett, Daniel J. Pack, "Embedded Systems – Design and Applications with the 68HC 12 and HCS12", Pearson Education

5.Micheal Khevi, "The M68HC11 Microcontroller application in control,Instrumentation & Communication", PH NewJersy

6.Steven F.Barrett,Daniel J.Pack,"Embedded Systems-Design & Application with the 68HC12 & HCS12", Pearson Education

7.Daniel W. Lewis, "Fundamentals of Embedded Software", PHI

8.Keneth J.Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC", Thomson India edition

ELECTIVE
Subject Code : ETE004
Subject Title : Flexible AC Transmission System
Structure of the Course Content

BLOCK 1 Transmission lines

Unit 1: Reactive Power Control
Unit 2: Uncompensated Transmission Line
Unit 3: Basic Concepts of Static Var Compensator
Unit 4: Thyristor Switched Series Capacitor

BLOCK 2 Static Var Compensator

Unit 1: Voltage Control by SVC
Unit 2: Design of SVC Voltage Regulator
Unit 3: Modelling of SVC for Power Flow and Transient Stability
Unit 4: Prevention of Voltage Instability

BLOCK 3 Thyristor Controlled Series Capacitor

Unit 1: Operation of the TCSC
Unit 2: Different Modes of Operation
Unit 3: Modelling of TCSC – Variable Reactance Model
Unit 4: Modelling for Power Flow and Stability Studies

BLOCK 4 FACT Controllers

Unit 1: Static Synchronous Compensator
Unit 2: Steady State Power Transfer
Unit 3: Operation of SSSC and the Control of Power Flow
Unit 4: Modelling of SSSC in Load Flow and Transient Stability Studies

BLOCK 5 Co-ordinations of FACTS Controllers

Unit 1: Controller Interactions
Unit 2: SVC Interaction
Unit 3: Co-Ordination of Multiple Controllers
Unit 4: Control Coordination using Genetic Algorithms

Books:

1.K.R.Padiyar," FACTS Controllers in Power Transmission and Distribution", New Age International(P) Limited, Publishers, New Delhi

2.Narain G. Hingorani, "Understanding FACTS -Concepts and Technology of Flexible AC Transmission Systems", Standard Publishers Distributors, Delhi

3. A.T.John, "Flexible A.C. Transmission Systems", Institution of Electrical and Electronic Engineers (IEEE)

4. R.Mohan Mathur, Rajiv K.Varma, "Thyristor – Based Facts Controllers for Electrical Transmission Systems", IEEE press and John Wiley & Sons, Inc

5. V.K.Sood,HVDC and FACTS controllers – Applications of Static Converters in Power System, APRIL 2004 , Kluwer Academic Publishers

ELECTIVE
Subject Code : ETE005
Subject Title : Transducers and Measurements
Structure of the Course Content

BLOCK 1 R, L, and C Elements

Unit 1: Strain gauge and Electrode Elements
Unit 2: Inductive and Capacitive Elements
Unit 3: Equivalent Circuits and Characteristics
Unit 4: Proximity Elements

BLOCK 2 Transformer and Resonant Elements

Unit 1: Transformer Elements
Unit 2: Electrodynamics Elements
Unit 3: Vibrating Strings and Vibrating Beams
Unit 4: Piezoelectric Resonators and Acoustical Resonators

BLOCK 3 Mechanical and Acoustical Elements

Unit 1: Stresses State of Diaphragm
Unit 2: Inertial Mass Elements
Unit 3: Acoustical elements
Unit 4: Ultrasonic Elements

BLOCK 4 Optical Sensors

Unit 1: Photo Detectors and Thermal Detectors
Unit 2: Photo Diodes and Avalanche Photo Diodes
Unit 3: Fiber Optic Sensors
Unit 4: Fiber Optic Gyroscopes and other Fiber Sensors

BLOCK 5 Magnetic and Electronic Sensors

Unit 1: Hall Effect Sensors
Unit 2: Solid State Chemical Sensors
Unit 3: Silicon Based Sensors
Unit 4: Magneto resistors and other Sensors

Books:

1.Pavel Ripka and Alois Tipek,"Modern sensors hand book", Instrumentation and measurement series, ISTE Ltd
2.David Fraden. , PHI, 2004 " Hand book of Modern Sensors, Physics,Design and Applications", Third Edition, Springer India Pvt.Ltd
3. Alexander D Khazan, "Transducers and their elements – Design and application", PTR Prentice Hall

ELECTIVE
Subject Code : ETE006
Subject Title : Soft Computing
Structure of the Course Content

BLOCK 1 Introduction to Soft Computing

Unit 1: Approaches to Intelligent Control
Unit 2: Architecture for Intelligent Control
Unit 3: Symbolic Reasoning System and Rule Based Systems
Unit 4: Expert Systems

BLOCK 2 Neural Networks

Unit 1: Concept of Artificial Neural Networks
Unit 2: Learning and Training the Neural Network
Unit 3: Hopfield Network and Self-Organizing Network
Unit 4: Neural Network Based Controller

BLOCK 3 Fuzzy Logic Systems

Unit 1: Introduction to Crisp Sets and Fuzzy Sets
Unit 2: Fuzzy Set Operation and Approximate Reasoning
Unit 3: Fuzzy Knowledge and Rule Bases
Unit 4: Fuzzy Modelling and Control Schemes

BLOCK 4 Genetic Algorithms

Unit 1: Basic Concept of Genetic Algorithm
Unit 2: Solution of Typical Control Problems
Unit 3: Concept on Search Techniques
Unit 4: Techniques for Solving Optimization Problems.

BLOCK 5 Case Studies

Unit 1: GA Application to Power System Optimisation Problem
Unit 2: Identification and Control of Linear Dynamic Systems using Mat Lab
Unit 3: Stability Analysis of Neural-Network Interconnection Systems
Unit 4: Stability Analysis of Fuzzy Control Systems

Books:

1.KOSKO,B. "Neural Networks And Fuzzy Systems", Prentice-Hall of India Pvt. Ltd
2. Jacek.M.Zurada, "Introduction to Artificial Neural Systems", Jaico Publishing House
3.Driankov, Hellendroon, "Introduction to Fuzzy Control", Narosa Publishers
4.KLIR G.J. & FOLGER T.A. "Fuzzy sets, uncertainty and Information", Prentice-Hall of India Pvt. Ltd
5.Zimmerman H.J. "Fuzzy set theory-and its Applications"-Kluwer Academic Publishers

ELECTIVE
Subject Code : ETE007
Subject Title : Principles of Robotics
Structure of the Course Content

BLOCK 1 Fundamentals of Robotics

Unit 1: History of Robotics
Unit 2: Classification of Robotics
Unit 3: Robots Components
Unit 4: Sensors and Actuators

BLOCK 2 Kinematics

Unit 1: Basic Mechanisms
Unit 2: Matrix Representation
Unit 3: Inverse Kinematics
Unit 4: Solution and Programming

BLOCK 3 Differential Motion and Velocities

Unit 1: Differential Motion of Frames
Unit 2: Interpretation and Calculation of Jacobian
Unit 3: Design and Lagrangian Mechanics
Unit 4: Dynamic Equations

BLOCK 4 Control Systems in Robots

Unit 1: Hydraulic Control
Unit 2: Pneumatic Control
Unit 3: Sensor and Electric Actuator
Unit 4: PID Control

BLOCK 5 Vision Systems in Robotics

Unit 1: Two and Three Dimensional Images
Unit 2: Spatial and Frequency Domain Representation
Unit 3: Processing Techniques
Unit 4: Image Analysis and Object Recognition

Books:

1. R.D. Klafter, TA Chmielewski and Michael Negin, "Robotic Engineering, An Integrated approach", Prentice Hall of India
2.Saeed B. Niku ,"Introduction to Robotics ", Pearson Education
3. Fu, Gonzalez and Lee Mcgrahill,"Robotics ", international

ELECTIVE
Subject Code : ETE008
Subject Title : Computer Networks
Structure of the Course Content

BLOCK 1 Network Fundamentals

Unit 1: Data Communication Networking
Unit 2: Overview of OSI
Unit 3: IP Addressing
Unit 4: Routing

BLOCK 2 Data Communications

Unit 1: Data Encoding
Unit 2: Flow and Error Control
Unit 3: Routers, Switches and Bridges
Unit 4: Congestion Control

BLOCK 3 Wireless LAN

Unit 1: Fundamentals of WLANs
Unit 2: IEEE 802.11 Standards
Unit 3: WLL
Unit 4: IEEE 802.16 Standards

BLOCK 4 Routing Protocols

Unit 1: MAC Protocols
Unit 2: Hybrid Routing Protocols
Unit 3: Multicast Routing Protocols
Unit 4: Tree-based and Mesh-based Protocols

BLOCK 5 Transport Layer

Unit 1: Transport layer Protocol
Unit 2: TCP over Adhoc wireless Networks
Unit 3: Network security attacks
Unit 4: Security routing

Books:

1. Mohammad Ilyas, The Handbook of AdHoc Wireless Networks, CRC press
2.Douglas E.Comer, "Internetworking with TCP/IP, Vol. 1", Third Edition, Prentice Hall
3. Behrouza A Forouzan,"Data Communications and Networking" Fourth edition, TMH
4.Wayne Tomasi, "Introduction to Data communications and Networking" Pearson Education
5.Al Williams, "Embedded Internet Design", Second Edition, TMH
6.Cory L. Clark, "LabVIEW Digital Signal Processing and Digital Communication", TMH edition
7.Krishna Kant,"Computer based Industrial control",PHI
8.Gary Johnson, "LabVIEW Graphical Programming", Second edition, McGraw Hill, Newyork
9.Kevin James, "PC Interfacing and Data Acquisition: Techniques for measurement, Instrumentation and control, Newnes

ELECTIVE
Subject Code : ETE009
Subject Title : VHDL
Structure of the Course Content

BLOCK 1 VHDL Basics

Unit 1: Basic Concepts of VHDL
Unit 2: Modelling Digital System
Unit 3: VHDL Modelling
Unit 4: Scalar Data Types and Operations

BLOCK 2 Data Types and Basic Modelling

Unit 1: Arrays and Operations
Unit 2: Access Types
Unit 3: Basic Modelling
Unit 4: Architecture Bodies

BLOCK 3 Subprograms, Packaging and Files

Unit 1: Procedure Parameters
Unit 2: Functions and Overloading
Unit 3: Package Declarations
Unit 4: I/O-Files

BLOCK 4 Signals and Components

Unit 1: Basic Resolved Signals
Unit 2: Resolved Signal Parameters
Unit 3: Parametersing Structure
Unit 4: Configuration of Generate Statements

BLOCK 5 Designs with PLD

Unit 1: Realization of Micro controller CPU
Unit 2: Realization of Micro controller Memories
Unit 3: Realization of Micro controller I/O Devices
Unit 4: Design Synthesis Simulation and Testing

Books:

1. Douglas Perry, "VHDL Programming by Example", Tata McGraw Hill,4th Edition
2.Peter J.Ashenden, "The Designer's guide to VHDL", Morgan Kaufmann publishers,San Francisco, Second Edition
3.Charles H Roth, Jr. "Digital system Design using VHDL", Thomson
4.Zainalabedin navabi, "VHDL Analysis ans modeling of Digital Systems", McGraw Hill international Editions, Second Editions
5.Navabi.Z., "VHDL Analysis and Modeling of Digital Systems", McGraw International
6.Peter J Ashendem, "The Designers Guide to VHDL", Harcourt India Pvt Ltd
7.Skahill. K, "VHDL for Programmable Logic", Pearson education

ELECTIVE
Subject Code : ETE010
Subject Title : Embedded Communication for Software Design
Structure of the Course Content

BLOCK 1 OSI Reference Model

Unit 1: Communication Devices
Unit 2: Design Consideration
Unit 3: Host Based Communication
Unit 4: Embedded Communication System

BLOCK 2 Software Partitioning

Unit 1: Limitation of Strict Layering
Unit 2: Tasks, Modules and Task Decomposition
Unit 3: Layer2 Switch and Layer3 Switch or Routers
Unit 4: Debugging Protocols

BLOCK 3 Tables and Other Data Structures

Unit 1: Partitioning of Structures and Tables
Unit 2: Table Resizing and Table Access Routines
Unit 3: Buffer and Timer Management
Unit 4: Third Party Protocol Libraries

BLOCK 4 Management Software

Unit 1: Device Management and Management Schemes
Unit 2: Router Management
Unit 3: Management of Sub System Architecture
Unit 4: System Start up and Configuration

BLOCK 5 MultiBoard Communications

Unit 1: Multi Board Architecture
Unit 2: Single Control Card and Multiple Line Card Architecture
Unit 3: Interface for Multi Board software
Unit 4: Failures and Fault Tolerance in Multi Board Systems

Books:

1. Sridhar .T, "Designing Embedded Communication Software" CMP Books
2. Comer.D, "Computer networks and Internet", Third Edition, Prentice Hall

ELECTIVE
Subject Code : ETE011
Subject Title : Embedded Networking
Structure of the Course Content

BLOCK 1 Communication Protocols

Unit 1: Serial, Parallel Communication and Protocols
Unit 2: RS232 Standard and RS485 Standard
Unit 3: Serial Peripheral Interface (SPI) and Inter Integrated Circuits (I2C)
Unit 4: PC Parallel port programming

BLOCK 2 USB and CAN Bus

Unit 1: USB Bus Introduction and Speed Identification
Unit 2: USB Bus Communication and Packets
Unit 3: CAN Bus Introduction, Frames, Bit stuffing and Types of Errors
Unit 4: Simple Application with CAN

BLOCK 3 Ethernet Fundamentals

Unit 1: Elements of a Network and Inside Ethernet
Unit 2: Cables, Connections and Network Speed
Unit 3: Design Choices, Selecting Components
Unit 4: Ethernet Controllers

BLOCK 4 Embedded Ethernet

Unit 1: Exchanging Messages using UDP and TCP
Unit 2: Serving web Pages with Dynamic Data
Unit 3: Serving web Pages that respond to user Input
Unit 4: Email for Embedded Systems

BLOCK 5 Wireless Embedded Networking

Unit 1: Introduction Wireless sensor networks
Unit 2: Wireless sensor networks Applications
Unit 3: Network Topology and Localization
Unit 4: Energy efficient MAC protocols

Books:

1.Frank Vahid, Givargis 'Embedded Systems Design: A Unified Hardware/Software Introduction', Wiley Publications

2.Jan Axelson 'Embedded Ethernet and Internet Complete', Penram publications

3.Bhaskar Krishnamachari, 'Networking wireless sensors', Cambridge press

4.Jan Axelson, 'Parallel Port Complete' , Penram publications

5.Dogan Ibrahim, 'Advanced PIC microcontroller projects in C', Elsevier

ELECTIVE
Subject Code : ETE012
Subject Title : Real Time Systems
Structure of the Course Content

BLOCK 1 Introduction to Real Time Systems

Unit 1: Issues in Real Time Computing
Unit 2: Structure of a Real Time System
Unit 3: Performance Measures for Real Time Systems
Unit 4: Task Assignment and Scheduling

BLOCK 2 Programming Languages and Tools

Unit 1: Desired language characteristics
Unit 2: Data typing and Control structures
Unit 3: Facilitating Hierarchical Decomposition and Packages
Unit 4: Low level programming and Task Scheduling

BLOCK 3 Real Time Databases

Unit 1: Real time Vs General Purpose Databases
Unit 2: Main Memory Databases
Unit 3: Concurrency Control Issues
Unit 4: Disk Scheduling Algorithms

BLOCK 4 Communications

Unit 1: Real Time Communication media, Network Topologies Protocols
Unit 2: Fault Tolerance Techniques
Unit 3: Fault Types and Fault Detection
Unit 4: Fault Error Containment Redundancy

BLOCK 5 Evaluation Techniques

Unit 1: Reliability Evaluation Techniques
Unit 2: Reliability Models for Hardware Redundancy
Unit 3: Software Error Models
Unit 4: Fault Tolerant Synchronization in Software

Books:

1.C.M. Krishna, Kang G. Shin, "Real – Time Systems", McGraw – Hill International Editions

2. Stuart Bennett, "Real Time Computer Control – An Introduction", Prentice Hall of India

3. Rajib Mall, "Real-time systems: theory and practice", Pearson Education

4. Peter D.Lawrence, "Real Time Micro Computer System Design – An Introduction", McGraw Hill

5. S.T. Allworth and R.N.Zobel, "Introduction to real time software design", Macmillan, 2nd Edition

6. R.J.A Buhur, D.L Bailey, "An Introduction to Real – Time Systems", Prentice – Hall International

7. Philip.A.Laplante, "Real Time System Design and Analysis", Prentice Hall of India, 3rd Edition

ELECTIVE
Subject Code : ETE013
Subject Title : CAD of Power Electronic Circuits
Structure of the Course Content

BLOCK 1 Introduction to CAD in Power Electronic Circuits

Unit 1: Importance of Simulation
Unit 2: General Purpose Circuit Analysis
Unit 3: Methods of Analysis of Power Electronic Systems
Unit 4: Review of Power Electronic Devices and Circuits

BLOCK 2 Simulation Techniques

Unit 1: Analysis of Power Electronic Systems in a Sequential Manner
Unit 2: Coupled and Decoupled Systems
Unit 3: Various Algorithms for Computing Steady State Solutions
Unit 4: Future Trends in Computer Simulation

BLOCK 3 Modelling of Power Electronic Devices

Unit 1: AC Sweep and DC Sweep Analysis
Unit 2: Transients and the Time Domain Analysis
Unit 3: BJT, FET, MOSFET and its Model
Unit 4: Amplifiers and Oscillator

BLOCK 4 Simulations of Circuits

Unit 1: Schematic Capture and Libraries
Unit 2: Time Domain Analysis
Unit 3: System Level Integration and Analysis
Unit 4: Fourier analysis

BLOCK 5 Case Studies

Unit 1: Simulation of Converters feeding R and R-L Loads
Unit 2: Simulation of Choppers feeding R and R-L Loads
Unit 3: Simulation of Inverters feeding R and R-L Loads
Unit 4: Simulation of AC voltage controllers feeding R and R-L Loads

Books:

1. Rashid, M., Simulation of Power Electronic Circuits using pSPICE, PHI

2. Rajagopalan, V. "Computer Aided Analysis of Power Electronic systems"-Marcell – Dekker Inc

3. John Keown "Microsim, Pspice and circuit analysis"-Prentice Hall Inc

ELECTIVE
Subject Code : ETE014
Subject Title : MEMS
Structure of the Course Content

BLOCK 1 Micro Fabrication

Unit 1: Overview of Micro Fabrication
Unit 2: Silicon and other Material Based Fabrication Processes
Unit 3: Crystal Planes and Orientation
Unit 4: Torsional Deflections and Intrinsic Stress

BLOCK 2 Electrostatic Sensors and Actuation

Unit 1: Principle of Electrostatic Sensor
Unit 2: Design, Fabrication of Parallel Plate Capacitors as Electrostatic Sensors
Unit 3: Design and Fabrication of Parallel Plate Capacitors as Actuators
Unit 4: Applications of Electrostatic Sensor

BLOCK 3 Thermal Sensing and Actuation

Unit 1: Principle of Thermal Sensing Actuation
Unit 2: Design and Fabrication of Thermal Couples
Unit 3: Design and Fabrication of Thermal bimorph sensors
Unit 4: Design and Fabrication of Thermal resistor sensors

BLOCK 4 Piezoelectric Sensing Actuation

Unit 1: Piezoelectric effect
Unit 2: Cantilever Piezoelectric Actuator Model
Unit 3: Properties of Piezoelectric Materials
Unit 4: Applications of Piezoelectric Sensors

BLOCK 5 Case Studies in MEMS

Unit 1: Piezoresistive Sensors
Unit 2: Fluidics Applications
Unit 3: Medical Applications
Unit 4: Optical MEMS

Books:

1. Chang Liu, “Foundations of MEMS”, Pearson International Edition
2.Marc Madou , “Fundamentals of microfabrication”,CRC Press
3.Boston , “Micromachined Transducers Sourcebook”,WCB McGraw Hill
4.M.H.Bao “Micromechanical transducers :Pressure sensors, accelerometers and gyroscopes”, Elsevier, Newyork

ELECTIVE
Subject Code : ETE015
Subject Title : Software Technology for Embedded Systems
Structure of the Course Content

BLOCK 1 Programming in Embedded Systems

Unit 1: Embedded Program
Unit 2: Role of Infinite Loop
Unit 3: Compiling, Linking, Locating, Downloading and Debugging
Unit 4: External Peripherals

BLOCK 2 C and Assembly

Unit 1: Overview of Embedded C
Unit 2: Programming and Assembly
Unit 3: Procedure Call and Return
Unit 4: Parameter Passing and Retrieving

BLOCK 3 Software Development Process

Unit 1: Program Elements, Queues and Stack
Unit 2: Embedded Programming in C++
Unit 3: Portability Issues
Unit 4: Testing, Validation, Debugging and Software maintenance

BLOCK 4 Unified Modelling Language

Unit 1: UML State Charts
Unit 2: Timing Diagrams
Unit 3: Types and Strategies of Operations
Unit 4: Architectural Design in UML Concurrency Design

BLOCK 5 Client Server Model in Embedded Systems

Unit 1: Client/server model
Unit 2: Domain Names and IP address
Unit 3: TCP/IP Protocols
Unit 4: Embedded Web servers

Books:

1. David E.Simon: "An Embedded Software Primer", Pearson Education
2.Michael Barr, "Programming Embedded Systems in C and C++", Oreilly
3.Raj Kamal, "Embedded Systems- Architecture, Programming and Design" Tata McGraw Hill
4.H.M. Deitel , P.J.Deitel, A.B. Golldberg " Internet and World Wide Web – How to Program" Third Edition , Pearson Education
5. Bruce Powel Douglas, "Real-Time UML, Second Edition: Developing Efficient Object for Embedded Systems, 2nd edition ,1999, Addison-Wesley
6. Daniel W.lewis "Fundamentals of Embedded Software where C and Assembly meet" PHI