Electrical & Electronics Engineering

(Detailed Syllabus of 6th Semester)

L: Lecture, T: Tutorial, P: Practical, C: Credit

SEMESTER VI

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credits L+(T+P)/2
				L	T	P	PRE*** Mid Sem	PRE*** TA**	ESE*	Total Marks	
01	EEE4128	EEE	Microcontrollers and Embedded System	3	1	0	30	20	50	100	4
02	EEE4129 (1-5)	EEE	Professional Elective-II (EEE Annexure – II)	3	1	0	30	20	50	100	4
03	EEE4130 (1-5)	EEE	Professional Elective –III (EEE Annexure – III)	3	0	0	30	20	50	100	3
04	EEE4131	EEE	Microcontrollers and Embedded Lab	0	0	3	0	30	20	50	2
05	EEE4132	EEE	Minor Project	0	0	8	0				6
06	EEE4133	EEE	Industrial Training and Seminar	0	0	2	0	15	10	25	1
07	HSS4104	EEE	Humanities and Social Sciences	1	0	0	0	15	10	25	1
08	PFD4107	Humanities	Professional Development	0	0	1	0	15	10	25	1
			TOTAL	**12**	**4**	**10**	**120**	**185**	**270**	**575**	**23**

*Teacher Assessment,**End Semester Examination, ***ProgressReviewExamination

Professional Elective -II (EEE Annexure - II)

Sr. No	Courses	Name of the Courses
1	EEE4129 (1)	High Voltage Engineering
2	EEE4129 (2)	FACTS
3	EEE4129 (3)	Industrial Automation
4	EEE4129 (4)	Power System Analysis
5	EEE4129 (5)	Control and Renewable Energy Systems

Professional Elective -III (EEE Annexure - III)

Sr. No	Courses	Name of the Courses
1	EEE4130 (1)	Soft Computing
2	EEE4130 (2)	Image Processing
3	EEE4130 (3)	Analog Filter Design
4	EEE4130 (4)	Speech Processing Techniques
5	EEE4130 (5)	VLSI design

Semester: VII **Branch: Electrical and Electronics Engineering**
Subject: Microcontrollers & Embedded Systems **Code: EEE4128**

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Course Description:

The course introduces microcontrollers and interfacing, operation and applications of microcontrollers including system level organization, analysis of specific processors, software and hardware interface design. Principles of low-level program execution and interfacing to peripherals are emphasized in this course. The course prepares the students with a set of concepts common to many different embedded systems.

Course Objectives:

to understand the concepts of hardware of various microcontrollers to enable programming and interfacing of microcontroller.

Syllabus:

UNIT-1:
Introduction to embedded systems: Classification, Characteristics and requirements, Applications.

UNIT-2:

8051 Microcontroller:
Architecture, TIMERS and Counters, Interrupts, Serial Communication, Addressing modes, instruction set and, Jumps, Loops, Interrupts and returns, Timers and Interrupts, Serial Communication, I/O programming.

UNIT-3:

PIC Microcontrollers: Introduction to 16 and 18F families, Architecture and programming, TIMERS and Counters, Interrupts, SPI, I2C, I/O programming and interfacing.

UNIT-4:

Real World Interfacing:
Basics of Serial Communication Protocol: Study of RS232, RS 485, I2C, SPI, MSSP structure (SPI &I2C), UART, Sensor interfacing using ADC, RTC (DS1306) with I2C and EEPROM with SPI.

UNIT-5:
Case Studies: All programs in embedded C.

Text Books:

1. The 8051 Microcontroller: Architecture, programming and Applications: Ayala J.K.,Penram International (2005) 3rd ed.

2. The 8051 Microcontroller and Embedded Systems:Mazidi,E. and Mazidi,F., Prentice-Hall of India (2004) 2nd ed.

3. Embedded system Design using PIC18Fxxx :Peatman J., Prentice Hall, 2003.

Reference Books:

Course Outcomes:

After completion of this course module, students will able to:

1. Analyze and design hardware and software for small digital systems involving microprocessors.

2. Understand the organization of a simple digital computer.

3. Use the 8051 microcontroller and its standard peripherals.

4. Apply assembly and C languages in embedded computer systems.

Semester: VII **Branch: Electrical and Electronics Engineering**
Subject: High Voltage Engineering **Code: EEE4129(1)**

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Course Description:

This subject deals with the detailed analysis of breakdown occurring in gaseous, liquid and solid dielectrics. The course also gives the information about generation and measurement of high voltages and current. in addition, in this subject, high voltage testing methods are discussed in detail.

Course Objectives:

This course is intended to fulfill the following objectives:

1. to explore the different dielectric material used in the high voltage equipment.
2. to learn the importance of high voltage generation and measurement.
3. to have an idea of testing the high voltage equipment.
4. to learn the advancements in the field of high voltage engineering.

Syllabus:

UNIT-1:

Introduction: Electric Field Stresses, Types of Insulation, Types of Ionizations-Impact, Thermal and Photo-Ionization, Estimation andControl ofElectric Stress, Numerical Methods for Electric Field Computation, Surge Voltages, Their Distribution and Control, Applications of Insulating Materials; Circuit Breakers, Cable Power Capacitors, Transformers, Bushings, andRotating Machines.

UNIT-2:

Breakdown inDielectric Materials: Gases as Insulating Media, Collision Process, Ionization Process, Townsend's Criteria of Breakdown in Gases, Streamer Theory of Breakdown, Paschen'sLaw, Liquid asInsulator, Pure andCommercial Liquids, Breakdown in Pure and Commercial Liquids, Intrinsic Breakdown, Electromechanical Breakdown, Thermal Breakdown, Treeing, Forms of Treeing Patterns and Classification of Treeing Process, Breakdown of Solid Dielectrics.

UNIT-3:

Generation ofHigh Voltages: Generation of High DC Voltages, Half-Wave andFull Wave Rectifier Circuits, Van De GraaffGenerators, Electrostatic Generators, Generation ofHigh Alternating Voltages, Cascade Transformers, Generation of Impulse Voltages, Multistage

Impulse Generator, Max Circuit, Tripping andControl ofImpulse Generators.

UNIT-4:

Measurement of High Voltages and Current: Measurement of High D.C, High a.Cand Impulse, Non-Destructive Testing ofMaterials andElectrical Apparatus: Measurement ofD.C. Resistivity, Dielectric Constant and Loss Factor, Partial Discharge andCondition Monitoring.

UNIT-5:

Over Voltage Phenomenon andInsulation Co-Ordination: Natural Causes for Over Voltages — Lightning Phenomenon, Over Voltage Due to Switching Surges, Systems Faults and Other Abnormal Conditions, Principals of Insulation Coordination Voltage andExtra High Voltage Power Systems.

Text Books:

1. MS Naidu andV. Kamaraju, *High Voltage Engineering*, 3rdEd Tata McgrawHil
2. J. KuffelandW. S. Zaengl, *High Voltage Engineering: Fundamentals*, Newnes, 2000.

Reference Books:

1. High Voltage Engineering: C. L. Wadhwa, New Age, 2007.
2. High Voltage Insulation Engineering: Ravindra Arora, New Age International.
3. High Voltage Engineering: D. V. RazevingandChaurasia, Khanna Pbs.
4. HVDC Power Transmission System: K. R. Padiyar, New Age International, 1996.

Course Outcomes:

On completion of this course module, the students will have a thorough knowledge on:

1. Basics of high voltage engineering.
2. Break-down phenomenon in different types of dielectrics and on generation and measurement of high voltages and current.
3. The phenomenon of over-voltages and concept of insulation co-ordination.
4. Testing of various materials and electrical apparatus used in high voltage engineering, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

Semester: VI **Branch: Electrical and Electronics Engineering**
Subject: FACTs **Code: EEE4129(2)**

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Course Description:

The subject curriculum focuses on the study of fundamentals of FACTs devices, which are important one. It also covers the fundamentals of converters. The subject deals with the review of semiconductor devices. It also covers the working principle of voltage source converters, current source converters, STATCOM and basic FACTs controller. The topics covered in the curriculum are chosen in such a way that the students get a very good idea of the underlying principles of FACTs controller.

Course Objectives:

1. Explain the working principle of series and shunt compensators.
2. Explain the working principle and application of SVCs and VAR generations.
3. Analyze and compare static synchronous series compensators.
4. Compare the different type of static series compensators
5. Overall idea on FACTs controller.

Syllabus:

UNIT-1:

Introduction: The Concept of Flexible AC Transmission - Reactive Power Control in Electrical Power Transmission Lines -Uncompensated Transmission Line – Series and Shunt Compensation. Overview ofFACTS Devices - Static Var Compensator (SVC) – Thyristor Switched Series Capacitor (TCSC) – Unified Power Flow Controller (UPFC) - Integrated Power Flow Controller (IPFC).

UNIT-2:

Static Var Compensator (SVC) and Applications: Voltage Control bySVC – Advantages of Slope in Dynamic Characteristics – Influence ofSVC On System Voltage. Applications - Enhancement of Transient Stability – Steady State Power Transfer – Enhancement of Power System Damping – Prevention of Voltage Instability.

UNIT-3:

Thyristor Controlled Series Capacitor(TCSC)andApplications:
Operation of The TCSC - Different Modes of Operation – Modeling ofTCSC – Variable Reactance Model – Modeling for Stability Studies. Applications - Improvement of The System Stability Limit – Enhancement of System Damping – Voltage Collapse Preventionconcepts, Three-Phase Cscs, Three-Phase Full Wave Rectifier, Comparison ofVSC andCSC.StaticShunt Compensators: Basic Concepts, Method of Controllable VAR

Generation, Static VAR Compensator (SVC), Application ofSVC in Power Systems.

UNIT-4:

Emerging Facts Controllers:
Introduction, Mathematical Model, Working of Static Synchronous Compensators (STATCOM), V-I andV-Q Characteristics, Transient Stability Enhancement and Exchange of Real Power Using STATCOM, Comparison ofSVC andSTATCOM, Merits of Hybrid Compensators.

UNIT-5:

Static Series Compensators:
Objectives of Series Compensation, Variable Impedance Type Series Compensation, GTO Thyristor Controlled Series Capacitors (GCSC), Thyristor Controlled Series Capacitor (TCSC), Basic Concepts ofGCSC andTCSC. Introduction toUnified Power Flow Controller (UPFC).

Text Books:

1. Understanding Facts:Hingorani.
2. Thyristor Controlled FACTS Devices:Mathur

Reference Books:

1. FACTS forTransmission Lines: Song Yu.

Course Outcomes:

After completion of this course module, students will able to:

1. Understand and analyze reactive power control in transmission line.
2. Overall idea about static series and shunt compensators.
3. 3Overall idea about static synchronous series compensators.
4. Understand and analyze different FACTs controllers.

Semester: VI **Branch: Electrical and Electronics Engineering**
Subject: Industrial Automation **Code: EEE4129(3)**

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Course Description

This course provides an overall exposure to the technology of Industrial Automation and Control as widely seen in factories of all types, both for discrete and continuous manufacturing. The course discusses a wide range of related topics from the advantage and architecture of automation systems, measurement systems including sensors and signal conditioning, discrete and continuous variable control systems, hydraulic, pneumatic and electric actuators, industrial communication and embedded computing and CNC Machines.

Course Objectives:

Syllabus:

Unit 1:

Introduction toIndustrial Automation

Definition, Comparison Between Automation and Control, Architecture ofIndustrial Automation Systems, Levels ofIndustrial Automation, Hierarchical Structure ofIndustrial Automation Systems, Differences Between Automatic Control and Supervisory Control.

Unit 2:Measurement andData Acquisition Systems

Measurement Systems Characteristics, Static Characteristic Parameters for Sensors and Instruments, Calibration and Characterization of Errors, Response of First and Second Order Instrument to Step and Sinusoidal Inputs, Typical Industrial Sensor Specifications.

Data Acquisition Systems: Structure and Components, Sampling and Quantization Error of a Signal Typical to Data Acquisition Systems, Circuit Architecture and Performance Parameters fora/DConverters.

Unit 3: Process Control

Introduction to Automatic Control, PID Control, PID Control Tuning, Feed Forward Control, RatioControl, Time-Delay Systems andInverse Response Systems, Special Control Structures, Process Control, Introduction to Sequence Control, PLC,RLL, Scan Cycle, Simple RLL Programs, aStructured Design Approach to Sequence Control, PLC Hardware Environment.

Unit 4: Hydraulic andPneumatic Control

Flow Control Valves, Hydraulic Control Systems:Constructional and Functional Aspects of Hydraulic Pumps and Motors, Directional Valves and Control Valves, Industrial Hydraulic Circuit.

Pneumatic Control Systems: Constructional and Functional Aspects of Pneumatic Pumps and Motors, Directional Valves and Control Valves,Energy Savings with Variable Speed Drives.

Unit 5: Higher Level Automation

Introduction toCNC Machines, Main Features and Advantages ofCNC Machines, The Field Bus Network: Physical Network Structure and Advantages, Higher Level Automation Systems,Techniques of Process Monitoring, Planning and Scheduling in Manufacturing.

Text Books:

1. **Industrial Instrumentation, Control andAutomation**- S. Mukhopadhyay, S. Sen anda. K. Deb, (Jaico Publishing House, 2013)

2. **Chemical Process Control, an Introduction toTheory andPractice**- George Stephanopoulos, (Prentice Hall India, 2012)

3. **Hydraulic Control Systems**- Herbert E. Merritt, (Wiley, 1991)

Reference Books

1. **Industrial Control Electronics Devices, Systems, &Applications**- Terry Bartlet(Delmar 3rd Edition)
2. **an Introduction toAutomated Process Planning Systems**- Tiess Chiu Chang andRichard a. Wysk(Prentice-Hall, 1985)

Course Outcomes:

On completion of this course,students will be able to accomplish the following competencies

1. Explain the General function and architecture of Industrial Automation.
2. Distinguish between automatic control and supervisory control
3. Identify Practical Programmable Logic Controller Applications
4. Recognize Fundamentals of Programming
5. Identify Types of Industrial Sensors
6. Explain Fundamentals of Process Control
7. Classify Process Control System

Semester: VII **Branch: Electrical and Electronics Engineering**
Subject: Power System Analysis **Code: EEE4129(4)**

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Course Description:

The course deals with the design and analysis of electrical power grids. Calculation of power flow in a power system network using various techniques, formation of Z-bus and its importance are covered in this course. in addition, it deals with the short circuit analysis, analysis of power system for steady state, and transient stability.

Course Objectives:

This course is intended to fulfill the following objectives:

1. to study the development of impedance diagram (p.u) and formation of Y-bus
2. to study the Gauss Seidel, Newton Raphson, Decoupled and Fast decoupled load flow methods.
3. to study the concept of the Z-busbuildingalgorithm.
4. to study short circuit calculation for Symmetrical faults
5. to study the effect of Unsymmetrical faults.
6. to study the Rotor angle stability analysis of power systems.

Syllabus:

UNIT-1:

Per Unit Representation &Topology Per Unit Quantities–Single Line DiagramandImpedance Diagram of a Power System, Graph Theory Definition,Formation of Element Node Incidence and Bus Incidence Matrices,Primitive Network Representation,Formation ofY– Bus Matrix by Singular Transformation and Direct Inspection Methods.

UNIT-2:

Breakdown inDielectric Materials: Power Flow Studies: Necessity of Power Flow Studies, Derivation of Static Power Flow Equations, Power Flow Solution Using Gauss-Seidel Method, Newton Raphson Method (Rectangular and Polar Coordinates Form), Decoupled andFast Decoupled Methods (Algorithmic Approach).

UNIT-3:

Z–Bus Formulation: Partial Network,Algorithm for The Modification ofZ-Bus Matrix for Addition Element for The Following Cases: Addition of Element froma New Bus to Reference, Addition of Element froma New Bus toan Old Bus, Addition of Element Between an Old Bus to Reference,andAddition of Element Between Two Old Busses (Derivations andNumerical Problems), Modification ofZ–Bus for The Changes in Network.

UNIT-4:

Symmetrical Fault Analysis: 3–Phase Short Circuit CurrentandReactancesof Synchronous Machine, Short Circuit MVA Calculations.
Symmetrical Components andFault Analysis: Synthesis of Unsymmetrical Phasor from Their Symmetrical Components, Symmetrical Components of Unsymmetrical Phasor, Phase Shift of Symmetrical Components inY–Δ–Power in Terms of Symmetrical Components, Sequence Networks; Positive, Negative and Zero Sequence Networks, Various Types of Faults LG– LL– LLG andLLL On Unloaded Alternator,Unsymmetrical Faults On Power System.

UNIT-5:

Power System Stability Analysis: Elementary Concepts ofSteady State, Dynamic, andTransient Stabilities, Description ofSteady State Stability Power Limit,TransferreactanceSynchronizing Power Coefficient, Power Angle Curve andDetermination ofSteady State Stability, Derivation ofSwing Equation, Determination ofTransient Stability byEqual Area Criterion, Application ofEqual Area Criterion, Methods to Improve Steady State and Transient Stability.

Text Books:

1. Power System Analysis byGrainger andStevenson, Tata McgrawHill.
2. Electrical Power Systems byP.S.R.Murthy, B.S.Publications
3. Modern Power System Analysis – byI.J.Nagrath&D.P.Kothari: Tata Mc Graw–Hill Publishing Company, 2nd Edition.
4. Power System Analysis andDesign byJ.Duncan Glover, M.S.Sarma, T.J. Overbye–Cengagelearning Publications.

Reference Books:

1. Power System Analysis – bya.R.Bergen, Prentice Hall, Inc.
2. Power System Analysis byHadisaadat – TMH Edition.

Course Outcomes:

On completion of this course module, the students will be able to:

- Draw an impedance diagram for a power system network.
- Form a Y-bus matrix for a power system network with or without mutual couplings.
- Find out the load flow solution of a power system network using different types of load flow methods.
- Formulate the Z-bus for a power system network.
- Find out the fault current for all types faults with a view to provide data for the design of protective devices.
- Find out the sequence components of current for any unbalanced power system

network.

- Analyze the steady state, transient, and dynamic stability concepts of a power system.

Semester: VII **Branch: Electrical and Electronics Engineering**
Subject: Soft Computing **Code: EEE4130(1)**

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Course Description

Soft computing is an emerging approach to computing which parallel the remarkable ability of the human mind to reason and learn in an environment of uncertainty and imprecision. Soft computing is based on some biological inspired methodologies such as genetics, evolution, ant's behaviors, particles swarming, human nervous systems, etc. Soft computing provides solution when we don't have any mathematical modeling of problem solving (i.e., algorithm), need a solution to a complex problem in real time, easy to adapt with changed scenario and can be implemented with parallel computing. It has enormous applications in many application areas such as medical diagnosis, computer vision, hand written character reconditions, pattern recognition, machine intelligence, weather forecasting, network optimization, VLSI design, etc.

Course Objectives:

1. to understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control.
2. to understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.
3. to understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.

Syllabus

Unit 1: Basics ofSoft Computing

Introduction to Soft Computing, Hard Computing, Soft Computing Characteristics, Hard Computing Vs. Soft Computing, Howto Do Soft Computing, Hybrid Computing

Unit 2: Fuzzy Logic

Introduction toFuzzy Logic, Introduction to Crisp Sets and Fuzzy Sets, Basic Fuzzy Set Operation (Union, Intersection, Complement and Other Fuzzy Algebraic Operations) and Approximate Reasoning,FuzzyMembership Functions, Fuzzy Relations, Fuzzy Propositions, Fuzzy Implications, Fuzzy Inferences Such asMamdaniMinimum andLarsen Product, Different Defuzzification Techniques Like Cog, Coa, Cos, Height Methods.

Unit 3: Applications ofFuzzy Logic

Fuzzy Logic Controllers, Architecture of Fuzzy Logic Controllers, Knowledge-Based Control, Fuzzy Knowledge and Rule Bases,MamdaniType andTakagi-SugenoType Fuzzy Controllers, Fuzzy PI andFuzzy PD Controllers.

Unit 4: Genetic Algorithm

Solving Optimization Problems, Basic Concept ofGenetic Algorithm and Detail Algorithmic Steps, Adjustment of Free Parameters**,**GA Operators: Encoding, GA Operators: Selection, GA Operators: Crossover, GA Operators: Mutation, Multi-Objective Optimization, Pareto Optimality.

Unit 5: Neural Networks

Concept ofArtificial Neural Networks and Its Basic Mathematical Model,ANN Architecture, Feed-Forward Multilayer Perceptron,LearningandTraining The Neural Network, Applications ofANN, Recurrent Neural Networks, Radial Basis Function Network

Text Books:

1. **an Introduction toFuzzy Control**- Dimiterdriankov, Hans Hellendoorn, Michaelreinfrank (Springer-Verlag Berlin Heidelberg; 2nd Edition)
2. **Intelligent Systems andControl: Principles andApplications** - Laxmidharbehera, Indranikar (Oxford University Press)
3. Genetic Algorithms inSearch, Optimization, andMachine Learning - David E. Goldberg (Addison-Wesley Longman Publishing Co.; 1st Edition)
4. **Introduction toArtificial Neural Systems**- Jacek M. Zurada(Jaico; 1st Edition)

Reference Books

1. **Fuzzy Logic with Engineering Applications**- Timothy J. Ross (Wiley; 3rd Edition)
2. **Neural Networks andLearning Machines**- Simon S. Haykin(Pearson; 3rd Edition)
3. **Optimization forEngineering Design: Algorithms andExamples**- Kalyanmoy Deb (Prentice Hall India Learning Private Limited; 2nd Edition)

Course Outcomes

After completing this course a student will be in a position to

1. Understand the difference between hard computing and soft computing
2. Understanding of fuzzy set theory and can differentiate between crisp and fuzzy sets
3. Different applications of fuzzy logic such as fuzzy logic controllers
4. Understand the concept of evolutionary optimization techniques such as genetic algorithm.
5. Understand the working of artificial neural networks and applications of ANN for problem solving.

Semester: VII **Branch: Electrical and Electronics Engineering**
Subject: Image Processing **Code: EEE4130(2)**

Course Description:to learn and understand the fundamentals of digital image processing, and various image Transforms, Image Enhancement Techniques, Image restoration Techniques and methods, image compression and Segmentation used in digital image processing.

Course Objectives:

1. to prepare students to compete for a successful career in Electronics and Communication Engineering profession through global education standards.
2. to enable the students to aptly apply their acquired knowledge in basic sciences and mathematics in solving Electronics and Communication Engineering problems.
3. to produce skillful graduates to analyze, design and develop a system/component/ process for the required needs under the realistic constraints.
4. to train the students to approach ethically any multidisciplinary engineering challenges with economic, environmental and social contexts
5. to create awareness among the students about the need for lifelong learning to succeed in their professional career

Syllabus:

UNIT-1:

Digital Image Fundamentals: Introduction, Origin, Steps inDigital Image Processing, Components, Elements ofVisual Perception, Image Sensing andAcquisition, Image Sampling andQuantization, Relationships Between Pixels, Color Models.

UNIT-2:

Image Enhancement: Spatial Domain: Gray Level Transformations, Histogram Processing, Basics ofSpatial Filtering–Smoothing andSharpening Spatial Filtering, Frequency Domain: Introduction toFourier Transform, Smoothing andSharpening Frequency Domain Filters, Ideal, Butterworth andGaussian Filters.

UNIT-3:

Image Restoration and Segmentation: Noise Models, Mean Filters, Order Statistics, Adaptive Filters, Band Reject Filters, Band Pass Filters, Notch Filters, Optimum Notch Filtering, Inverse Filtering, Wiener Filtering Segmentation: Detection ofDiscontinuities–Edge Linking andBoundary Detection, Region Based Segmentation, Morphological Processing, Erosion and Dilation.

UNIT-4:

Wavelets and Image Compression: Wavelets, SubbandCoding, Multiresolution Expansions, Compression: Fundamentals, Image Compression Models, Error Free Compression, Variable Length Coding, Bit, Plane Coding, Lossless Predictive Coding, Lossy Compression, Lossy Predictive Coding, Compression Standards.

UNIT-5:

Image Representation andRecognition: BoundaryRepresentation, Chain Code, Polygonal Approximation, Signature, Boundary Segments, Boundary Description, Shape Number, Fourier Descriptor, Moments, Regional Descriptors –Topological Feature, Texture, Patterns andPattern Classes, Recognition Based On Matching.

Text Books:

3. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2010.

Reference Books:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
2. Anil Jain K. "Fundamentals ofDigital Image Processing", PHI Learning Pvt. Ltd., 2011.
3. Willliam K Pratt, "Digital Image Processing", John Willey, 2002.
4. Malay K. Pakhira, "Digital Image Processing andPattern Recognition", First Edition, PHI Learning Pvt. Ltd., 2011.
5. Http://Eeweb.Poly.Edu/~Onur/Lectures/Lectures.Html.
6. Http://Www.Caen.Uiowa.Edu/~Dip/LECTURE/Lecture.Html

Course Outcomes:

1. an ability to apply knowledge of mathematics, science, and engineering
2. an ability to design and conduct experiments, as well as to analyze and interpret data
3. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. an ability to function on multidisciplinary teams
5. an ability to identify, formulate, and solve engineering problems
6. an understanding of professional and ethical responsibility
7. an ability to communicate effectively
8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
9. a recognition of the need for, and an ability to engage in life-long learning
10. a knowledge of contemporary issues

11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Semester: VII **Branch: Electrical and Electronics Engineering**
Subject: Analog Filter Design **Code: EEE4130(3)**

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Course Description:

The course deals with the design and analysis of Analog Filters for the given specification. It also deals with the different orders of the filter and their frequency response analysis.

Course Objective:
1. Provide students with an understanding of active filter design

Syllabus:

Unit I:
Introduction: Fundamentals, Types of Filters and Descriptive Terminology, Why We Use Analog Filters, Circuit Elements and Scaling, Circuit Simulation and Modeling. Operational Amplifiers: OpampModels, OpampSlew Rate, Operational Amplifiers with Resistive Feedback: Noninverting, Inverting, Analyzing OpampCircuits, Block Diagrams, Feedback, The Voltage Follower, Addition, and Subtraction, Application ofOp-Amp Resistor Circuits.

Unit II:
First Order Filter: Bilinear Transfer Functions and Frequency Response Bilinear Transfer Function and Its Parts, Realization of Passive Elements, Bode Plots, Active Realization, The Effect ofa(S), and Cascade Design.

Unit III:
Second Order Low Pass and Band Pass Filters:DesignParameters, Second Order Circuit, Frequency Response of Low Pass and Band Pass Circuits, Integrators and Others Biquads.

Unit IV:
Second Order Filters with Arbitrary Transmission Zeros: byUsing Summing, byVoltage Feed Forward, Cascade Design Revisited. Low Pass Filters with Maximally Flat Magnitude: The Ideal Low Pass Filter, Butterworth Response, Butterworth Pole Locations, Low Pass Filter Specifications, Arbitrary Transmission Zeros.

Unit V:
Low Pass Filter with Equal Ripple (Chebyshev) Magnitude Response, The Chebyshev Polynomial, The Chebyshev Magnitude Response, Location of Chebyshev Poles, Comparison of Maximally Flat & Equal Ripple Responses, Chebyshev Filter Design Inverse Chebyshev andCauer Filters: Inverse Chebyshev Response, from Specifications to Pole and Zero Locations, CauerMagnitude Response, Chebyshev Rational Functions, CauerFilter Design.

Text Books:
1. Rolf. Schaumann, Haiqiao Xiao, Mac. E. Van Valkenburg, Analog Filter Design, 2nd Indian

Edition, Oxford University Press.

Reference Books:
1. J. Michael Jacob Second Edition, Pearson. - CRC Press.

Course Outcomes:
1. The student will be able to design filters to meet specifications.
2. The student will have an appreciation of op-amp limitations.
3. The student will have familiarity with computer design tools for filters.

Semester: VII **Branch: Electrical and Electronics Engineering**
Subject: Signal Processing techniques **Code: EEE4130(4)**

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Course Description:
Oral Speech may be the most natural, common and direct mode of human communication. Since the middle of the last century, Speech has become an area of intense and active research and development (R&D) to become a prime means of direct Human-Computer Interactions (HCI). The pace of such R&D has farther got boosted with the general abundance of cheap computing power in the form of PC, PDA or Mobile Handset. While man to machine in speech mode is yet to reach the minimum threshold level for wide-spread deployment, spoken messages directly by machine. This need research in speech science and development of speech technology. The course provides the foundation knowledge on speech production and perception along with processing of speech signal in digital domain.

Course Objectives:

1. to introduce speech production and related parameters of speech.
2. to show the computation and use of techniques such as short time Fourier transform, linear predictive coefficients and other coefficients in the analysis of speech.
3. to understand different speech modeling procedures such as Markov and their implementation issues.

Syllabus:

Unit-1:

The Speech Production Mechanism: Physiological and Mathematical Model, Relating The Physiological and Mathematical Model, Categorization of Speech Sounds Based On The Source,Systemand The Articulatory Model.

Unit-2:

Basic Speech Signal Processing Concepts: Discrete Time Speech Signals, Relevant Properties of The Fast Fourier Transform andZ,Transformfor Speech Recognition, Convolution, Linear and Non Linear Filter Banks, Spectral Estimation of Speech Using The Discrete Fourier Transform, Pole,Zero Modeling of Speech and Linear Prediction (Lp) Analysis of Speech, Homomorphic Speech Signal De Convolution, Real and Complex Cepstrum, Application of Cepstral Analysis to Speech Signals.

Unit-3:

The Speech Recognition Front End: Feature Extraction for Speech Recognition, Static and Dynamic Features for Speech Recognition, Robustness Issues, Discrimination in The

Feature Space, Feature Selection,N Mel Frequency Cepstral Co-Efficients (Mfcc), Linear Prediction Cepstral Coefficients (Lpcc), Perceptual Lpcc.

Unit-4:

Distance Measures for Comparing Speech Patterns: Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances, Distances for Linear and Warped Scales, Dynamic Time Warping for Isolated Word Recognition.

Unit-5:

Statistical Models for Speech Recognition: Vector Quantization Models and Applications in Speaker Recognition, Gaussian Mixture Modeling for Speaker and Speech Recognition, Discrete and Continuous Hidden Markov Modeling for Isolated Word and Continuous Speech Recognition.

Text Books:

1. Lawrence RabinerandBiing,Hwangjuang, "Fundamentals of Speech Recognition", Pearson Education, 2003.
2. Daniel Jurafskyand James H Martin, "Speech and Language Processing,an Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Pearson Education, 2002.
3. Frederick Jelinek, "Statistical Methods of Speech Recognition", Mit Press, 1997.

Reference Books:

1. Steven W. Smith, "The Scientist andEngineer" S Guide to Digital Signal Processing", California Technical Publishing, 1997.
2. Thomas F Quatieri, "Discrete,Time Speech Signal Processing,Principlesand Practice", Pearson Education, 2004.
3. Claudio Becchettiand Lucio Prinaricotti, "Speech Recognition", John Wiley and Sons, 1999.
4. Ben Gold and Nelson Morgan, "Speech and Audio Signal Processing, Processing and Perception of Speech and Music", Wiley, India Edition, 2006.

Course Outcomes:

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

1. Model speech production system and describe the fundamentals of speech.
2. Extract and compare different speech parameters.
3. Choose an appropriate statistical speech model for a given application.
4. Design a speech recognition system.
5. Use different speech synthesis techniques.

Semester: VII **Branch: Electrical and Electronics Engineering**
Subject: Microcontroller & Embedded System Lab **Code: EEE4131**

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Course Description:

The Lab introduces microcontrollers programming and interfacing. Operation and applications of microcontrollers, including system level organization, analysis and software and hardware interface design.

Course Objectives:

1. to have knowledge about the basic working of a microcontroller system and its programming in assembly language.

2. to provide experience to integrate hardware and software for microcontroller applications systems.

Syllabus:

List of Experiments:

1. to study development tools/environment for ATMEL/PIC microcontroller programme and Architecture.
2. Write an assembly language program to add, subtract, multiply, divide 16 bit data by Atmel microcontroller.
3. an assembly language program to generate 10 KHz frequency using interrupts on P1.2.
4. Study and analyze the interfacing of 16 x 2 LCD.
5. Study of implementation, analysis and interfacing of seven segment display.
6. Study of implementation of steeper motor angle control.
7. Study of implementation of DC Motor control using PWM method.
8. Study and observation of Position control of Servo Motor.
9. Study of Programming and Transmission and Reception of data through serial port.
10. to study implementation and programming of Pressure measurement.
11. to study implementation and programming of Temperature measurement.
12. Study and analysis of interfacing of graphical LCD using PIC Microcontroller.
13. to interface PWM based voltage regulator using PIC Microcontroller.
14. Study and interface of IR (RC5 Protocol) and RF Communication using PIC Microcontroller.

Equipments/Machine/Software required:

Reference Books & Manuals:

Course Outcomes:

to acquire knowledge about microcontrollers embedded processors and their applications.

1. Foster ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.

2. Foster ability to write the programs for microcontroller.

3. Foster ability to understand the role of embedded systems in industry.

Semester: VII **Branch: Electrical and Electronics Engineering**
Subject:Professional Development **Code: PD4107**

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COURSE DESCRIPTION

This course provides employability skills training to Engineering Graduates. The employability skills are non-technical skills which contribute to an individual's effective participation in the workplace. The curriculum framework addresses each of the six core HRD components:

1) assessment of an individual's assets and limitations,
2) development of a positive self-concept,
3) development of employability skills,
4) development of communication skills,
5) development of problem-solving skills, and
6) awareness of the impact of information technology in the workplace.

COURSE OBJECTIVES

The objectives of this course are:

- to make students understand what is expected of new employees
- to make students learn and practice communications skills
- to make students understand key behaviors to satisfy employer expectations
- to make students learn and practice customer service skills
- to make students learn to deal with conflict effectively
- to make students learn financial skills
- to make students learn to create a job-search-ready resume and portfolio.

Syllabus:

Module 1- The Rewards of Working
Module 2- Know Thyself: Assets, Strengths and Choices
Module 3- Personal Power: responding to Challenges
Module 4- Work Search Planning: Laying the Groundwork in the New Millennium
Module 5- Tools for the Journey: Proposals, Resumes and Correspondence
Module 6- Researching Options and Opportunities
Module 7- Contacting Employers: Taking it to the Streets
Module 8- Interviewing with Ease: Mastering the Art of Self-Presentation
Module 9- Researching Options and Opportunities

RECOMMENDED TEXTS

1. "Soft Skills" by Hariharan S., S. N.Sundararajan, and S.P.Shanmugapriya, Mjp Publishers
2. "Soft Skills: Know Yourself and Know the World" by Alex
3. "Making Work Work for the Highly Sensitive Person" by Beverly Jaeger, McGraw-Hill Education

REFERENCE BOOKS

1. "Get your First Job: a companion for getting your first job – a Guide to Employability Skills and Career Planning " by a J Balasubramanian and Dr J Sadakkadulla, Amazon Asia-Pacific Holdings Private Limited

2. ” Soft Skills at Work: Technology for Career Success ” by Beverly Amer, Course Technology Inc
3. ” BEST: Basic Employability Skills Training: Volume 1 ” by Sally J. Vonada and JoAnn Brunner, CreateSpace Independent Publishing Platform

Course Outcomes:

- Students are expected to understand difference between employment and employability.
- Students are expected to about their Inner strength and corresponding Opportunities.
- Students are expected to solve problems regarding finding job opportunities
- Students are expected to represent themselves in a best impressive way in front of Interviewer.