IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curricula (B. Tech)

Electrical and Electronics Engineering Department

VI Semester

w.e.f. July 2022

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours/ Week			Total Credits
				Theory			Practical						
				End Sem	Mid Sem Exam	Quiz/ Assignment	End Sem	Term Work / Lab Work & Sessional		L	T	P	
1	**PCC - EEE601**	**PCC**	Power System-II	70	20	10	60	40	200	**3**	**0**	**2**	**4**
2	**PCC - EEE602**	**PCC**	Electrical Drives	70	20	10	60	40	200	**3**	**0**	**2**	**4**
3	**PCC - EEE603**	**PCC**	Analog & Digital Communication	70	20	10	60	40	200	**3**	**0**	**2**	**4**
4	**PEC - EEE601**	**PEC**	Professional Elective-II	70	20	10	-	-	100	**3**	**0**	**0**	**3**
5	**OEC - EEE601**	**OEC**	Open Elective-II	70	20	10	-	-	100	**3**	**0**	**0**	**3**
6	**PCC - EEE604**	**PCC**	Simulation Lab-II	-	-	-	60	40	100	**0**	**0**	**4**	**2**
7	**PCC - EEE605**	**PCC**	Departmental Lab	-	-	-	60	40	100	**0**	**0**	**4**	**2**
			Total	**350**	**100**	**50**	**300**	**200**	**1000**	**15**	**0**	**14**	**22**

Professional Elective-II (PEC-EEE601)	**Open Elective-II (OEC-EEE601)**
(A) Embedded System	(A) Entrepreneurship
(B) Digital Signal Processing	(B) Stress Management
(C) Computer Networks	(C) JAVA
(D) Special Machines	

1 Hr. Lecture	1 Hr. Tutorial	2 Hr. Practical
1 Credit	1 Credit	1 Credit

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Electrical and Electronics Engineering Department

PCC-EEE601	Power System II	3L: 0T: 2P (5 hrs.)	4 Credits

Course objective: To familiarize the students with the problems associated with modern interconnected power system, Load flow analysis and stability.

Prerequisite: Power System-I, electrical machines.

Module 1 (8 hrs.)

General - Problems associated with modern interconnected power Systems, deregulation, power systems restructuring, distributed generation, congestion, available transfer capability. Reactive power capability curve of alternator

Module2 (10 hrs.)

Power flow studies - Formulation of static power flow equations and solutions using Gauss Seidel, Newton Raphson, comparison of these methods, Economic operation of power system – Economic dispatch, line loss, ITL, economic dispatch uses Lagrangian multiplier method.

Module 3 (10 hrs.)

MW Frequency control- Fundamental of Speed Governing, Modeling of Speed Control Mechanism, Primary ALFC, Closing of ALFC, Static & Dynamic Response to Primary ALFC, Speed Control Characteristics ,Fundamental of AGC,AGC in Isolated & Interconnected Power Systems, Modeling of the Tie line, Static & Dynamic response of two area system, Economic dispatch Control.

Module 4 (8 hrs.)

Reactive Power & Voltage control –Protection & Absorption of Reactive Power Method of Voltage Control, Static VAR systems, Different types, Application, characteristics, characteristics of an excitation system, DC AC and static excitation system, General block diagram representation of voltage regulators

Module 5 (8 hrs.)

Power System Stability - Steady state, dynamic and transients stability, Swing equation, equal area criterion, solution of swing equation using step by step method, methods of improving transient stability.

Course Outcomes: After successful completion of course students will be able to

CO 1: Able to understand the Problems associated with modern interconnected power Systems.
CO 2: Evaluate the Power flow through different Power flow tech
CO 3: Explain MW Frequency control, methods for economic load dispatch and unit commitment
CO 4: Explain MVAR Voltage control Problem-.
CO 5: Analyze the performance of single and multi-machine systems under transient, steady state and dynamic conditions

List of Experiments (Expandable)

1. To develop a program in MATLAB for information of Y-bus matrix for N bus system.
2. Load flow solution for 3-bus system using Gauss- Seidel, Newton Raphson and FDLF methods up to 3 iteration.
3. Load flow solution for IEEE 6-bus and 30-bus system in MATLAB using Newton Raphson method.
4. Assessment of transient stability of a single machine system.
5. Effect of compensation on voltage profile of IEEE 6-bus system.
6. Study of software tool PSCAD.

Text/ Reference Books:

1. I.J. Nagrath& D.P. Kothari , Modern Power System Analysis, Tata Mc Graw – Hill Publication Company Ltd 2nd edition.
2. C.L.Wadhwa, Electrical Power Systems, New Age International (P) Limited Publishers, 2^{nd}edition 1998.
3. Elgerd O.I., "Electric Energy Systems Theory", TMH, New Delhi, Second Edition1983.
4. R Bergin Vijay Vittal ,Power system analysis, Prentice Hall
5. L L Lai ,Power system restructuring and deregulation, John Welly and sons

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Electrical and Electronics Engineering Department

PCC-EEE602	Electrical Drives	3L: 0T : 2P (5 hrs.)	4 Credits

Course Objective: Advance electrical drives course are give unified treatment of complete electrical drive systems, electrical machines, power converters and control system.

Pre Requisite:-Fundamental knowledge of electrical machine & Power Electronics.

Module 1(10hrs.)

Introduction, types and classification of Electric drives, components of load torque, load-drive speed torque characteristics, Constant power and constant torque drives, Selection of motor power capacity for continuous duty at constant load and variable loads, Selection of motor capacity for short time and intermittent periodic duty, permissible frequency of starting of squirrel cage motor for different duty cycles, Load equalization, Review of power converters used in drives, multi-quadrant operation of electric drive.

Module 2(10hrs.)

D.C. Drives-Introduction to closed loop control of drives, DC Drives Starting & Braking of conventional, Single-phase half controlled and fully controlled converter fed dc motor drives, operation of dc drives with continuous armature current, voltage and current waveforms, Operation of drive under discontinuous current, expression for speed-torque characteristic, Drives with current limit control, single-quadrant closed loop drive with inner current control loop, advantage of inner current control loop in drives.

Module 3 (10hrs.)

Chopper and Four quadrant operation of D.C. Drives: Motoring operation of chopper fed separately excited dc motor, steady state analysis of drive with time-ratio control, Introduction to Four quadrant operation, mode of chopper, motoring operations, Electric braking, Plugging, dynamic and regenerative braking operations.

Module 4 (10hrs.)

AC Drives:-Principles of speed control, Various methods of Induction motor drive, Variable voltage operation, Variable frequency operation, Constant flux operation, Torque-Slip characteristic, Constant Torque and Constant power operation, Implementation of V/f control with slip compensation scheme, Starting, Braking and transient analysis of Induction Motor Drives, Control of Induction Motor by AC Voltage controllers, Variable frequency control of induction motor by Voltage Source, Current Source inverters, cyclo-converters and PWM control, Closed loop operation of induction motor drives, Static rotor resistance control, Slip power recovery, static Scherbius Drive, Static Kramer Drive. Self-controlled synchronous motor drive, Vector control of synchronous motor, Permanent magnet drives and Industrial drives.

Module 5 (8hrs.)

Special Drives: Fundamentals of Switched reluctance motors, Stepper Motors, and Permanent Magnet Motor; Construction and working principle of Brushless DC Machines, Construction and working of PMSM Linear Induction Machines, Digital control of drives.

Energy Conservation in Electrical Drives: Concept of Energy efficient motor, Energy efficient motor standards, Energy efficient operation of drives, Efficiency evaluation technique, Efficiency evaluation factor, Losses in electrical drive system; Motor life cycle, Direct Savings and pay back analysis.

List of Experiments:

1. Study the starting and running characteristics of converter fed D.C. traction motor.
2. To study the energy recovery systems and braking of a D.C. drive.
3. To study the braking Methods of a three-phase induction motor.
4. To study the performance of VSI fed three-phase induction motor using PWM technique.
5. To control the speed of a three phase slip ring Induction motor using rotor impedance control.
6. To study the performance of Vector Controlled three phase Induction motor drive.
7. To Study frequency Controlled Synchronous motor drive.
8. To study the control and performance Characteristics of switched Reluctance motor.
9. To study the performance & control of a Stepper motor.
10. To Study the Performance of a permanent magnet Brushless dc motor drive.

Course Outcomes: After successful completion of course students will be able to

CO1: Understand basic drive system and theoretical concepts of dynamics of electrical drives.
CO2: Analyze the performance of D.C. drives during starting and braking.
CO3: Explain chopper and four quadrants operation for D.C. drives.
CO4: Analyze control strategies and controllers for A.C. drives.
CO5: Understand applications of special drives.

Text/ Reference Books:

1. G.K. Dubey "Fundamentals of Electrical Drives"-. Narosa Publications.
2. Vedam Subrahmaniam, Electric Drives (Concepts and Applications), Tata McGraw-Hill, 2010.
3. Mohammed A. El-Sharkawi, “Fundamentals of Electric Drives”, Thomson Asia, Pvt. Ltd. Singapore.
4. B.K. Bose "Power Electronic control of AC Drives", PHI Learning.

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PCC-EEE603	Analog & Digital Communication	3L : 0T : 2P (5 hrs.)	4 Credits

Course Objective:-Objective of this course is to introduce the students with basic concepts of analog and digital communication System.

Pre Requisite:-Basic concept of signals and systems.

Module 1 (06hrs.)

Time domain and frequency domain representation of signal, Fourier Transform and its properties, Transform of Gate, Periodic gate, Impulse periodic impulse sine and cosine wave, Concept of energy density and power density (Parseval's theorem), Power density of periodic gate and impulse function, impulse response of a system, convolutions, convolution with impulse function, causal and non causal system impulse response of ideal low pass filter, Correlation & Auto correlation.

Module 2 (11hrs.)

Base band signal, need of modulation, Introduction of modulations techniques, Amplitude modulation, Equation and its frequency domain representation, Bandwidth, Power distribution. AM suppressed carrier waveform equation and frequency domain representation Generation (Balance/Chopper modulator) and synchronous detection technique, errors in synchronous detection, Introduction to SSB and VSB Transmission Angle modulation, Frequency and phase modulation equation and their relative phase and frequency deviations, modulation index frequency spectrum, NBFM and WBFM, Bandwidth comparison of modulation techniques.

Module 3 (10hrs.)

Sampling of signal, sampling theorem for low pass and Band pass signal, Pulse amplitude modulation (PAM), Time division, multiplexing (TDM). Channel Bandwidth for PAM-TDM signal Type of sampling instantaneous, Natural and flat top, Aperture effect, Introduction to pulse position and pulse duration modulations, Digital signal, Quantization, Quantization error, Pulse code modulation, signal to noise ratio, Companding, Data rate and Baud rate, Bit rate, multiplexed PCM signal, Differential PCM (DPCM), Delta Modulation (DM) and Adaptive Delta Modulation (ADM), comparison of various systems.

Module 4 (06hrs.)

Digital modulations techniques, Generation, detection, equation and Bandwidth of amplitude shift keying (ASK) Binary Phase Shift keying (BPSK), Differential phase shift keying (DPSK), offset and non offset quadrature phase shift keying (QPSK), M-Ary PSK, Binary frequency Shift Keying (BFSK), M-Ary FSK Quadrature Amplitude modulation (QAM), MODEM, Introduction to probability of error.

Module5 (07hrs.)

Information theory and coding- Information, entropies (Marginal and conditional), Model of a communication system, Mathematical representation of source, channel and receiver characteristics, Mutual information, channel capacity efficiency of noise free channel Binary symmetric channel (BSC) Binary erasure channel (BEC), Repetition of signal, NM symmetric Binary channel, Shannon theorem, Shanon-Hartley theorem (S/N-BW trade off)Source encoding code properties; Shanon, Fano and Huffman coding methods and their efficiency error control coding.

List of Experiments

1. To study different types of signals and their properties
2. To perform and analyze experiment of Amplitude modulation (DSB Signal)
3. To perform and analyze experiment of Amplitude Demodulation (DSB Signal)
4. To perform and analyze experiment of Frequency Modulation & demodulation.
5. To perform and analyze experiment of Pulse amplitude Modulation & Demodulation
6. To perform and analyze experiment of time division multiplexing.
7. To perform and analyze experiment of pulse code modulation & demodulation
8. To perform and analyze experiment of BPSK & QPSK modulation

Course Outcomes:-After successful completion of course students will be able to:

CO 1: Compute Fourier Transform and analyze different types of signals and systems.
CO2: Understand the need of modulation and different types of Analog modulation schemes.
CO 3: Analyze different aspects of PCM techniques.
CO 4: Identify and describe different types of digital modulations
CO 5: Understand and analyze the source and channel coding.

Text/ Reference books:

1. Singh &Sapre, Communication System, TMH
2. Taub& shilling, Communication System, TMH
3. B.P. Lathi, Modern Digital and analog communication system,
4. Simon Haykins, Communication System. John Willy

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PEC –EEE601 (A)	**Professional Elective II (Embedded System)**	**3L: 0T : 0P (3 hrs.)**	**3 Credits**

Course Objective:-Objective of this course is to introduce the students with basic-to-advanced concepts of Embedded System, and also hardware and software design requirements of embedded systems.

Pre Requisite:-Basic concept of microcontroller

Module 1(08hrs.)

Introduction to Embedded Systems: Definition of embedded system, embedded systems vs. general computing systems, history of embedded systems, classification, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, common design metrics, and processor technology: general purpose processor, application specific processor, single purpose processor.

Module 2(08hrs.)

Embedded System Architecture: Von Neumann v/s Harvard architecture, instruction set architecture, CISC and RISC instructions set architecture, basic embedded processor, microcontroller architecture, CISC & RISC examples: 8051, ARM, DSP processors.

Module 3(08hrs.)

Input Output and Peripheral Devices: Timers and counters, watchdog timers, interrupt controllers, PWM, keyboard controller, analog to digital converters, real time clock.

Module 4(08hrs.)

Embedded System Development Environment, Integrated Development Environment (IDE), types of files Generated on Cross-Compilation, Disassemble/Decompile, Simulators, Emulators and Debugging, Boundary Scan.

Module 5(08hrs.)

Embedded Product Development Lifecycle (EDLC) and Trends in Embedded Industry What is EDLC, Objectives of EDLC, Different phases of EDLC.

Course Outcomes:-After successful completion of course students will be able to:

CO 1: Understand basic concept of embedded systems.
CO 2: Apply and analyze the applications in various processors and domains of embedded system.
CO 3: Understand the key concepts of embedded systems such as I/O, timers, interrupts and interaction with peripheral devices.
CO 4: Acquire knowledge about different entities of Embedded System Development Environment.
CO 5: To provide a clear understanding of Embedded Product Development Lifecycle (EDLC).

Text/ Reference books:

1. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education.
2. "Embedded Systems Design" by Steve Heath. Publisher: Butterworth-Heinemann.
3. Principles of Embedded computing system design, WynewoffMprgankoffman publication 2000.
4. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.

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PEC –EEE601 (B)	**Professional Elective II (Digital Signal Processing)**	**3L: 0T: 0P (3 hrs.)**	**3 Credits**

Course Objective:-To make students familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors.

Pre Requisite:-Basic knowledge of Fourier Transform, Laplace Transform

Module 108hrs.) Basics of Signals and Systems

Introduction and Classification of signals and systems, Elementary Operations on Signals and Sequences, Properties of Systems, Sampling theorem, Periodic Sampling, Frequency-Domain Representation of Sampling, Reconstruction of Samples. Discrete Time processing of Continuous -time Signals, Continuous Time Processing of Discrete-Time Signals.

Module 2(08hrs.) Linear Time Invariant Systems

Time Domain Representations of Continuous and Discrete time Linear Time Invariant (LTI) Systems, Properties of LTI Systems, Impulse Response, Convolution, Differential Equation Representation for continuous time LTI system, Linear Constant - Coefficient Difference Equation Representation for discrete time LTI system

Module 3(08hrs.) Application of Z-Transform

Review of Z- Transform and its applications, Recursive and Non recursive Structure, Block Diagram and Signal Flow Graph Representation of Discrete-Time systems. Basic Structure for FIR and IIR Systems.

Module 4 (08hrs.) Discrete Fourier Transform

Discrete time Fourier series and its convergence, discrete time Fourier Transform, its properties, frequency response. Introduction to DFT in time domain and frequency domain, Derivation of DFT from DTFT, Inverse DFT, Convolution using DFT, Computational Complexity of the DFT, Decimation-in time FFT Algorithm, Decimation In Frequency FFT Algorithm, Comparison of DIT and DIF algorithms.

Module 5 (06hrs.) FIR and IIR DIGITAL FILTERS

Introduction to FIR and IIR Filter Design. Characteristics of FIR Digital Filters frequency response, Design of FIR Digital Filters using Window Techniques. Comparison of IIR and FIR filters, Realization of FIR digital filters - direct, linear phase, cascade & parallel forms.

Course Outcomes:-After successful completion of course students will be able to:

CO1: Realize the abstraction of signals and systems, from the point of view of analysis and characterization.

CO2: Perform convolution and correlation operations on signals.

CO3: Able to calculate Z-transforms for discrete time signals and system functions

CO4: To study about discrete time systems and to learn about DFT and FFT algorithms.

CO5: Design and realization of FIR and IIR filters.

Text/ Reference books:

1. Signals and systems by Oppenheim, Willsky and Nawab 2nd, Ed., Pearson (low price), 1996.
2. DSP: Principles, algorithms and applications" by Proakis and Manolakis, 4th edition, Prentice Hall, 1996
3. Oppenheim & Schaffer, Digital Signal Processing, PHI.
4. John G. Proakis Digital Signal Processing: Principles, Algorithms, And Applications, 4/E
5. Digital Signal Processing By S. Salivahanan.Tata MC-Graw Hill.

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PEC –EEE601 (C)	**Professional Elective II (Computer Networks)**	**3L: 0T : 0P (3 hrs.)**	**3 Credits**

Course Objective:-

The course objectives include learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems.

Pre Requisite:-Fundamental knowledge of data transmission.

Module 1(06hrs.)
Introduction to computer network, classification of networks (WAN, MAN, LAN), distributed systems, digital signals and data rates, bit stream, symbols and band rate, transmission media, modems, structure of computer network, circuit, packet, message switching topological design, back bone design OSI, reference model.

Module 2(08hrs.)
Physical and data link layer, bit communication between DTE and DCE, RS232C, novel modem Terminal handling, multiplexing and concentration data link layer service and design issues, errors detection and correction, retransmission strategies, sliding window protocols, satellite and packet radio networks, pure aloha protocols, slotted aloha protocol, satellite networks, reservation aloha protocol, DES, PCEM, packet radio networks.

Module 3(08hrs.)
Network layer, basic design issues, network layer services, connection oriented and connection less services, routing, static multipath, centralized isolated distributed hierarchical broadcast, flow based routing, congestion deadlocks radio concept of Ethernet LAN topology and architecture CSMA/CD protocol, token ring LAN token bus LAN, Fiber optic LAN principle of LAN bridges, transparent bridge source routing bridges, gateway, gateway design issues x25 internet working.

Module 4(08hrs.)
ISDN, B-ISDN and ATM, evolution of ISDN, goal of ISDN services, ISDN system architecture and network terminating devices ISDN interface ISDN signaling, broad band ISDN, A synchronomous transfer modem ATM adaptation layer, transport layer, OSI transport protocol, session layer designing issues, data exchange OSI session layer primitives, transport protocol TCP

Module 5 (08hrs.)

Presentation layer, abstract syntax notation data compressed on oxyptography, application layer OST service elements ACSE and CCR, electronic mail directory services distributed systems, formal protocol modules, network management, mobile networking. Networking Equipments and Monitoring Tools Routers, Modems, Switches, Gateways, online networking monitoring tools, Network security, Proxy Server design.

Course Outcomes:-After successful completion of course students will be able to:

CO1: Build an understanding of the fundamental concepts of computer networking.

CO2: Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.

CO3: To determine proper usage of the IP address, subnet masks and default gateway in a routed network.

CO4: Students will understand the concepts of some Modern topics (like ISDN services & ATM)

CO5: Ability to discuss about network management, mobile networking, Networking Equipments and Monitoring Tools.

Text/ Reference books:

1. J.F. Kurose and K. W. Ross, "Computer Networking – A top down approach featuring the Internet", Pearson Education, 5th Edition
2. L. Peterson and B. Davie, "Computer Networks – A Systems Approach" Elsevier Morgan Kaufmann Publisher, 5 th Edition.
3. B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition
4. Andrew Tanenbaum, "Computer networks", Prentice Hall

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PEC-EEE601 (D)	Special Machine	3L : 0T : 0P (3 hrs.)	3 Credits

Course Objective: The basic objective of this course is to introduce the theory, construction, design, control electronics, and in-depth analysis of several non-traditional machines such as stepper motors, switched reluctance motors, permanent magnet synchronous motors and brushless DC machines.

Pre Requisite: Fundamentals of Electrical Engineering, Electrical Machine-I, Electrical Machine-II

Module 1 (08 hrs.)

Stepper Motors: Discretisation of angular position by stepper structures, stepping angle and frequency of excitation. VR and PM rotor structures and their torque production, torque angle characteristics. The hybrid structure and torque production by permanent magnet and excitation fluxes. Power electronic converters for stepper motors, control by load angle.

Module 2 (08 hrs.)

Switched reluctance motor, static torque production, partition of energy and the effects of saturation, Dynamic torque production, torque speed characteristics, shaft position sensing, solid rotors.

Module 3 (10 hrs.)

BrushLess DC Motor construction and principle, speed control, basic concept of torque, outer and inner rotor, magnetic circuit concept, electrical analogy, winding pattern series and parallel, Thermal consideration.

Module 4 (08 hrs.)

Permanent magnet materials and circuits; Characteristics, parameters, properties, classification and calculations, Permanent magnet motors, D.C. brushed motors, design analysis and control and applications.

Module 5 (06 hrs.)

PM synchronous motors, rotor construction, theory, operation, control and applications. PM step motors, hybrid step motors, sensorless control, reduction of torque pulsations; Case studies such electric vehicles, industrial drives, PV fed water pumping.

Course Outcomes:-After successful completion of course students will be able to:

CO1: Explain the performance and control of stepper motors, and their applications

CO2: Explain theory of operation and control of switched reluctance motor.

CO3: Distinguish between brush dc motor and brush less dc motor.

CO4: Analyze permanent magnet materials and circuits of PM motors & DC brushed motors

CO5: Explain the fundamental principles and classification of PM Synchronous motor.

Text/ Reference books

1. Brushless Permanent Magnet & Reluctance Motor Drives – T.J.E.Miller
2. Special Electrical Machine by E.G. Janardanan, PHI Learning
3. Principles of Electric Machines & Power Electronics – P.C.Sen
4. Electric Drives – G.K.Dubey
5. Permanent magnet synchronous & brushless DC motor drives- R Krishnan, CRCPress, 2004

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Electrical and Electronics Engineering Department

PCC –EEE604	Simulation Lab - II	0L : 0T : 4P (4hrs)	2 Credits

Course Objective: To teach students simulation process of different power electronics converter.

Pre Requisite: Power Electronics, Basic MATLAB, PSIM.

List of Experiments

Experiments can cover any of the above topics, following is a suggestive list:

1. Introduction to Basic SIMULINK Modeling & Analysis
2. Introduction of PSIM (Power Simulation Software) for power Electronics
3. Simulation and of Uncontrolled Rectifier Circuits
4. Simulation and of Controlled Rectifier Circuits
5. Simulation of One Quadrant Chopper Circuit
6. Simulation of Fourth Quadrant Chopper Circuit
7. Simulation of Single Phase Half Wave Inverter
8. Simulation of Single Phase Full Wave Inverter
9. Simulation of AC Voltage Controller Circuit using MATLAB & PSIM
10. Simulation and Analysis of Three Phase 120 Degree Inverter Circuit

Course Outcomes:-After successful completion of course students will be able to:
CO1: Analyzing operation of different power electronic converters.
CO2: Analyzing waveforms exhibited at the input and output ports of the converters.
CO3: Measurement of input and outputs of converters

Text/ Reference books:

1 Dr. Shailendra Jain, "Modeling and Simulation using MATLAB - Simulink", 2nd Edition, John wiley& sons.
2 MATLAB and its Applications in Engineering, Raj kumar Bansal, Pearson Publishers, ISBN-10: 8131716813, 2009.
3 MATLAB: An Introduction with Applications, by Amos Gilat, 2nd edition, Wiley,ISBN-13 978-0471694205, 2004.
4 MATLAB: A Practical Introduction to Programming and Problem Solving. Attaway, Stormy, 2012.

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PCC – EEE605	Departmental Lab	0L:0T:4P(4Hrs)	2 Credits

Course Objective: To teach students basic knowledge about PLC.

Pre Requisite: Fundamentals of electrical machine.

List of Experiments

Experiments can cover any of the above topics, following is a suggestive list:

1. To develop logic gates using ladder diagram.
2. To develop a logic for DOL starter.
3. To develop a ladder logic for staircase.
4. To develop a ladder diagram using timer for sequential On/OFF of three motors.
5. Ladder programming for washing with dryer application.
6. Move BLDC motor only for 60 Sec with the help of PLC.
7. Move BLDC motor for 60 sec and stop using brake with the help of PLC.
8. Move stepper motor for 90 degree angle in 10 sec.
9. Move stepper motor for 90 degree in forward and 90 degree in reverse in 20 sec.
10. To study introduction and analysis for SCADA.

Course Outcomes: -After successful completion of course students will be able to:

CO1: Describe the development of PLCs.
CO2: Demonstrate understanding and use of the different types of inputs/outputs commonly used on PLC-based equipment.
CO3: Understanding and use of PLC with special machine.

Text/ Reference books:

1. "Programmable Logic Controllers and Industrial Automation: An Introduction 2nd Edition" by Madhuchhanda Mitra and Samarjt.
2. "Programmable Logic Controller (PLC) Tutorial, Siemens Simatic S7-200" by Stephen P Tubbs.
3. "Fundamentals of Automation and Industrial Control Systems Using PlC" by Ayman Aly El-Naggar.

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OEC-EEE601 (A)	Entrepreneurship	3L: 0T: 0P (3Hrs)	3 Credits

Pre requisite(s): Nil

Course Objectives:

- To develop conceptual understanding of the concept of Entrepreneurship
- To learn the government's policy .
- To Learn about **types of Enterprises**
- To Learn about E-commerce and its Technological Aspects
- To Learn about Digital Marketing

Course Content:

Module 1 **(08 Hrs)**

Entrepreneurship: Definition, requirements to be an entrepreneur, entrepreneur and intrapreneur, entrepreneur and manager, growth of entrepreneurship in India, women entrepreneurship, rural and urban entrepreneurship.

Module 2 **(10 Hrs)**

Entrepreneurial Motivation

Motivating factors, motivation theories-Maslow's Need Hierarchy Theory, McClelland's Acquired Need Theory, government's policy actions towards entrepreneurial motivation, entrepreneurship development programmes.

Module 3 **(10 Hrs)**

Types of Enterprises and Ownership Structure: Small scale, medium scale and large scale enterprises, role of small enterprises in economic development; proprietorship, partnership, Ltd. companies and co-operatives: their formation, capital structure and source of finance.

Module 4 **(12 Hrs)**

E-commerce and its Technological Aspects: Overview of developments in Information Technology and Defining E-Commerce: The scope of E commerce, Electronic Market, Electronic Data Interchange, Internet Commerce, Benefits and limitations of E-Commerce, Produce a generic framework for E-Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture.

Module 5 **(10 Hrs)**

Introduction to Digital Marketing: Evolution of Digital Marketing from traditional to modern era, Role of Internet, Search Engine Advertising, Display marketing, Social Media Marketing.

Course outcomes:

1. To inculcate entrepreneurship skills to students.
2. To aware about industry structure and how to start up a company.
3. To aware about t**ypes of Enterprises.**
4. To understand E-commerce practices.
5. To understand and practice Digital Marketing.

Text /Reference Books :

1. Koontz & O'Donnel¸ Essentials of Management, Tata McGraw Hill, New Delhi ,2009
2. Peter F Drucker, The Practice of Management, McGraw Hill, New York ,1960
3. Peter F. Drucker, Innovation and Development, McGraw Hill, New York,2000.
4. Mohanty SK; Fundamental of Entrepreneurship; PHI, 2005.
5. Davis & Olson; Management Information System; TMH, 1985.