Course Name: Digital Electronics **Course Code: KEE-401**

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

CO 1: Apply concepts of Digital Binary System and implementation of Gates..

CO2: Analyze and design of Combinational logic circuits.

CO3: Analyze and design of Sequential logic circuits with their applications.

CO4: Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits.

CO5: Apply the concept of Digital Logic Families with circuit implementation.

KEE 401- Digital Electronics		
	SYLLABUS	**MAPPING**
Unit I	**Digital System And Binary Numbers: Number System and its arithmetic, Signed binary numbers, Binary codes, Cyclic codes, Hamming Code, the map method up to five variable, Don't care conditions, POS simplification, NAND and NOR implementation, Quine McClusky method (Tabular method).**	**CO 1**
Unit II	**Combinational Logic: Combinational Circuits: Analysis Procedure, Design procedure, Binary addersubtractor, Decimal adder, Binary multiplier, Magnitude comparator, Multiplexers, Demultiplexers, Decoders, Encoders.**	**CO 2**
Unit III	**Sequential Logic And Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.**	**CO 3**
Unit IV	**Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, Design procedure, Reduction of state and flow table, Race-free state assignment, Hazards.**	**CO 4**
Unit V	**Memory & Programmable Logic Devices: Digital Logic Families: DTL, DCTL, TTL, ECL & CMOS etc., Fan Out, Fan in, Noise Margin; RAM, ROM, PLA, PAL; Circuits of Logic Families, Interfacing of Digital Logic Families, Circuit Implementation using ROM, PLA and PAL; CPLD and FPGA.**	**CO 5**

Text Books:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.
2. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press.
3. RP Jain, "Modern Digital Electronics", Tata McGraw Hill Publication.

Course Name: ELECTRICAL MACHINES – I **Course Code: KEE-402**

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

CO 1: Analyze the various principles & concepts involved in Electromechanical Energy conversion.

CO2: Demonstrate the constructional details of DC machines as well as transformers, and principle of operation of brushless DC motor, Stepper and DC Servo motors.

CO3: Evaluate the performance and characteristics of DC Machine as motor and as well as generator.

CO4: Evaluate the performance of transformers, individually and in parallel operation.

CO5: Demonstrate and perform various connections of three phase transformers.

KEE 402- Electrical Machines-I		
	SYLLABUS	**MAPPING**
Unit I	**Pre- Requisites:** Magnetic Materials, BH characteristics **Principles of Electro-mechanical Energy Conversion**: Introduction, Review of magnetic system, Energy in Magnetic system, Force and torque in magnetic field system, Energy balance equation, Energy conversion via electrical field, Energy in a singly excited system, Determination of the Force and Torque from energy and co-energy, Generation of EMF in Machines, Torque in machine with cylindrical air gap.	**CO 1**
Unit II	**Pre- Requisites**: **Principle & Construction, Classification and circuit model, EMF equation of generator and torque equation of motor DC Machines:** Armature winding (Concentrated and Distributed), Winding Factor, Armature reaction,Commutation, Interpoles and compensating windings, Performance characteristics of DC generators, Applications	**CO 2**
Unit III	**DC Machines (Contd.):** Performance characteristics of DC motors, Starting of DC motors; 3 point and 4 point starters, Speed control of DC motors; Field control, Armature control and Voltage control (Ward Leonard method); Efficiency and Testing of DC machines (Hopkinson's and Swinburne's Test), Applications, Introduction to Brushless DC Motor, stepper motor and DC Servo motor and their applications.	**CO 3**
Unit IV	**Pre- Requisites: Construction & Principle, Ideal and practical transformer, equivalent circuit & phasor diagram, losses in transformers.** **Single Phase Transformer:** Efficiency and voltage regulation, all day efficiency, Excitation phenomenon and harmonics in transformers. **Testing of Transformers**- O.C. and S.C. tests, Polarity test, Sumpner's test. **Auto Transformer-** Single phase and three phase autotransformers, Volt-amp relation, Copper saving in autotransformer Efficiency, Merits & demerits and applications..	**CO 4**
Unit V	**Pre- Requisite:** Three-phase connections – Star/Delta. **Three Phase Transformers:** Construction, Three phase transformer, phasor groups and their connections, open delta connection, three phase to 2 phase and their applications, Three	**CO 5**

	winding transformers. Parallel operation of single phase and three phase transformers and load sharing.	

Text Books:

1. I.J Nagrath & D.P. Kothari, "Electrical Machines", Tata McGraw Hill
2. Rajendra Prasad , "Electrical Machines", PHI
3. PS Bimbhra, "Electrical Machinery", Khanna Publisher
4. AE Fitggerald, C. Kingsley Jr and Umans, "Electric Machinery", McGraw Hill, International Student Edition.

Reference Books:

1. H. Cotton, "Electrical Technology", CBS Publication.
2. MG Say, "The Performance and Design of AC machines", Pit man& Sons.
3. PS Bimbhra, " Generalized Theory.

Course Name: Network Analysis And Synthesis **Course Code: KEE-403**

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

CO 1: Apply the knowledge of basic circuital law, nodal and mesh methods of circuit analysis and simplify the network using Graph Theory approach.
CO2: Analyze the AC and DC circuits using Kirchhoff's law and Network simplification theorems.
CO3: Analyze steady-state responses and transient response of DC and AC circuits using classical and Laplace transform methods.
CO4: Demonstrate the concept of complex frequency and analyze the structure and function of one and two port network. Also evaluate and analysis two-port network parameters.
CO5: Synthesize one port network and analyze different filters.

KEE 403- Network Analysis And Synthesis		
	SYLLABUS	**MAPPING**
Unit I	**Graph Theory:** **Pre- Requisites:** Basic circuital law, Mesh & Nodal analysis. Importance of Graph Theory in Network Analysis, Graph of a network, Definitions, planar &Non- Planar Graphs, Isomorphism, Tree, Co Tree, Link, basic loop and basic cutset, Incidence matrix, Cut set matrix, Tie set matrix, Duality, Loop and Nodal methods of analysis.	CO 1
Unit II	**AC Network Theorems (Applications to dependent & independent sources):** **Pre- Requisites:** Concepts of DC Network Theorems, Electrical Sources&Basic circuital law. Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem. Millman's theorem, Compensation theorem, Tellegen's Theorem.	CO 2
Unit III	**Transient Circuit Analysis:** **Pre- Requisites:** Laplace Transform& Concept of Initial conditions. Natural response and forced response, Transient response andsteady state response for arbitrary inputs (DC and AC), Evaluation of time response both through classical and Laplace methods.	CO 3
Unit IV	**Network Functions:** **Pre- Requisites:** Concept of basic circuital law, parallel, series circuits.Concept of complex frequency, Transform impedances network functions of one port and two port networks, Concept of poles and zeros, Properties of driving point and transfer functions. Two Port Networks- Characterization of LTI two port networks; Z, Y,ABCD, A'B'C'D', g and h parameters, Reciprocity and symmetry, Inter-relationships between the parameters, Inter-connections of two port networks, Ladder and Lattice networks: T & Π representation, terminated two Port networks, Image Impedance.	CO 4
Unit V	**(a)Network Synthesis**: **Pre- Requisites:** Laplace Transform, Concept of immittance functions. Positive real function; definition and properties, Properties of LC, RC and RL driving point functions, Synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.	CO 5

	(b) Filters **Pre- Requisites:** Concept of Passive & active elements. Image parameters and characteristics impedance, Passive and active filter fundamentals, Low pass filters, High pass (constant K type) filters, Introduction to active filters.	

Text Books:

1. ME Van Valkenburg, "Network Analysis", Prentice Hall of India.
2. Alexander, Sadiku, "Fundamentals of Electric Circuits", McGraw Hill.
3. D. Roy Choudhary, "Networks and Systems", Wiley Eastern Ltd.
4. CL Wadhwa, "Network Analysis and Synthesis", New Age International Publishers.
5. A. Chakrabarti, "Circuit Theory", Dhanpat Rai & Co.

Reference Books:

1. Hayt, Kimmerly, Durbin, "Engineering Circuit Analysis", McGraw Hill.
2. Donald E. Scott, "An Introduction to Circuit analysis: A System Approach", McGraw Hill.
3. ME Van Valkenburg, "An Introduction to Modern Network Synthesis", Wiley Eastern Ltd.
4. T.S.K.V. Iyer, "Circuit Theory", Tata McGraw Hill.
5. Samarjit Ghosh, " Network Theory: Analysis & Synthesis" Prentice Hall India.

Course Name: Circuit And Simulation Lab **Course Code: KEE-451**

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

CO 1: Apply the knowledge of basic circuital law, nodal and mesh analysis for given circuit.
CO2: Analysis of the AC and DC circuits using simulation techniques.
CO3: Analysis of transient response of AC circuits.
CO4: Evaluation and analysis of two-port network parameters.
CO5: Estimation of parameters of different filters.

KEE 451- Circuit And Simulation Lab		
	List of Experiments	**MAPPING**
I	Verification of principle of Superposition with AC sources using Multisim/ PSPICE.	**CO 1**
II	Verification of Thevenin and Maximum Power Transfer theorems in AC Circuits using Multisim/ PSPICE.	**CO 1**
III	Verification of Norton theorems in ACCircuits using Multisim/ PSPICE.	**CO 1**
IV	Verification of Tellegen's theorem for two networks of the same topology using Multisim/ PSPICE.	**CO 1,CO2**
V	Determination of Z and h-parameters (DC only) for a network and computation of Y and ABCD Parameters using Multisim/PSPICE.	**CO4**
VI	Determination of driving point and transfer functions of a two port ladder network and verifywith theoretical values using Multisim/ PSPICE.	**CO4**
VII	Determination of transient response of current in RL and RC circuits with step voltageinput.	**CO3**
VIII	Determination of transient response of current in RLC circuit with step voltage input damped, critically damped and over damped cases.	**CO3,**
IX	Determination of image impedance and characteristic impedance of T and Πnetworks, using O.C. and S.C. tests.	**CO3**
X	Verification of parameter properties in inter-connected two port networks: series, paralleland cascade using Multisim/ PSPICE.	**CO4**
X1	Determination of frequency response of a Twin – T-notch filter.	**CO5**
XII	To determine attenuation characteristics of a low pass / high pass active filters.	**CO5**

Course Name: Electrical Machine Lab-I **Course Code: KEE-452**

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

CO 1: Analyze and conduct basic tests on DC Machines and single-phase Transformer
CO2: Obtain the performance indices using standard analytical as well as graphical methods.
CO3: Determine the magnetization, Load and speed-torque characteristics of DC Machines.
CO4: Demonstrate procedures and analysis techniques to perform electromagnetic and electromechanical tests on electrical machines.

KEE 452- Electrical Machine Lab-I		
	List of Experiments	**MAPPING**
I	To obtain magnetization characteristics of a DC shunt generator.	**CO 1**
II	To obtain load characteristics of a DC shunt generator and compound generator (a)Cumulatively compounded (b) Differentially compounded.	**CO 1**
III	To obtain efficiency of a DC shunt machine using Swinburne's test.	**CO 1**
IV	To perform Hopkinson's test and determine losses and efficiency of DC machine.	**CO 1.CO4**
V	To obtain speed- torque characteristics of a DC shunt motor.	**CO1,CO3**
VI	To obtain speed control of DC shunt motor using (a) armature resistance control (b) field control	**CO3,CO4**
VII	To obtain speed control of DC separately excited motor using Ward-Leonard.	**CO3**
VIII	To obtain equivalent circuit, efficiency and voltage regulation of a single-phase transformer using O.C. and S.C. tests.	**CO3,CO4**
IX	To obtain efficiency and voltage regulation of a single-phase transformer by Sumpner's test.	**CO4**
X	To obtain 3-phase to2-phase conversion by Scott connection.	**CO4**
XI	To demonstrate the parallel operation of three phase transformer and to obtain the load sharing at a load.	**CO4**

Course Name: Digital Electronics Lab **Course Code: KEE-453**

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

CO 1: Understanding of Digital Binary System and implementation of Gates.
CO2: Design the Sequential circuits with the help of combinational circuits and feedback element.
CO3: Design data selector circuits with the help of universal Gates.
CO4: Design the counters with the help of sequential circuit and basic Gates.
CO5: Implement the projects using the digital ICs and electronics components.

KEE 453- Digital Electronics Lab		
	List of Experiments	**MAPPING**
I	Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, Concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.	**CO 1,CO5**
II	Implementation of the given Boolean function using logic gates in both SOP and POS forms.	**CO 1,CO3**
III	Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.	**CO4**
IV	Implementation and verification of Decoder using logic gates..	**CO2,CO4**
V	Implementation and verification of Encoder using logic gates.	**CO2,CO4**
VI	Implementation of 4:1 multiplexer using logic gates.	**CO2,CO3,CO4**
VII	Implementation of 1:4 demultiplexer using logic gates.	**CO2,CO3,CO4**
VIII	Implementation of 4-bit parallel adder using 7483 IC.	**CO4,CO5**
IX	Design, and verify the 4-bit synchronous counter.	**CO4,CO5**
X	Design, and verify the 4-bit asynchronous counter.	**CO4,CO5**
XI	Implementation of Mini Project using digital integrated circuit's and other components.	**CO5**

Course Name- Power System Analysis Course Code- EEE 601

Course Outcomes (CO):

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

CO1: Demonstrate the modeling of individual power system components like transmission lines and generators.

CO2: Analyze the unsymmetrical faults in power system.

CO3: Analyze the load flow and short circuit calculations.

CO4: Evaluate the power system stability, security and reliability.

CO5: Elaborate the travelling wave.

EEE-601 Power System Analysis	
SYLLABUS	**Mapping**
Representation of Power System Components: Synchronous machines, Transformers, Transmission lines, One line diagram, Impedance and reactance diagram, per unit System **Symmetrical components**: Symmetrical Components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks. **Symmetrical fault analysis**: Transient in R-L series circuit, calculation of 3-phase short circuit current and reactance of synchronous machine, internal voltage of loaded machines under transient conditions	CO1
Unsymmetrical faults: Analysis of single line to ground fault, line-to-line fault and Double line to ground fault on an unloaded generators and power system network with and without fault impedance Formation of Zbus using singular transformation and algorithm, computer method for short circuit calculations	CO2
Load Flows: Introduction, bus classifications, nodal admittance matrix (Y_{BUS}), development of load flow equations, load flow solution using Gauss Siedel and Newton-Raphson method, approximation to N-R method, line flow equations and fast decoupled method	CO3
Power System Stability: Stability and Stability limit, Steady state stability study, derivation of Swing equation, transient stability studies by equal area criterion and step-by-step method. Factors affecting steady state and transient stability and methods of improvement	CO4
Traveling Waves: Wave equation for uniform Transmission lines, velocity of propagation, surge impedance, reflection and transmission of traveling waves under different line loadings. Bewlay's lattice diagram, protection of equipments and line against traveling waves	CO5

Text Books:

1. W.D. Stevenson, Jr. " Elements of Power System Analysis", Mc Graw Hill.
2. C.L. Wadhwa, "Electrical Power System", New Age International.
3. Chakraborthy, Soni,Gupta & Bhatnagar, "Power System Engineering", Dhanpat Rai & Co.
4. T.K Nagsarkar & M.S. Sukhija, "Power System Analysis" Oxford University Press,2007.

Reference Books:

5. L. P. Singh; "Advanced Power System Analysis & Dynamics", New Age International
6. Hadi Sadat; "Power System Analysis", Tata McGraw Hill.
7. D.Das, " Electrical Power Systems" New Age International, 2006.
8. J.D. Glover, M.S. Sharma & T.J.Overbye, "Power System Analysis and Design" Thomson, 2008.
9. P.S.R. Murthy " Power System Analysis" B.S. Publications,2007.

10. Stagg and El-Abiad, “Computer Methods in Power System Analysis” Tata Mc Graw Hill
11. Kothari & Nagrath, “Modern Power System Analysis” Tata Mc. Graw Hill.

Course Name: Power Electronics **Course Code: EEE-602**

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

CO 1: Establish the understanding of the basics of Power Electronics.

CO2: Understand the conceptual details of power semiconductor switches (Construction, Characteristics and operation).

CO3: Demonstrate the working of the various types of converters.

CO4: Analyse the converters and design the components of them, under various load types.

CO5: Control of various inverters.

KEE 602- Power Electronics		
	SYLLABUS	**MAPPING**
Unit I	**Power semiconductor Devices:** Power semiconductor devices their symbols and static characteristics, Characteristics and specifications of switches, types of power electronic circuits, Operation, steady state & switch characteristics & switching limits of Power Transistor operation and steady state characteristics of Power MOSFET and IGBT **Thyristor** – Operation V- I characteristics, two transistor model, methods of turn-on Operation of GTO, MCT and TRIAC	**CO 1**
Unit II	**Power Semiconductor Devices(Contd):** Protection of devices, Series and parallel operation of thyristors, Commutation techniques of thyristor. **DC-DC Converters:** Principles of step-down chopper, step down chopper with R-L load Principle of step-up chopper, and operation with RL load, classification of choppers	**CO 2**
Unit III	**Phase Controlled Converters** Single phase half wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode. Single phase fully controlled and half controlled bridge converters. Performance Parameters, Three phase half wave converters Three phase fully controlled and half controlled bridge converters, Effect of source impedance, Single phase and three phase dual converters	**CO 3**
Unit IV	**AC Voltage Controllers** Principle of On-Off and phase controls Single phase ac voltage controller with resistive and inductive loads, Three phase ac voltage controllers (various configurations and comparison only) Single phase transformer taps changer. Cyclo Converters, basic principle of operation, single phase to single phase, three phase to single phase and three phase to three phase cyclo converters, output voltage equation	**CO 4**
Unit V	**Inverters** Single phase series resonant inverter, Single phase bridge inverters Three phase bridge inverters, Voltage control of inverters, Harmonics reduction techniques, Single phase and three phase	**CO 5**

	current source inverters.	

Text Books:

1. M.H. Rashid,"Power Electronics: Circuits, Devices & Applications", Prentice Hall of India Ltd. 3rd Edition,2004.

2. M.D. Singh and K.B.Khanchandani, "Power Electronics"Tata MC Graw Hill, 2005

3. V.R. Moorthy, " Power Electronics : Devices, Circuits and Industrial Applications" Oxford University Press,2007.

Reference Books:

4. M.S. Jamil Asghar, "Power Electronics" Prentice Hall of India Ltd., 2004

5. Chakrabarti & Rai, "Fundamentals of Power Electronics &Drives"Dhanpat Rai & Sons.

6. Ned Mohan, T.M.Undeland and W.P.Robbins, "Power Electronics:Converters, Applications and Design", Wiley India Ltd,2008.

7. S.N.Singh, "A Text Book of Power Electronics" Dhanpat Rai & Sons

Course Name- POWER ELECTRONICS LABORATORY Course Code- EEE-651

Course Outcomes (CO):

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

CO1: Demonstrate the V-I characteristics of SCR and UJT trigger circuit.

CO2: Demonstrate the single-phase half wave, fully wave controller and three phase fully/half controlled bridge rectifier with resistive and inductive loads.

CO3: Elaborate the single-phase ac voltage regulator and cyclo-converter.

CO4: Analyze the MOSFET/IGBT based inverters.

CO5: Design and simulation based power electronics experiment.

EEE-651 : POWER ELECTRONICS LABORATORY	
SYLLABUS	**Mapping**
1. To study V-I characteristics of SCR and measure latching and holding currents. 2. To study UJT trigger circuit for half wave and full wave control.	CO1
3. To study single-phase half wave controlled rectified with (i) resistive load (ii) inductive load with and without free wheeling diode. 4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads. 5. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.	CO2
6. To study single-phase ac voltage regulator with resistive and inductive loads. 7. To study single phase cyclo-converter	CO3
8. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor 9. To study operation of IGBT/MOSFET chopper circuit 10. To study MOSFET/IGBT based single-phase series-resonant inverter. 11. To study MOSFET/IGBT based single-phase bridge inverter.	CO4
12. To obtain simulation of SCR and GTO thyristor. 13. To obtain simulation of Power Transistor and IGBT. 14. To obtain simulation of single phase fully controlled bridge rectifier and draw load voltage and load current waveform for inductive load. 15. To obtain simulation of single phase full wave ac voltage controller and draw load voltage and load current waveforms for inductive load. 16. To obtain simulation of step down dc chopper with L-C output filter for inductive load and determine steady-state values of output voltage ripples in out put voltage and load current.	CO5

Text/Reference Books:

1. M.H.Rashid, “Power Electronics: Circuits, Devices and Applications”, 3rd Edition, prentice Hall of India.

2. D.W. Hart, “Introduction to power Electronics” prentice hall Inc. 1997.

3. Randal Shaffer, “Fundamentals of Power Electronics with MATLAB” Firewall Media, 2007.

Course Name-COMMUNICATION ENGINEERING Course Code-EEC 608

Course Outcomes (CO):

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

CO1: Compare the performance of AM, FM and PM schemes with reference to SNR

CO2: Understand noise as a random process and its effect on communication receivers.

CO3: Evaluate the performance of PCM, DPCM and DM in a digital communication system

CO4: Identify source coding and channel coding schemes for a given communication link.

CO5: Acquire the knowledge of Fibre optics.

EEC-608 COMMUNICATION ENGINEERING	
SYLLABUS	**Mapping**
Amplitude Modulation: Amplitude modulation, DSBSC, SSB and VSB modulation and demodulation schemes AM transmitters and receivers, super-hetrodyne receiver, IF amplifiers, AGC circuits Frequency division multiplexing	CO1,CO2
Angle Modulation: Frequency modulation, phase modulation Generation of frequency modulation FM receivers and demodulators **Noise:** External noise, internal noise, Noise calculations, signal to noise ratioNoise in AM and FM systems	CO2
Pulse Communication Sampling Process, PAM, PWM, PPM and PCM, Delta modulation and adaptive delta modulation **Digital Modulation:** Introduction, brief description of phase shift keying (PSK), Differential phase shift keying (DPSK), frequency shift Keying (FSK), Quadrature amplitude modulation (QAM) and time division multiplexing (TDM).	CO3
Radio Propagation: Ground waves, sky wave propagation, space waves, tropospheric scatter propagation, Satellite Communication- transponders, Geo-stationary satellite system, low earth and medium earth-orbit satellite system. Introduction to Cellular system Personal communication system (PCS), data communication with PCS.	CO4
Television: TV systems and standards, scanning and synchronizing, common video and sound circuits, vertical and horizontal deflections, colour transmission and reception. **Fibre Optical Communication:** Optical fibre and fibre cables, fibre characteristics and classification, fibre optic components and systems.	CO5

Text Books:

1. G. Kennedy and B. Davis , “Electronic Communication Systems” Tata McGraw Hill

2. Simon Haykin, “ Communication Systems” John Wiley & Sons

Reference Books:

3. Roy Blake, “ Wireless Communication Technology” Thomson Asia Pvt. Ltd. Singapore

4. B. P. Lathi, “Modern Analog and Digital Communication Systems” Oxford University Press.

5. Taub & Schilling, “Principles of Communication Systems” McGraw Hill.

Course Name- COMMUNICATION ENGINEERING LABORATORY Course Code- EEC-658

Course Outcomes (CO):

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

CO1: Generate AM and FM signals and evaluate their performance.

CO2: Perform signal sampling by determining the sampling rates for baseband signals and reconstruct the signals.

CO3: Generate digital modulation signals for ASK, PSK and FSK and perform their detection

CO4: Simulate MSK, DPSK, QPSK and DEPSK schemes and estimate their BER.

CO5: Demonstrate the functioning of Television.

EEC-658: COMMUNICATION ENGINEERING LABORATORY	
SYLLABUS	**Mapping**
1. To study amplitude modulation using a transistor and determine depth of modulation.	CO1,CO2
2. To study generation of DSB-SC signal using balanced modulator.	CO2
3. To study generation of SSB signal	CO1
4. To study envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.	CO1,CO2
5. To study super heterodyne AM receiver and measurement of sensitivity, selectivity and fidelity.	CO1
6. To study frequency modulation using voltage controlled oscillator.	CO1
7. To detect FM signal using Phase Locked Loop.	CO3
8. To measure noise figure using a noise generator.	CO4
9. To study PAM, PWM and PPM.	CO1
10. To realize PCM signal using ADC and reconstruction using DAC and 4 bit/8bit system. Observe quantization noise in each case.	CO1,CO2
11. To study Delta Modulation and Adaptive Delta Modulation.	CO2
12. To study PSK-modulation system.	CO3,CO4
13. To study FSK-modulation system	CO3,CO4
14. To study sampling through a Sample-Hold circuit and reconstruction of the sampled signal and observe the effect of sampling rate & the width of the sampling pulses	CO4
15. To study functioning of colour television	CO5

Course Name- Digital Control System **Course Code- EEE-011**

Course Outcomes (CO):

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

CO1: Elaborate the various signal processing techniques in digital control.

CO2: Design the digital compensator.

CO3: Design the digital control system with state feedback

CO4: Analyze the various stability criteria's of digital control system

CO5: Elaborate the discrete Euler Lagrange equation.

EEE-011 Digital Control System	
SYLLABUS	**Mapping**
Signal Processing in Digital Control: Basic digital control system, advantages of digital control and implementation problems, basic discrete time signals, z-transform and inverse z-transform, modeling of sample-hold circuit., pulse transfer function, solution of difference equation by z-Transform method.	CO1
Design of Digital Control Algorithms: Steady state accuracy, transient response and frequency response specifications, digital compensator design using frequency response plots and root locus plots.	CO2
State Space Analysis and Design: State space representation of digital control system, conversion of state variable models to transfer functions and vice versa, solution of state difference equations, controllability and observability, design of digital control system with state feedback.	CO3
Stability of Discrete System: Stability on the z-plane and Jury stability criterion, bilinear transformation, Routh stability criterion on rth plane. Lyapunou's Stability in the sense of Lyapunou, stability theorems for continuous and discrete systems, stability analysis using Lyapunor's method.	CO4
Optimal digital control : Discrete Euler Lagrange equation, max. min. principle, otpimality & Dynamic programming, Different types of problem and their solutions.	CO5

Text Books:

1. B.C.Kuo, "Digital Control System",Saunders College Publishing.

2. M.Gopal, "Digital Control and State Variable Methods", Tata McGraw Hill.

Reference Books:

3. J.R.Leigh, "Applied Digital Control", Prentice Hall, International

4. C.H. Houpis and G.B.Lamont, "Digital Control Systems:Theory, hardware, Software",Mc Graw Hill.

Course Name- SPECIAL ELECTRICAL MACHINES Course Code- EEE-012

Course Outcomes (CO):

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

CO1: Elaborate general structure of Poly-phase AC machines.

CO2: Differentiate type of single phase induction motor and AC servomotors.

CO3: Demonstrate the stepper motor and switched reluctance motors.

CO4: Analyze the permanent magnet machines.

CO5: Elaborate linear induction motors.

EEE-012 SPECIAL ELECTRICAL MACHINES	
SYLLABUS	**Mapping**
Poly-phase AC Machines: Construction and performance of double cage and deep bar three phase induction motors; e.m.f. injection in rotor circuit of slip ring induction motor, concept of constant torque and constant power controls, static slip power recovery control schemes (constant torque and constant power)	CO1
Single phase Induction Motors: Construction, starting characteristics and applications of split phase, capacitor start, capacitor run, capacitor start capacitor-run and shaded pole motors. **Two Phase AC Servomotors:** Construction, torque-speed characteristics, performance and applications.	CO2
Stepper Motors: Principle of operation, variable reluctance, permanent magnet and hybrid stepper motors, characteristics, drive circuits and applications. **Switched Reluctance Motors:** Construction; principle of operation; torque production, modes of operation, drive circuits.	CO3
Permanent Magnet Machines: Types of permanent magnets and their magnetization characteristics, demagnetizing effect, permanent magnet dc motors, sinusoidal PM ac motors, brushless dc motors and their important features and applications, PCB motors. Single phase synchronous motor; construction, operating principle and characteristics of reluctance and hysteresis motors; introduction to permanent magnet generators.	CO4
Single Phase Commutator Motors:Construction, principle of operation, characteristics of universal and repulsion motors ; Linear Induction Motors. Construction, principle of operation, Linear force, and applications.	CO5

Text Books:

1. P.S. Bimbhra “Generalized Theory of Electrical Machines” Khanna Publishers.

2. P.C. Sen “ Principles of Electrical Machines and Power Electronics” John willey & Sons, 2001

3. G.K.Dubey “Fundamentals of Electric Drives” Narosa Publishing House, 2001

Reference Books:

4. Cyril G. Veinott “Fractional and Sub-fractional horse power electric motors” McGraw Hill International, 1987

5. M.G. Say “ Alternating current Machines”Pitman & Sons

Course Name- HIGH VOLTAGE ENGINEERING Course Code- EEE-021

Course Outcomes (CO):

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

CO1: Elaborate the break downs in gases, liquid and solid dielectrics.

CO2: Generate the mechanism of high voltages and currents.

CO3: Measure the high voltages and currents.

CO4: Analyze the non-destructive and high voltage testing.

EEE-021 HIGH VOLTAGE ENGINEERING	
SYLLABUS	**Mapping**
Break Down In Gases: Ionization processes, Townsend's criterion, breakdown in electronegative gases, time lags for breakdown, streamer theory, Paschen's law, break down in non-uniform field, breakdown in vacuum. **Break Down In Liquid Dielectrics:** Classification of liquid dielectric, characteristic of liquid dielectric, breakdown in pure liquid and commercial liquid. **Break Down In Solid Dielectrics:** Intrinsic breakdown, electromechanical breakdown, breakdown of solid, dielectric in practice, breakdown in composite dielectrics.	CO1
Generation of High Voltages and Currents: Generation of high direct current voltages, generation of high alternating voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.	CO2
Measurement of High Voltages and Currents: Measurement of high direct current voltages, measurement of high alternating and impulse voltages, measurement of high direct, alternating and impulse currents, Cathode Ray Oscillographs for impulse voltage and current measurements.	CO3
Non-Destructive Testing: Measurement of direct current resistively, measurement of dielectric constant and loss factor, partial discharge measurements **High Voltage Testing:** Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, testing of transformers, testing of surge arresters, radio interference measurements.	CO4

Text Book:

1. M. S. Naidu and V. Kamaraju, "High Voltage Engineering, Tata Mc-Graw Hill.

Reference Books:

2. E. Kuffel and W. S. Zacngal, High Voltage Engineering", Pergamon Press.
3. M. P. Chaurasia , "High Voltage Engineering", Khanna Publishers
4. R. S. Jha, "High Voltage Engineering", Dhanpat Rai & sons
5. C. L. Wadhwa, "High Voltage Engineering", Wiley Eastern Ltd.
6. M. Khalifa,' High Voltage Engineering Theory and Practice,' Marcel Dekker.
7. Subir Ray,' An Introduction to High Voltage Engineering' Prentice Hall of India

Course Name- INTELLIGENT INSTRUMENTATION Course Code- EEE-022

Course Outcomes (CO):

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

CO1: Understand the graphical and Historical Perspective of intelligent instrumentation.

CO2: Make students capable of analysis of virtual instrumentation.

CO3: Analyze the working of analog and digital instruments.

CO4: Design the PC hardware.

EEE-022 INTELLIGENT INSTRUMENTATION	
SYLLABUS	**Mapping**
1. **Introduction: Introduction to Intelligent Instrumentation:** Historical Perspective, current status, software based instruments. 2. **Virtual Instrumentation:** Introduction to graphical programming, data flow & graphical programming techniques, advantage of VI techniques, VIs and sub-VIs loops and charts , arrays, clusters and graphs, case and sequence structures, formula nodes, string and file I/O, Code Interface Nodes and DLL links.	CO1,CO2
3. Data Acquisition Methods: Analog and Digital IO, Counters, Timers, basic ADC designs, interfacing methods of DAQ hardware, software structure, use of simple and intermediate VIs. Use of Data Sockets for Networked Communication and Controls.	CO3
4. PC Hardware Review & Instrumentation Buses: Structure, timing, interrupts, DMA, operating system, ISA, PCI, USB, PCMCIA buses. IEEE488.1 & 488.2 Serial Interfacing - RS232C, RS422, RS423, RS485; USB, VXI, SCXI, PXI.	CO4

References:

1. G.C. Barney / Intelligent Instrumentation / Prentice Hall, 195.

2. A.S. Moris / Principles of Measurement & Instrumentation / Prentice Hall, 1993.

3. S. Gupta , J.P. Gupta / PC interfacing for Data Acquisition & Process Control, 2nd ED./ Instrument Society of America, 1994.

4. Gary Johnson / Lab VIEW Graphical Programing II Ediction / McGraw Hil 1997.

Course Name- CONVENTIONAL & CAD OF ELECTRICAL MACHINES
Course Code- EEE-023
Course Outcomes (CO):
After the successful completion of the course, students will be able to,
CO1: Analyze the various transformer designs.
CO2: Design the core and armature of dc and ac machines.
CO3: Design the rotor of three phase induction motor.
CO4: Analyze the various computer aided designs.

EEE-023 CONVENTIONAL & CAD OF ELECTRICAL MACHINES	
SYLLABUS	**Mapping**
Basic Considerations: Basic concept of design, limitation in design, standardization, modern trends in design and manufacturing techniques, Classification of insulating materials. Calculation of total mmf and magnetizing current. Transformer Design: Output equation design of core, yoke and windings, overall dimensions, Computation of no load current to voltage regulation, efficiency and cooling system designs	CO1
Design of rotating machines – I: Output equations of rotating machines, specific electric and magnetic loadings, factors affecting size of rotating machines, separation of main dimensions, selection of frame size. Core and armature design of dc and 3-phase ac machines	CO2
Design of rotating machines – II: Rotor design of three phase induction motors. Design of field system of DC machine and synchronous machines. Estimation of performance from design data	CO3
Computer Aided Design Philosophy of computer aided design, advantages and limitations. Computer aided design approaches analysis, synthesis and hybrid methods. Concept of optimization and its general procedure. Flow charts and 'c' based computer programs for the design of transformer, dc machine, three phase induction and synchronous machines.	CO4

Text Books:
1. K. Sawhney, "A Course in Electrical Machine Design" Dhanpat Rai & Sons.
2. K.G. Upadhyay," Conventional and Computer Aided Design of Electrical Machines" Galgotia Publications.
Reference Books:
3.M.G. Say, "The Performance and Design of AC Machines" Pitman & Sons.
4.A.E. Clayton and N.N. Hancock, "The Performance and Design of D.C.Machines" Pitman & Sons.
5.S.K. Sen, "Principle of Electrical Machine Design with Computer Programming" Oxford and IBM Publications.

Course Name: UTILIZATION OF ELECTRICAL ENERGY AND TRACTION

Course Outcome **Course Code: EEE-801**

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

CO1: Demonstrate the concept of electric heating.
CO2: Elaborate the electric welding and electrolytic process.
CO3: Analyze the illumination lighting schemes and refrigeration air conditioning system.
CO4: Demonstrate the various types of electric traction and their mechanics.
CO5: Control the traction drive.

EEE-801: UTILIZATION OF ELECTRICAL ENERGY AND TRACTION	
SYLLABUS	**MAPPING**
Electric Heating: Advantages and methods of electric heating, Resistance heating, Electric arc heating, Induction heating, Dielectric heating	**CO1**
Electric Welding: Electric Arc Welding**,** Electric Resistance welding Electronic welding control **Electrolyte Process:** Principles of electro deposition, Laws of electrolysis, applications of electrolysis	**CO2**
Illumination: Various definitions, Laws of illumination, requirements of good lighting Design of in door lighting and outdoor lighting systems **Refrigeration and Air Conditioning:** Refrigeration systems, domestic refrigerator, water cooler**,** Types of air conditioning, Window air conditioner	**CO3**
Electric Traction – I Types of electric traction, systems of track electrification**,** Traction mechanics- types of services, speed time curve and its simplification, average and schedule speeds**,** Tractive effort, specific energy consumption, mechanics of train movement, coefficient of adhesion and its influence	**CO4**
Electric Traction – II Salient features of traction drives Series – parallel control of dc traction drives (bridge transition) and energy saving, Power Electronic control of dc and ac traction drives Diesel electric traction.	**CO5**

Text Books:

1. H.Partab,"Art and Science of Electrical Energy" Dhanpat Rai & Sons.
2. G.K.Dubey,"Fundamentals of Electric Drives" Narosa Publishing House

Reference Books:

3. H. Partab, " Modern Electric Traction" Dhanpat Rai & Sons.
4. C.L. Wadhwa, " Generation, Distribution and Utilization of Electrical Energy" New Age International Publications.

Course Name: Power Quality **Course Code: EEE-061**

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

CO1: Develop the concept of importance of power quality
CO2: Differentiate among the various methods of protection from voltage sag.
CO3: Analyze the sources of transients and devices for its protection.
CO4: Demonstrate the techniques for harmonic protection.
CO5: Measure and calculate the power quality problems.
CO6: Design the custom power devices

EEE 061- Power Quality		
	SYLLABUS	**MAPPING**
Unit I	**Introduction to Power Quality:** Terms and definitions of transients, Long Duration Voltage Variations: under Voltage, Under Voltage and Sustained Interruptions**;** Short Duration Voltage Variations: interruption, Sag, Swell; Voltage Imbalance; Notching D C offset, waveform distortion; voltage fluctuation; power frequency variations**.**	**CO 1**
Unit II	**Voltage Sag:** Sources of voltage sag: motor starting, arc furnace, fault clearing etc; estimating voltage sag performance and principle of its protection; solutions at end user level- Isolation Transformer, Voltage Regulator, Static UPS, Rotary UPS, Active Series Compensator.	**CO 2**
Unit III	**Electrical Transients:** Sources of Transient Over voltages- Atmospheric and switching transients- motor starting transients, pf correction capacitor switching transients, ups switching transients, neutral voltage swing etc; devices for over voltage protection.	**CO 3**
Unit IV	**Harmonics:** Causes of harmonics; current and voltage harmonics: measurement of harmonics; effects of harmonics on Transformers, AC Motors, Capacitor Banks, Cables, and Protection Devices, Energy Metering, Communication Lines etc. harmonic mitigation techniques.	**CO 4**
Unit V	**Measurement and Solving of Power Quality Problems:** Power quality measurement devices- Harmonic Analyzer , Transient Disturbance Analyzer, wiring and grounding tester, Flicker Meter, Oscilloscope, multimeter etc. **Introduction to Custom Power Devices**- Network Reconfiguration devices; Load compensation and voltage regulation using DSTATCOM; protecting sensitive loads using DVR; Unified power Quality Conditioner. (UPQC)	**CO5, CO6**

Text Books:

1. Roger C Dugan, McGrahan, Santoso & Beaty, "Electrical Power System Quality" McGraw Hill
2. Arinthom Ghosh & Gerard Ledwich, "Power Quality Enhancement Using Custom Power Devices" Kluwer Academic Publishers
3. C. Sankaran, " Power Quality" CRC Press.

Course Name: SCADA & ENERGY MANAGEMENT SYSTEM

Course Code: EEE-062

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

CO1: Understand the effect of SCADA.

CO2: Analyze the supervisory and control functions of the data acquisition systems.

CO3: Communicate between MAN and machines.

CO4: Configure between non redundant and redundant dual processors.

CO5: Explore the functions of the energy management centers.

EEE – 062: SCADA & ENERGY MANAGEMENT SYSTEM		
	SYLLABUS	**MAPPING**
Unit I	**1. SCADA:** Purpose and necessity, general structure, data acquisition, transmission & monitoring. general power system hierarchical Structure. Overview of the methods of data acquisition systems, commonly acquired data, transducers, RTUs, data concentrators, various communication channels- cables, telephone lines, power line carrier, microwaves, fiber optical channels and satellites.	**CO 1**
Unit II	**2. Supervisory and Control Functions:** Data acquisitions, status indications, majored values, energy values, monitoring alarm and event application processing. Control Function: ON/ OFF control of lines, transformers, capacitors and applications in process in industry - valve, opening, closing etc. Regulatory functions: Set points and feed back loops, time tagged data, disturbance data collection and analysis. Calculation and report preparation.	**CO 2**
Unit III	**3. MAN- Machine Communication:** Operator consoles and VDUs, displays, operator dialogues, alarm and event loggers, mimic diagrams, report and printing facilities.	**CO 3**
Unit IV	**4. Data basis-** SCADA, EMS and network data basis. SCADA system structure - local system, communication system and central system. Configuration- NON-redundant- single processor, redundant dual processor. multicontrol centers, system configuration. Performance considerations: real time operation system requirements, modularization of software programming languages.	**CO 4**
Unit V	**5. Energy Management Center:** Functions performed at a centralized management center, production control and load management economic dispatch, distributed centers and power pool management.	**CO 5**

Text Books:

1. Torsten Cergrell, " Power System Control Technology", Prentice Hall International.
2. George L Kusic "Computer Aided Power System Analysis",, Prentice Hall of India,
3. A. J. Wood and B. Woolenberg, "Power Generation Operation and Control", John Wiley & Sons.
4. Sunil S Rao, "Switchgear Protection & Control System" Khanna Publishers 11th Edition.

Course Name: POWER CONVERTER APPLICATIONS Course Code: EEE-063

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

CO1: Understand the effect of source inductance on the performance of converters.
CO2: Differentiate among the various types of FACT controllers.
CO3: Analyze the importance of various types of power supplies.
CO4: Applegate the various types of converters in the industries.
CO5: Interconnect the renewable energy sources to the power grid.

EEE – 063: POWER CONVERTER APPLICATIONS		
	SYLLABUS	**MAPPING**
Unit I	**HVDC Transmission:** Schematic diagram, modes of operation, twelve pulse line commutated converters, effect of source inductance, control of HVDC converters, converter faults and protection, harmonic filters.	**CO 1**
Unit II	**FACT Controllers :** Principle of power transmission, principles of shunt compensation and series compensation; Shunt compensators-TCR,TSC, SVC,STATCOM Series compensators-TSSC,FCSC,TCSC,SSVC; Phase angle compensator, Unified power flow controller (UPFC),comparison of compensators.	**CO 2**
Unit III	**Power Supplies:** Desirable specifications of power supplies, drawbacks of linear power supply. Switch-Mode Power supply (SMPS)-schematic diagram, flyback converter, forward converter, push-pull converter, half bridge and full bridge converters; Uninterruptible power supply (UPS)-configurations of offline and on-line UPS, switch mode and resonant power supplies; air-craft power supply.	**CO 3**
Unit IV	**Industrial Applications:** High frequency inverters for induction and dielectric heating, ac voltage controllers for resistance heating and illumination control, high frequency fluorescent lighting, electric welding control.	**CO 4**
Unit V	**Interconnection of Renewable Energy Sources to the Utility Grid :** Photovoltaic array interconnection, wind and small hydro interconnection, interconnection of energy storage systems; DC circuit breaker, single phase and three phase ac switches; Excitation control of synchronous generators.	**CO 5**

Text Books:

1. Ned Mohan, T.M.Undeland and William P. Robins, "Power Electronics: Converters, Applications and Design", John Wiley & Sons.
2. M.H. Rashid, "Power Electronics: Circuits, Devices and Applications" Prentice Hall of India.

Reference Books:

3. K.R.Padiyar, "HVDC Power Transmission: Technology and System Reactions" New Age International.

Course Name: BIO-INSTRUMENTATION **Course Code: EEE-051**

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

CO1: Understand the basic transducer principle.
CO2: Differentiate among the various types of electrodes.
CO3: Analyze the importance of nervous system.
CO4: Demonstrate patient care monitoring.
CO5: Interconnect the computer with medical instrumentation and other equipments.

EEE – 051: BIO-INSTRUMENTATION		
	SYLLABUS	**MAPPING**
Unit I	**Basic physiological system of the body:** Problems encountered in measuring living systems, bioelectric potentials, biomaterials **Basic Transducer Principles:** Active and passive transducers, Transducers for biomedical applications. Generation, propagation and distribution of bioelectric potentials (ECG, EEG and EMG).	**CO 1**
Unit II	**Bio-potential electrodes:** Basic types (micro, skin surface and needle electrodes) biochemical transducers. (PH, blood, gas and specific ions electrodes). **The cardiovascular system and measurements:** Heart and cardiovascular system and circulation block diagram, blood pressure and measurement, characteristics of blood flow and heart sounds. Electrocardiography, ECG lead configurations, ECG recording and their types	**CO 2**
Unit III	**The Nervous System** The anatomy of nervous system, Neuronal communication, EPSP & IPSP Organization of the brain, Measurements from the nervous system **Systemic Body & Skin Temperature Measurement** Temperature measurements Brief idea about ultrasonic measurements	**CO 3**
Unit IV	**Patient care monitoring:** Elements of intensive care, Organization of the Hospital for patient-care monitoring Pace-makers-types, systems, modes and generators, Defibrillators-types. Bio telemetry & applications of telemetry in patient care	**CO 4**
Unit V	Automation of chemical tests, Instrumentation for diagnostic X Rays, Interfacing computer with medical instrumentation and other equipments, biomedical computer applications. Shock hazards from electrical equipments, methods of accident prevention	**CO 5**

Text Book:

1. T. Cromwell, F.J. Weibell & F.A.Pfieffer, "Biomedical Instrumentation & Measurements" Prentice Hall
International

Reference Books:

2. R.S. Khanpur, "Handbook of Biomedical Instrumentation" Tata Mc Graw Hill
3. H.E. Thomas, "Handbook of Biomedical Instrumentation and Measurement" Restone Publishing Company
4. J.G. Webester, "Medical Instrumentation", Houghton Mifflin.

Course Name: ADVANCED CONTROL SYSTEM **Course Code: EEE-052**

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

CO1: Understand the state space analysis of continuous system.

CO2: Analyze the Discrete system.

CO3: Analyze the importance of stability in advanced control system.

CO4: Understand the optimization of control system.

CO5: Elaborate the adaptive control systems fuzzy system.

EEE – 052: ADVANCED CONTROL SYSTEM		
	SYLLABUS	**MAPPING**
Unit I	**State Space Analysis of Continuous System:** Review of state variable representation of continuous system, conversion of state variable models to transfer function and vice-versa, solution of state equations and state transition matrix, controllability and obsrvability, design of state observer and controller	**CO 1**
Unit II	**Analysis of Discrete System:** Discrete system and discrete time signals, state variable model and transfer function model of discrete system, conversion of state variable model to transfer function model and vice-versa, modeling of sample hold circuit, solution of state difference equations, steady state accuracy, stability on the z-plane and Jury stability criterion, bilinear transformation, Routh-Hurwitz criterion on rth planes	**CO 2**
Unit III	**Stability:** Lyapunov's stability theorems for continuous and discrete systems, methods for generating Lyapunov function for continuous and discrete system, Popov's criterion. **Non linear System:** Types of non linearities, phenomena related to non - linear systems. Analysis of non linear systems-Linearization method, second order non-linear system on the phase plane, types of phase portraits, singular points, system analysis by phase-plane method, describing function and its application to system analysis.	**CO 3**
Unit IV	**Optimal Control:** Introduction, formation of optimal control problem, calculus of variations minimization of functions, constrained optimization. Pontryagin's Minimum Maximum Principle, Linear Quadratic Problem-Hamilton Jacobi equation, Riccati equation and its solution.	**CO 4**
Unit V	**Adaptive Control:** Introduction, modal reference adaptive control systems, controller structure, self tuning regulators. Introduction to neural network, fuzzy logic and genetic algorithms	**CO 5**

Text Books:

1. M.Gopal, "Digital Control and State variable Methods", Tata Mc Graw Hill
2. Ajit K.Madal, "Introduction to Control Engineering: Modelling, Analysis and Design"
3. New Age International.
4. D.Landau, "Adaptive Control", Marcel Dekker Inc.
5. S.Rajasekaran & G.A.Vjayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic
6. Alogorithms: Synthesis and Applications" Prentice Hall of India.

Reference Book:

7. Donald E. Kiv, "Optimal Control Theory: An Introduction" Prentice Hall
8. B.C. Kuo, "Digital Control Systems" Sounders College Publishing

9. C.H.Houpis and G.B.Lamont,"Digital Control Systems:Theory,Hardware,Software"Mc Graw Hill.

Course Name: RELIABILITY ENGINEERING **Course Code: EEE-053**

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

CO1: Understand the reliability concept.
CO2: Demonstrate the reliability mathematics.
CO3: Differentiate the reliability types of system.
CO4: Analyze the methods of reliability improvement.
CO5: Understand the method of life testing.

EEE – 053: RELIABILITY ENGINEERING		
	SYLLABUS	**MAPPING**
Unit I	**1. Introduction:** Definition of reliability, types of failures, definition and factors influencing system effectiveness, various parameters of system effectiveness.	**CO 1**
Unit II	**2. Reliability Mathematics :** Definition of probability, laws of probability , conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis procedures, empirical reliability calculations.	**CO 2**
Unit III	**3. Reliability:** Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie-set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.	**CO 3**
Unit IV	**4. Reliability Improvements:** Methods of reliability improvement, component redundancy, system redundancy, types of redundancies-series, parallel, series - parallel, stand by and hybrid, effect of maintenance.	**CO 4**
Unit V	**5. Reliability Testing:** Life testing, requirements, methods, test planning, data reporting system, data reduction and analysis, reliability test standards.	**CO 5**

Reference Books:

1. R.Billintan & R.N. Allan,"Reliability Evaluation of Engineering and Systems", Plenum Press.
2. K.C. Kapoor & L.R. Lamberson,"Reliability in Engineering and Design", John Wiely and Sons.
3. S.K. Sinha & B.K. Kale,"Life Testing and Reliability Estimation", Wiely Eastern Ltd.
4. M.L. Shooman, "Probabilistic Reliability, An Engineering Approach", McGraw Hill.
5. G.H.Sandler,"System Reliability Engineering", Prentice Hall.

Course Name: ENERGY EFFICIENCY AND CONSERVATION Course Code: EEE-054

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

CO1: Understand the Principles of Energy Conservation.

CO2: Demonstrate the demand side management.

CO3: Analyze the voltage and reactive power in distribution system.

CO4: Create the Load scheduling/shifting.

CO5: Evaluate the Efficiency in Motors and Lighting system.

EEE-054: ENERGY EFFICIENCY AND CONSERVATION		
	SYLLABUS	**MAPPING**
Unit I	**Energy conservation:-** Principles of Energy Conservation, Energy conservation Planning, Energy conservation in small scale industries, Large scale industries and in electrical generation, transmission and distribution. Energy conservation Legislation. **Energy Audit:-** Aim of energy Audit, Strategy of Energy Audit, Energy management Team Considerations in implementing energy conservation Programme, Instruments for energy audit, Energy audit of Electrical System, HVAC, Buildings, Economic analysis.	**CO 1**
Unit II	**Demand Side Management:-** Concept and Scope of Demand Side Management, Evolution of Demand Side Management, DSM Strategy ,Planning, Implementation and its application. Customer Acceptance & its implementation issues. National and International Experiences with DSM.	**CO 2**
Unit III	**Voltage and Reactive power in Distribution System:-** Voltage and reactive power calculations and control: Voltage classes and nomenclature, voltage drop calculations, Voltage control, VAR requirements and power factor, Capacitors unit and bank rating, Protection of capacitors and switching, Controls for switched capacitors and fields testing.	**CO 3**
UnitIV& V	**Efficiency in Motors and Lighting system:-** Load scheduling/shifting, Motor drives- motor efficiency testing, energy efficient motors, and motor speed control. Lighting- lighting levels, efficient options, fixtures, day lighting, timers, Energy efficient windows.UPS selection, Installation operation and maintenance. Indian Electricity Act 1956, Distribution Code and Electricity Bill 2003	**CO 4, CO 5**

Text / Reference Books

1. Tripathy S. C., "Electric Energy Utilization and conservation", Tata McGraw Hill.
2. Industrial Energy Conservation Manuals, MIT Press, Mass, 1982.
3. "The Efficient Use of Energy", Edited by I.G.C.Dryden, Butterworths, London, 1982.
4. Energy Management Handbook, Edited by W.C.Turner, Wiley, New York, 1982.
5. L.C.Witte, "P.S.Schmidt, D.R. Brown, Industrial Energy Management and Utilization", HemispherePubl,
Washington, 1988
6. Power Capacitor Handbook, Butterworth & Co (Publishers) Ltd, 1984.
7. Electrical Systems Analysis and Design for Industrial Plants, McGraw-Hill Book Company.
8. IEEE Bronze Book, 'Recommended Practice for Energy Conservation and cost effective planning in Industrial facilities, IEEE Press.

Course. Digital Electronics. Coordinating Unit. School of Electrical & Electronic Engineering.Â Practical Coordinator Name: Dr Hong-Gunn Chew Email: honggunn.chew@adelaide.edu.au Room: Ingkarni Wardli 3.52. Course Timetable. The full timetable of all activities for this course can be accessed from Course Planner.Â TOPIC 1: Introduction to Digital Electronics Analog and digital electronics: analog and digital representation, applications of digital electronics Managing complexity: abstraction, modularity, abstraction, design communication, written communication, working in diverse teams, presentations Logic gates Digital logic technologies: discrete logic, PLAs, FPGAs, microcontrollers, PLCs, integrated logic.

Electronics Tutorial about Combinational Logic Circuits that use Logic Gates to make Multiplexers, Encoders and Solid State Switches.Â Unlike Sequential Logic Circuits whose outputs are dependant on both their present inputs and their previous output state giving them some form of Memory. The outputs of Combinational Logic Circuits are only determined by the logical function of their current input state, logic â€œ0â€ or logic â€œ1â€, at any given instant in time. The result is that combinational logic circuits have no feedback, and any changes to the signals being applied to their inputs will immediately have an effect at the output. In other words, in a Combinational Logic Circuit, the output is dependant at all times on the combi the right components, design and build circuits, use microcontrollers and ICs, work with the latest software Digital Principles and Logic Design. 507 PagesÂ·2007Â·8.1 MBÂ·2,182 DownloadsÂ·New! . Programmable Logic Devices.Â , combinational and sequential logic design, as well as more advanced subjects such as assembly language Electronic Circuits: Handbook for Design and Application. 2008Â·17.02 MBÂ·6,109 DownloadsÂ·New! circuits starts with the internal circuitry of logic gates and continues with combinatorial and sequen Boolean Algebra and Logic Gates. 524 PagesÂ·2006Â·9.92 MBÂ·1,435 Downloads. and Subtractors. In digital circuit theory, combinational logic (sometimes also referred to as time-independent logic) is a type of digital logic which is implemented by Boolean circuits, where the output is a pure function of the present input only. This is in contrast to sequential logic, in which the output depends not only on the present input but also on the history of the input. In other words, sequential logic has memory while combinational logic does not.