Second Year Second Semester

Course code	**EE/PC/B/T/221**
Category	Program Core
Course title	Electrical Instrumentation
Scheme and Credits	L-T-P: 2-1-0; Credits: 3.0;
Pre-requisites (if any)	

EE/PC/B/T/221 : Electrical Instrumentation	L	T
Transducers: Recapitulation of preliminaries. Linear Variable Differential Transducers (LVDTs). Null reduction techniques. Phase compensation circuits. Phase sensitive demodulation. Synchronous demodulation.	3	1
Capacitive transducers: variable air gap, variable plate overlap, variable dielectric. Level gauge. Thickness gauge. Humidity sensor. Capacitive microphone. Signal conditioning circuits for capacitive transducers: reactive bridges, transformer ratio bridges, multivibrator circuits, op-amp based circuits.	3	1
Pressure transducers: Primary sensing elements: Diaphragms, Bourdon tube, diaphragm, bellows. Capacitive pressure sensor and other electronic pressure gauges.	2	0
Piezoelectric transducers. Fundamental concepts, materials, charge sensitivity, voltage sensitivity. Force/displacement transducers. Buffer amplifiers, charge amplifiers. Static and dynamic responses. Accelerometers.	2	1
Hot wire anemometers: constant-current and constant temperature varieties for measurement of static and dynamic flow. Electromagnetic flowmeters: dc, ac and interrupted dc excitation for magnet system. Ultrasonic transit-time flowmeters: wetted and nonwetted varieties.	4	1
Radiation pyrometers: Stefan-Boltzmann law and Planck’s law. Total radiation pyrometer. Disappearing filament system.	2	0
Active filters: Filter approximations Techniques: Butterworth, Chebyshev. Realization of Active Filter circuits. State-variable filter. Switched capacitor filter circuits.	6	3
Data Converters: DAC: Binary-weighted register, R-2R ladder. DAC characteristics & specifications. DAC errors. ADC: Successive-approximation, Dual-slope, Delta-sigma. ADC codes and errors.	4	3
Waveform display devices & applications: CRT, LCD, LED. PLL and its applications.	3	1

Reference Books:

1	Measurement Systems-Application and Design: Doebelin
2	Transducers and Instrumentation: D. V. S. Murty
3	Principles of Measurement Systems: Bentley
4	Operational Amplifiers: Clayton and Winders
5	Instrument Transducers: Neubert

6	Principle of Industrial Instrumentation: Patranabis
7	Electronic Data Converters: Anvekar & Sonde
8	Analog and Digital Filters: Design and Realization. H. Y. F. Lam
9	Passive and Active Filters: Theory and Implementations: W. K. Chen
10	Digital Principles &Applications : Malvino & Leach
11	Modern Electronic Instrumentation & Measurement Techniques : Helfrick & Cooper
12	Principles of Electronic Instrumentation: D. Patranabis
13	Data conversion handbook, Analog Devices Inc., Elsevier.

Content Delivery Method

- Class room lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

The students of the course should be able to

CO1	**Describe** operations of various display devices used in electrical instrumentation. (K1)
CO2	**Describe** the operating principles of various transducers. (K2)
CO3	**Discuss** operating principles and applications of PLL, switched capacitor and state variable filter circuits. (K2)
CO4	**Solve** numerical problems on various errors of different types of data converters.(K3)
CO5	**Analyze** the signal conditioning circuits for different types of sensors. (K4)
CO6	**Deduce** various active filter circuits based on filter approximation techniques. (K4)

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Electrical Instrumentation	CO1	3				1							
	CO2	3											
	CO3	3											
	CO4	3	2										
	CO5	2	3	2	1								
	CO6	2	3	2									

Course code	**EE/PC/B/T/222**
Category	Program Core
Course title	Electrical Machines - II
Scheme and Credits	L-T-P: 2-1-0; Credits: 3.0;
Pre-requisites (if any)	

EE/PC/B/T/222 : Electrical Machines - II	L	T
M.M.F. distribution of poly phase distributed winding subjected to poly phase excitation; Winding factors of distributed winding;	2	1
Production of rotating magnetic field. Induced e.m.f& its frequency: relationship to no. of poles; synchronous speed; slip, slip speed and slip frequency, mechanical and electrical angles. Types of ac machine windings.	2	0
Three-phase induction motor: Construction of IM and materials used. Squirrel cage and Wound-rotor/Slip-ring rotor construction.	2	0
Operating principle; slip. Per-phase equivalent circuit. Phasor diagram. Equations for torque. Torque-speed & torque-slip characteristics. Effect of change in rotor resistance in slip-ring machine and slip power recovery.	2	2
Deep bar and Double cage rotor. Pole changing motor. Methods of starting and speed control.	2	1
No-load and blocked rotor test : determination of equivalent circuit parameters. Separation of losses. Circle diagram.	2	1
Space harmonics : Crawling & cogging	1	0
Tests as per standards.	1	0
Operation of the induction machine as a generator.	1	0
Polyphase Transformer: Construction and basic principle of operation. Core type 3-limb & 5-limb construction and shell type and three phase transformer bank. Flux distributions in different constructions.	1	1
Polyphase connections: Star, Delta and Inter-connected star/ zig-zag connections. Vector groups. Significance of vector groups in parallel operation.	3	1
Special connections: T connection. Phase shifting connections. Scott and Le-Blanc connections, 3-phase to 1-phase transformation. Open Delta and reverse delta connections. Three-phase auto-transformers: different connections.	3	1
Harmonics in Transformers: Origin of harmonics, behavior of transformers with different connections and different constructions.	2	1
Tertiary windings: its requirement and equivalent circuit.	1	1
Tap changer principles: OFF-load and On-load types, reactor and resistor types.	2	0
Impulse on transformers, Graded insulation and shielding for HV.	1	1
Tests as per standards.	1	0

Reference Books:	
1	AC Machines : Puchstein, Lloyd & Hunte
2	Performance and Design of Alternating Current Machines: M. G. Say
3	Principles of Alternating Current machinery: Lawrence
4	Electrical machines: P.K. Mukherjee & S. Chakravorti
5	Electrical Machinery : P. S. Bimbhra
6	Electrical Machinery : S. K. Sen
7	Generalised Theory of Electrical Machines : P. S. Bimbhra
8	Electrical Machinery : A. E. Fitzgerald & C. Kingsley
9	J & P Transformer Handbook

Content Delivery Method

- Class room lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

The students of the course should be able to

CO1	**Describe** the basic principles of operation of three phase transformer and induction machine. (K1)
CO2	**Discuss** the constructions of three phase transformer and induction machine. (K2)
CO3	**Develop** equivalent circuits for three phase transformer and induction machine. (K3)
CO4	**Analyze** various performance characteristics of three phase transformer and induction machine. (K4)
CO5	**Solve** numerical problems related to various aspects of three phase transformer and induction machine. (K3)

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Electrical Machines - II	**CO1**	**3**	**2**										
	CO2	**3**	**2**	**1**				**1**					
	CO3	**2**	**2**	**3**									
	CO4	**2**	**2**	**3**									
	CO5	**2**	**2**	**3**									

Course code	**EE/PC/B/T/223**
Category	Program Core
Course title	Power Supply Systems
Scheme and Credits	L-T-P: 2-1-0; Credits: 3.0;
Pre-requisites (if any)	

EE/PC/B/T/223 : Power Supply Systems	L	T
Structure of Power System – Generation, transmission and distribution. Power generating stations – different types.	1	0
Steam power stations: Main parts and working, types of boilers and their characteristics. Characteristics of steam turbines and alternators. Main flow circuits of steam power station. Power station auxiliaries, cooling system of alternators. Starting up and shut down procedures of thermal units.	6	2
Gas-turbine power stations- Main parts, plant layout and Bryton cycle operation. Combined cycle generation & Co-generation.	3	1
Nuclear power stations- Layout of nuclear power station, types of power reactors, main parts and control of reactors, nuclear waste disposal, radioactivity and hazards.	2	1
Hydroelectric stations: Arrangement and location of hydroelectric stations, principles of working, types of turbines and their characteristics, Pumped storage plants. Coordination of operation of different power stations.	4	1
Substation - Classification of substations, Major equipment in Substation, Busbar layouts.	2	0
Power distribution system: Primary and secondary distribution, types of conductors in distribution system, comparison of distribution systems.	4	1
Distributor design, radial and ring main, current and voltage profiles along a distributor, economics of feeder design.	4	2
Electrical wiring and installation - Domestic, commercial and industrial wiring, estimation of main, submain and subcircuit wiring.	3	0
Earthing practice. Testing of installation. Special lighting connections. Conductors, Fuse and disconnecting devices.	3	0

Reference Books:

1	Power plant Technology: M. M. El-Wakil, McGraw Hill
2	Power Station Engineering & Economy: B. G. A. Skrotzki & W. A. Vopat, Tata McGraw Hill
3	A Course in Power Plant Engineering: Arora & Domkundwar, Dhanpat Rai
4	Elements of Electrical Power Station Design: M. V. Deshpande, Wheeler
5	Electric Power Distribution System Engineering: Turan Gonen
6	Transmission & Distribution: H. Cotton

Content Delivery Method

- Class room lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

The students of the course should be able to

CO1	**Discuss/ describe** the basic principles of operation of conventional power generating stations. (K2)
CO2	**Discuss** and clarify domestic, commercial and industrial wiring and installation. (K2)
CO3	**Classify** substation and identify major equipment in a substation, (K4)
CO4	**Explain** the principle of feeder design. (K2)
CO5	**Calculate** the current loading and voltage drop in different types of distributors. (K3)

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Power Supply Systems	**CO1**	**3**	**2**				**1**	**1**					
	CO2	**3**					**2**		**2**				
	CO3	**1**	**2**	**3**									
	CO4	**1**	**2**	**3**									
	CO5	**1**	**2**	**3**	**2**								

Course code	**EE/PC/B/T/224**
Category	Program Core
Course title	Digital Signal Processing
Scheme and Credits	L-T-P: 2-1-0; Credits: 3.0;
Pre-requisites (if any)	

EE/PC/B/T/224: Digital Signal Processing	L	T
Analog Signal Processing versus Digital Signal Processing. Sampling and Aliasing. Frequency domain representation of uniformly-sampled signals. Anti-alias filter.	2	1
Different types of sequences – Causal, anticausal and noncausal (two-sided) sequences. Odd and even sequences. Power and energy sequences. Time-domain operation on sequences – convolution and correlation.	1	1
Z-transform and its properties. ROCs of Z-transforms. Mapping between z-plane and s-plane, Discrete-Time Fourier Transform. Inverse Z-transform.	3	1
Discrete-Time LTI systems. Impulse response of DTLTI systems. Convolution representation. Recursive and Non-recursive systems. FIR and IIR systems. Z-transfer function and frequency response.	3	1
Introduction to the Discrete Fourier transform (DFT): Fourier series for a periodic signal, Fourier series for a periodic discrete sequence, Discrete Fourier Transform (DFT), Inverse Discrete Fourier Transform (IDFT). Properties of DFT: periodicity, linearity, symmetry. Circular convolution. Computation of DFT.	2	1
Fast Fourier Transforms (FFT): radix-2 decimation in frequency in-place FFT algorithm. 4-point FFT and 8-point FFT. Comparison of DFT and FFT. Applications of FFT. Introduction to the Discrete Cosine transform (DCT).	2	1
FIR digital filters. Distortion-less transmission of signal through a filter: linear phase characteristic. Concepts of phase delay and group delay. Linear phase digital filter. Properties of linear phase digital filter: periodicity, symmetry.	1	1
Design of digital filters by Fourier Series method. Frequency response of digital filters, realization problems. Direct realization of linear phase FIR digital filters, effect of truncation of impulse response, circular complex convolution integral, Gibb's phenomenon.	2	1
Common window functions for design of linear phase FIR filters: Bartlett, Hamming, Hann, and Blackman. Frequency domain characteristics of common window functions. Design of brick-wall type low pass, high pass, band pass FIR digital filters.	1	1
Design of linear phase FIR filters by the frequency sampling method. Design of optimum equiripple linear phase FIR filters.	1	1
FIR digital filters for off-line analysis of one-dimensional and two-dimensional data. 2-D finite impulse sequence of FIR filters.	2	0
Design of IIR filters by discretizing analog filters. Impulse invariant transformation, Bilinear Transformation, Mapping of differentials, Matched Z-transform. Structures for	3	1

IIR filters – Direct realizations, Cascade realization, Transposed Structures.		
Ideal Interpolation Formula for reconstructing analog signals from their samples. DAC employing zero-order hold.	1	0
Finite word length effects in digital IIR filters.	1	0
Introduction to image processing: gray image as a two-dimensional continuous function of space. Image filtering: a two-dimensional filtering problem, FIR image filters for low pass and high pass filtering. Contrast enhancement by histogram equalization.	1	1
Digital signal processors. Processor architecture: Von Neumann architecture, Harvard architecture, modified Harvard architecture. TMS320C25 processor: architecture, multiply/accumulate operation, benchmarks.	2	0

Reference Books:

1	Digital Signal Processing: Principles, Algorithms & Applications: J. G. Proakis and M. G. Manolakis.
2	Signals and Systems: Simon Haykin and Barry Van Veen
3	Network Analysis and Synthesis: M. E. Van Valkenburg
4	Principles of Linear Systems and Signals (International Version): B. P. Lathi
5	Discrete-Time Signal Processing: Oppeinham, Schaffer and Buck
6	Digital Signal Processing: P. Ramesh Babu
7	Digital Signal Processing: T. K. Rawat
8	Digital Signal Processing: J. R. Johnson
9	Digital Signal Processing: Spectral Computation and Filter Design: Chi-Tsong Chen
10	Digital Image Processing: Gonzalez and Woods.

Content Delivery Method

- Class room lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

The students of the course should be able to

CO1	**Describe** the basic principles, properties and applications of uniform sampling process, Z-transform, discrete-time Fourier Transform (DTFT), Discrete Fourier Transform (DFT) and Fast Fourier Fourier Transform (FFT). (K1)
CO2	**Illustrate** the basic principles, properties and applications of Discrete-time LTI systems, one-dimensional and two-dimensional Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) digital filters, and digital signal processors. (K2)
CO3	**Apply** DFT and digital filters for one-dimensional and two-dimensional signal processing for engineering problems. (K3)
CO4	**Solve** problems for designing FIR and IIR filters. (K3)
CO5	**Analyse** implementation issues and realization problems related to digital filters and digital-

	to-analog converters. (K4)

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Digital Signal Processing	**CO1**	**3**	**1**													**3**
	CO2	**3**	**1**													**3**
	CO3	**2**	**3**	**2**	**1**											**3**
	CO4	**2**	**3**	**2**	**1**											**3**
	CO5	**2**	**3**	**1**	**2**											**3**

Course code	**EE/PC/B/T/225**
Category	Program Core
Course title	Sequential Systems & Microprocessors
Scheme and Credits	L-T-P: 3-0-0; Credits: 3.0;
Pre-requisites (if any)	

EE/PC/B/T/225 : Sequential Systems & Microprocessors	L	T
Sequential Circuits. State machines and State diagrams. Present State Table, Next State Table.	2	0
Concepts of Synchronous, Asynchronous, Linear Sequential Machine. Time driven, Event driven and Time/Event driven sequential systems. Statement List, Process timing diagram, Function sequence, Chart, Mode Chart, Start Chart. Case Studies.	4	0
Relay logic and switching algebra Ladder diagram representation of sequential systems. Design of elementary sequential systems. Petrinet representation and case studies.	3	0
Memory Interfacing: Memory Map, Address decoding, word-size expansion, capacity expansion.	2	0
Algorithmic Sequential Machines; Design of Direct Addressed and Indirect Addressed ROM based Sequential systems, Case Studies.	3	0
Design of Input Forming Logic of the State Machine using Direct -Addressed and Indirect Addressed Multiplexers. Case Studies.	3	0
State Assignment for Minimization of Output Forming Logic. State assignment to eliminate output glitches. Microprocessor as an FSM/ASM.	3	0
Microprocessor Architecture: Address / Data and Control lines, Timing diagrams, Internal registers, Interrupt mechanism (Hardware/Software), DMA mechanism - [NB: Study mainly based on Intel 8085 and other popular microprocessors].	3	0
Detailed description of a typical 8-bit Microprocessor (preferably 8085).	4	0
Interfacing with support chips: Programmable Peripheral Interface (8255), Programmable time/counter (8253), Programmable UART (8251), Programmable Interrupt Controller (8259), DMA Controller (8257), Programmable Keyboard and Display Controller (8279) - signals and timing details along with hardware/software interfacing techniques. I/O interfaces with switch, multi-segment display, ADC/DAC	6	0
Assembly Language Programming of 8 bit Microprocessor: Instruction Cycle, Machine Cycle, T states. Instruction Set, addressing modes, stack subroutine, interrupt service routines. Example programs in assembly languages.	5	0
Concept and operation of Assembler and Cross Assembler, Brief overview of 16-bit Microprocessors (Intel, Motorola)	2	0

Reference Books:	
1	Microprocessor Architecture, Programming and Applications with the 8085A/8080A: Ramesh S. Gaonkar, Wiley Eastern Limited.
2	Digital Logic and State Machine Design: David J. Comer, Hold, Rinehart and Winston.

Content Delivery Method

- Class room lecture (chalk and board) (D1)
- Visual presentation (D2)
- Discussion (D7)

Course Outcomes:

The students of the course should be able to

CO1	**Describe** time/event driven sequential systems and their implementation using flip-flops, registers etc. along with combinational modules.(K1)
CO2	**Explain** the basic concepts of state machines and **associate** state diagrams with state table for a given sequential system. (K2)
CO3	**Describe** the architecture of a microprocessor and **identify** the hardware and software interactions and integrations in a microprocessor. (K1)
CO4	**Discuss** the interfacing of various peripheral devices with microprocessor. (K2)
CO5	**Develop** programs in assembly language for 8-bit microprocessor. (K3)

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Sequential Systems & Microprocessors	**CO1**	3	2	1									
	CO2	3	2										
	CO3	3	2										
	CO4	2	3										
	CO5	2	2	3									

Course code	**EE/PC/B/T/226**
Category	Program Core
Course title	Field Theory
Scheme and Credits	L-T-P: 2-1-0; Credits: 3.0;
Pre-requisites (if any)	

EE/PC/B/T/226 : Field Theory	L	T
Magnetic field intensity, Lorentz force, Motoring and generating principles,	2	0
Physical interpretation of curl and stoke's theorem, Ampere's law in both integral and differential forms,	2	0
Scalar and Vector magnetic potential and deduction of Biot-Savart's law and its application for different current configuration,	2	0
Boundary conditions, Solution of field problem by image method,	1	0
Self and mutual inductance, Inductance of coaxial cable and two wire transmission lines,	2	0
Energy in magnetic field, Force due to magnetic field in magnetic medium. Faraday's Law of electromagnetic induction,	2	0
Maxwell's field equations, Displacement current density and continuity equation,	2	0
Electromagnetic wave equations in loss-free and lossy media,	2	0
Plane and polarized waves and their propagation as solutions of wave equation, propagation, attenuation and phase constants, intrinsic impedances,	2	0
Poynting's vector, Poynting's theorem, Power flow through electromagnetic media,	1	0
Elements of wave guide and radiating systems (antenna),	1	0
Diffusion equation for eddy currents and skin effect.	1	0
Electric vector field and scalar potential field; Relation between electric field intensity and electric potential; Interpretation of potential gradient	1	0
Field due to point charge; Field due to uniformly charged ring; Field due to uniformly charged disc.	2	0
Integral and differential form of Gauss's Law; Divergence Theorem; Poisson's and Laplace's Equation.	1	1
Orthogonal coordinate systems and vector operators:Cartesian, cylindrical and spherical coordinate system. Generalized orthogonal curvilinear coordinate system; General expression and its conversion in Cartesian, cylindrical and spherical coordinate system. Expression of gradient, divergence and Laplacian in generalized orthogonal curvilinear coordinate systems and its conversion in different coordinate systems.	2	1
Analyses of single dielectric configurations: Parallel plate, coaxial cylinders and concentric spheres. Analyses of multi-dielectric configurations: Parallel plate, coaxial cylinders and concentric spheres.	2	0
Electric polarization: Fundamentals; Significance of permittivity; Polarization Vector; Homogeneity and isotropy; Dipole moment; Polar and non-polar materials; Field due	2	0

to electric dipole; Electret.		
Boundary Conditions: Between conductor and dielectric; Between two dielectric media; Uniqueness Theorem	2	0
Conformal transformation: Exponential transformation; Logarithmic transformation; Application in electric field analysis.	1	0
Electric field analysis by method of images: Image of point charge in infinite conducting plane; Image of line charge in infinite conducting plane; Infinite Two-wire Transmission Line; Infinite Single-wire Transmission Line.	2	1
Concept of numerical field calculation: Finite Difference Method.	1	1

Reference Books:

1	Engineering Electromagnetics: W. H. Hayt
2	Electromagnetics: Kraus & Carver
3	Electromagnetic Theory and application: P. Mukhopadhyay
4	Electromagnetics: Edminister

Content Delivery Method

- Class room lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

The students of the course should be able to

CO1	**Recall** the definitions of the basic quantities of electric and magnetic fields and also the equations governing the relationship between source and the field quantities for both electric and magnetic fields (K1).
CO2	**Discuss** the energy contained in electric and magnetic fields explaining Maxwell's equations (K2).
CO3	**Find** the boundary conditions and demonstrate solution techniques for the electric and magnetic fields and identify the different practical applications of these techniques (K3).
CO4	**Analyze** polarization and losses in dielectric and magnetic materials (K4).
CO5	**Analyze** Electromagnetic waves and their propagation (K4).

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Field Theory	CO1	3											1
	CO2	3	2										1
	CO3		2	3	2	3							1
	CO4	1	1	2	3								1
	CO5			1	2	3	2	2					1

Course code	**EE/PC/B/S/221**
Category	Program Core
Course title	Electrical Engineering Laboratory - II
Scheme and Credits	L-T-P: 0-0-3; Credits: 1.5;
Pre-requisites (if any)	

EE/PC/B/S/221 : Electrical Engineering Laboratory - II	P
1. Study of load performance of DC Series Motor	3
2. Determination of B-H Loop of a ring specimen	3
3. Determination of phase sequence of a given 3-phase supply system	3
4. Study of transient response of Linear Time Invariant systems using Linear System Simulator	3
5. Study of different characteristics of a DC Generator	3
6. Parallel operation of single phase transformers	3
7. Measurement of Capacitance and p.f. of a capacitor using Schering Bridge	3
8. Simulation of DC distributor by Network Analyzer	3
9. Study of Operational Amplifier as a computing element	3
10. Starting and speed control of a DC Shunt Motor	3
11. Introduction, arrear and assignment	9

Content Delivery Method

- Class room lectures (Chalk and Board) (D1)
- Active learning (D4)
- Blended/Hybrid learning (D5)
- Discussions (D7)
- Case Studies (D9)

Course Outcomes:

The students of the course should be able to

CO1	**Identify** the instruments required to perform the experiment (K1, S1)
CO2	**Select** the range/ratings of the instruments identified (K2, S1)
CO3	**Comprehend** the objective of the experiment and **Relate** that with the acquired theoretical knowledge (K3, S2)
CO4	**Develop** the circuit duly connecting selected instruments and other devices (K2, S2)
CO5	**Interpret** the data and prepare a detailed report. (K2, A2)

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Electrical Engineering Laboratory - II	**CO1**	**3**	**2**	**1**						**2**			
	CO2	**1**	**3**	**2**						**2**			
	CO3	**1**	**3**	**2**						**2**			
	CO4	**1**	**2**	**3**						**2**			
	CO5	**1**	**1**	**2**	**3**				**1**	**2**		**1**	**1**

Course code	**EE/PC/B/S/222**
Category	Program Core
Course title	Circuits Laboratory
Scheme and Credits	L-T-P: 0-0-3; Credits: 1.5;
Pre-requisites (if any)	

EE/PC/B/S/222 : Circuits Laboratory	P
Introduction to Circuits Laboratory	3
1. Transient and frequency response of R-L-C series Circuit	3
2. Active Low Pass and High Pass Filter	3
3. Determination of Fourier Coefficients of a Periodic Signal	3
4. Coupled Circuits	3
5. Characteristics of a common Timer IC	3
Introduction to SPice	6
6. Genera ration of Signals and response of a systems in SPice	3
7. Transformer Equivalent Circuit in SPice	3
8. Circuit Realization of a Transfer Function in SPice	3
Assignment	6

Content Delivery Method

- Class room lecture (chalk and board) (D1)
- Demonstration (D2)
- Active learning (D3)

Course Outcomes:

The students of the course should be able to

CO1	**Identify** the instruments required to perform the experiment (K1, S1)
CO2	**Select** the range/ratings of the instruments identified (K2, S1)
CO3	**Comprehend** the objective of the experiment and **Relate** that with the acquired theoretical knowledge (K3, S2)
CO4	**Develop** the circuit duly connecting selected instruments and other devices (K2, S2)
CO5	**Interpret** the data and prepare a detailed report. (K2, A2)

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Circuits Laboratory	**CO1**	**3**	**2**	**1**						**2**			
	CO2	**1**	**3**	**2**						**2**			
	CO3	**1**	**3**	**2**						**2**			
	CO4	**1**	**2**	**3**						**2**			
	CO5	**1**	**1**	**2**	**3**				**1**	**2**		**1**	**1**