SH 226U: ENGINEERING MATHEMATICS

Teaching Scheme : 03L+ 01T Total: 04 **Credit :** 04
Evaluation Scheme: 10 ISA + 30 MSE +60 ESE **Total Marks:** 100
Duration of ESE : 03 Hrs

COURSE DESCRIPTION:

This course introduce the student to higher order differential equation, integral transforms, vector calculus, statistics and probability distribution and complex variables and their applications in engineering.

DESIRABLE AWARENESS:

Basic of differential equation, statistic, vector calculus and complex numbers

COURSE OBJECTIVES:

The objectives of offering this course are to-

1. teach them to solve differential equation, integral transforms, vector, calculus, statistic and probability distribution and complex functions.
2. equip the students with standard concept and tools at an intermediate
3. advanced level that will serve them well towards lacking various problems in discipline.

COURSE OUTCOMES:

On the successful completion of this course, students will be able to -

1. solve differential equations and apply the knowledge to engineering problems
2. apply the idea of statistics, probability distribution calculus for problem analysis and solution.
3. apply the idea of integral transform for problem analysis and solution.
4. apply the idea of vector calcus for the problem analysis and solution
5. demonstrate the knowledge of complex variables, complex functions and related concepts.

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	1	-	-	-	-	-	-	-	-	-
CO 2	2	3	1	-	-	-	-	-	-	-	-	-
CO 3	2	3	1	-	-	-	-	-	-	-	-	-
CO 4	3	3	-	-	-	-	-	-	-	-	-	-
CO 5	1	3	1	-	-	-	-	-	-	-	-	-

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT:

Higher order linear differential equations: n^{th} order linear differential equations with constant coefficient, complementary function and particular integrals, general method, short cut method, method of variation of parameters, linear differential equations with variable coefficient: Cauchy's differential equations and Legendre's differential equations, simultaneous linear differential equations, applications: L-R-C circuits.

Integral Transform: Laplace Transform: - definition, Laplace transform of elementary functions, properties of Laplace transform, Inverse Laplace transform: - definition and properties, Inverse Laplace transform by partial fraction, convolution theorem and standard results, Application of Laplace transform to LDE. (Fourier integral, Fourier sine and cosine integrals), Fourier transforms:- definition & properties, Inverse Fourier transforms:- definition and properties.

Vector Calculus: Vector differentiation and its physical interpretation, vector differential operator, gradient, divergence and curl, directional derivatives, solenoidal and irrotational fields, vector identities, vector integration: line integral, surface integral, volume integral, green's lemma, gauss divergence theorem, stokes theorem.

Statistics & probability distributions: Measures of central tendency, dispersion, moments, skewness and kurtosis, covariance, Karl Pearson coefficient of correlation, lines of regression, curve fitting, method of least square, straight lines, second degree parabola, exponential and power curves. Probability distribution: binomial distribution, Poisson distribution, normal distribution,

Complex Variables: Functions of complex variables, analytic functions, C-R equations, conformal mapping, bilinear transformation, Cauchy's theorem, Cauchy's integral formula, Cauchy's residue theorem.

Text books:

1. A Textbook of Engineering Mathematics (Vol-I and II) by P.N.Wartikar and J.N.Wartikar, 07^{th} edition, Pune Vidhyarthi Griha Prakashan, Pune, 2013.
2. A Textbook of Engineering Mathematics, by N.P.Bali & Manish Goyal, 09^{th} edition, Laxmi Prakashan, 2014.

Reference books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 8^{th} edition ,Willey Eastern Ltd. Mumbai, 2013.
2. Higher Engineering Mathematics by B. S. Grewal, 33^{rd} edition , Khanna Publication, New Delhi, 1996.
3. Advanced Engineering Mathematics by H. K. Dass, 12^{th} edition, S. Chand Publication, New Delhi, 2003.
4. Higher Engineering Mathematics by B. V. Ramana, 12^{th} edition , Tata McGraw Hill, Delhi, 2011.
5. Statistical methods by Dr. S.P.Gupta, 43^{rd} edition, Sultan chand & Sons, Delhi, 2014.

EE201U - ANALOG ELECTRONICS

Teaching Scheme: 03L + 00T, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION :

This course provides knowledge about electronic devices, their characteristic and ability to control high power electrical equipment. This course also provides the knowledge of various analogue electronics applications.

DESIRABLE AWARENESS/SKILLS :

Basic knowledge of diodes and doping.

COURSE OBJECTIVES :

The objectives of this course are to:

1. understand operation of semiconductor devices.
2. understand dc and ac models of semiconductor devices.
3. apply concepts for the design of regulators and amplifiers.
4. implement mini projects based on concept of electronics circuit concepts.

COURSE OUTCOMES :

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

1. design analytical capability to analyze feedback in amplifiers.
2.develop design competence in the area of discrete feedback amplifiers.
3. acquire knowledge on the fundamentals of analogue integrated circuits.
4. develop competence in linear and nonlinear Op-Amp circuit analysis.
5. acquire knowledge on commonly used linear and non-linear applications of Op-Amp and comparators.
6. develop design competence in linear and non-linear Op-Amp circuits.
7.develop analysis and design competence on signal filtering and signal conversion.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1		2													
2					2								1		
3				2										2	2
4					2										
5		2													
6				1											
7					1										

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Diode Circuits P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.

Amplifiers: Bi Junction Transistors (BJT) – Common Base (CB), Common Emitter (CE), Common Collector (CC) configuration, analysis of CB, CC and CE. Low and high frequency response of RC, transformer coupled, dc amplifier, h-parameters, feedbacks in amplifiers, oscillators. Transistor power amplifiers, FET amplifiers biasing, MOSFET, types and NMOS, PMOS applications.

Differential, Multi-stage and Operational Amplifiers (Op-Amp): Differential amplifier, power amplifier, direct coupled multi-stage amplifier, internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)

Linear Applications of Operational Amplifiers: Idealized analysis of Op-Amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers, lead and lag compensator using an Op-Amp, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion.

Nonlinear Applications of Operational Amplifiers: Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector, 555 timer as mono-stable, astable multivibrator, phase locked loops operating principles, 565 PLL applications, voltage regulators-fixed, adjustable.

Text Books:-

1. Microelectronic Circuits by A.S. Sedra and K. C. Smith, fourth edition, New York, Oxford University Press, 1998
2. Introduction to Operational Amplifier Theory and Applications by J. V. Wait, L. P. Huelsman and G. A. Korn, second edition, McGraw Hill U. S., 1992.
3. Microelectronics by J. Millman and A. Grabel, fifth edition, McGraw Hill Education, 1988
4. Analysis and Design of Analog Integrated Circuits by P. R. Gray, R. G. Meyer and S. Lewis, fifth edition, John Wiley & Sons, 2001

Reference Books:-

1. Integrated Electronics by Millman and Halkias, third edition, Tata McGraw Hill, 2011
2. Op-Amp and Linear IC by R. A Gaikwad, fourth edition, Tata McGraw Hill, 2008

EE202U - ELECTRICAL CIRCUIT ANALYSIS

Teaching Scheme: 03L + 01T, Total: 04 **Credits:** 04
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course provides a brief introduction to students to analyze, design and synthesize network with passive and active elements. This course also includes network topologies, circuit theorems, initial conditions of network, Laplace transform of signals, two port network parameters and Fourier series of signals. This course provides brief description about sinusoidal steady – state analysis of R-L-C circuits.

DESIRABLE AWARENESS/SKILLS:

Basic knowledge of Kirchhoff's Laws, Ohms Law, Laplace Transforms.

COURSE OBJECTIVES:

The objectives of this course are:

1. to know basic concepts and modern engineering methods of circuit analysis.
2. analyze steady state and study network theorems in dc and ac circuits.
3. analyse signal waveforms, Laplace transformation and its applications in electric circuits.
4. to study mutually coupled circuits, two port networks, graph theory.

COURSE OUTCOMES:

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

1. obtain circuit matrices of linear graphs and analyze networks using graph theory.
2. obtain network functions and poles and zeros of network functions.
3. study conditions for stability and realize network functions.
4. synthesize driving point functions of RL, RC and RLC networks.
5. synthesize two port network functions.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1		2											1		
2		1											1		
3			3											2	
4															
5				1											

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Network Theorems Applied to DC and A.C. Network: Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem
Classical solution of first and second order differential equations for series and parallel R-L, R-C, R-L-C circuits, initial and final conditions in network elements, forced and free response, time constants, transient state and steady state response.

Laplace Transformation: Laplace transform of various periodic and non-periodic waveforms, inverse Laplace transform, transformed network with initial conditions, analysis of electrical network with and without initial conditions by Laplace transform for step, impulse and ramp and impulse functions.

Two Port Network and Network Functions: Terminal pairs, relationship of two port variables, Z, Y, transmission parameters and hybrid parameters, interconnections of two port networks. Network functions for one port and two port, calculations of network functions for ladder and general network, poles and zeros, restrictions on pole and zero locations for driving point and transfer functions

Network Topology: Concept of graph, tree and co-tree, tie set and cut set matrices and Kirchhoff 's laws to network analysis, choice between loop and nodal analysis, concept of super loop and super mesh, dot convention for coupled circuits, concept of duality and dual networks.

Text Books:-

1. Circuit Analysis by Ashutosh Chakraborty, first edition, Tata McGraw, 2011
2. Network Analysis by M. E. Van Valkenburg, third edition, Prentice Hall, 2001

Reference Books:-

1. Network & Systems by D. Roy Choudhary, second edition New Age publications, 2010.
2. Engineering Circuit Analysis by William H. Hayt, Jr. J E. Kemmerly, Tata McGraw Hill, fourth edition, 1986
3. Circuits and Networks by A.Sudhakar, Tata McGraw Hill, fourth edition, 2011

EE203U - ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Teaching Scheme: 03L + 00T, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

Every engineer must have some basic knowledge electrical engineering as (s)he has to work in different engineering fields and to deal with various electric al machines and equipment. This course provides knowledge about basics of electrical engineering to familiarize students with AC and DC measurements, electrical measuring systems. Learn about various measurement devices, their characteristics, and their operation.

DESIRABLE AWARENESS/SKILLS:

Basic knowledge of permanent magnets, electromagnets, power and energy

COURSE OBJECTIVES:

The objectives of this course are:

1. to design and validate dc and ac bridges.
2. to analyze the dynamic response and the calibration of few instruments.
3. to learn about various measurement devices, their characteristics, their operation and their limitations.
4. to understand statistical data analysis.
5. to understand data acquisition.

COURSE OUTCOMES:

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

1. classify different types of measuring instruments on the basis of principle of operation.
2. measure various electrical and physical quantities using transducers.
3. apply different methods to measure power and energy.
4. compute resistance, inductance and capacitance using different methods.
5. select proper technique and instrument for particular type of measurement.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2												1		
2		2												2	3
3			3												
4		1													
5				3											

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Measurement Basics: Definition and significance of measurements, method of measurements, classification of instruments: absolute and secondary instruments, function of instruments and measurement systems, application of measurement system, static and dynamic characteristics, true value, accuracy, precision, resolution, drift, hysteresis, dead-band, sensitivity.

Errors in Measurement and Analysis: Limiting and relative limiting error, types of errors-gross, systematic and random errors. Mean and statistical treatment of data in detail.

Measurement of Voltage and Current: Permanent Magnet Moving Coil, moving iron meters, and electro dynamometer type meters, digital voltmeters, extension of range of meters. Digital multi-meter, true RMS meters, electronic voltmeter. Time, frequency and phase angle measurements using Cathode Ray Oscilloscope. Spectrum and wave analyzer. Digital counter, frequency meter, Digital Storage Oscilloscope.

Measurement of Power: Power in AC and DC Circuits, electrodynamometer type wattmeter and Low Power Factor (LPF) wattmeter. Measurement of power using instrument transformers, measurement of power in poly-phase circuits. Shunts and multipliers, potential dividers. Instrument transformers CT and PT- Relations, burden, errors, clamp-on meters, Hall sensors.

Measurement of Resistance, Inductance and Capacitance: Measurement of low medium and high resistance, insulation resistance, earth resistance. Megger, Kelvin Double bridge, AC bridges for inductance (self and mutual inductance) and capacitance measurements.

Sensors and Transducers for Physical Parameters: Temperature-Thermistors, resistance thermometers, thermocouples, pressure, torque. Synchros, flow measurements. Speed and position sensor, potentiometer device, resistance strain gauge, LVDT, Magneto-Strictive transducers,

Text Books:

1. A course in Electrical and Electronic Measurements and Instrumentation, A. K. Sawhney, Dhanpat Rai and Sons, eleventh edition, 1995.
2. Modern Electronic Instrumentation and Measurement Techniques, Helfrick and Cooper, PHI, first edition, 2007.

Reference Books:

1. Instrumentation Measurement and Feedback by Barry E. Jones, Tata McGraw -Hill, 1986
2. Electrical Measurement and Measuring Instruments by E.W. Golding, third edition, Sir Issac, Pitman and Sons, 1960.

EE204U - SIGNALS AND SYSTEMS

Teaching Scheme: 03L + 00T, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course provides a brief introduction to students to analyze, design and synthesize network with passive and active elements. This course also includes network topologies, circuit theorems, and initial conditions of network, Laplace transform of signals, two port network parameters and Fourier series of signals. This course provides brief description about sinusoidal steady –state analysis of R-L-C circuits Lectures.

DESIRABLE AWARENESS/SKILLS:

Basic knowledge of Fourier and Z-Transforms,

COURSE OBJECTIVES:

The objectives of this course are:

1. to understand basics of signals and systems.
2. to use Fourier transforms and Laplace transforms in electrical and electronics circuits.
3. to understand sampling theorem in time and frequency domain.
4. to present the concepts of convolution and correlation integrals.
5. to understand the properties in the context of signals/systems and lay down the foundation for advanced courses.

COURSE OUTCOMES:

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

1. classify different types of signals and systems.
2. analyse LTI systems.
3. discuss Fourier transform analysis for discrete type systems
4. explain Z-transform and their properties.
5. explain time and frequency characteristics of signal and systems.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2												1	1	
2		2													
3			3												
4				1										2	2
5					2										

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENTS

Introduction to Signals and Systems: Signals and systems as seen in everyday life and in various branches of engineering and science. Signal properties: periodicity, absolute integral ability, determinism and stochastic character. Some special signals of importance: unit step, unit impulse, sinusoid, complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additive and homogeneity, shift-invariance, causality, stability, reliability.

Behaviour of Continuous and Discrete Time Linear Time Invariant systems: Impulse response and step response, convolution, input-output behaviour with a periodic convergent inputs, cascade interconnections. Characterization of causality and stability of Linear time invariant systems. System representation through differential equations and difference equations. State-space representation of systems. State-space analysis, Multi-Input Multi Output (MIMO) representation. State transition matrix and its role. Periodic inputs to an LTI system, notion of a frequency response and its relation to the impulse response.

Fourier and Z-Transforms: Fourier series representation of periodic signals, waveform symmetries, calculation of Fourier coefficients. Fourier transforms, convolution/multiplication and their effect in the frequency domain, magnitude and phase response,

Fourier Domain Duality: The Discrete Time Fourier Transform (DTFT) and Discrete Fourier Transform (DFT). Parseval's Theorem. Review of Laplace transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behaviour. The Z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, Z-domain analysis.

Sampling and Reconstruction: Sampling theorem and its implications. Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.

Text Books:

1. Circuits and Systems: A Modern Approach, Hardcover, June 8, 2005
2. Signals and Systems: Continuous and Discrete" by R F Ziemer and D R Fannin, Fourth edition, 2014

Reference Books:

1. Signal and Systems, A. V. Oppenheimand A. S. Willsky and I. T. Young, 2014
2. Signals and Systems, Person, Alan V. Oppenheim and S Hamid, New International Edition, 2014

EE205U - ANALOG ELECTRONICS LAB

Teaching Scheme: 02 Pr, Total: 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

The laboratory work should consist of minimum 10 experiments based on theory syllabus of EE201U. Experiments should involve simulation performance/design of practical, result and conclusion based on it.

COURSE OBJECTIVES:

The objectives of this course are:

1. To make the students aware of the analog circuits
2. To use the basics in different electrical circuits
3. To apply BJT, UJT and other devices in different applications
4. To use filters in different circuits

COURSE OUTCOMES:

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

1. apply basic knowledge of science and engineering to understand electronic circuits.
2. conduct practical and able to analyze the data for determination of circuit parameters and response of electronic devices.
3. understand the use of different electronic devices such as BJT, FET, MOSFET, IC741, etc.
4. implement simple linear integrated circuits, able to design timers, amplifiers.

LIST OF EXPERIMENTS:

1. To design wave shaping circuit using diode - clipping and clamping circuits..
2. To determine the performance characteristics of BJT using AC and DC biasing analysis of CE, CB and CC Configuration.
3. To determine the frequency response of a BJT/FET single stage and multistage amplifier and to study the effect of coupling and bypass capacitor on the frequency.
4. To analyze Class A transformer coupled and Class B push-pull symmetry complementary amplifiers.
5. To estimate common mode gain, differential gain, common mode rejection ratio of a CE differential amplifier.
6. To design and test dependent voltage and current sources using an Op-Amp and to determine their frequency response.
7. Analysis and applications of active circuits using Op-amp: (i) Comparator (ii) Zero Crossing Detector (iii) Integrator (iv) Logarithmic amplifier (v) Differentiator.
8. To design the active filters using Op-Amp and determine their frequency stability: (i) Low pass, (ii) High pass, (iii) Band pass, (iv) Band reject
9. To design oscillators such as phase shift oscillator, Wein's bridge oscillator
10. Design and test Schmitt trigger circuit for given hysteresis. Measure the hysteresis voltage.

GUIDE LINES FOR ICA:

It should support for regular performance of practical and its regular assessment with proper understanding principles of experimental set-up / experiment carried out. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by student. The performance shall be assessed experiment wise using internal continuous assessment format.

GUIDE LINES FOR ESE:

It should be of Three hours duration and based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of

understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1					1								1		
2					2								1		
3					3									3	
4					3										3

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

EE206U - ELECTRICAL CIRCUIT ANALYSIS LAB

Teaching Scheme: 02P, Total: 02 **Credits**: 01

Examination Scheme: 25 ICA + 25 ESE **Total Marks:** 50

Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

The laboratory work should consist of minimum 10 experiments based on theory syllabus of EE202U. Experiments should involve simulation/performance/design of practical, result and conclusion based on it. The sample list given below is just a guide line.

COURSE OBJECTIVES:

The objectives of this course are:

1. to examine the different circuits with the help of different theorems
2. to observe the time response with different input signals
3. to analyse the circuits with initial conditions

COURSE OUTCOMES:

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

1. know the basics of the electrical networks and theorems
2. analyze the networks with different initial conditions
3. simulate the circuits with different inputs
4. know graphical theory and apply for small networks

LIST OF EXPERIMENTS:

1. Verification of Thevenin's theorem in A.C. circuits.
2. Verification of Norton's theorem in AC circuits.
3. Verification of superposition theorem in A.C. circuits.
4. Verification of maximum power transfer theorem in A.C. circuits.
5. Determination of time response of R-C circuit to a step D.C. voltage input. (Charging and discharging of a capacitor through a resistor)
6. Determination of time response of R-L circuit to a step D.C. voltage input. (Rise and decay of current in an inductive circuit)
7. Determination of time response of R-L-C series circuit to a step D.C. voltage input.
8. Determination of parameter of two port network.
9. Harmonic analysis of no load current of a transformer.
10. Determination of resonance, bandwidth and Q factor of R-L-C series circuit.
11. Determination of resonance of R-L-C Parallel circuit.

GUIDE LINES FOR ICA:

Internal Continuous Assessment shall support for regular performance of minimum 10 practical's and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student(journal) based on practical's performed by student. The performance shall be assessed experiment wise using internal continuous assessment format.

GUIDE LINES FOR ESE:

The end semester examination (ESE) for the laboratory course of three hrs duration, shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1					1								1		
2						2							1		
3							3								
4								2						1	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

EE207U - ELECTRICAL MEASUREMENT AND INSTRUMENTATION LAB

Teaching Scheme: 02 Pr, Total: 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

The laboratory work should consist of minimum 10 experiments based on theory syllabus of EE203U as per sample list given below. Experiments should involve simulation/ performance/design of practical, result and conclusion based on it. The sample list given below is just a guide line.

COURSE OBJECTIVES:

The objectives of this course are:

1. to measure different electrical quantities
2. to sense the different signals
3. to use measuring instruments in different industries

COURSE OUTCOMES:

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

1. learn about various measurement devices, their characteristics, their operation and their limitations.
2. design and validate DC and AC bridges.
3. analyse the dynamic response and the calibration of few instruments.
4. understand statistical data analysis.
5. understand computerized data acquisition.

LIST OF EXPERIMENTS:

1. Study of MI, PMMC and Dynamometer type instruments (Basic moving systems).
2. Measurement of a batch of resistors and estimating statistical parameters.
3. Measurement of low resistance using Kelvin's double bridge.
4. Measurement of L using a bridge technique as well as LCR meter.
5. Measurement of C using a bridge technique as well as LCR meter.
6. Measurement of high resistance and insulation resistance using megger.
7. Measurement of power in three phase circuits by conventional two wattmeter method.
8. Calibration of single phase energy meter.
9. Speed measurement using photoelectric pick up and magnetic pick up.
10. Study and use of CRO for measurement of current, voltage, time period, frequency, phase angle.
11. Usage of digital storage oscilloscope for steady state periodic waveforms produced by a function generator.
12. Usage of DSO to capture transients like a step change in R-L-C circuit.
13. Current measurement using shunt, CT, and hall sensor.

GUIDE LINES FOR ICA:

Internal Continuous Assessment should support for regular performance of practical and its regular assessment with proper understanding principles of experimental set-up / experiment carried out. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by student. The performance shall be assessed experiment wise using internal continuous assessment format.

GUIDE LINES FOR ESE:

The End Semester Examination (ESE) for the laboratory course of three hrs duration, shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1			1										2		
2					2									2	2
3						3									
4								3							
5								1							

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

EE208U - SIGNALS AND SYSTEMS LAB

Teaching Scheme: 02Pr, Total: 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course introduces signals and systems as per the syllabus EE204U. This course also provides introduction of classification of signals, time frequency characterization. Course also provides knowledge of sampling, DFT, random variables and processes.

COURSE OBJECTIVES:

The objectives of this course are to:
1. Classify different inputs
2. Design different filters for different circuits
3. Study the time response of first order and higher order systems

COURSE OUTCOMES:

On the successful completion of this course, students will be able to -
1. use MATLAB, Labview, SCILAB, etc or any other open source, simulation software packages
2. apply basic knowledge of signals and systems.
3. understand sampling principles
4. apply DFT in different circuits
5. understand need and concept of Z transform

LIST OF EXPERIMENTS:

1. To study different types of signals.
2. To study sampling of signals.
3. To study the time response of first, second and higher order system.
4. To study root locus.
5. To study Z transform and inverse Z transform.
6. To study realization of systems.
7. To design low pass, high pass filters.
8. To study filter transformation.
9. To apply different inputs to first, second and higher order system
10. To study Butterworth approximation.
11. To study Chebyshev approximation.

GUIDE LINES FOR ICA:

Internal Continuous Assessment shall support for regular performance of minimum 10 practical's and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by student. The performance shall be assessed experiment wise using internal continuous assessment format.

GUIDE LINES FOR ESE:

The End Semester Examination (ESE) for the laboratory course of three hrs duration, shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1				2									1	1	1
2					3										
3						2									
4							1								1
5								3							

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

EE209U - ELECTRICAL AND ELECTRONICS MATERIAL LAB

Teaching Scheme: 02 Pr, Total: 02 **Credits:** 01
Evaluation Scheme: 50 ICA + 00 ESE **Total marks:** 50
Duration of ESE: 00 Hrs

COURSE DESCRIPTION:

The laboratory work should consist of experiments based on courses which students have learnt up till now. Experiments should involve simulation, performance/design of practical, result and conclusion based on it. The sample list given below is just a guide line.

COURSE OBJECTIVES:

The objectives of this course are to:

1. Classify the materials from electrical applications point of view and use them as per the requirement
2. Test different materials as per the IS
3. Know the properties of nano-materials
4. Make ware about the actual ratings and prices of the different materials

COURSE OUTCOMES:

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

1. classify and categorise different materials from Electrical Engineering applications point view.
2. select suitable material for application in electrical equipment.
3. test different classes of materials as per IS.
4. explain various properties and characteristics of conducting, insulating, semiconducting and magnetic materials.
5. explain properties of nano-materials, batteries and solar cell materials.

LIST OF EXPERIMENTS:

1. To measure resistivity of low resistivity conducting materials e.g., wires, cables, etc.
2. To measure resistivity of high resistivity alloys.
3. To measure insulation resistance of machines and equipments.
4. To measure dielectric strength of liquid insulating material (transformer oil).
5. To observe/study the aging effect on different insulating materials e.g. porcelain, mica, PVC.
6. Measurement of dielectric loss angle (tan δ) of solid/liquid dielectric materials.
7. To determine hysteresis loss of ferromagnetic material.
8. To compare the performance of mono-crystalline, polycrystalline and thin film type solar cells.
9. To study the properties of nano-materials.
10. Market survey of different electrical and electronic materials (conducting, insulating, magnetic etc.) available in the market by a group of four to six students and presentation/report submission based on trade names, types, specifications, identification, testing, manufacturers, cost etc.
11. Visit to an industry related to manufacturing of batteries, capacitors, transformers, cables, motors etc, by a group of four to six students and presentation/report submission based on various materials used.
12. Visit to nanotechnology laboratory and report submission.

GUIDE LINES FOR ICA:

Internal Continuous Assessment should support for regular performance of practical and its regular assessment with proper understanding principles of experimental set-up / experiment carried out. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by student. The performance shall be assessed experiment wise using internal continuous assessment format (S10).

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1						1							2		
2							2							2	2
3								2							
4									2						
5									3						

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

SH200AU ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Teaching Scheme: 00L: **Credit: 00**
Evaluation Scheme: 60 ESE **Total Marks: 60**

COURSE DESCRIPTION:

This course is intended to provide basic understanding of Indian traditional knowledge. This course introduces students to the fundamental concept of basic & modern Indian knowledge system as well as Indian tradition.

DESIRABLE AWARENESS:

Basic structure of Indian knowledge system & various Indian traditions

COURSE OBJECTIVES:

Upon completion of this course, the student will be able to-

1. understand Indian knowledge system
2. understand Indian perspective of modern scientific world view
3. understand basic principles of yoga and holistic health care system
4. develop ability to understand, connect up and explain basics of Indian traditional knowledge
5. understand Indian philosophical tradition

COURSE OUTCOMES:

Students are able to –

1. remember & apply Indian knowledge system in their personal as well as academic life.
2. apply Indian perspective of modern scientific world view.
3. analyzing basic principles of yoga and holistic health care system.
4. evaluate and explain basics of Indian traditional knowledge.
5. understand basic knowledge about Indian philosophical tradition.

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	2	-	-	-	-	-	3
2	-	-	-	-	-	2	-	-	-	-	-	3
3	-	-	-	-	-	2	-	-	-	-	-	3
4	-	-	-	-	-	2	-	-	-	3	-	3
5	-	-	-	-	-	2	-	-	-	3	-	3

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlate**

COURSE CONTENT:

Basic structure of Indian Knowledge System:

Ashtadashavidya –Types of vedas - rigveda, yajurveda ,samveda ,atharvveda, types of upaved- ayurveda ,dhanurveda ,gandharva veda ,stapatya veda, limbs of vedang, types of upanga

Modern Science and Indian Knowledge System: Logic, mathematics, phonetics, life sciences, physics, military science

Yoga and Holistic Care: General introduction to yoga, aims and objectives of yoga , psychological aspects and mythological concepts of yoga

Philosophical Tradition (Sarvdarshan): Various Indian Philosophical Tradition (Heterodox): jain, buddhist, ajivika, ajnana, carvaka

Indian Linguistic Tradition: phonology, morphology, syntax, semantics

Indian Artistic Tradition: Understanding key terms in art appreciation: art, craft:

Sculpture - iconography: hindu, buddhist and jaina ,modern sculpture

Architecture - temple architecture -nagara, dravida and vesara ,mosques and mausoleums - tajmahal (any one)

Painting - mural painting – ajanta , mughal and rajput- miniature styles ,modern and contemporary artists

Music - traditional music**:** classical, folk, bhajan, thumri, dadra, sufi, modern music **:** bhangra, blues, dance, jazz, rock

Dance- classical, semi-classical, folk, tribal, shiva and natraja, bharatan atyam, kathak

Text Book:

- An Introduction to Indian Philosophy, S.C. Chaterjee & D.M. Datta, University of Calcutta, 1984.
- Arts of India, Krishna Chaitanya, Abhinav Publications, 1987.
- वासुदेवशरण अxzवाल, कलाएवंसंLd`त, साहिR; भवन, इलाहाबाद,1952.
- Cultural Heritage of India-course material, Sivaramakrishnan (Ed.), Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014.

References:

1. Foundations of Indian Art, R. Nagaswamy, Tamil Arts Academy, 2002.
2. The Wave of life, Fritzof Capra.
3. Ed. RN Jha, GN Jha (Eng. Trans.),Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakashan, Delhi 2016
4. India Arts, Pramod Chandra, Howard Univ. Press, 1st Edition, 1983

SH286U LIFE SKILLS

Teaching Scheme: 02L + 00T **Credit: 02**
Evaluation Scheme: 10 ISA+30 MSE+60 ESE **Total Marks: 100**
ESE Duration: 03 Hrs

COURSE DESCRIPTION:

The course is intended to provide basic life skills to the engineering students. This course introduces different aspects of personality as well as skills like critical thinking problem solving, stress management & leadership skills.

DESIRABLE AWARENESS:

Basic knowledge of life skills and leadership skills

COURSE OBJECTIVES:

The objectives of the course are to -

1) develop the positive personality in prospective engineers.
2) learn stress management
3) inculcate critical thinking process and problem solving skills.
4) understand group behavior and conflict management
5) learn leadership qualities and practice them.

COURSE OUTCOMES:

After completing this course, Students will able to –

1) understand own personality traits.
2) apply critical thinking on a particular problem.
3) analyse different problems by using skills.
4) understand how to work efficiently in group.
5) understand & apply an effective leadership skills

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	2	-	-	2	3	-	3
2	-	-	-	-	-	2	-	-	2	3	-	3
3	-	-	-	-	-	2	-	-	2	3	-	3
4	-	-	-	-	-	2	-	-	3	3	-	3
5	-	-	-	-	-	2	-	3	2	3	-	3

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT:

Personality: meaning, formation, determinants, traits for building positive personality, self awareness: how to gain? developing positive personality: subconscious programming and conscious programming, SWOT analysis

Organizational Change and Stress Management: Forces for change, managing planed change, what can change agents change?, resistance to change, approaches' to managing organizational change, stress: consequences of stress, sources of stress, how to overcome stress.

Critical Thinking & Problem Solving: Creativity, lateral thinking, critical thinking, multiple intelligence, problem solving, six thinking hats, mind mapping & analytical thinking.

Group Behavior and Motivation: Definition, types, formation of groups, building effective teams; conflict: meaning, nature, types, process of conflict, conflict resolution, Motivation meaning, types, steps, Maslow's theory of hierarchy of needs, Vroom's expectancy theory of motivation, Alderfer's ERG theory.

Leadership Skills: Leadership, levels of leadership, making of a leader, types of leadership, transactions vs transformational leadership, VUCA leaders, dart leadership, leadership grid & leadership formulation.

Text Book:

1) Life Skills for Engineers, Complied by ICT Academy of Kerala, McGraw Hill Education (India) Private Ltd., 2016
2) Organizational Behavior, Suja R. Nair, Himalaya Publications, 2014
3) Organizational Behavior, V.S.P.Rao, 1st edition, Excel Publications, 2009
4) Personality Development and Soft skills, Oxford University Press by Barun K. Mitra 2st edition, 2016.
5) Steps to Build Positive Attitude By Asha Thorat, Booktango Publication.2014.

References:

1) Personality Development & Soft Skills, Barun K. Mitra, 1st Edition; Oxford Publishers, 2011.
2) Soft Skill for Managers, Kalyana, 1st Edition; Wiley Publishing Ltd., 2015.
3) The 1st Book of Life Skills; Larry James ; 1st Edition; Embassy Books.,2016.
4) Development of Life Skills and Professional Practice; Shalini Verma, 1st Edition; Sultan Chand (G/L) & Company, 2014.
5) The 5 Levels of Leadership, John C. Maxwell, Centre Street, A division of Hachette Book Group Inc., 2014.

EE251U - ELECTROMAGNETIC FIELDS

Teaching Scheme: 03L + 00T, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

Most of the students find difficult to visualize electric and magnetic fields. Instructors may demonstrate various simulation tools to visualize electric and magnetic fields in practical devices like transformers, transmission lines and machines.

DESIRABLE AWARENESS/SKILLS:

Basic knowledge of engineering mathematics, matrix calculation, Laws related to electrical field.

COURSE OBJECTIVES:

The objectives of this course are:

1. to understand electric and magnetic fields.
2. to apply principles of electromagnetism.
3. to use electric and magnetic fields for simple configurations under static conditions.
4. to understand Maxwell's equation.
5. to understand propagation of EM waves.

COURSE OUTCOMES:

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

1. derive the relationship between different types of coordinate systems
2. apply Coulombs law to various charge distribution in space
3. apply Gauss' Law to highly symmetric and asymmetric charge distribution
4. solve electrostatic boundary-value problems by Poisson's and Laplace's equations.
5. analyse time-varying electromagnetic field governed by Maxwell's equations.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1				2									1		
2					2								1		
3						3							1	1	
4							1							1	
5								1							

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Review of Vector Calculus: Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus- differentiation, partial differentiation, integration, vector operator del, gradient, divergence and curl; integral theorems of vectors. Conversion of a vector from one coordinate system to another.

Static Electric Field: Coulomb's law, electric field intensity, electric flux density, electrical field due to point charges, line, surface and volume charge distributions. gauss law and its applications, divergence. Absolute electric potential, potential difference, calculation of potential differences for different configurations. Electric dipole, method of images for conducting plane, electrostatic energy and energy density.

Conductors, Dielectrics and Capacitance: Current and current density, Ohms Law in Point form, continuity of current, boundary conditions of perfect dielectric materials. permittivity of dielectric materials, effect of dielectric medium, capacitance,capacitance of a two wire line, poisson's equation, laplace's equation, solution of laplace and poisson's equation, application of laplace's and poisson's equations.

Static Magnetic Fields: Biot-Savart law, ampere law, magnetic flux and magnetic flux density, scalar and vector magnetic potentials. Steady magnetic fields produced by current carrying conductors.

Magnetic Forces, Materials and Inductance: Force on a moving charge, force on a differential current element, force between differential current elements, nature of magnetic materials, magnetization and permeability, magnetic boundary conditions, magnetic circuits, inductances and mutual inductances.

Time Varying Fields and Maxwell's Equations: Faraday's law for electromagnetic induction, displacement current, point form of Maxwell's equation, integral form of Maxwell's equations, motional electromotive forces. boundary Conditions.

Electromagnetic Waves: Derivation of wave equation, uniform plane waves, Maxwell's equation in phasor form, wave equation in phasor form, plane waves in free space and in a homogenous material. wave equation for a conducting medium, plane waves in lossy dielectrics, propagation in good conductors, skin effect. Poynting;s theorem

Text Books:-

1. Elements of Electromagnetic's by M. N. O. Sadiku and and S.V. Kulkarni, secound edition Oxford University Publication, 2014
2. Electromagnetism-Problems with solution by A. Pramanik, Prentice Hall India, 2012
3. Engineering Electromagnetics by W. Hayt by McGraw Hill Education, 2012

Reference Books:-

1. The electromagnetic field in its engineering aspects by G. W. Carter, Longmans, 1954
2. Electricity and Magnetism by W. J. Duffi, McGraw Hill Publication, 1980
3. The Fundamentals of Electromagnetism by E. G. Cullwick, Cambridge University Press, 1966
4. Introductory Engineering Electromagnetics by B. D. Popovic, Addison-Wesley Educational Publishers, International edition, 1971
5. Elements of Electromagnetic Fields by S. P. Seth, Dhanpat Rai & Co, second edition
6. Schaum's Outline of Signals and Systems by Hwei Hsu, third edition, McGraw-Hill Education, 2014

EE252U - DC MACHINES AND TRANSFORMERS

Teaching Scheme: 03 L + 00 T, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

The aim of introducing this course is to impart knowledge of basic energy conversion in DC machines and transformer. Through the study of this course the students will get adequate knowledge of construction, working, classification and performance of electrical machines and helps to gain the skills for selection, operation and control of DC machines and transformers in industrial applications.

DESIRABLE AWARENESS/SKILLS:

Basic knowledge of Laws related to electrical field

COURSE OBJECTIVES:

The objectives of this course are:

1. to equip the students with basic understanding of transformers and DC machines.
2. to gain the skills for operating and controlling transformers and DC machines.
3. to select proper DC machine and transformer for industrial applications.
4. to analyze the equivalent circuits of DC machines and transformers.
5. to understand testing of transformers and DC machines.

COURSE OUTCOMES:

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

1. operate and control DC machines.
2. select proper DC machine for industrial applications.
3. analyze the performance of transformer using equivalent circuits.
4. execute various tests on single phase and three phase transformers.
5. operate single phase and three phase transformers in parallel.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1					2								1		
2					2									2	
3					3									3	
4						1								1	
5							2								

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Electromechanical Energy Conversion: Principle of electromechanical energy conversion, singly excited magnetic system and doubly excited magnetic system, torque production in rotating machines and general analysis of electro mechanical system.

DC Generators: Working principle, construction. armature winding: simplex lap and wave windings. EMF equation, methods of excitation – separately and self-excited, shunt, series, compound. Voltage build-up, no load characteristics, load characteristics, applications of DC generators. Losses and efficiency, power flow diagram. Armature reaction, demagnetizing & cross magnetizing ampere-turns, compensating windings, inter poles.

DC Motors: Principle of operation, back EMF, classification, torque equation, losses and efficiency, power flow diagram. Performance characteristics of shunt, series and compound motors, starting of DC motors, necessity and types of starters, speed control – methods of speed control, testing of dc motors as per IS, applications.

Single Phase Transformer: Principle, construction and operation, phasor diagram, equivalent circuit, voltage regulation, losses and efficiency, all day efficiency. Testing- Direct loading, open and short circuit tests, polarity test, Sumpner's test, separation of hysteresis and eddy current losses. Autotransformers - construction, principle, applications and comparison with two winding transformer. Parallel operation of single phase transformers. Excitation phenomenon in transformer, harmonics in transformers.

Three Phase Transformer: Construction, various types of connections and their comparative features, 3-phase transformer connections, vector groups. Scott connection and open delta connection, three winding transformer, per unit impedance. Parallel operation of three phase transformers. Tap changing Transformers - no load and on load tap changing of transformers, cooling methods of transformers. Type and routine tests as per IS2026.

Text Books:-

1. Electrical Machines by D. P. Kothari and I. J. Nagrath, Fifth Edition, McGraw Hill, 2017.
2. Electrical Machines by S. K. Bhattacharya, Third edition, McGraw Hill, 2009.
3. Electrical Machines by A. Chakrabarti and S. Debnath, McGraw Hill, 2015

Reference Books:-

1. Electric Machinery by A. E. Fitzgerald, C. Kingsley and S. D. Umans, Sixth Edition, McGraw Hill, 2003
2. Electrical Machines by P. Purkait and I. Bandopadhyay, Oxford University Press, first edition, 2017
3. Alternating Current Machines by M. G. Say, Pitman Publishing, fifth revised edition, 1984

EE253U - DIGITAL ELECTRONICS AND MICROPROCESSOR

Teaching Scheme: 03L + 01T, Total: 04 **Credits:** 04
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

The course explores knowledge of digital electronics and microprocessor. The course comprises of digital techniques, architecture, assemble language programming and interfacing of peripherals and their applications.

DESIRABLE AWARENESS/SKILLS:

Basic knowledge of numbering systems, diodes,

COURSE OBJECTIVES:

The objectives of this course are:
1. To understand the operation of basic digital electronic devices.
2. To understand how to design digital circuits.
3. To introduce 8085 microprocessor architecture and programming in assembly language.
4. To understand basic concepts of interfacing of memory and peripheral devices to a microprocessor.
5. To implement concept microprocessors in mini-projects.

COURSE OUTCOMES:

On the successful completion of this course, students will be able to:
1. learn the basics of digital systems.
2. understand the working of a microprocessor.
3. learn to program a processor using assembly language.
4. learn configuring and using different peripherals in a digital system.
5. compile and debug a Program.
6. generate an executable file and use it

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1				2									1	1	
2				3											
3				2											2
4					2										2
5						1									
6					3										

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Digital Systems (Combinational and Sequential Circuits): Number systems, binary, octal, hexadecimal number, binary arithmetic, one's and two's complement arithmetic, codes, error detecting and correcting codes, characteristics of digital Integrated Circuits(IC), examples of IC gates digital logic families- Transistor Transistor Logic(TTL), Schottky TTL, Metal Oxide Semiconductor logic(MOS), Complementary MOS logic, Tri-state logic, representation of logical functions, K-map representation, simplification using K-map, multiplexer, De-multiplexer/decoders, adders, digital comparator, parity checker/generator, code converters, priority encoders, decoder/drivers for display devices. Flip flops, S-R, J-K, T, D-flip flops, counters, ring counter, ripple counters, synchronous counters, and applications of counters.

Fundamentals of 8085 Microprocessor: Architecture, block diagram, addressing modes, timing diagrams, state transition diagrams, classification of instructions, instruction set, assembly language programming, interrupt structure.

Data Transfer Schemes: Introduction to stack, subroutines, I/O mapped I/O and memory mapped I/O, synchronous and asynchronous data transfer schemes, memory interfacing, memory organization, address space, memory specification memory design using RAM and ROM, etc.

Interfacing Peripherals and Applications: Study of common peripheral devices, their architecture, control words and control register & different modes of operation of PPI 8255, PIT 8253, USART 8251, PKBDC 8279 interface, 8259 Programmable Interrupt Controller and interrupt Processing, real time systems

Data Conversion and Applications: 0809, 0808, architecture, interfacing with 8085 microprocessor. Microprocessor applications, frequency measurement, phase angle and power factor, measurement, current voltage measurement, kVA, kW and Maximum demand measurement, protection relays, microprocessor based speed control.

Introduction to Electronic design automation tools like Very High Speed Integrated Circuit Hardware Description Language(VHDL), microprocessor based development systems, simulators, emulators and logic analyzers

Text Books:-

1. Modern Digital Electronics by R. P. Jain, Tata McGraw Hills, Fourth Edition, 2012
2. Microprocessor Architecture, Programming, & Applications with 8085 by R.A. Gaonkar Third Edition, Penram International Publication (India) Pvt. Ltd.1997

Reference Books:-

1. Fundamentals of Digital Circuits by Anand Kumar, PHI, first edition, 2003
2. Digital Electronics Principles by Malvino A.P, Seventh Edition, Tata McGraw Hills, 2012
3. Digital Integrated Electronics by Herbert Taub- Donald Schilling, Third Edition, Tata McGraw Hills, 1997
4. Digital Design by M. Morris Mano, and Michael D Ciletti, Fifth Edition Pearson
5. Digital Logic Design by B Holdsworth , TMH ,Third Edition, 2000
6. Fundamentals of Microprocessors and Microcontrollers by B. Ram, Dhanpat Rai, Fourth Edition,1997
7. Microprocessor and Interfacing by Douglas V. Hall, TMH, second edition 2005

EE254U - POWER SYSTEM I

Teaching Scheme: 03L + 00T, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course provides an introduction to generation transmission. This course also provides introduction of different components of transmission system, concept and calculation of transmission line components. Course also provides knowledge of different parts and auxiliaries in power plants.

DESIRABLE AWARENESS/SKILLS:

Basic knowledge generating plants, resistance, induction and capacitance

COURSE OBJECTIVES:

The objectives of this course are:

1. to aware the general structure of power system
2. to impart the knowledge of generation of electricity based on conventional energy sources
3. to make students capable of analysis of mechanical and electrical design aspects of transmission system
4. to study the voltage regulation and efficiency of transmission line
5. enable the students to do analysis of different types of distribution systems and its design
6. to know the use of lightning arrestor and its string efficiency

COURSE OUTCOMES:

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

1. classify various types of substations
2. compute various transmission line parameters
3. illustrate power system networks using per unit system
4. analyze the performance of short, medium and long transmission lines
5. select various types of insulators and cables used in transmission lines

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1					1								2	2	2
2					2										
3					2										
4						3								2	
5						3									

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENTS

Generating Plants: Classification of power plants, base load, peak load and intermediate load plants. **Hydro electric power plant:** basic requirements, site selection, schematic block diagram, principle of working, main components and auxiliary components of hydro electric power plant, **Thermal electric power plant:** basic requirements, site selection, schematic block diagram, principle of working, main components and auxiliary components of thermal electric power plant. **Nuclear power plant:** basic requirements, site selection, schematic block diagram, principle of working, main components and auxiliary components of Nuclear electric power plant, **Diesel Power Plants**

Economic Aspects and Load Calculations: Hydrograph, Category of load curves, nature of load curve for domestic, commercial, industrial, agricultural, tractive, nature of load duration curve, Load factor, Demand factor, Diversity factor, Plant capacity factor, Plant use factor.

Transmission: Resistance, concept of inductance and capacitance, two-wire - single-phase and three phase, single and double circuit lines with and without transposition, equal and unequal and horizontal spacing, bundled conductors, circuit representation of lines. Corona effect. Classification of lines based on length as short, medium and long transmission lines, representation of short and medium transmission line as T and Pie circuit using R, L and C parameters, voltage and current relation, voltage regulation and efficiency, long transmission line, rigorous solution, Ferranti effect, skin effect and proximity effect.

Insulators: Working principle, types, string efficiency, methods of improving string efficiency
Line supports for Low voltage, high voltage and extra high voltage, sag calculation

Text Books:-

1. Elements of Power System Analysis, William Stevenson, Tata McGraw Sixth edition,2006
2. Modern Power System Analysis, J. Nagrath& D. P. Kothari, Third Edition, Tata McGraw Hill Publishing Company, New Delhi, reprint2010

Reference Books:-

1. Power System Analysis, Hadi Saadat, McGraw Hill,2003
2. Electrical Wiring, Estimation and Costing by S.L.Uppal, Khanna Publishers, NewDelhi, 1987.
3. Principle of Power System by V. K. Mehta, S. Chand, NewDelhi, 1982.

EE255U - DC MACHINES AND TRANSFORMERS LAB

Teaching Scheme: 02 Pr, Total: 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 03Hours

COURSE DESCRIPTION:

The laboratory work should consist of experiments based on theory syllabus of EE252U. Experiments should involve simulation performance/design of practical, result and conclusion based on it. The sample list given below is just a guide line.

COURSE OBJECTIVES:

The objectives of this course are:

1. to find the efficiency and regulation of the dc machines
2. to study the starting methods of the dc motors
3. to control the speed of the dc motors
4. to study applications of parallel and V-connections and Scott connections of transformers

COURSE OUTCOMES:

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

1. connect, operate and control DC machines under different load conditions.
2. perform various tests on DC machines.
3. determine the performance parameters of single phase and three phase transformers.
4. connect and operate single phase/three phase transformers in parallel.
5. apply safety measures as per IE rules.

LIST OF EXPERIMENTS:

1. Simulation based on electromagnetic fundamentals.
2. Magnetization, external and internal characteristics of a DC shunt generator.
3. Speed control of a DC Shunt motor by- (i) armature voltage control and (ii) Field current control method.
4. Load/break test on DC shunt/series motor.
5. Efficiency of a DC machine by Swinburn's test.
6. Load test on single/three phase transformer.
7. Open circuit and short circuit tests on single phase transformer to find its efficiency and regulation.
8. Parallel operation of two single-phase transformers under various conditions.
9. V-connection of identical single-phase transformers.
10. Scott-connection for three-phase to two-phase transformation.
11. Verification and analysis of no load current waveform of single-phase transformer.
12. Sumpner's test and separation of core losses.

GUIDE LINES FOR ICA:

Internal Continuous Assessment should support for regular performance of practical and its regular assessment with proper understanding principles of experimental set-up / experiment carried out. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by student. The performance shall be assessed experiment wise using internal continuous assessment format.

GUIDE LINES FOR ESE:

The end semester examination (ESE) for the laboratory course of three hrs duration, shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1				1									1	1	
2					2									1	
3						2								1	
4							3								1
5						1									

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

EE256U - DIGITAL ELECTRONICS AND MICROPROCESSOR LAB

Teaching Scheme: 02P; Total 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 03Hrs

COURSE DESCRIPTION:

The practical course explores knowledge of digital electronics and microprocessor based on the syllabus EE253U. The course comprises of architecture, assemble language programming and interfacing of peripherals and their applications

COURSE OBJECTIVES:

The objectives of this course are:
1. to introduce numbering systems, flip-flops and counters
2. know the basics of 8085 and 8086 and their peripherals
3. to use 8085 and 8086 in mini-projects and major projects
4. design different small circuits for society

COURSE OUTCOMES:

On the successful completion of this course, students will be able to:
1. do hardwired logic system design.
2. know the pin configuration and memory organization of a typical microprocessor.
3. develop assemble language programming and interfacing peripherals for wide application in electrical engineering.
4. develop assembly language source code for applications that use I/O ports, timer and single/multiple interrupts
5. apply techniques for measurement of electrical quantities by microprocessor.
6. apply the knowledge of digital electronics and microprocessor in application of microprocessor based electrical protection system.

LIST OF EXPERIMENTS:

1. To study the operation of logic gates, verification of Boolean laws and D Morgan's theorem.
2. Realization of combinational circuits, study of arithmetic ircuits, half adder and full adder, sub tractor, bcd adder/ subtractor.
3. Study of Flip Flops: S-R, J-K, D type, master slave J-K truth tables.
4. Study of counters using IC's: up down, decade, synchronous, binary, bcd counter, study of ring counter, johnson counter etc.
5. Study of architecture and instructions of 8085
6. Microprocessor 8085 assembly language programs based on data transfer, arithmetic instruction, logical instruction with 8/16 bit data
7. Microprocessor 8085 assembly language programs based on any interrupt.
8. Microprocessor 8085 assembly language programs based on SIM / RIM instructions
9. Interfacing of 8255 PPI with 8085
10. Interfacing of 8253 with 8085.
11. Interfacing of 8279 with 8085.
12. Applications of microprocessor 8085 in measurement of electrical quantity.
13. Applications of microprocessor 8085 in Electrical drives and speed control for stepper motor.

GUIDE LINES FOR ICA:

Internal Continuous Assessment shall support for regular performance of minimum 10 practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by student. The performance shall be assessed experiment wise using internal continuous assessment format (S10).

GUIDE LINES FOR ESE:

The End Semester Examination (ESE) for the laboratory course of three hrs duration, shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1						2							1	1	
2						2							2		1
3							3								
4								3						1	
5								1							2
6									1						

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

EE257U - POWER SYSTEM I LAB

Teaching Scheme: 02Pr, Total: 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 03Hrs

COURSE DESCRIPTION:

The term work shall include minimum 10 experiments based on curriculum of course EE254U Power System I, students should involve performance/design/drawing sheet of practical, result and conclusion based on it. The sample list given below is just a guide line.

COURSE OBJECTIVES:

The objectives of this course are:
1. to know the layout of the generating plants
2. to analyse different types of loads
3. to estimate the unit cost generation
4. to model and analyse transmission line

COURSE OUTCOMES:

On the successful completion of this course, students will be able to:
1. calculate the load factor, maximum demand of a zone, feeder in the city
2. program and simulate in MATLAB and analyse the results
3. design the parameters of transmission line
4. calculate the voltage regulation and efficiency of the transmission line
5. understand the effects of ferranti, skin, proximity and corona

LIST OF EXPERIMENTS:

1. To draw schematic block diagram of thermal power plant, hydro electrical, nuclear power plant
2. Visit to any generating plant and presentation/report submission.
3. Visit to any substation and presentation/report submission.
4. To calculate MD, load factor of typical distribution of feeder in zone
5. Layout of typical transmission system withcalculations
6. To find the voltage and power at sending end and the voltage regulation of 1-phase and 3-phase (short and medium line) transmission line.
7. Calculation the load duration curve for azone.
8. Simulation of equivalent T and π model of short and medium transmission line in MATLAB
9. To study the transmission line trainingsimulator.
10. To study ferranti effect.
11. Calculation of inductance of a single phase and three phase (single and double circuit) transmissionline.
12. Calculation of capacitance of single phase and three phase (single and double circuit) transmissionline.

GUIDE LINES FOR ICA:

Internal Continuous Assessment shall support for regular performance of minimum 10 practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record/drawings submitted by student (journal) based on practical performed by student. The performance shall be assessed experiment wise using internal continuous assessment format.

GUIDE LINES FOR ESE:

The End Semester Examination (ESE) for the laboratory course of three hrs duration shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out ofinstitute.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1				1											
2				2									2	2	
3					2										2
4						1								2	
5							3								

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

EE258U - CIRCUIT SIMULATION LAB

Teaching Scheme: 02Pr, Total: 02 **Credits:** 01
Evaluation Scheme: 50 ICA + 00 ESE **Total marks:** 50
Duration of ESE: 00Hrs

COURSE DESCRIPTION:

The laboratory work should consist of performing minimum 10 experiments of the following based on theory syllabus of EE201U, EE202U, EE251U, EE252U, EE253U and EE254U using any of the following or other equivalent software packages such as

- MATLAB
- ANSYS
- P-SPICE or appropriate software
- ETAP
- PSCAD
- CYME
- Powerworld simulator
- Any other relevant open source software

COURSE OBJECTIVES:

The objectives of this course are:
1. simulate different circuits in different software
2. design the circuits for mini and major projects

COURSE OUTCOMES:

At the end of the course the student will be able to:
1. use software packages for simulation of electrical circuits/machines/power systems etc.
2. reinforce theoretical concepts studied in classroom.
3. simulate and analyse analogue and digital electronic circuits.
4. use software packages for design of electrical and electronic circuits.

LIST OF EXPERIMENTS:

1. Simulation and performance analysis of any 1 phase, 3 phase machines
2. Simulation and analysis of different types of rectifier/converter/inverter circuits
3. Loadflow of small distribution system using CYMEDIST software.
4. Electronic / electrical circuit simulation and performanceanalysis
5. Op-Amp circuitssimulation
6. Time response of ACcircuits
7. Study offilters
8. Study of BJT/ MOSFETcircuits
9. Study of activefilters

GUIDE LINES FOR ICA:

Internal Continuous Assessment shall support for regular performance of minimum 10 practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical's performed by student. The performance shall be assessed experiment wise using internal continuous assessment format.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**			
1					1										
						2									
3						2									
4							3								

1. **1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated**

EE259U - MINI PROJECT

Teaching Scheme: 02PR, Total: 02 **Credits:** 02
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course provides the students to apply knowledge to design and analyze the circuits. Students will be able to interact with the society and develop the skills for the betterment of the society

COURSE OBJECTIVES:

The objectives of this course are:

1. to develop the circuit for the society.
2. to simulate the circuit and analyse it using software
3. to select proper components for circuit.
4. to fabricate electrical circuit.

COURSE OUTCOMES:

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

1. develop the circuit for the model.
2. make use of software for simulation of circuit.
3. select proper components for circuit.
4. fabricate electrical circuit.
5. test and record the performance for the circuit.

GUIDELINES FOR MINI PROJECT:

- Each student shall work on an approved project, a group of 4-5 students (maximum) shall be allotted for each minor project and same group may be continued for majorproject.

- Mini project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students will get acquainted with different aspects of fabrication, design oranalysis.
- Each student is required to maintain separate log book for documenting various activities of minorproject.

- Three-member committee appointed by Head of the department shall be constituted for finalizing the topics of mini project. Maximum four minor project groups shall be assigned to one teachingstaff.

Table-A.
Assessment of Mini Project
Name of the Project: _____
Name of the Guide: _____
Evaluation may contain:

S.No.	Exam Seat No	Name of Student	Project Selection	Design/ Simulation/Logic PCB/hardware/programming	Result	Verification	Documentation andReport	Presentation	Total (75)

GUIDE LINES FOR ICA:

Internal Continuous Assessment shall support for regular performance of minimum 10 practical's and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical's performed by student. The performance shall be assessed experiment wise using internal continuous assessment format.

GUIDE LINES FOR ESE:

The End Semester Examination (ESE) for the laboratory course of three hrs duration, shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1						2							1		2
2							2							1	
3							2								
4							1								
5								3							

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

SH299U EFFECTIVE TECHNICAL COMMUNICATION

Teaching Scheme: 00L+02 PR **Credit: 01**
Evaluation Scheme: 25 ICA + 25 ESE **Total marks: 50**

COURSE DESCRIPTION:

The course is intended to provide basic technical communication to engineering students. This course introduces various engineering ethics as well as self development & assessment of the student.

DESIRABLE AWARENESS:

Basic knowledge of technical communication skill and engineering ethics

COURSE OBJECTIVES:

Upon completion of this course, the student will be able to-

1. identify and describe the basic communication process.
2. appreciate the value of empathic listening and effective feedback.
3. use technology appropriately to enhance communication success.
4. prepare and deliver an effective oral presentation.
5. understand the role of communication in personal & professional success.

COURSE OUTCOMES:

Students are able to –

1. understand & apply business communication strategies and principles to prepare effective communication for domestic and international business situations.
2. remember ethical, legal, cultural, and global issues affecting technical communication.
3. evaluate accurate business documents using computer technology.
4. apply an effective oral technical presentation.
5. understand ethically use of document and integrate sources.

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	2	2	1	-	3	-	2
2	-	-	-	-	-	2	2	1	-	3	-	2
3	-	-	-	-	-	2	2	1	-	3	-	2
4	-	-	-	-	-	2	2	1	-	3	-	2
5	-	-	-	-	-	2	2	3	-	3	-	2

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENT

Introduction to Technical Communication: Definition of technical communication, aspect of technical communication, forms of technical communication, importance of technical communication, technical communication skills, (listening, speaking, reading, writing), linguistic ability, style in technical communication.

Nature of Technical Communication: Communication as sharing, stages of communication, channels of communication, nature of technical communication, aspects of technical communication, forms of technical communication, general and technical communication, importance and need for technical communication, technical communication skills: listening, speaking, reading, writing, barriers to effective communication

Comprehension of Technical Material :(Information Design and Development)
Different kinds of technical documents, information development life cycle, organisation structures, factors affecting information and document design, strategies for organization, information design and writing for print and for online media

Technical Writing: Grammar and Editing- technical writing process, forms of discourse, writing drafts and revising, collaborative writing, creating indexes, technical writing style and language, basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style, introduction to advanced technical communication, usability, human factors, managing technical communication projects, time estimation, single sourcing, localization

Engineering Ethics: Senses of engineering ethics, variety of moral issues, types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, consensus and controversy, professional ideals and virtues, attributes of an ethical personality, theories about right action, self interest, responsibilities and rights of engineers, collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflict of interest, professional rights

Self Development and Assessment: Self assessment, awareness, perception and attitude, values and beliefs, personal goal setting, career planning, self esteem, managing time, personal memory, rapid reading, taking notes, complex problem solving, creativity

Text Books:

1. Effective Technical Communication By M Ashraf Rizvi, 2nd Edition, The McGraw Hill Publication, 2017
2. Business Communication, Rai and Rai, 2nd edition, Himalaya Publishing House, 2014
3. Organization Behavior, Suja R. Nair, 2nd Edition, Himalaya Publications, 2014
4. Technical Communication: Principles And Practice, Meenakshi Raman, Sangeeta Sharma, 2nd Edition, 2012

Reference Books:

1. Goal Setting: How to Create an Action Plan and Achieve Your Goals, Susan Wilson and Michael Dobson, 2008
2. Business Communication, Raman and Singh, 2nd edition, Oxford Publication, 2012
3. Nonverbal Communication in Human Interaction by Mark L. Knapp, Judith A. Hall, Terrence G. Horgan
4. Business Communication (BCOM), Lehman Sinha, 2nd edition, Cengage Learning, 2012
5. Business Communication for Managers, Penrose, Rasberry, Myers, 5th edition, Cenage Learning

It is a representative list of practical. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Ten practical should be performed to cover entire curriculum of course SH299U. The list given below is just a guideline.

List of practical / Assignments

1. Delivery of a speech on general topics by giving emphasis on non-verbal communication
2. Practical based on fourfold skills (Technical communication skills)
3. Delivery of a speech on technical topic
4. Role play on importance of time management
5. Performing a corporate meeting
6. Personal goal setting with priorities
7. Resume writingalong with application letter
8. Group discussion
9. Personal interview
10. Debate on recent topics
11. Practical based on reading skills
12. Writing business letter
13. Role play on engineering ethics

Guide lines for ICA:

Internal Continuous Assessment should support for regular performance of practical by student and his/her regular assessment with proper understanding practical carried out.

SH 250AU INTRODUCTION TO THE CONSTITUTION OF INDIA

Teaching Scheme: 00L: **Credit: 00**
Evaluation Scheme: 60 ESE **Total Marks: 60**

COURSE DESCRIPTION:

The course provides knowledge about constitution of India, state and central policies, fundamental rights, fundamental duties, powers and functions of municipalities, panchayats and co-operative societies, electoral process and judiciary system.

DESIRABLE AWARENESS:

Basic knowledge of Indian Constitution

COURSE OBJECTIVES:

The objectives of the course are to-

1. provide knowledge about legal literacy, state and central policies, fundamental rights, fundamental duties, powers and functions of municipalities, panchayats and co-operative societies, electoral process
2. enable the students to take up competitive examinations and also demonstrate the qualities of a responsible citizen.

COURSE OUTCOMES:

On the successful completion of this course, student shall be able to –

1. understand & remember the knowledge of basic information about Indian constitution.
2. analyse individual role and ethical responsibility towards society.
3. apply the knowledge of human rights and its implications while behaving with other citizens.

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	3	2	3	1	-	-	2
2	-	-	-	-	-	2	2	3	3	-	-	3
3	-	-	-	-	-	3	2	3	3	-	-	3

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT:

Introduction to the constitution of India: the making of the constitution and salient features of the constitution., preamble to the constitution, fundamental rights and its limitations.

Directive principles of state policy and relevance of directive principles, state policy fundamental duties, union executives – president, prime minister, parliament, supreme court **State executives:** governor, chief minister, state legislature, high courts of state, electoral process in India, procedures for amendment in constitution

Human rights – meaning and definitions, emergency provisions, working of national human rights commission in India, powers and functions of municipalities, panchyats and co-operative societies

Text Books

1. Introduction to the Constitution of India, (Students Edn.) Durga Das Basu, Prentice –Hall EEE, 19th / 20th Edition., 2001
2. Introduction to the Constitution of India", Brij Kishore Sharma, PHI Learning Pvt. Ltd., New Delhi, 2011

Reference Books

1. An Introduction to Constitution of India, M.V.Pylee, Vikas Publishing, 2002
2. Constitution of India, Dr. B. R. Ambedkar, Government of India Publication
3. Latest Publications of Indian Institute of Human Rights, New Delhi