ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR SEM A (4 YDC)
EE22004: ELECTRICAL MEASUREMENT & INSTRUMENTATION

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Fundamental of Electrical Engineering, Physics.

COURSE OBJECTIVES:

1. To introduce students to monitor, analyze and control any physical system.
2. To understand students how different type of meters work with their construction.
3. To provide a brief knowledge of measurements and measuring instruments related to engineering.
4. To impart the knowledge of sensors and different types of AC and DC transducers.
5. To teach students basic principle of operation, construction, and application of recording devices, such as CRO, X-Y plotters etc.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE22004(T).1: Interpret various characteristics and errors in the measuring instruments.
EE22004(T).2: Select and calibrate specific instrument for the purpose of measurement of different electrical quantities.
EE22004(T).3: Measure unknown impedance using AC/DC bridges and potentiometers.
EE22004(T).4: Make use of transducer and signal conditioning in order to measure unknown electrical and physical quantities.
EE22004(T).5: Demonstrate the application of CRO'S and DSO'S in the research and development activities in domain of electrical engineering.

COURSE CONTENTS:

THEORY:

UNITS
UNIT: 1 Basics of Measurement: Static and Dynamic charactereristics of instruments , Errors and their analysis, Standards of Measurement , classification of instruments
UNIT: 2 Analog electromechanical instruments, measurement of voltage, current, power and energy in single phase and 3- phase circuits. Maximum demand indicator, power factor meter , frequency meter, tri- vector meter, error estimations and compensations , extension of instrument range , calibration and testing.
UNIT: 3 DC and AC potentiometers, working principle and standardization, Instrument Transformers characteristics and applications , AC bridges – Balance principle , Maxwell, Hay's, Owens, Anderson, De-Sauty, Schering , Wein bridges. Sources of errors and their removal, measurement of small, medium and high resistance, Kelvin's double bridge, Megger.
UNIT: 4 Transducer definition and classifications, Measurement of physical quantities, Specific Transducers , strain guage , RTD , Thermocouple, thermistors, LVDT and Capacitive transducers. Data Acquisition systems- A/D & D/A converters , signal conditioning, Digital measurement of various electrical quantities.
UNIT: 5 CRO- Deflection sensitivity of CRT, extension of frequency range , various types of oscilloscopes , DSO and its applications. Types of Sweep , pre- trigger concepts , compensating probes, Q- meters.

ASSESMENT:

A. Continuous evaluation through two mid-term test with a weightage of 30% of the total marks. It includes class attendance as well as assignments on the course topics.
B. The end-term theory examination weightage is 70%.

TEXT BOOKS RECOMMENDED:

1. A.k. Sawhney, "A course in Electrical and Electronic measurement and Instrumentation", tenth edition, Dhanpat Rai, 1994.
2. C.S. Rangan, G.R.Sharma & V.S.V. Mani, "Instrumentation devices and Systems", Tata McGraw Hill Education, 2008
3. B.C. Nakra, K.K. Chaudhary ,"Instrumentation , Measurement and Analysis" , second edition, Tata McGraw Hill Education,2006.

REFERENCES BOOKS:

1. William David Cooper, Albert D. Helfrick, "Electronic Instrumentation and Measurement Techniques", third edition , prentice – Hall of India,1985.
2. J. B. Gupta, "Electrical measurement and measuring Instruments", Fourth Edition, Katson Publisher, 1979.

3. E.W. Golding & F.C. Widdlis, " Electrical measurements and measuring Instruments", fifth edition AH WHEELER & company, 1993.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	-	1	1	-	-	-	-	-	-
CO2	2	3	1	2	1	3	1	-	-	-	-	-
CO3	3	3	3	2	1	1	-	-	-	-	-	-
CO4	3	3	3	2	1	1	-	-	-	-	-	-
CO5	3	3	3	2	1	1	-	-	-	-	-	-
Average	3	3	2	2	1	1	1	-	-	-	-	-

LABORATORY:

OBJECTIVES: The fundamental of Electrical engineering Laboratory is designed:

1. To provide the student with the knowledge to use basic measuring instruments techniques and equipments such as motors, transformers etc with proficiency.
2. In this lab, students are expected to get hands-on experience in using the basic measuring devices used in electrical engineering and in interpreting the results of measurement operations.
3. To develop communication skill through laboratory note book with written descriptions of procedure, result and analysis.
4. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.

LABORATORY OUTCOMES:

1. Identify the various parameters measurable in the electrical instruments that can be calibrated to rectify the errors.
2. To carry out experiments for determining the unknown quantities in the electrical instruments using different Bridge circuits.
3. Explore the constructions of various meters for the electrical systems.
4. To have an understanding about the CRO, DSO, and Transducers.
5. To construct the meaning from oral, written, and graphical plotting through the experiments.

S. No.	LIST OF EXPERIMENTS
1	Calibration of voltmeter and ammeter.
2	To study the construction of electrodynamometer type power factor meter and measure power factor for different types of loads.
3	To study the construction of single phase induction type energy meter and to find out the error at various loads and power factor by phantom loading.
4	To determine accurate Quality Factor of an unknown coil.
5	Determine the unknown inductance using Maxwell's inductance bridge and Maxwell's inductance capacitance bridge method.

6	Determine the unknown inductance and Q factor using Hay's bridge method.
7	Determine the unknown weights using Strain Gauge.
8	Determine the input output characteristics and sensitivity of LVDT.
9	Demonstration of Cathode Ray Oscilloscope (CRO).
10	Demonstration of TDS210 Digital Storage Oscilloscope (DSO).

ASSESMENT:

A. Continuous evaluation of laboratory journals with a weightage of 30%. It includes lab attendance as well as experiments performed in the lab.
B. The end-term practical examination weightage is 70%.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	3	-	-	-	-	-	3	-	-
CO2	-	3	-	-	3	-	-	-	-	3	-	-
CO3	3	3	-	3	3	3	-	-	-	3	-	3
CO4	3	3	-	-	-	-	-	-	-	3	-	-
CO5	-	3	-	3	-	-	-	-	-	3	-	-
Average	3	3	-	3	3	3	-	-	-	3	-	3

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR SEM A (4 YDC)
EC22002: ANALOG ELECTRONICS

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Basic Electronics and Engineering

COURSE OBJECTIVES:

This course introduces the characteristics and applications of semiconductor devices and circuits. Emphasis is placed on analysis, selection, biasing, and applications.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EC22002(T).1: Develop the capability to analyze and design simple circuits containing different types of diodes.
EC22002(T).2: Design circuits based on BJT and FET transistors with their different configurations to operate them in desired modes.
EC22002(T).3: Analyze and design of amplifiers and their cascade with the help of smallsignal models BJT and FET.
EC22002(T).4: Improve amplifier performance by employing different feedback topologiesand design various frequency generators.
EC22002(T).5: Use OP-AMP to design linear and nonlinear circuits.

COURSE CONTENTS

THEORY:

UNITS
UNIT1: Semiconductor physics & PN junction diode: Physical operation of diodes: basic semiconductor concepts, PN junction diode under open & biased condition, VI characteristics of diode, small signal model and its application such as clipper, clamper and rectifier. Special diodes and their applications: Zener diode, Tunnel diode, Schottky diode, photodiode and LED.

UNIT2:

Transistors & their characteristics and biasing techniques: Physical structure, characteristics and modes of operation of Bipolar junction transistor (BJT) and Metal Oxide Semiconductor Field effect transistor (MOSFET). Types of BJT and MOSFET, comparison between BJT and MOSFET. Different configurations of BJT and MOSFET. Basics of JFET. Transistor biasing and operating point: DC and AC load lines, thermal runaway, bias stability, different biasing techniques of BJT and analysis of transistor circuits at DC. Darlington pair and Miller theorem & its dual.

UNIT3:

Amplifiers & their frequency response: Small signal model of transistor, AC analysis of transistor circuits. Graphical analysis of a single stage amplifiers using BJT. Analysis of cascaded stages using BJT in different configurations. Low and high frequency response of amplifiers. Effect of coupling & bypass capacitors on low frequency response.

UNIT4:

Feedback amplifiers & Oscillators: General feedback theory, types of feedback, effect of negative feedback on input & output impedance, gain and stability of amplifier. Oscillators: principle of oscillation, condition for sustained oscillation. Various types of Oscillators: LC Oscillator, RC Oscillator and Crystal Oscillator.

UNIT5:

Op-amp and its application: Characteristics of an ideal Op-amp, Differential amplifiers, internal Architecture of Op-amp, Op-amp parameters such as CMRR, slew rate, input/output impedance, offset voltage, frequency response and gain-bandwidth product. Op-amp gain in inverting and non-inverting configurations. Applications of Op-amp as: adder, subtractor, integrator, differentiator, comparator, Schmitt trigger and log-antilog amplifiers using Ics μA741, LM 324 &LM 358.

ASSESMENT:

A. Continuous evaluation through two mid-term test with a weightage of 30% of the total marks. Itincludes class attendance as well as assignments on the course topics.
B. The end-term theory examination weightage is 70%.

TEXT BOOKS RECOMMENDED:

1. David Bell, "Electronic Devices & Circuits", fourth edition, Prentice-Hall of India, 2010.
2. Millman and Grabel, "Microelectronics", second edition, Tata McGraw-Hill, 2001.
3. Milliman & Halkias, "Integrated Electronics", McGraw Hill Pub., 2001.
4. Gayakwad R.A., "Op AMP & Linear Integrated Circuits", third edition, Prentice-Hall of India,2000

REFERENCES BOOKS:

1. Robert Boylestad, "Electronic Devices & Circuits", Prentice-Hall of India, 2000.
2. Schilling & Belove, "Electronic Circuits", third edition, McGraw Hill, 2002.
3. John D. Ryder, "Electronics Fundamentals & Applications", Prentice-Hall of India, 1970.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	1	2	-	-	-	-	-	-	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-
Average	3	3	2	2.5	-	-	-	-	-	-	-	-

LABORATORY:

OBJECTIVES:

The fundamental of Analog Electronics engineering Laboratory is designed

1. To provide the student with the knowledge to use basic measuring instruments techniques and equipments such as function generator, CRO etc with proficiency.

2. In this lab, students are expected to get hands-on experience in using the basic measuring devices used in electronics engineering and in interpreting the results of measurement operations.

3. To develop communication skill through laboratory note book with written descriptions of procedure, result and analysis.

4. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.

LABORATORY OUTCOMES:

1. Study the nonlinear characteristics of different types of Diodes and theirapplications experimentally.
2. Develop competence in frequency response analysis of single amplifiers.
3. Develop competence in frequency response analysis of multistage amplifiers.
4. Measure frequency of various oscillators.
5. Design and experiment OP-AMP based linear and nonlinear circuit.

S.No.	List of Experiments
1	Study of V- I characteristics of diode.
2	To study Zener diode as voltage regulator.
3	Study of different types of rectifiers.
4	To plot frequency response of single stage RC coupled amplifier.
5	To plot frequency response of single stage JFET amplifier.
6	To plot frequency response of double stage RC coupled amplifier
7	To plot frequency response of double stage RC coupled amplifier withfeedback.
8	Analyze the characteristics of RC Phase Shift oscillator.
9	Analyze Wein Bridge oscillator.
10	Study of OP-Amp as: 1. Inverting Amplifier 2. Non inverting Amplifier 3. Summing Amplifier
11	Study of integrator circuit & differentiator circuit using Op Amp.

ASSESMENT:

A. Continuous evaluation of laboratory journals with a weightage of 40%. It includes labattendance as well as experiments performed in the lab.
B. The end-term practical examination weightage is 60%.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	1	2	-	-	-	-	-	-	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-
Average	3	3	2	2.5	-	-	-	-	-	-	-	-

ELECTRICAL ENGINEERING DEPARTMENT
B. TECH SECOND YEAR SEM A (4 YDC)
EE22006: NETWORK THEORY

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Fundamental of electrical engineering, mathematics**.**

COURSE OBJECTIVES:
The objective of the course is to familiarize the students with the analysis, characterization and elementary synthesis of networks and develop a basic understanding of various components under transient and steady state conditions. This helps in designing of real life applications.
The objectives include equipping students with:

1. The fundamental concepts of current; voltage and power along with the properties of passive circuit elements as well as network theorems.
2. Designing of various types of filters, transient and steady state response of various circuits, two- port network and state space variable analysis.
3. Illustrate the magnetically coupled circuits, Analysis of balanced and unbalanced polyphase circuits.
4. Knowledge of attenuators, equalizers, Fourier series and its frequency spectrum.

COURSE OUTCOMES:
After completing the subject student will be able to:

EE22006(T).1: Apply the knowledge of basic physics and mathematics to develop approximate circuit model of practical elements. Formulation of circuit equations using Kirchhoff's law and network topology.
EE22006(T).2: Apply the network reduction techniques and network theorems to obtain solution of network.
EE22006(T).3: Infer and evaluate transient response, steady state response in time and frequency domain, determine different network functions and analyze the series and parallel resonant circuit.
EE22006(T).4: Analysis of polyphase circuits, neutral shift concept and power factor improvement.
EE22006(T).5: Develop and evaluate two-port model and its parameters, design attenuators, filters and equalizers.

COURSE CONTENTS:
THEORY:

UNIT: 1

Practical Circuit elements, Distributed v/s Lumped circuits, Lump circuit approximations, Linear Circuit Model, Kirchhoff's Laws, Power and energy, Passivity, Loop and Nodal equations, analysis of circuits with controlled sources and magnetically coupled elements, Network Topology, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman's Theorem, Compensation Theorem and Tellegen's Theorem

UNIT: 2

First and second order networks, Initial Conditions, zero state, zero input, transient and steady state response, Step, Ramp, Impulse and arbitrary inputs, Solution of network equations using Laplace transform, Initial and Final value theorem

UNIT: 3

Network functions, their pole zero description, Two port network model, Gyrator, various two port network parameters, relationship of two port variables, interconnection of two port networks, terminated two port networks

UNIT: 4

Sinusoidal steady state analysis, Introduction to Polyphase Circuits, analysis of balanced and unbalanced polyphase circuits, Neutral Shift, complex power, power factor improvement

UNIT: 5

Fourier analysis of periodic waveforms, frequency spectrum, Power and energy of complex waveforms, frequency response plots, Series and Parallel Resonance, Basic Concept of attenuator, filter, equalizers and design of low pass and high pass filters using passive elements

ASSESMENT:

A. Continuous evaluation through two mid-term test with a weightage of 30% of the total marks. It includes class attendance as well as assignments on the course topics.
B. The end-term theory examination weightage is 70%.

TEXT BOOKS RECOMMENDED:

1. M.E Van Valkenburg, "Network Analysis", Third Edition, PHI, New Delhi, 1998.
2. Desoer and Kuh, "Basic circuit theory", Tata McGraw Hill Edition 2009.
3. William Hart Hayt, Jack E. Kemmerly, Steven M. Durbin, "Engineering Circuit Analysis", Eight Edition, McGraw-Hill Higher Education, 2012.
4.

REFERENCES BOOKS:

1. Ronald E. Scott, "Linear circuits Vol.I and II", Addison-Wesley Publication, 2007.
2. Joseph A Edminister, "Electric circuits Schaum's outlines", Fifth Edition, Tata McGraw Hill Education Private Limited 2009.
3. G K Mithal, "Network Analysis", Khanna Publication, edition 2011.
4. Robert L. Boylestad, "Introductory Circuit Analysis", Twelfth Edition, Pearson Education Limited, 2012.

CO's - PO's MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	1	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	1	-	-	-	-	-	-	-
CO4	3	-	2	-	1	-	-	-	-	-	-	-
CO5	3	3	2	2	1	-	-	-	-	-	-	-
Average	3	3	2	2	1	-	-	-	-	-	-	-

LABORATORY:

OBJECTIVES: the network theory laboratory is designed

1. To access and use the most basic functions of electrical test and measurement equipment including oscilloscopes, multi-meters, function generators and power supplies.
2. Work effectively in groups by sharing responsibilities and collaborating on findings.
3. Record and document results of lab work using text and graphs.
4. Test circuits, analyze data and compare measured performance to theory and simulation.

LABORATORY OUTCOMES:

1. Analyze complicated circuits using different network theorems.
2. Apply the knowledge of basic circuital law and simplify the network.
3. Infer and evaluate transient response, Steady state response, and network functions.
4. Obtain the maximum power transfer to the load, and analyze the series resonant and parallel resonant circuit.
5. Evaluate two port network model and its parameters.

S.No.	List of Experiments
1	To determine the equivalent networks by application of Thevenin's Theorem.
2	To determine the equivalent networks by application of Norton's Theorem.
3	To plot current with respect to time and evaluate time constant of Transient in RC circuits.
4	Analyzed salient feature of series and parallel resonance circuits and draw its characteristics.
5	To verify the voltage and current relations in star and delta connected systems.
6	To validate open circuit parameter and short circuit parameter for two port network.
7	Illustrate linearity property of a circuit using superposition theorem.
8	Verification of reciprocity theorem.
9	Evaluate power versus load curve and verify maximum power transfer theorem.
10	Designing of Passive Low-pass and High-pass Filters.

ASSESSMENT:

B. Continuous evaluation of laboratory journals with a weightage of 40%. It includes lab attendance as well as experiments performed in the lab.

C. The end-term practical examination weightage is 60%.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	-	3	-	-	-	-	3	-	-
CO2	2	3	3	-	3	-	-	-	-	3	-	-
CO3	-	3	3	3	3	-	-	-	-	3	-	-
CO4	-	3	3	-	3	-	-	-	-	3	-	-
CO5	-	-	3	3	3	-	-	-	-	3	-	-
Average	2	3	3	3	3	-	-	-	-	3	-	-

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE

B. TECH. SECOND YEAR SEM A (4YDC) ELECTRICAL ENGINEERING

MA22014: MATHEMATICS – III

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	-	1	3	-	1	30	70	-	-	100

PRE –REQUISITES: Mathematics-I and Mathematics-II.

COURSE OBJECTIVES

1. To explain the concept of partial differential equation with its application.
2. To introduce the concept of Fourier series and Fourier Transform with their applications.
3. To teach the concept of Laplace Transform and its application in solving ordinary differential equations.
4. To solve the problems related to algebra, differential calculus and integral calculus using numerical analysis.

COURSE OUTCOMES

On completion of the course, students will be able to

MA22014(T).1: Apply the basic concept of partial differential equations for solving some physical problems in engineering models that result in partial differential equations.

MA22014(T).2: Acquire the knowledge of Fourier analysis and its applications to solve the problems in physics and electrical engineering.

MA22014(T).3: Use the fundamental concept of Laplace Transform, Inverse Laplace Transform and its applications to solve engineering applications such as circuit analysis and control theory.

MA22014(T).4: Analyze the basic concept of finite differences for solving problems based on numerical interpolation, differentiation, integration. Formulation and evaluation of difference equations.

MA22014(T).5: Apply various numerical methods to solve algebraic, transcendental and simultaneous equations.

COURSE CONTENTS:

UNIT 1

Partial Differential Equations :Formation of Partial Differential Equations, Partial Differential Equations of first order and first degree i.e., Pp+Qq=R, Linear Homogeneous Partial Differential Equations of nth order with constant coefficient, Separation of Variables, Applications to Vibration of String and Transmission Line Equation

UNIT 2

Fourier Series and Fourier Transform: Definition and Derivations, Odd and Even functions, Half-Range Series, Change of Scale, Fourier Integral, Numerical Harmonic Analysis. Fourier Transforms: Sine and Cosine Transform, Applications of Fourier

Transforms to solution of Partial Differential Equations.

UNIT 3

Laplace Transform : Definition, Laplace Transform of elementary and periodic functions, properties of Laplace Transform and Transforms of derivatives, Inverse Laplace Transform and its properties, Convolution Theorem, Applications of Laplace Transform to solution of linear differential equations with constant and variable coefficients, Simultaneous differential equations.

UNIT 4

Calculus of Finite Differences: Difference table, Operators E and Δ, Newton's forward and backward interpolation formula, Lagrange's interpolation formula, Differentiation and Integration, Difference Equations with constant coefficients.

UNIT 5

Numerical Methods: Solution of Algebraic and Transcendental equations using Bisection method, Regular-Falsi method and Newton Raphson method. Numerical solution of simultaneous equations: Gauss Elimination method, Gauss Seidel method. Numerical solution of ordinary differential equations: Taylor's, Picard's and Runge- Kutta method.

ASSESSMENT:

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%).
2. End semester Theory Exam (70%).

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.
3. Balagurusamy E., Numerical Methods, Tata McGraw-Hill Publishing Company Ltd. , New Delhi, 1999.

REFERENCE BOOKS

1. Kreyszig Erwin, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
2. Jain, R.K. and S.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi,2006.
3. Vedamurthy V.N. andIyengar S.N., Numerical Methods, Vikas Publishing, 2008.
4. Veerarajan T, Statistics, Probability and Random Process, 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi 2003.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	-	-	-	-	3
CO2	3	3	3	-	-	-	-	-	-	-	-	3
CO3	3	3	3	-	-	-	-	-	-	-	-	3
CO4	3	3	3	-	-	-	-	-	-	-	-	3
CO5	3	3	3	-	-	-	-	-	-	-	-	3
Average	3	3	3	-	-	-	-	-	-	-	-	3

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
B.TECH. SECOND YEAR SEM A (4YDC)
HU22005: ECONOMICS FOR ENGINEERS

HOURS PER WEEK			CREDITS		MAXIMUM MARKS				
L	T	P	Th	Pr	THEORY		PRACTICAL		TOTAL MARKS
					CW	END SEM	SW	END SEM	
3	-	-	3	-	30	70	-	-	100

PRE REQUISITES: Knowledge of English language

OBJECTIVES:

1. To develop the optimizing skills of technology-use in engineering problems
2. To articulate economic analytical skills so as to contextualize the solutions of engineering problems.
3. To explore the potential of students in economic perspective of engineering professional goals.
4. To make sense of need of entrepreneurship and understand the financial reports of a business.

COURSE OUTCOMES:

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

HU22005 (T).1: Explain economic cyclic flow and Estimate the demand and demand elasticity for a product.

HU22005 (T).2: Plan the production; choose appropriate production technology (combination of production factors); and estimate feasible range of production.

HU22005 (T).3: Analyze the production-cost-profit relation and select the suitable project for investment

HU22005 (T).4: Estimate price and the equilibrium for a firm/organization in different competitive market situations.

HU22005 (T).5: Review, summarize and compare the financial statements of an accounting entity and able to apply financial ratio technique for financial analysis.

HU22005 (T).6: Identify the problems, see the opportunity, and ideate the solution to the problems

COURSE CONTENT:

UNIT 1.Nature and scope of economics, Economic cyclic flow, Central Economic problems, macro and micro economics, concept, determinants and law of demand and supply, Elasticity of demand, Equilibrium price, consumer surplus and equilibrium.
UNIT 2. Production, cost and Revenue: Production function, laws of return to variable proportion, Laws of return to scale, cost concepts, cost functions and their inter relation, Revenue Concepts and functions, break- even analysis, Time value of money and Investment analysis- NPV, IRR, ARR and payback period method.

UNIT 3. Pricing and Market: Price determination and firm's equilibrium under perfect competition and monopoly, price-output determination under monopolistic competition, kinked demand curve, collusive and non-collusive oligopoly.
UNIT 4. Entrepreneur, entrepreneurship and start-up, characteristics of an entrepreneur, forms of business organization, phases of startup, small medium and large scale enterprise, problems, opportunities, Design Thinking and Ideation. Business model.
UNIT 5. Accountancy: Accountancy and bookkeeping, GAAP, Assets, Liabilities and Capital, types of accounts, Journal, Ledger, Trial Balance and Financial Statements, Financial Ratio Analysis.

ASSESSMENT: Through End-Sem. Theory Exam, Theory sessionals, Mid-Sem Tests, and Assignments

BOOKS & REFERENCE RECOMMENDATION:

1. JhingalM.l., Economics of development and Planning, Vrinda Publication (40th Ed./latest).
2. Ahuja H. L., Advance economic theory, S Chand Publication, (21st Ed./Latest)
3. Riggs, Bedworth and Randhawa, Engineering Economics, Tata McGraw-Hill, (4th Ed./latest)
4. Principles of accountancy, Nirmal Jain, Entrepreneurship by Rajeev Roy, 2nd edition

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
CO1	-	-	-	-	-	1	-	-	-	-	2	-
CO2	-	-	-	-	-	1	1	-	-	-	3	-
CO3	-	-	-	-	-	-	1	-	-	-	3	-
CO4	-	-	-	-	-	-	1	-	-	-	2	-
CO5	-	-	-	-	-	-	-	2	-	-	3	-
CO6	-	-	-	-	-	1	1	1	-	-	3	-
Average	-	-	-	-	-	**1.0**	**1.0**	**1.5**	**-**	**0.0**	**2.7**	**-**

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR SEM A (4 YDC)
EE22443: ELECTRICAL WORKSHOP-I

HOURS PER WEEK			CREDIT			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
-	4	-	-	2	-	-	-	40	60	100

OBJECTIVES: The Electrical workshop –I laboratory is designed.

1. The main objective is to make the students able to understand, design and prepare electrical
   circuit using basic concept.
2. To focus on Electrical safety and equipment earthing.
3. To address the underlying concepts of wiring of various electrical installation.
4. In this lab, students are expected to get hands-on experience in using the electrical tools
   and develop communication skills through manual with written descriptions of procedure,
   result and analysis.

LABORATORY OUTCOMES:

The student will able to:

1. To get acquainted with various tools, symbols used in the electrical system.
2. Prepare estimate for electrical wiring in the domestic applications.
3. Provide effective earthing solution in domestic as well as industrial domain.
4. Suggest suited illumination devices as per application requirement.
5. Repair and maintain electrical appliances and make robust joint in electrical connection.

EXPERIMENTS:

S. No.	LIST OF EXPERIMENTS
1	Introduction of tools, Electrical materials, Symbol and Abbreviation.
2	To make T joint and Straight joint.
3	To Study Staircase wiring.
4	To Study and estimate House wiring
5	To Study Fluorescent tube light
6	To Study high pressure mercury vapour lamp (H.P.M.V)
7	To Study Sodium vapour lamp

8	To study different types of earthing system and measure the earth resistance.
9	To study repairing of Home Appliances such as Heater, Electric iron, Fans etc.

ASSESMENT:

A. Continuous evaluation laboratory journals with a weightage of 40 %. It includes lab attendance as well as experiments performed in the lab.

B. The end term practical examination weightage is 60%.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	3
CO3	3	-	-	-	-	-	-	-	-	-	-	3
CO4	3	-	3	-	-	-	-	-	-	-	-	-
CO5	3	1	-	-	-	1	-	-	1	-	-	3
Average	3	1	3	-	-	1	-	-	1	-	-	3

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR, SEM B (4 YDC)
EE22501: ELECTRICAL MACHINES-I

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	S W	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Fundamentals of electrical engineering.

COURSE OBJECTIVES:

1. To get the basic understanding of transformer operation and working principle.
2. Estimation of various performance parameters of the transformer through different tests.
3. Introduction to auto transformer, 3-phase transformer and per unit calculations.
4. Understanding of rotating magnetic field and operation of induction motor as transformer.
5. Complete understanding of DC machines.
6. To provide students a deep insight about the constructional, working and practical aspects of Synchronous machines.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EE22501 (T).1: Interpret the nameplate rating of the transformer & distinguish between two winding transformers and auto transformer.

EE22501 (T).2: Categorize three phase transformers based on Phasor groups and select the conversion scheme for the application.

EE22501 (T).3: Select DC machine for various applications and identify the cause of failure of voltage build up in dc generators.

EE22501 (T).4: Estimate motor rating, various currents, efficiency, etc. experimentally and determine the equivalent circuit model of the induction motor under different operating conditions.

EE22501 (T).5: Demonstrate the effect of changing torque and excitation on characteristics of a synchronous generator using circuit model and Phasor diagram.

COURSE CONTENTS:

THEORY:

UNIT: 1

Transformer-Constructional features. Ideal transformer, practical transformer, Phasor diagram and equivalent circuit, Nameplate rating, OC and SC tests, performance evaluation, voltage regulation, power efficiency and energy efficiency, Auto transformer, comparison with ordinary transformer, KVA rating, equivalent circuit and phasor diagram, Effect of saturation on magnetizing current.

UNIT: 2

Introduction to 3 phase transformer, Connection of single phase transformers in a 3 phase bank, 3 phase transformer connections in different phase groups, analysis and phasor diagrams, Scott Connection, V-Connection, Three to Six phase conversion, , use of tertiary windings on 3 phase transformers, Parallel operation of 3 - phase transformers.

UNIT: 3

DC Machines - Constructional features, classification, emf equation, OCC and voltage build up in separately excited and self-excited d.c. generators, DC machine winding, Characteristics, commutation and armature reaction, Load characteristics of various types of d.c. generator, Interpoles and compensating windings, Losses and efficiency calculations, motor equivalent circuit, power flow, load characteristics, starting and speed control of d.c. motors, Application and limitations, Swinburne's test.

UNIT: 4

Production of Rotating magnetic field, Induction motor as transformer, Slip, equivalent circuit and power flow diagram, torque slip characteristics, Light running and blocked rotor tests, Performance analysis, starting and speed control, Nameplate ratings, Double cage and deep bar rotor motors, Cogging and Crawling

UNIT: 5

Synchronous machines: cylindrical and salient pole, circuit model, phasor diagram, power angle characteristics, Effect of changing mechanical torque and excitation, Synchronous condenser, V-curve, Short circuit ratio, Starting of synchronous motor

ASSESSMENT:

A. Continuous evaluation through two mid-term test with a weightage of 30% of the total
marks. It includes class attendance as well as assignments on the course topics.
B. The end-term theory examination weightage is 70%.

TEXT BOOKS RECOMMENDED:

1. V. Del Toro, "Electric Machines and Power System", Prentice-Hall Englewood Cliffs, N.Y., 1985.
2. Stephen Umans, A Fitzgerald, Charles Kingsley, "Electric Machinery", seventh edition McGraw-Hill Higher Education, 2013.
3. P.S. Bimbhra, "Generalized Theory of Electrical Machines", fifth edition Khanna Publication, 1995.

REFERENCES BOOKS:

1. Theodore Wildi, "Electrical Machines, Drives and Power Systems", sixth edition Pearson Education, 2007.
2. Harry Cotton, "Alternating Current Machines", second edition MacMillan publisher, 1960.
3. Vincent Del Toro, "Electromechanical devices for energy conversion and control systems", Prentice-Hall, 1968.
4. Irving L. Kosow, "Electric Machinery and Transformers", second edition, Pearson Education India 2007.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	-	1	-	-	-	-	-	-	-	-
CO2	1	2	2	-	-	1	-	-	-	-	-	-
CO3	1	2	2	1	-	1	-	-	-	-	-	-
CO4	1	2	2	1	-	1	-	-	-	-	-	-
CO5	-	2	2	1	-	1	1	-	-	-	-	-
Average	1	2	2	1	-	1	1	-	-	-	-	-

LABORATORY:

OBJECTIVES: The Electrical Machines-I Laboratory is designed:-

1. To provide the student with the knowledge of various electrical machines, measuring instruments, equipment such as dc motors, three phase and single phase induction motors, generators and transformers etc. with proficiency.
2. In this lab, students are expected to get hands-on experience of operating large electrical machines and in interpreting the results of measurement operations.
3. To develop communication skills through laboratory notebook with written descriptions of procedure, result and analysis.
4. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.

LABORATORY OUTCOMES:

1: Determine equivalent circuit parameter by conducting tests and use it for estimating its performance.

2: Categorise three phase transformers on the basis of various connection schemes.

3: Employ phase conversion techniques to get desired three to two phase supply from available three phase supply.

4: Apply appropriate speed control techniques to get the desired speed range of the dc shunt motor & predict the efficiency of the machine without loading it.

5: Illustrate the various characteristics of self & separately excited DC generators.

6: Analyze the operating characteristics of SCIM for different loading conditions and compute the three phase power applied to it.

S. No.	LIST OF EXPERIMENTS
1	To perform open circuit and short circuit test on a single phase transformer.
2	To determine the Voltage Regulation of a single phase transformer.
3	Separation of iron losses in a single phase transformer
4	To make various 3-phase transformer connections using three 1-Φ transformers a) Conduct polarity test on a single phase transformer b) To verify the voltage and current relationships for I) Y-Y II) Y-Δ III) Δ- Y IV) Δ-Δ
5	To make Scott connection of 3-phase transformer using two 1-phase transformers
6	Speed control of DC shunt motor.
7	To determine the efficiency of a DC shunt machine by Swinburne's Test.
8	To obtain the load characteristics of a separately excited and shunt generator.
9	To obtain the magnetization characteristics of a D.C. generator.
10	Measurement of power in a three phase balanced circuit by two watt meter

ASSESMENT:

A. Continuous evaluation of laboratory journals with a weightage of 30%. It includes lab attendance as well as experiments performed in the lab.
B. The end-term practical examination weightage is 70%.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	3	3	1	1	1	-	2	3	-	3
CO2	-	1	1	1	-	-	-	-	-	1	-	1
CO3	-	1	1	1	-	-	-	-	-	1	-	1
CO4	1	2	-	2	-	-	-	-	1	2	-	2
CO5	-	2	-	2	-	-	-	-	1	2	-	2
CO6	1	1	1	1	-	-	-	-	1	1	-	1
Average	3	3	-	3	3	3	-	-	-	3	-	3

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR, SEM B (4 YDC)
EE22502: ELECTROMAGNETIC FIELDS & MATERIALS

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	1	4	-	-	30	70	-	-	100

PRE- REQUISITE: Physics and Fundamental of electrical engineering.

COURSE OBJECTIVES:

1. To explain the basic fundamentals of electric and magnetic fields culminating in Maxwell's equations & their applications.
2. To impart the knowledge of magnetic field intensity and associated quantities in free space & magnetic materials.
3. To accomplish the different aspects of time varying fields and electromagnetic waves.
4. Provide the students of Electrical Engineering with a clear and logical presentation of the basic concepts & principles of electromagnetism.
5. To acquaint students with the concepts of Transmission line and its design for lossy and lossless mediums.

COURSE OUTCOMES: After completing this course, the student will be able to

EE22502(T).1: Develop the understanding of basic Electro-magnetic laws and Effectively utilize the significance of operations such as curl, divergence, gradient as well as Del and Laplacian operators.

EE22502(T).2: Utilize Poisson's and Maxwell's equations for determination and analysis of various engineering problems in sorting boundary conditions between dielectrics.

EE22502(T).3: Select suitable conducting, insulating and magnetic materials for various applications. Identify and formulate the phenomenon of electromagnetic wave propagation in different media via calculations of skin depth, energy flow, and dielectric loss estimation at various temperatures to determine exact estimations of wave propagation properties.

EE22502(T).4: Acquire knowledge of different semiconductor materials, conductors and metals, their properties for electromagnetic field applications.

EE22502(T).5: Identify and remove inconsistency in basic electric and magnetic field equations for Lossless transmission of EM waves using Maxwell's equations.

EE22502(T).6: Develop the concepts of absorption, reflection and refraction for wave propagation in deep and congested areas through simulation software.

COURSE CONTENTS:
THEORY:

UNIT: 1 Gauss law, its integral and differential forms and its applications, multipoles, potential energy, energy density in an electric field, dielectrics, electric polarization, polarizability, permittivity, Clausius–Mossotti equation, electric displacement, Gauss's law in dielectrics, dielectric materials, dielectric function, refractive index and absorption coefficient, dielectric relaxation and losses. Maxwell's first equation, Divergence, Poisson's and Laplace equation and their solutions. Capacitance, electrostatic energy condition at a boundary between dielectrics.
UNIT: 2 Fields due to moving charge, magnetic field, Ampere's law, particles motion in E and B fields, Hall Effect, electro-static and magnetic focusing, magnetic materials: dia, para and ferromagnetic, soft and hard magnetic materials, B, M and H vectors, Ampere's law for magnetic materials, hysteresis, magnetic circuits.
UNIT: 3 Electromagnetic waves, plane electromagnetic waves, wave equation and solution, Poynting vector, wave propagation through dielectrics and conductors, phase velocity, reflection and refraction absorption skin depth, and energy flow density of a wave, boundary conditions.
UNIT: 4 Semiconducting materials, band theory of semiconductors, band-to-band transitions, theory of p-n junction and p-n devices, mobility of charge carriers.
UNIT: 5 Conductivity of metals, electron scattering and resistivity of metals, heat developed in a current - carrying conductor, superconductivity.

ASSESSMENT:

A. Continuous evaluation through two mid-term test with a weightage of 30% of the total marks. It includes class attendance as well as assignments on the course topics.
B. The end-term theory examination weightage is 70%.

TEXT BOOKS RECOMMENDED:

1. William Hart Hayt, John A. Buck, "Engineering Electromagnetics", eight edition, McGraw- Hill, 2012.
2. Matthew N. O. Sadiku, "Elements of Electromagnetics", fifth edition Oxford University Press, 2010.
3. C.S. Indulkar, "Electrical Engineering Materials", S.Chand & Company Limited, 2008.
4. A.J. Dekkar, "Electrical Engg. Materials", Prentice-Hall of India Pvt. Limited, 2005.

REFERENCES BOOKS:

1. E. C. Jordan, K. G. Balmain, "Electromagnetic Waves and Radiating Systems", second edition, Prentice Hall, 1968.
2. Bhag Singh Guru, Huseyin, "Electromagnetic Field Theory Fundamentals", second edition, Cambridge University Press, 2004.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	-	-	-	-	-	-	-	-
CO2	-	-	1	-	-	-	-	-	-	-	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	1	-	-	-	-	-	-	-	-	-
CO6	-	-	-	1	-	-	-	-	-	-	-	-
Average	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

ELECTRICAL ENGINEERING DEPARTMENT

B.TECH. SECOND YEAR, SEM B (4 YDC)

EC22562: DIGITAL ELECTRONICS

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Engineering. Physics, Basic Electronics

COURSE OBJECTIVES:

1. To acquire the basic knowledge of digital logic levels and application of knowledge tounderstand digital electronics circuits.
2. To impart how to design Digital Circuits.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EC22562(T).1: Acquire knowledge about the number systems, codes, Boolean algebra, basiclogic gates and simplify digital circuits.

EC22562(T).2: Synthesize and design small combinational circuits and use standard combinational functions/building blocks to build larger more complex circuits.

EC22562(T).3: Design and develop sequential logic circuits and understand data storageelements.

EC22562(T).4: Analyze digital integrated circuits and employ these ICs to build larger morecomplex circuits.

EC22562(T).5: Analyze and design multivibrators and ADC & DAC converters to convert realworld analog signals to digital and vice versa.

COURSE

THEORY

UNITS
UNIT1:- Introduction to digital logic: Review of semiconductor device as a switch, wave shaping circuits, time base generators. Number system, number base conversion, Binary codes, Boolean algebra, Boolean functions, logic gates. Simplification of Booleanfunctions, Combinational logic, Karnaugh map methods, SOP-POSsimplification, NAND-NOR implementation, variable mapping.

UNIT2:- Combinational logic:
Half adder, Full adder, Carry look ahead, Multiplexer - demultiplexer,encoder - decoder, arithmetic circuits, ALU.

UNIT3:- Sequential logic :
Flip flops, D,T, S-R, J-K, Master-Slave, racing condition, Edge & Level triggered circuits, Shift registers, Asynchronous and synchronous counters, their types and state diagrams. Semiconductor memories, introduction to digital ICs 2716, 2732 etc. & their address decoding. Modern trends in semiconductor memories such as DRAM, FLASH RAM etc.

UNIT4:- Comparison of N-MOS, P-MOS, C-MOS, H-MOS etc. Logicfamilies:
TTL, ECL, CMOS, IIL and their comparison on the basis of Fan in, Fan out, speed, propagation delay and noise margin, interfacing between ICs ofdifferent logic families.

UNIT5:- Applications of digital circuits:
Introduction to A/D & D/A conversion & their types, sample and hold circuits, Voltage to Frequency & Frequency to Voltage conversion. Multivibrators: Bistable, Monostable, Astable, Schmitt trigger, IC555,
IC565 & their applications.

ASSESMENT:

A. Continuous evaluation through two mid-term test with a weightage of 30% of the total marks.It includes class attendance as well as assignments on the course topics.
B. The end-term theory examination weightage is 70%.

TEXT BOOKS RECOMMENDED:

1. Morris Mano, Digital Circuits & Logic Design, 2nd ed., 2000, PHI.
2. Gothman, Digital Electronics 2nd ed., 1998
3. Floyd, Digital Fundamentals, 2nd ed., 2001, Pearson.

REFERENCES BOOKS:

1. Tocci, Digital Electronics,2nd ed., 2004, PHI.
2. Malvino & Leach, Digital Principles & Applications. 7th ed., 2011, TMH
3. Taub and Schilling, Digital integrated electronics, 3rd ed., 1977, Mc Graw Hill

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	2	2	2	1	-	-	-	-	-	-	-	-
CO5	3	3	2	1	-	-	-	-	-	-	-	-
Average	**2.6**	**2.4**	**2**	**1.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

LABORATORY:

OBJECTIVES:

- To know the concepts of Combinational circuits.
- To understand the concepts of flip-flops, registers and

counters The fundamental of Digital Electronics engineering

Laboratory is designed

1. To provide the student with the knowledge to use logic gates and Flip-flop, registers, counters and their applications in electronics circuits.
2. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.
3. The practical experience gained by the student in the laboratory will be useful in designing more complex circuits, fault detection and testing of existing circuits etc.
4. In this lab, students are expected to get hands on experience, confidence in making minor and major projects, developing faults diagnosis skill & reconfirming the fundamental principles of basic electronics.
5. To develop communication skill through laboratory note book with written descriptionsof procedure, result and analysis.

LABORATORY OUTCOMES:

EC22562(P).1: Learn the basics of gates and implement logic functions.

EC22562(P).2: Construct basic combinational circuits such as arithmetic circuits, code converter circuits and parity generator & checker and verify their functionalities.

EC22562(P).3: Learn about Magnitude Comparator and multiplexers.

EC22562(P).4: Apply the design procedures to design basic sequential circuits

S.No.	List of Experiments
1	To Study various logic gates.
2	To Verify Properties of NAND and NOR Gates as Universal BuildingBlock.
3	Simplification & Implementation of Boolean Functions
4	Implementation of Basic Boolean arithmetic logic circuits.
5	Implementation of even & odd parity generator & checker.
6	Conversion from binary to gray and gray to binary code.
7	To verify 2-bit Magnitude Comparator for all possible conditions.
8	Connection of various logical functions using 8-to-1 multiplexer.
9	Construction of a 4-bit ripple counter & study of its operation.
10	Design and implement of various types of Flip-Flop using JK flip Flop
11	Design of a 3-bit Synchronous counter & study of its operation.

ASSESMENT:

A. Continuous evaluation of laboratory journals with a weightage of 40%. It includes labattendance as well as experiments performed in the lab.
B. The end-term practical examination weightage is 60%.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
Average	**2.8**	**2.5**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE
B. TECH. SECOND YEAR SEM B (4YDC)
MA22563: MATHEMATICS-IV

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	100
3	-	1	4	-	-	30	70	-	-	

PRE –REQUISITES: Mathematics – I, Mathematics-II and Mathematics – III

COURSE OBJECTIVES

1. To introduce the basic theory of complex variables and its applications.
2. To incorporate knowledge of random variables, its distributions and stochastic process with markov chain.
3. To impart the knowledge of reliability for improving the quality of manufacturing components.
4. To acquire the knowledge of different types of graphs and various algorithms.

COURSE OUTCOMES

On completion of this course, students are able to

MA22563(T).1: Apply the basic concepts of complex variables and identify various techniques to solve problems in electric field and fluid dynamics.
MA22563(T).2: Acquaint with the notion of probability theory, random variables and probability distribution function in one and two dimensions.
MA22563(T).3: Utilize the theory of stochastic process, especially markov processes and the applications of markov models in various fields.
MA22563(T).4: Acquire the knowledge of reliability and maintainability for quality improvement of manufactured products and components.
MA22563(T).5: Analyze the basic concepts of graph theory and algorithms to solve real life problems.

COURSE CONTENTS:

THEORY:

UNIT 1
Functions of Complex Variables: Analytic function, Cauchy-Riemann Equations and Harmonic Functions, Conjugate Functions and their Applications, Complex Integrals, Cauchy's Integral Theorem and Integral Formula, Singularities, Poles, Residues, Residue Theorem, Contour Integration for simple cases, Conformal mapping and its Application to two-dimensional problems in electric field.

UNIT 2
Statistics: Modern view of Probability theory, Random Variables, Distribution Function and Density Function, Random Variables of Discrete and Continuous type, Functions of two random variables, Bivariate Probability with Conditional and Marginal Probability Distribution.

UNIT 3

Stochastic Process and Markov Chain: General Concepts and Definition of Stochastic Processes, Mean, Auto-correlation and Auto-Covariance, Classification of Stochastic Process and Some Problems. Probability Vectors, Stochastic Matrix, Fixed Point of a Matrix, Definition of Markov Chain, Transition Matrix and Graph, Some Theorems and Applications.

UNIT 4

Reliability: Basic concepts, Failure law, Bath Tub Curve, Evaluation of Reliability of a Component from Test Data, System Reliability, Components in Series and Parallel, Redundancy, Non-Series Parallel System.

UNIT 5

Graph Theory and Combinatorial Optimization: Graphs – Definitions and Basic Properties, Isomorphism, Euler Circuits and Hamiltonian Cycle, Digraphs, Trees- Properties, Spanning Trees, Planer graphs, Shortest Path Problem, Dijkstra Algorithm, Spanning Tree-Kruskal and Prim Algorithm.

ASSESSMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%)
2. End semester Theory Exam (70%)

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.
3. Baisnab A, and Jas M, Elements of Probability and Statistics, Tata McGraw Hill Book Company, New Delhi, 1993.

REFERENCE BOOKS

1. Jain, R.K. and Iyengar S.K, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi , 2006 .
2. Veerarajan T, Statistics, Probability and Random Process, 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi 2003.
3. Balagurusamy E., Reliability Engineering, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2012.
4. Goodaire E.G. and Michael M. Permenter, Discrete Mathematics with Graph Theory.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	-	-	-	-	-	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3
Average	3	3	3	3	-	-	-	-	-	-	-	3

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR SEM B (4YDC)
EE22841: ELECTRICAL WORKSHOP & DESIGN-II

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	100
-	4	-	-	2	-	-	-	40	60	

PRE- REQUISITE: Fundamentals of Electrical Engineering.

COURSE OBJECTIVES:

1. Students would be able to identify tools, symbols & Abbreviations & Various Lamps.
2. Students would be able to understand the importance of different types of wiring.
3. Students will learn the basic repairing process of domestic appliances.
4. Improvement in ability to work in team, resource management, documentation.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE22442(P).1: Design and implement a simple real life project using microcontroller.
EE22442(P).2: Give professional presentation to discuss the progress of the project.
EE22442(P).3: Work in a group and develop leadership quality.
EE22442(P).4: Generate technical documents and reports.

CRITERIA AND RUBRICS

INTERNAL ASSESMENT:

Maximum Marks: 40 Marks

Student will be judged using following criteria and rubrics:

S.No.	Criteria	Marks	CO
1	Literature survey	10	CO1
2	Proposed Design	10	CO2
3	Leadership Developed	10	CO3
4	Organisation of Report	10	CO4

EXTERNAL ASSESMENT:

Maximum Marks: 60 Marks

Student will be judged using following criteria and rubrics:

S.No.	Criteria	Marks	CO
1	Learning outcome	5	CO3
2	Presentation	10	CO2
3	Technical Knowledge	20	CO1, CO2
4	Results	20	CO4
5.	Confidence	5	CO3

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	1	1	-	-	-	-	-
CO2	-	-	-	-	2	1	-	-	-	3	-	3
CO3	-	-	-	-	-	1	-	-	3	3	-	-
CO4	-	-	-	-	-	-	-	1	3	-	2	-
Average	**3**	**3**	**3**	**2**	**2**	**1**	**1**	**1**	**3**	**3**	**2**	**3**

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
B.TECH. SECOND YEAR SEM B (4YDC)
HU22881: VALUES, HUMANITIES AND PROFESSIONAL ETHICS

HOURS PER WEEK			CREDITS		MAXIMUM MARKS				
L	T	P	Th	Pr	Theory		Practical		Total marks
					CW	End SEM	SW	End SEM	
-	3	-	2	-	100	-	-	-	100

PRE REQUISITES: Knowledge of English language

COURSE OBJECTIVES:-

1. To make students understand of his/her social responsibility as an engineer.
2. To create an awareness on Engineering Ethics, Indian constitution and Human Values
3. To make students capable of doing self-exploration and recapitulation
4. To make students aware of the global problems

COURSE OUTCOMES:
After completion of course, the students will be able to:

HU 22881(T).1: Explain and elaborate the social institutions and Constitution of India through which the society andnation is governed.
HU 22881(T).2: Describe the kinds of values and ethics and their importance
HU 22881(T).3: Contextualize the professional attitude and approaches as per needs of society and values.
HU 22881(T).4: Explain and illustrate the process of Social, Political and Technological changes in context to globalchanges

COURSE CONTENT:

UNIT 1. Role of Humanities in Engineering education, Morals, Values and Ethics, social institutions and association, social stratification in India, social change, Universal and Situational values, coexistence of self and body and their needs and activities.
UNIT 2. Constitution of India - Preamble, Rights and Duties. Directive Principles, Parliamentary and presidential democracy, The Problem of hierarchy of values and their choice, the views of Mahatma Gandhi on concept Indian nation and democracy.
UNIT 3. Ethical and decision making capability and its development: Meaning of Ethical dilemma, Concept of personal and group Ethics: Balance between -rights and duties. The Problem of Sustenance of value in the process of Social, Political and Technological changes.
UNIT 4. Engineering Ethics: engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger variety of moral issued - types of inquiry - moral dilemmas – moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy Models of Professional Roles.
UNIT 5. Global Issues: Multinational corporations - Environmental ethics - computer ethics - weapons development – engineers as managers-consulting engineers-engineers as expert witnesses and advisors - moral leadership.

ASSESSMENT:

Only **Sessional Work** (100 marks) on the basis of internal viva (30) Attendance (20), Quizes/Tests (30) andPresentations (20) will be awarded against the assessment done throughout the session.

REFERENCES BOOKS:

1. Little, William: An Introduction of Ethics (allied Publisher, Indian Reprint1955)
2. William, K Frankena : Ethics (Prentice Hall of India,1988)
3. Gaur R. R., Sangal R. and Bagaria G. P., Haman Values and Professional Ethics, Excel Books, NewDelhi, 2010
4. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
5. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India,New Delhi, 2004.
6. Introduction to the Constitution of India, D.D. Basu

CO- PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	1	3	2	-	-	1
CO2	-	-	-	-	-	3	-	3	2	1	-	1
CO3	-	1	-	-	-	3	3	3	2	1	-	1
CO4	-	-	-	-	-	2	3	3	2	1	-	1
Average	**-**	**1.0**	**-**	**-**	**-**	**2.5**	**2.3**	**3.0**	**2.0**	**1.0**	**-**	**1.0**