Kolhapur Institute of Technology's
College of Engineering (Autonomous), Kolhapur

KOLHAPUR INSTITUTE OF TECHNOLOGY'S COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

Curriculum
for
S.Y. B. Tech. Electrical Engineering

Academic Year 2019-20

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course : DC Motors and Transformers	L	T	P	Credit
Course Code:UELE0301	03	01	-	04

Course Pre-Requisite: Basic Electrical Engineering

Course Description: This course contains construction, working and testing of DC motors and Transformers.

Course Objectives:

1.To provide basic concept of DC machines and Transformers.
2.To develop skills to evaluate ratings of DC machines and transformers for various applications.
3. To analyze performance of DC machines and Transformers.

Course Outcomes:

COs	After completion of the course the students will be to	Bloom's Level	Descriptor
CO1	**Explain** the construction and operation of DC motors, Universal motor,	II	Understanding
CO2	**Explain** the construction and operation of special purpose motors.	II	Understanding
CO3	**Explain** the construction and operation of Transformers.	II	Understanding
CO4	**Analyze** performance of DC machines.	IV	Analyzing
CO5	**Analyze** performance of Transformers.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			1	2	2								3	
CO2			1		1								3	
CO3			1	2									3	
CO4				1										3
CO5				2										3

Assessments:

Teachers' assessment-

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight-age for course content.(Normally last three modules) covered after MSE.

Course Contents:

Unit 1:---DC Machines Constructional Details: Construction of D.C. machines, magnetic circuit of DC machines, commutator and brush arrangement, EMF equation, torque equation, power flow diagram of D.C. machines. Armature Winding: Simple lap winding and wave winding Armature Reaction: MMF due to armature winding, flux distribution due to armature current and resultant flux distribution in a machine. Demagnetization and cross magnetization ampere turns, principle of compensation, compensating winding and its use in machines.	**8 Hrs.**
Unit 2:--- D.C. Motors Concept of back e.m.f., types, torque equation, speed equation, characteristics of D.C. motors, applications, method of speed control, electro braking, parallel and series operation of motors. Testing of D.C. machines: Losses and efficiency, Brake test, Swinburn's test, Hopkinson's test, Retardation test, Field test on D.C. series motor.	**8Hrs.**
Unit 3:--- Single Phase Transformer Construction and type, EMF equation phasor diagram, equivalent circuit, efficiency, losses, regulation, experimental determination of equivalent circuit parameters and calculation of efficiency and regulation, parallel operation, polarity test, power transformer.	**5 Hrs.**
Unit 4:--- Poly Phase Transformer Construction, single phase transformer bank versus polyphase transformer, polarity test, transformer windings, grouping YD1,YD11,DY1,DY11,DZ1,DZ1,YZ1,YZ11, phase shift.	**7 Hrs.**
Unit 5:--- Performance of Transformers Switching inrush current, harmonics in exciting current, causes and effects of harmonics, harmonics with different transformer connections, tertiary winding, oscillating neutral, Testing of transformers as per IS 2026, heat run test, Sumpner's test, Equivalent delta test.	**8 Hrs.**
Unit 6:--- Special Purpose Motors Construction, types, working and applications of Brushless DC motor, Stepper motor, DC Servo motor.	**6Hrs.**

Textbooks:

1. A.E.Clayton, "DC Machines", Mc Graw Hill publication, 3rd Edition.
2. M. G. Say. "Performance Design of AC Machines", CBS Publishers, 3rd Edition.
3. B. L. Theraja, A. K. Theraja,, S. Chand " A textbook of Electrical Technology, Vol I and Vol II".

References:

1. S.K.Bhattacharya, "Electrical Machines", Tata Mc Graw Hill, New Delhi.
2. J. B. Gupta, "Electrical Machines", S.K.Kataria and Sons, New Delhi.
3. Fitzerald and Kingsley, "Electric Machine", Tata McGraw Hill.

Unit wise Measurable students Learning Outcomes:

1. The students will be able to understand working of DC motor.
2. The students will be able to understand controlling methods of a dc motor.
3. The students will be able to understand working of a transformer.
4. The students will be able to differentiate between different types of a transformer.
5. The students will be able to test a transformer.
6. The students will be able to understand working of brushless motor and stepper motor.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Analog Electronics	L	T	P	Credit
Course code:UELE0302	03	-	-	03

Course Pre-Requisite :- Semiconductor Physics

Course Description: Analogue electronic components and circuits are building blocks for any electronic equipment or control panels used in industries or in daily life. This course provides the basics of construction, principle of operation and applications of various types of electronic components such as UJT, JFET, MOSFET and circuits such as feedback amplifier, oscillators, power amplifiers, operational amplifier and timer using linear ICs.

Course Objectives:

1. To understand the operation of Rectifiers and unregulated power supply.
2. To implement the regulators using BJT and IC's.
3. To understand the operation of Amplifier using BJT as per specifications.
4. To develop switching circuits using BJT,JFET,MOSFET,DIAC,TRIAC.
5. To understand the operation of oscillators using OPAMP.
6. To understand the operation of multi vibrators and timers.

Course Outcomes:

CO	After completion of the course the students will be to	Bloom's Level	Descriptor
CO1	**Understand** operation of rectifiers and regulators using diodes, BJTs and IC's.	II	Understanding
CO2	**Develop** oscillators, multi vibrators and timer circuits.	III	Applying
CO3	**Analyze** frequency response and characteristics of BJT amplifiers.	IV	Analyzing
CO4	**Compare** performance of switching circuits using different devices.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2			2											3
CO3		2											2	
CO4		3		2										2

Assessments:

Teachers' assessment-

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight-age for course content.(Normally last three modules) covered after MSE.

Course Contents:

Unit 1:---Unregulated Power Supplies Specification and ratings of diodes (P-N junction, Zener and power diode) and transistor (low power, high power & switching). Rectifiers: half wave, full wave: center tap and bridge type, analysis for different parameters: PIV, TUF, efficiency, ripple factor, regulation, etc. Filters: Need of filters, types: capacitor, inductor, LC, CLC, analysis for ripple factor and regulation.	**7 Hrs**
Unit 2:---Voltage Regulators Need of voltage regulator, stabilization factors, shunt regulator (using Zener diode & BJT), and series voltage regulator (using BJT) series voltage regulator with pre-regulator & overload protection circuit. **IC regulators** : Study the design of regulators using IC's :78XX,79XX,723,LM317, Switching regulator: Introduction, study of LM3524.	**7 Hrs.**
Unit 3:--- Single Stage and Multi Stage Amplifier RC coupled, direct coupled ,transformer coupled amplifier, frequency response Need of cascading, parameter evaluation such as Ri , Ro, Av, Ai & bandwidth for general multi stage amplifier , two stage) amplifier.	**7 Hrs.**
Unit 4:--- Solid state Switching Devices BJT,JFET,MOSFET,DIAC,TRIAC construction and switching circuits, Biasing of JFET, Common source FET amplifier at low and high frequency- analysis and design. MOSFET-construction, characteristics and comparative study of Enhancement and Depletion MOSFET (P-channel & N-channel),Handling precautions of MOS devices, ratings and specifications of MOS,CMOS inverter.	**7hrs**
Unit 5:--- Feedback Amplifier and Oscillators General theory of feedback, reasons for negative feedback, types of negative feedback in transistor circuits: voltage series, current series, voltage shunt, current	**7 Hrs.**

shunt feedback amplifiers, Barkhausen's criteria, frequency and amplitude stability, classification, and basic concepts of OPAMPs and IC 555.RC oscillators: RC phase shift & Wien bridge oscillator using OPAMP and IC 555.	
Unit 6:--- Multivibrators Transistor as a switch, different transistor switching parameters, classification of multivibrators, analysis and design of Astable, Monostable, Bistable multivibrator and Schmitt trigger using OPAMP and 555	**7 Hrs.**

Textbooks:

1. Allen Mottershed, "Electronic Devices & Circuits", Prentice- Hall India.
2. J. Millman & C.Halkias, "Electronic Devices & Circuits", IInd Edition,Tata McGraw Hill Publication.
3. N.C. Goyal & R.K. Khetan, " A Monograph on Electronics Design Principles'',Vth Edition, Khanna Publishers.

References:

1. David A. Bell, "Electronic devices & circuits", IVth Edition, Prentice- Hall India.
2. Robert L. Boylsted, Louis Nashelsky, "Electronic devices & circuit theory'', Pearson Education. (IXth edition)

3 National Semiconductor Data Manual.

Unit wise Measurable students Learning Outcomes:

1. The students will be able to design Rectifiers as per specifications.
2. The students will be able to design Regulators as per specifications.
3. The students will be able to implement amplifier and test it's characteristics.
4. The students will be able to use different switching devices and compare their performance.
5. The students will be able to understand theory of feedback and develop oscillators.
6. The students will be able to develop multivibrators.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Measurement and Instrumentation	L	T	P	Credit
Course Code:UELE0303	03	-	-	03

Course Pre-Requisite: Basics of passive components, principles of electricity, Magnetism, heat, lights and materials.

Course Description: This course intends to develop skills to measure electrical parameters using various instruments. This course includes basic knowledge of various Instruments, transducers and circuits used in testing and measuring instruments.

Course Objectives:

1. To understand the working of basic measurement system and sources of errors in measurement system.
2 .To study the operation of bridge circuits.
3. To familiarize units, characteristics, operation and error of measurement systems and instruments.
4. To understand the working principle of transducers and Oscilloscope.

Course Outcomes:

COs	After the completion of the course the students will be able to	Blooms level	Descriptor
CO1	**Define** units, characteristics of measurement systems.	I	Remembering
CO2	**Explain** the principle of operation of generalized measurement system and different sources of errors in measurements.	II	Understanding
CO3	**Classify** and **select** transducer for particular application.	II	Understanding
CO4	**Demonstrate** the use of CRO, DSO, Power Analyzer, Wave Analyzer, Digital data recorders, LCD, LED, DPM, 7 Segment display.	II	Understanding

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			3										1	
CO2	3				2									3
CO3		1	1		1							1		1
CO4	2				3									3

Assessments:

Teacher's assessment-

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight-age for course content.(Normally last three modules) covered after MSE.

Course Contents:

Unit 1:--- Basics of Measurement Systems Introduction, definition of measurement, definition of instrumentation, generalized block diagram of measurement system, different sources of errors in measurement, calibration of instruments, performance characteristics of instruments – static characteristics, dynamic characteristics, accuracy and precision, statistical analysis of data, arithmetic mean, deviation, average and standard deviation, probable error.	**6 Hrs.**
Unit 2:--- Analog and Digital Measurements Analog instruments- classification, PMMC, MI, MC – construction, working principle, range extension. Measurement of low, medium and high resistance, Wheatstone Bridge, Kelvin's Double Bridge, Ammeter-Voltmeter method, Megger, Earth tester for earth resistance measurement, Maxwell's Bridge, Hay's Bridge, Anderson's Bridge, Schering Bridge and Wien's Bridge. Digital Instruments- Digital Voltmeter- ramp type DVM, integrating type DVM, Successive approximation type DVM, DFM, DMM, Digital Tachometer, Line mains frequency indicator, vibration and noise measurement.	**7 Hrs.**
Unit 3:--- Measurements of Power and Energy Wattmeter (upf, low pf). Construction, working principle, measurement of power using wattmeter, single phase induction type energy meter- torque equation, errors and adjustments, Calibration of energy meter. Digital Energy Meter, Block diagram and operation of electronic energy meter. Three phase energy meters.	**7 Hrs.**
Unit 4:--- Oscilloscope and Transducers Block diagram &working of CRO & Digital Storage Oscilloscopes. Transducers: Introduction, classification, basic requirements for transducers. Electrical transducer, Resistive transducer, Thermistor and RTD and thermocouple, inductive transducer, Pressure inductive transducer-LVDT, capacitive transducer (pressure), Piezoelectric Transducers, High pressure measurement using electric methods.	**7 Hrs.**

Unit 5:---Level and Strain Measurement Introduction and importance of level measurement, level measurement methods: mechanical, hydraulic, pneumatic, electrical. Strain Gauge: Introduction, definition of strain, types of strain gauge: Wire strain gauge, foil strain gauge, semiconductor strain gauge etc; their construction, working, advantages and disadvantages.	**8 Hrs.**
Unit 6:---Recent Developments in Instrumentation and Measurements DSO, Power Analyzer, Wave Analyzer & Harmonic Distortion, and Instrument Transformers: construction, connection of CT & PT in the circuit, advantages of CT / PT, X-Y recorders, Digital data recorders, Digital input and output devices, LCD, LED, DPM, 7 segment displays.	**7 Hrs.**

Textbooks:

1.A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement techniques", Pearson education.

2. E.W.Golding, "Electrical & Electronic Measurement", ELBS Edition, 5th Edition, 2013.

References:

1. A.K.Sawhney,Dhanpat Rai, "Electrical & Electronic Measurement & Instruments".
2. S. N.Patil,K.P. Pardesi, "Electronics measurements & Instrumentation", Electrotech publication.
3. H.S.Kalsi, "Electronics Instrumentation", second edition, Tata McGraw Hill publication.
4. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxford publication.
5. Rangan, Mani ,Sharma, "Instrumentation Devices & Systems", Tata McGraw-Hill Education, 1997.
6. Johnson, Pearson/Prentice Hall, "Process Control Instrumentation Technology", 8th Edition, 2006.
7. S.K.Singh, Tata McGraw- Hill Education, "Industrial Instrumentation and Control", 2nd Edition, 2003.

Unit wise Measurable students Learning Outcomes:

1. The students will be able to different terms and parameters in Measurement system.
2. The students will be able to analyze AC &DC bridges for measurement of Parameters of different Components.
3. The students will be able to select instrument for different Measurement.
4. The students will be able to use transducer to measure temperature and pressure.
5. The students will be able to use transducer to measure level and strain.
6. The students will be able to use modern instruments for measurement.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Electrical Circuit Analysis Course Code: UELE0304	L	T	P	Credit
	03	01	-	04

Course Pre-Requisite: Basic Electrical Engineering , Solution of Integral-Differential Equations, Laplace Transform

Course Description:

This Course aims to develop the basic concepts of network analysis, which is the pre-requisite for all the Electronics Engineering courses.

The course deals with network reduction techniques such as Source transformation, Network theorems etc. and simplifying analysis of different complex R-L-C circuits using these techniques. The course enables students to design resonant circuits which are used at different frequency spectrum. The course discusses about two-port networks and the synthesize of different parameters in networks. Students understand and implement different types of passive filters. Students acquire knowledge about the transient Response of complex R-L-C passive circuits necessary to design stable systems.

Course Objectives:

1. To solve different complex circuits using various network reduction techniques such as source transformation, Network theorems etc.
2. To discriminate between series and parallel resonance and design Resonant circuits.
3. To evaluate two port network parameters.
4. To implement types of passive filters.
5. To Evaluate AC and DC transients Response for complex R-L-C series and parallel circuits and to analyze the system stability.

Course Outcomes:

COs	After completion of the course The students will be to	Bloom's Level	Descriptor
CO1	**Apply** Laplace Transform for steady state and transient analysis , appreciate the frequency domain techniques and **design** filters	II	Understanding
CO2	**Distinguish** between series resonance and parallel resonance concepts and calculate Parameters like resonance frequency half power frequencies, BW, Q factor, current, voltages.	II	Understanding
CO3	**Analyze** the basic AC and DC circuits using Nodal analysis, mesh analysis & network theorems.	IV	Analyzing
CO4	**Derive** two port network parameters viz Z, Y, ABCD, h and their interrelationships and **determine** different network functions.	V	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2		1	2									1
CO2	2												2	
CO3	3	1											1	
CO4		1	2											

Assessments:

Teachers' assessment-

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

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MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight-age for course content.(Normally last three modules) covered after MSE.

Course Contents:

Unit 1:---Network Fundamentals Representation of voltage & current sources (Independent & Dependent), source transformation, series & parallel connection of passive elements(R,L,C), graph of network & its parts, loops & trees, linear graphs & incidence matrix, cut sets, planner & non-planner graph loop matrix. Star- Delta transformation, reduction of networks: Mesh analysis, Node analysis. Super mesh and super node analysis. Matrix approach of network containing voltage and current sources and reactance.	**7Hrs**
Unit 2:---Network Theorems D.C and A.C. network solution using dependent and independent sources: Superposition Theorem, Millman's Theorem, Norton's Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Duality Theorem, Compensation and Tellegen's Theorem.	**7 Hrs.**
Unit 3:--- Resonance with AC excitation Definition, Types:series & parallel resonance. series resonance- resonant frequency, variation of impedance, admittance, current & voltage across L & C with respect to frequency, Effect of resistance on frequency response, Selectivity, B.W. and Quality factor. Parallel resonance	**6Hrs.**

– nti resonance frequency, variation of impedance & admittance with frequency, Selectivity & B.W.	
Unit 4:--- Two Port Network & Network Functions Two port network: Open circuit impedance (Z) parameters, Short circuit admittance (Y) parameters, Hybrid (H) parameter, Transmission parameters(ABCD), Interrelation of different parameters, Interconnections of two port network (Series, Parallel, Cascaded, Series- Parallel) Network functions: Network functions for one port & two port networks, Driving point impedance and admittance of one port network, Driving point impedance, admittance & different transfer function of two port network (Z,Y,H & T).	**8 Hrs.**
Unit 5:--- Filters &Attenuators **Filters:** Definitions, classification & characteristics of different filters, filter fundamental such as attenuation constant, phase shift constant, propagation constant, characteristic impedance, relationship between decibel and neper. Design & analysis of constant K, M derived filters (low pass, high pass, band pass & band stop filters): T & Pi sections. **Attenuators** -Definitions, classification, Analysis & design of T type, Π type , α Lattice , bridged- T & L types attenuators Equalizer: Inverse network, series and shunt equalizer.	**8 Hrs.**
Unit 6:--- Transient Response with DC excitation Analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions. Transient behavior Steady state & transient response (Voltage & Current) DC response of RL,RC,RLC circuits DC response of RL,RC,RLC circuits.	**6hrs**

Textbooks:

1. A. Sudhakar, Shyammohan S.Palli, "Circuit & Network – Analysis & Synthesis", IIIrd Edition – Tata McGraw Hill Publication (Unit II, IV, VI).
2. A.Chakrabarti, "Circuit Theory (Analysis & Synthesis)", IIIrd Edition (Unit I,II) Dhanpat Rai & Co.
3. Joseph Edministrar, "Theory & Problems of Electronic Circuit (Schaum's series)", Tata McGraw Hill, Publication.

References:

1. William H Hayt, Jack E Kimmerly and Steven M.Durbin, "Engineering Circuit Analysis", Tata McGraw Hill.
2. M.E.VanValkenburg, "Network Analysis", IIIrd Edition , Pearson Education / PHI.
3. Boylestad, "Introductory Circuit Analysis', Universal book stall, New Delhi.(Unit I,II).

Unit wise Measurable Students Learning Outcomes:

1. The students will be able to analyze Circuit using the methods learnt in this course. Techniques.
2. The students will be able to apply Network Theorems to DC and AC circuits with R,L,C components.
3. The students will able to design R-L-C series and parallel resonant circuit for different frequencies and evaluate Q factor, current and voltage variations across each component with respect to frequency.
4. The students will able to determine Z,Y, h and ABCD parameters of two port n/w and convert these parameters of two port n/w into each other.
5. The students will be able to Design & analyze filters and attenuators studied in this course.
6. The students will be able to analyze Step or DC response and Sinusoidal or AC response of RC/RL/R-L-C series circuit.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Engineering Mathematics-III	L	T	P	Credit
Course Code:UELE0305	03	01	-	04

Course Pre-Requisite: Basic Terminologies of differential equations, vector algebra, concepts of probability, rules and formulae of derivative and integration.

Course Description: This Course contains linear differential equations, vector calculus, Laplace transforms, probability distributions, Fourier series, Fourier Transforms.

Course Objectives:

1.To develop abstract, logical and critical thinking and the ability to reflect critically upon their work.
2.To study various mathematical tools like differential equations, integral transforms, vector calculus, probability to devise engineering solutions for problems arising in engineering.
3.To formulate a mathematical model of a real life and engineering problem, solve and interpret the solution in real world.

Course Outcomes:

COs	After the completion of the course the students will be able to	Bloom's level	Descriptor
CO1	Solve linear differential equations with constants coefficients and apply them to realistic problems.	III	Applying
CO2	Apply knowledge of vector differentiation to find directional derivatives, curl and divergence of vector fields.	III	Applying
CO3	Find Laplace transforms of given functions and use it to solve LDEs.	III	Applying
CO4	Make use of appropriate probability distribution for finding probabilities of events.	III	Applying
CO5	Develop Fourier series expansion of a function over the given interval.	IV	Analyzing
CO6	Determine Fourier transforms of given function using its definition and properties.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2		1										
CO2	3			2										
CO3	1													
CO4		2		1										
CO5		1		1										
CO6	2	1						1						

Assessments:

Teachers' assessment-

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

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MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight-age for course content.(Normally last three modules) covered after MSE.

Course Contents:

Unit 1:---Linear Differential Equations with Constant Coefficients and Its Applications Definition, general form, complete solution. Rules for finding complementary function, Short methods for finding particular integral, General rule for finding particular integral, Applications to electrical circuits.	**8hrs**
Unit 2:--- Vector Calculus Differentiation of vectors, Velocity and acceleration, Gradient of scalar point function and directional derivative, Divergence of vector point function, Curl of a vector point function, Solenoid and Irrotational vector fields.	**7hrs**
Unit 3:--- Laplace Transforms Definition, transforms of elementary functions, properties of Laplace transform, Transforms of derivative and integral**,** Inverse Laplace transforms**,** Inverse Laplace transforms by using partial fractions and convolution theorem. Transforms of periodic functions and Heaviside unit step function, Solution of linear differential equations with constant coefficients by Laplace transform method.	**8hrs**
Unit4:--- Probability Distributions Random variable, Probability mass function and probability density function, Binomial distribution, Poisson distribution, Normal distribution.'	**6hrs**
Unit 5: --- Fourier Series & Fourier Transform Definition, Euler's formulae, Dirichlet's conditions, functions having points of discontinuity, Change of interval, expansion of odd and even periodic functions, Half range series.	**7hrs**
Unit 6:--- Fourier Transform Fourier integral theorem, Fourier transforms Fourier sine and cosine transforms, Finite Fourier sine and cosine transforms, Properties of Fourier transforms, Convolution theorem for Fourier transform, Parsevals identity for Fourier transform.	**6hrs**

Textbooks:

1. Dr. B. S. Grewal, "Higher Engineering Mathematics",Khanna Publishers, Delhi.
2. P. N. Wartikar & J. N. Wartikar, A Text Book of Applied Mathematics, Vol. I, Vol. II and vol. III, Vidyarthi Griha Prakashan, Pune.

References:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India Pvt. Ltd.
2. H. K. Dass, S. Chand, "Advanced Engineering Mathematics", New Delhi.
3. N. P. Bali, Iyengar, A text book of Engineering Mathematics, Laxmi Publications (P) Ltd., New Delhi.
4. Rakesh Dube, Narosa Publishing House, Mathematics for Engineers Vol-I & Vol-II.

Unit wise Measurable Learning Outcomes:

Unit 1: Linear Differential Equations with Constant Coefficients and Its Applications

The students will be able to

a) Solve linear differential equations with constant coefficients and solve the problems on **electrical circuits.**

Unit 2: Vector Calculus

The students will be able to

a) Differentiate vector quantity and find the directional derivative of scalar point function.
b) Find the divergence and curl of vector point function.

Unit 3: Laplace Transforms

The students will be able to

a) Find Laplace transform by using definition and recall properties of Laplace transform and use to find transforms of given functions.

Unit 4: Probability Distributions

The students will be able to

a) Verify the function as probability mass and density function and use probability distributions in solving physical and engineering problems.

Unit 5 : Fourier Series

The students will be able to

a) Define Fourier series, Euler's formulae. and develop Fourier series in an interval.
c) Expand function

Unit 6: Fourier Transforms

The students will be able to

a) Find Fourier transforms of various functions and find Fourier sine and cosine transforms of given functions.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Professional Ethics and Value Education	L	T	P	Credit
Course code :UELE0361	02	-	-	-

Course Pre-Requisite: Basic opinions about fundamental duties and rights, human values.

Course Description: This course contains information about engineering professions, fundamental duties and ethics in these professions, various categories of values in life.

Course Objectives:

1. To be aware of engineering professions, fundamental duties and ethics in these professions, Various categories of values in life.
2. To identify their individual roles and ethical responsibilities towards engineering profession.
3. To understand human values and its implications in their life.
4. To understand larger issues of life and society and to develop awareness and sensitivity, feeling of equality, compassion and oneness.

Course Outcomes:

COs	After completion of the course The students will be to	Bloom's Level	Descriptor
CO1	**Deliver** general information about electrical engineering professions.	II	Understanding
CO2	**List** roles and ethical responsibilities of an electrical engineer.	II	Understanding
CO3	**List** human values.	II	Understanding
CO4	**Analyze** importance of human values in their life.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						1								1
CO2								3				1		1
CO3	3							2						
CO4								3				2		1

Assessment:

Teachers' assessment-

It consists of one End Semester Examination (ESE) having 100% weightage

Assessment	Marks
ESE	100

ESE: Assessment is based on 100% course content with 100% weightage for course content

Course Contents:

Unit 1:--- Engineering Ethics I The history of ethics, Engineering Ethics, Consensus and controversy, Profession and Professionalism, Professional roles to be played by an engineer, Self interest, Customs and religion,	**4 Hrs**
Unit 2:--- Engineering Ethics II Uses of ethical theories, Professional ethics, Types of inquiry, Engineering and ethics, Engineers as managers, consultants and leaders, Accountability, Role of Codes, Codes and experimental nature of engineering.	**4 Hrs**
Unit 3:--- Engineers' Responsibilities I Engineers' responsibility for safety and risk, Collegiality, Techniques for achieving collegiality, Two senses of loyalty, Obligations of loyalty, misguided loyalty, professionalism and loyalty. Professional rights, Professional responsibilities, Confidential and proprietary information,	**5 Hrs.**
Unit 4:--- Engineers' Responsibilities II Solving conflict of interest, Customs and religion, Ethical egoism, Collective bargaining, Confidentiality, Acceptance of bribes/gifts, Occupational crime, Industrial espionage, Price fixing, Endangering lives, Whistle blowing.	**4 Hrs**
Unit 5:--- Human Values Morals, Values and ethics, Integrity, Work ethics, Service learning, Civic virtue,, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Value time, Co-operation, Commitment, Empathy, Self-confidence, Spirituality, Character.	**4 Hrs.**
Unit 6:--- Global Issues **Globalization,** Cross-culture issues, Environmental ethics, Computer ethics, Computers as the instrument of unethical behavior, Computers as the object of unethical acts, Computer codes of ethics, Weapons development, Ethics and research, Analyzing ethical problems in research, Intellectual property rights**.**	**5 Hrs**

Textbooks:

1. M. Govindarajan, S.Natarajan and V.S.SenthilKumar, Engineering Ethics & Human Values, PHI Learning Pvt. Ltd-2009.

2.M.W.Martin&R.Schinzinger,Ethics in Engineering, McGraw-Hill Publications
3.Prof.A.R.Aryasri,Professional Ethics and Morals, Dharanikota Suyodhana-Maruthi Publications

References:

1. A.Alavudeen, R.Kalil, Rahman and M. Jayakumaran, Professional Ethics and Human Values, Laxmi Publication.

Unit wise Measurable students Learning Outcomes:

1. The student will understand the concept of professionalism.
2. The student will understand Code of Ethics as defined by Institution of Engineers (India).
3. The student will understand engineering responsibilities.
4. The student will understand factors affecting engineering responsibilities.
5. The students will be able to list various human values.
6. The students will be to observe ethics in regards of global issues.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :DC Motors and Transformers LAB	L	T	P	Credit
Course Code:UELE0331	-	-	2	01

Course Pre-Requisite: Basic Electrical Engineering Lab

Course Description: This course contains experimentation to familiarize and operate and control electric machines studied in electric machines-I theory course.

Course Objectives:

1. To develop skills to demonstrate performance/ operation of DC motors &transformers using different tests.
2. To develop skills to analyze operation and performance of DC machines & transformers.

Course Outcomes:

COs	After the completion of the course the students will be able to	Bloom's level	Descriptor
CO1	**Find** electrical characteristics and performance of DC machines.	III	Applying
CO2	**Find** electrical characteristics and performance of transformers.	III	Applying
CO3	**Analyze** performance of DC machines.	IV	Analyzing
CO4	**Control** a machine as per requirement.	IV	Applying
CO5	**Analyze** performance of transformer.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1						3					
CO2	3	2		1					3					
CO3		3	1						3					
CO4			2	2					3			1		2
CO5		2	1	1					3					

Assessments:

Teachers' assessment-

In Semester Evaluation (ISE), and End Semester Examination (ESE) having 50% weightage each

Assessment	Marks
ISE	25
ESE(POE)	50

ISE is based on at least two of the assessment tools like performance of student in laboratory, experimental write-up, presentation, oral, and test (surprise/declared/quiz). ESE Assessment is based on performance in a practical examination and oral test thereafter, at the end of the semester.

Course Contents:	
Experiment No.1:---Speed control of dc shunt motor (i) Armature control method (ii) Field control method.	**2Hrs**
Experiment No.2:---Determination of efficiency of DC motor by Swinburne's test.	**2Hrs**
Experiment No.3:--- Determination of efficiency of DC motor by Hopkinson's test.	**2Hrs**
Experiment No.4:---Brake test on shunt motor to determine effect on various parameters.	**2Hrs**
Experiment No.5:---Field test on series motor to determine effect on various parameters.	**2Hrs**
Experiment No.6:---Load test on compound motor.	**2Hrs**
Experiment No.7:---Open circuit and short circuit test for determining equivalent circuit parameters of a single phase transformer.	**2Hrs**
Experiment No.8:---Parallel operation of single phase transformer to demonstrate load sharing.	**2Hrs**
Experiment No.9:---Scott connections for converting 3 phase to 2 phase supply.	**2Hrs**
Experiment No.10:---Equivalent Delta test or Heat run Test for determination of temperature rise and efficiency of 3 phase transformer.	**2Hrs**
Experiment No.11:---DY1 and DY11 parallel connection to demonstrate load sharing.	**2Hrs**
Experiment No.12:---Load test on transformer (single phase and three phase) to determine losses and efficiency using Sumpner's test.	**2Hrs**

Textbooks:

1. A.E.Clayton, "DC Machines", Mc Graw Hill publication, 3rd Edition.
2. M. G. Say. "Performance Design of AC Machines", CBS Publishers, 3rd Edition.
3. O. E. Taylor, "Performance Design of AC commutator motors", Wheeler Publisher, 15th Reprint.

References:

1. Nagrath and Kothari, "Electrical Machines", Tata Mc Graw Hill, New Delhi.
2. J. B. Gupta, "Electrical Machines", SK Kataria and Sons, New Delhi.
3. Fitzerald and Kingsley, "Electric Machine", Tata McGraw Hill.

Experiment wise Measurable students Learning Outcomes:

Experiment No.1- The students will be able to control speed of a dc motor.

Experiment No.2- The students will be able to determine efficiency of a dc motor.

Experiment No.3- The students will be able to determine efficiency of a dc motor.

Experiment No.4- The students will be able to judge effect of loading on a dc shunt motor.

Experiment No.5- The students will be able to judge effect of changing flux on a dc series motor.

Experiment No.6- The students will be able to judge effect of loading on a compound dc motor.

Experiment No.7- The students will be able to find equivalent circuit parameters of transformer.

Experiment No.8- The students will be able to operate two transformers in parallel.

Experiment No.9- The students will be able to obtain 2 phase supply from three phase supply.

Experiment No.10-The students will be able to determine temperature rise and efficiency of 3 phase transformer.

Experiment No.11- The students will be able to operate two 3 phase transformers in parallel connection.

Experiment No.12- The students will be able to judge effect of loading a transformer (single and three phase) on losses and efficiency.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Analog Electronics LAB Course Code: UELE0332	L	T	P	Credit
	-	-	02	01

Course Pre-Requisite: Basic knowledge of Semiconductor physics, Basic Electrical Engineering

Course Description: : This course includes experimentation to study the performance of applications of various types of electronic components such as UJT,JFET, MOSFET like feedback amplifier, oscillators, power amplifiers, operational amplifier, and timer using linear ICs.

Course Objectives:

1. To evaluate performance of Rectifiers and unregulated power supply.
2. To implement the regulators using BJT and IC's.
3. To evaluate amplifiers using BJT.
4. To develop witching circuits using BJT, JFET, MOSFET, DIAC, TRIAC.
5. To evaluate oscillators using OPAMP.
6. To develop multi vibrators and timers.

Course Outcomes:

COs	After completion of the course the students will be to	Bloom's Level	Descriptor
CO1	**Understand** operation of rectifiers and regulators using diodes, BJTs and IC's.	II	Understanding
CO2	**Develop** oscillators, multi vibrators and timer circuits.	III	Applying
CO3	**Analyze** frequency response and characteristics of BJT amplifiers.	IV	Analyzing
CO4	**Compare** performance of switching circuits using different devices.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1					2		1		3				1	1
CO2														3
CO3					1		2		2				1	1
CO4					2		2		2				1	3

Assessments:

Teachers' assessment-

In Semester Evaluation (ISE), and End Semester Examination (ESE) having 50% weightage each

Assessment	Marks
ISE	25
ESE(POE)	50

ISE is based on at least two of the assessment tools like performance of student in laboratory, experimental write-up, presentation, oral, and test (surprise/declared/quiz). ESE Assessment is based on performance in a practical examination and oral test thereafter, at the end of the semester.

Course Contents:	
Experiment No.1:--- Single phase half wave rectifier with Capacitive filter, Inductive filter.	**2Hrs**
Experiment No.2:--- Single phase full wave rectifier with Capacitive filter, Inductive filter.	**2Hrs**
Experiment No.3:--- Zener diode shunt voltage regulator.	**2Hrs**
Experiment No.4:--- Series voltage regulator with Pre- regulator & Overload protection circuit using BJT.	**2Hrs**
Experiment No.5:--- Performance of regulators using IC's:78XX, 79XX, 723, LM317.	**2Hrs**
Experiment No.6:--- Frequency response of single stage RC coupled amplifier.	**2Hrs**
Experiment No.7:---.Frequency response of two stage RC coupled amplifier.	**2Hrs**
Experiment No.8:--- RC phase shift oscillator.	**2Hrs**
Experiment No.9:--- Wien Bridge oscillator.	**2Hrs**
Experiment No.10:--- Monostable and astable multivibrators.	**2Hrs**
Experiment No.11:--- Bistable multivibrator.	**2Hrs**
Experiment No.12:--- Timer circuits.	**2Hrs**

Textbooks:

1. S.Salivahanan, A Vallavaraj.,N Suresh Kumar, "Electronic Devices and circuits".
2. Anil K. Maini, Varsha Agarwal, "Electronic Devices and Circuits", Wiley India.
3. A.P.Godse and U.A.Bakshi, "Electronic Devices and Circuits".
4. Electronic Devices and Circuits by Mantri & Jain.

References:

1. Boylestad, "Electronic Devices and Circuit Theory".
2. J.B.Gupta, "Electronic Devices and Circuits".
3. Millman, Halkias Pulse, "Digital & Switching Waveforms", TMH.
4. Schaum's Outlines, "Electronic Devices and Circuit".
5. Allen Mottershead, "Electronic Devices and Circuits", PHI.
6. Ben Streetman, Pearson, Solid State Electronic Devices.
7. Data Sheets.

Experiment wise Measurable students Learning Outcomes:

Experiment No.1-The students will be to evaluate the performance of single phase half wave rectifier with Capacitive filter, Inductive filter.

Experiment No.2-The students will be to evaluate the performance of single phase full wave rectifier with Capacitive filter, Inductive filter.

Experiment No.3 -The students will be to evaluate the performance of Zener diode shunt voltage regulator.

Experiment No.4- The students will be to evaluate the performance of series voltage regulator with Pre-regulator & overload protection circuit using BJT.

Experiment No.5-The students will be to evaluate performance of regulators using IC's:78XX, 79XX, 723,LM317.

Experiment No.6-The students will be to evaluate the performance of frequency response of single stage RC coupled amplifier.

Experiment No.7- The students will be to evaluate the performance of frequency response of two stage RC coupled amplifier.

Experiment No.8-The students will be to evaluate the performance of performance of RC phase shift oscillator.

Experiment No.9-The students will be to evaluate the performance of performance of Wien Bridge oscillator.

Experiment No.10 - The students will be evaluate the performance of monostable and astable multivibrators.

Experiment No.11 - The students will be to evaluate the performance of bistable multivibrator.

Experiment No.12- The students will be to evaluate the performance of timer circuits.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Measurement and Instrumentation LAB Course Code:UELE0333	L	T	P	Credit
	-	-	02	01

Course Pre-Requisite: Basic Understanding of passive components.

Course Description: This course contains experimentation to measure passive components and to have 'Hands on experience' on measuring tools like CRO, DSO, DMM, etc.

Course Objectives:

1. To understand the measurement of electrical parameters using different instruments.
2. To study the operation & use of different transducers.
3. To understand measurement of parameters such as R, L, C with the help of AC, DC bridge.

Course Outcomes:

COs	After the completion of the course the students will be able to	Blooms level	Descriptor
CO1	**Measure** passive components with the help of AC, DC bridges.	II	Understanding
CO2	**Measure** various electrical parameters using CRO and DSO.	III	Apply
CO3	**Analyze** the operation and use of various transducers.	IV	Analyzing
CO4	**Analyze** the operation of various AC, DC bridges.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1			1	3				3					2
CO2	1			1	3				3				1	
CO3	2		1						3				1	2
CO4	3				1				3				1	

Assessments:

Teachers' assessment-

In Semester Evaluation (ISE), and End Semester Examination (ESE) having 50% weightage each

Assessment	Marks
ISE	25
ESE(OE)	50

ISE is based on performance of student in laboratory, experimental write-up, presentation, oral, and test (surprise/declared/quiz). The course teacher shall use at least two assessment tools as mentioned above for ISE. ESE Assessment is based on oral test at the end of the semester.

Course Contents:	
Experiment No.1:---Measurement of voltage signal parameters using Cathode Ray Oscilloscope and Digital Storage Oscilloscope.	**2Hrs**
Experiment No.2:---Measurement of frequency and phase using Lissajous patterns.	**2Hrs**
Experiment No.3:--- Measurement of insulation resistance and earth resistance is using Megger.	**2Hrs**
Experiment No.4:--- Comparative analysis of temperature transducers.	**2Hrs**
Experiment No.5:--- Measurement of temperature using Thermocouple.	**2Hrs**
Experiment No.6:--- Comparative analysis of AC and DC bridges: a)Whetstone bridge b) Wien bridge	**2Hrs**
Experiment No.7:--- Measurement of weight using strain gauge.	**2Hrs**
Experiment No.8:--- Measurement of Capacitance using Schering Bridge.	**2Hrs**
Experiment No.9:--- Measurement of active and reactive power in 3 phase circuit.	**2Hrs**
Textbooks: **1.** A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement techniques", Pearson education.	
References: 1. A. K. Sawhney. "A course in electrical & electronics measurements & instruments".	
Experiment wise Measurable students Learning Outcomes: **Experiment No.1-**The students will be able to identify different operational features of oscilloscope. **Experiment No.2-**The students will be to use oscilloscope for frequency and phase shift measurement. **Experiment No.3-**The students will be to use Megger for insulation measurement. **Experiment No.4-**The students will be able to choose temperature transducer for a particular application.. **Experiment No.5-** The students will be able to measure temperature using thermocouple. **Experiment No.6-** The students will be able to understand the principle of AC and DC bridges for measurement of passive components. **Experiment No7-** The students will be able to utilize strain gauge for weight measurement. **Experiment N.o8-** The students will be able to measure Capacitance using Schering Bridge. **Experiment N.o9-** The students will be able to measure active and reactive power in 3 phase circuits.	

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Electrical Circuit Analysis LAB	L	T	P	Credit
Course Code:UELE0334	-	-	02	01

Course Pre-Requisite: Basic Electrical Engineering Lab

Course Description: This course contains experimentation to find/ verify properties of different electrical networks.

Course Objectives:

1. To make students demonstrate electrical circuit theorems through various experiments.
2. To develop skills for experimenting with first and second order electrical circuit.
3. To develop skills to measure two port electrical networks.

Course Outcomes:

COs	After the completion of the course the students will be able to	Blooms level	Descriptor
CO1	**Verify** A.C. and D.C. circuit theorems through experiments.	IV	Analyzing
CO2	**Analyze** first and second order circuits through simulation.	IV	Analyzing
CO3	**Analyze** first and second order circuits through experiments.	IV	Analyzing
CO4	**Measure** parameters of any two port network in real life.	V	Applying

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		1	2	1					3				2	1
CO2		2	1						3				1	1
CO3		3		1					3				2	1
CO4			1	1					3					

Assessments:

Teachers' assessment-

In Semester Evaluation (ISE), and End Semester Examination (ESE) having 50% weightage each

Assessment	Marks
ISE	25

ISE is based on at least two of the following assessment tools performance of student in laboratory, experimental write-up, presentation, oral, and test (surprise/declared/quiz).

Course Contents: Use of software like PSpice, Matlab is recommended.	
Experiment No.1:--- Validation Kirchhoff's law.	**2Hrs**
Experiment No.2:--- Analyzation of D.C circuits using Mesh and Node analysis.	**2Hrs**
Experiment No.3:--- Validation of Superposition theorem.	**2Hrs**
Experiment No.4:--- Validation of Thevenin's and Norton's theorem.	**2Hrs**
Experiment No.5:--- Verification of Maximum Power Transfer theorem.	**2Hrs**
Experiment No.6:--- Analysis of transient and steady state behavior of a first order circuit (R-C circuit).	**2Hrs**
Experiment No.7:--- Analysis of transient and steady state behavior of a second order circuit (R-L-C circuit).	**2Hrs**
Experiment No.8:--- Measurement of Z, Y, ABCD and Hybrid parameters of two port network.	**2Hrs**
Experiment No.9:--- Analysis of A.C. circuits using Mesh and Node analysis. **Computer Usage / Lab Tool:** PSpice.	**2Hrs**

Textbooks:

1. C.K. Alexandar and M.O. Sadiku "Electric Circuits Analysis", Tata McGraw Hill, 5th Edition, 2013.

References:

1. L.P. Huelsman, "Basic Circuit Theory", PHI Publication, 3rd Edition, 2009.
2. M.E. Van Valkenburg, "Network Analysis", PHI publication, 3rd Edition, 1983.
3. Sudhakar Shyammohan "Circuit and Networks", Tata McGraw Hill, 2nd Edition, 2002.

Experiment wise Measurable students Learning Outcomes:

Experiment no.1 -The students will be to find unknown circuit parameters using Kirchhoff's law.
Experiment no.2-The students will be to analyze D.C circuits using Mesh and Node analysis.
Experiment no.3-The students will be to use Superposition Theorem to analyze a circuit.
Experiment no.4-The students will be to apply Thevenin's and Norton's theorem. to analyze a circuit.
Experiment no.5-The students will be to use Maximum Power Transfer theorem..to analyze a circuit.
Experiment no.6-The students will be to relate time constant with transient and steady state behavior of a

first order circuit (R-C circuit).
Experiment no. 7-The students will be to relate time constant with transient and steady state behavior of a first order circuit (R-L circuit).
Experiment no.8-The students will be to co- relate Z, Y, ABCD and Hybrid parameters of two port network.
Experiment no.9 -The students will be to analyze A.C circuits using Mesh and Node analysis.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Second Year B.Tech. Program in Electrical Engineering Semester-IV

Title of the Course :AC Machines	**L**	**T**	**P**	**Credit**
Course Code:UELE0401	**03**	**-**	**-**	**03**

Course Pre-Requisite: Basic Electrical Engineering.

Course Description: This course contains detailed information about construction, working, testing and controlling of AC machines.

Course Objectives:

1. This course intends to provide details of operation and performance of asynchronous and synchronous machines.
2. It intends to develop application skill to operate asynchronous and synchronous machines.
3. It intends to develop a skill to determine asynchronous and synchronous machines.

Course Outcomes:

Cos	**After the completion of the course the students will be able to**	**Blooms level**	**Descriptor**
CO1	**Explain** the construction and operation of 3 phase induction motor	II	Understanding
CO2	**Explain** the construction and operation of synchronous Machines.	II	Understanding
CO3	**Analyze** the performance of induction motor..	IV	Analyzing
CO4	**Analyze** the performance of synchronous machines.	IV	Analyzing

PO MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO1	3												1	
CO2	2												1	
CO3														
CO4		2		1										
CO5		1		2										

Assessments:

Teachers' Assessment:
It consists of two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight-age for course content.(Normally last three modules) covered after MSE.

Course Contents:

Unit 1:--- Three Phase Induction Motor Construction, Types- cage type (single cage, double cage), slip ring type, operation, creation of rotating field, Torque equation, speed equation, speed torque curve, starting torque, stalling torque, full load torque, equivalent circuit, power flow diagram, efficiency, starting and types of starter.	**6Hrs**
Unit 2:--- Speed Control and Testing of 3 Phase Induction Motor Speed control: Change of supply frequency, pole changing, cascading, Injection of EMF in secondary, V/F control. Application and Testing: No load test, Blocked rotor test, and circle diagram, Testing as per I.S., Industrial applications of induction Motor.	**10 Hrs.**
Unit 3:--- Single Phase Induction Motor Types, construction, operation, double field revolving theory, phasor diagram, equivalent circuit, application. AC servo motor.	**6 Hrs.**
Unit 4:--- Synchronous Generator Construction, 3 phase winding, Principle of operation, EMF equation, harmonics voltage**.** armature reaction, armature resistance and reactance, leakage reactance, field excitation system, damper winding. Voltage regulation by synchronous Impedance method, Zero power factor method, MMF method, rating, efficiency and losses, method of synchronizing, synchronizing power, hunting, damping, single and Infinite bus, power angle equation, short circuit ratio and its significance. **Two reaction Theory**: Phasor diagram, slip test, power angle equation, saliency.	**11Hrs.**
Unit 5:--- Synchronous Motor Construction, operation, speed, torque, Method of starting, phasor diagram, torque and torque angle equation, V –curves, hunting and damping, synchronous condenser, Testing.	**5Hrs.**

Unit 6:--- HT Motors and Electric Braking of Motors HT motors and their applications, Electric braking of AC motors.	**4Hrs.**

Textbooks:

1.I. J. Nagrath and D.P.Kothari. "Electric Machines",MacGraw Hill Education,2010.

2.O. E. Taylor, "Performance Design of AC commutator motors", Wheeler Publisher, 15th Reprint.

References:

1.J. Chapman, "Electrical Machine", 3/E, S Mc Graw Hill.

2.J. B. Gupta, "Electrical Machines", S K Kataria and Sons, New Delhi.

3.Fitzerald and Kingsley, "Electric Machine", Tata McGraw Hill.

Unit wise Measurable students Learning Outcomes:

1.The students will be to evaluate the performance rating of induction motor.

2.The students will be to understand the speed controlling and testing methods of induction motor.

3.The students will be to determine the parameters of single phase induction motor.

4.The students will be to study the principles of synchronous generator.

5.The students will be to determine the performance of the synchronous motor.

6.The students will be to design a three phase winding of AC machines.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Digital Electronics	**L**	**T**	**P**	**Credit**
Course Code: UELE0402	**03**	**-**	**-**	**03**

Course Pre-Requisite: Basic Algebra Electronic devices such as diodes, transistors, MOSFET**S.**

Course Description:
This course discusses the fundamentals of digital circuits. This course includes the basics of combinational as well as sequential logic. In this course, the performance of digital circuits is analyzed.

Course Objectives:

1. To familiarize with digital/binary mathematics.
2. To understand various digital circuits and applications.
3. To learn digital memory devices.

Course Outcomes:

COs	**After the completion of the course the students will be able to**	**Blooms level**	**Descriptor**
CO1	**Understand** working of logic families and logic gates.	II	Understanding
CO2	**Understand** the process of Analog to Digital conversion and Digital to Analog conversion.	II	Understanding
CO3	**Design** and implement Combinational and Sequential logic circuits.	III	Applying
CO4	**Use** PLDs to implement the given logical problem.	III	Applying

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	2	2											1	1
CO3			3			1						1		2
CO4	3				1									

Assessments:

Teachers' assessment-

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight-age for course content.(Normally last three modules) covered after MSE.

Course Contents:	**7 Hrs**
Unit 1:--- Fundamentals of Digital Systems and Logic Families Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of logic gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.	
Unit 2:--- Combinational Digital Circuits Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.	**7Hrs.**
Unit 3: --- Sequential Circuits and Systems A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T And D types flip flops, operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits, Moore/Mealy models, state minimization, state assignment, circuit implementation, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, synchronous counters, counters design using flip flops, special counter IC's, applications of counters.	**7 Hrs.**
Unit 4: --- Asynchronous Sequential Circuits Ripple (Asynchronous) counters, Asynchronous Sequential Counters Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits.	**7 Hrs.**

Unit 5:--- A/D and D/A Converters Digital to analog converters and its types, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit. Analog to digital converters: quantization and encoding, Types of A/D converter, specifications of A/D converters, example of A/D converter ICs.	**7 Hrs.**
Unit 6:--- Semiconductor Memories and Programmable Logic Devices Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).	**7 Hrs.**
Textbooks/References: 1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009. 2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016. 3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.	
Unit wise Measurable students Learning Outcomes: 1.The students will be able to undertake Boolean algebra operations and list truth tables of logic gates. 2.The students will be able to understand k maps and Combinational Digital Circuits.. 3.The students will be able to analyze the performance of sequential logic circuits. 4.The students will be able to understand Ripple counters , Asynchronous Sequential Counters. 5.The students will be able to understand concepts of A/D and D/A Conversion. 6.The students will be able to understand concepts of semiconductor memory, PLA, CPLDS,FPGA.	

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course : Power System Economics	**L**	**T**	**P**	**Credit**
Course Code: UELE0403	**03**	**01**	**-**	**04**

Course Pre-Requisite: Basic Electrical Engineering.

Course Description: This course contains knowledge about electric power system components like generation and transmission and distribution.

Course Objectives:

1.To learn the concepts of power and power system.
2.To learn the concepts of electric power generation.
3.To learn the structure of transmission and distribution system.

Course Outcomes:

COs	**After the completion of the course the students will be able to**	**Blooms level**	**Descriptor**
CO1	**Explain** traditional and non-traditional Energy sources.	II	Understanding
CO2	**Explain** variable load on power stations, cost of generation and depreciation methods.	II	Understanding
CO3	**Implement** different types of tariffs.	III	Applying
CO4	**Apply** different methods of power factor improvement.	III	Applying

PO MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3					1								2
CO2		1				1							1	
CO3	2	2												
CO4	1		1			1							1	

Assessments:

Teachers' assessment-

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% weight-age for course content.(Normally last three modules) covered after MSE.	
Course Contents:	
Unit 1---Traditional and Non-Traditional Energy sources A perspective, brief introduction to generating stations -Hydro power plants, classification on the basis of head, advantages and disadvantages of low, medium and high head plants, pumped storage plants, review of steam and nuclear power plant, wind energy conversion systems, solar systems, Fuel cells, Comparison of these plants on the basis of installation cost, running cost, reliability and environmental effects, structure of power systems, growth of power system in India, trends Indian power industry.	**7Hrs**
Unit 2:--- Variable Load on Power Stations Introduction, electric industry structure, modern power system-generation, transmission and sub transmission, distribution, loads-types of loads, variation of load demands, various factors affecting generation such as – maximum demand, average demand, demand factor, diversity factor, total load demand and its variation, chronological load curve, load duration curve, energy load curve, mass curve, plant capacity factor and plant load factor.	**7 Hrs.**
Unit3:--- Cost of Generation Fixed and running cost of power plants, Annualized fixed and running charges, Depreciation fund and its calculation by straight line method, sinking fund method and fixed percentage method, Fixed and running cost of generation, overall cost for hydroelectric plants, thermal plants and nuclear plants, effects of various factors (like load diversity, load factor and load curve) on cost of generation.	**7Hrs**
Unit 4:---Tariffs Different types of tariffs such as fixed rate tariff, block rate tariff, two-part tariff, maximum demand tariff, penalty for low p.f. and power factor tariff, off peak tariff, time of day (T.O.D.) tariff, M.D. calculation.	**7Hrs**
Unit 5:--- Power Factor Improvement Concept of real, reactive and complex power and their effects on power system operation. Power Factor Improvement-Causes and disadvantages of Low power factor, power factor improvement using Static capacitors, synchronous condensers, phase advancers, FACT Devices.	**7 Hrs**
Unit 6:--- Supply Systems Electric supply system, typical AC power supply scheme, comparison of D.C. and A.C. transmission, advantages of high transmission voltage, various systems of power transmission, comparison of conductor material in overhead system and underground system, comparison of various systems of transmission, elements of a transmission line, economics of power transmission, economic choice of conductor size and transmission voltage, requirements of satisfactory electric supply.	**7Hrs**

Textbooks:

1. Glover, Sharma, overbye, "Power Systems Analysis and Design", Thompson, 5th Ed., 2012.
2. Ashfaq Husain, "Electrical Power Systems", CBS, 5th Edition, 2007.
3. O.I.Elegerd, "Electric Energy Systems Theory", MGH Education, 1995.
4. A.R.Bergen and V.Vittal, "Power System Analysis", Pearson Education Inc., 1999.
5. B.M.Weedy, B.J.Cory, N. Jenkins, J. Eknayake and G. Strbac, "Electric Power Systems", Wiley, 2012.

References:

1. Nagrath, D.P.Kothari, "Modern Power System Analysis", TMH, 2nd Edition, 2015.
2. Hadi Saadat, "Power System Analysis", TMH, 1st Edition, 2002.
3. Stevenson W.D., "Elements of Power System Analysis", TMH, 4th Edition, 1989.
4. J. Grainger and W.D.Stevanson, "Power System Analysis", McGraw hill Education, 1994.

Unit wise Measurable students Learning Outcomes:

1.The students will be able to identify different types of electric power generation.
2.The students will be able to understand various parameters of electric load.
3.The students will be able to identify effect of various factors on the cost of generated power.
4.The students will be able to discuss different tariffs and the concerned factors.
5.The students will be able to undertake an exercise of pf improvement.
6.The students will be able to understand features of transmission system.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course :Electromagnetic Fields	L	T	P	Credit
Course Code:UELE0404	03	01	-	04

Course Pre-Requisite: Basic Knowledge about magnetic fields and electromagnetic effect.

Course Description: This course discusses the concepts of electric fields and magnetic fields.

Course Objectives:

1. To provide basic concepts of vector algebra, vector calculus and coordinate system.
2. To introduce the fundamental concepts applicable to static electric fields in free space and material space.
3. To explain the forces created by magnetic field on charged particles, current elements, loops and dipoles.

Course Outcomes:

COs	After the completion of the course the students will be able to	Blooms level	Descriptor
CO1	**Grasp** the concepts of electromagnetism.	II	Understanding
CO2	**Perform** mathematical operations on vectors, coordinate system, electrostatics and electromagnetic fields.	IV	Analyzing
CO3	**Apply** vector calculus to understand the behavior of static electric fields in standard configurations.	IV	Analyzing
CO4	**Apply** vector calculus to understand the behavior of static magnetic fields in standard configurations.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1													1
CO2	1	2												1
CO3		1												1
CO4	1	3												1

Assessments:

Teachers' assessment-

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content.(Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight-age for course content. (Normally last three modules covered after MSE.)

Course Contents: **Unit 1:--- Vector Analysis** Vector Algebra, Rectangular Coordinate System, Vector Component, Vector Field, Dot Product, Cross Product, Circular and Cylindrical Coordinate System, Vector Calculus, Del Operator, Gradient of Scalar, Divergence of Vector and Divergence Theorem, Curl of a Vector and Stroke's Theorem, Classification of Vector Fields.	**6 Hrs**
Unit 2:--- Electrostatic Fields Coulombs law and Field intensity, Electric fields due to continuous charge distributions, Electric flux density, Gauss's law, Maxwell's equation, Electric potential, Relationship between E and V, Electric dipole and flux lines, Energy density in electrostatic fields.	**6 Hrs.**
Unit 3: ---Electric Fields in Material Space Electric properties of materials, Convection and conduction current, Conductors, Polarization in dielectrics, Dielectric constant and strength, Linear, isotropic and homogenous dielectrics, Continuity equation and relaxation time, Boundary conditions.	**6Hrs.**
Unit 4: ---Electrostatic Boundary-Value Problems Introduction, Poisson's and Laplace's equations, Uniqueness theorem, General procedures for solving Poisson's and Laplace's equations, Resistance and capacitance, Method of images.	**6Hrs.**
Unit 5:--- Magneto Static Fields and Magnetic Forces Biot-Savart's law, Ampere's Circuital law, Maxwell's equation, Application of Ampere's law, Magnetic flux density, Maxwell's equation for static fields, Magnetic scalar and vector potentials. Forces due to magnetic torque and moment, magnetic dipole.	**6 Hrs.**
Unit 6:--- Maxwell's Equations Introduction, Faraday's law, Transformer and motional electromotive forces, Displacement current, Maxwell's equations in final forms, Time varying potentials, time harmonic fields.	**6 Hrs.**

Textbooks:

1.William H. Hayt, Jr John A Buck, "Electromagnetic Engineering", Mc Graw Hill, 6th Edition.
2.John D. Kraus, "Electromagnetics", Tata Mc Graw Hill, 2nd Edition.

References:

1.Joseph A. Edminster, "Electromagnetics", Tata Mc Graw Hill, 2nd Edition.
2.M. Sadiku, "Elements of Electromagnetics", OUP, 4th ed.
3.Jorden and Balmen, "Electromagnetic Field and Radiation System1st Edition.

Unit wise Measurable students Learning Outcomes:

1.The students will be to perform numerical operations on vectors.
2.The students will be to calculate forces due electrostatic field in free space & in materials.
3.The students will be to explain electric fields in material space.
4.The students will be to explain Electrostatic boundary-value problems.
5.The students will be to grasp various concepts of electromagnetic field and calculate the forces existed by magnetic field.
6.The students will be to solve Maxwell's equations.

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Title of the Course :Signals and Systems	L	T	P	Credit
Course Code: UELE0405	03	01	-	04

Course Pre-Requisite: Knowledge of Derivative, Integration, Matrices and Laplace transform**.**

Basics of transform theory.

Course Description:

This course discusses basic mathematical frame work of signals and systems. It discusses various properties of signals and systems, characterization of Linear Time Invariant Systems/ Time variant systems, convolution and Fourier Series and Transform, It deals with the Parseval's theorem, Z-Transform, Correlation and Laplace transform. This course serves as prerequisite for other courses in this program of Electrical Engineering such as control systems, communication systems, digital signal processing.

Course Objectives:

1. To prepare students with the understanding of basics of test signals, their properties and its effect on the practical systems, and also understand different properties of the system.
2. To train students with problem solving capabilities such as analysis of the system and system output interpretation.
3. To develop students understanding with different transform techniques those can be used for system realization.

Course Outcomes:

COs	After the completion of the course the students will be able to	Blooms level	Descriptor
CO1	**Understand** and interpret different types of test signals and systems those systems can encounter in day-to-days life.	II	Understanding
CO2	**Explain** different properties and type of signals and system	II	Understanding
CO3	**Apply** different transform techniques to solve the system problems	III	Applying
CO4	**Evaluate** response of linear systems to any input signal by convolution in the frequency domain using the concepts of auto correlation and cross correlation and power density spectrum.	V	Evaluating

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3					
CO2		3	1						1				2	
CO3					2	1								2
CO4		3	1						2					

Assessments:

Teachers' assessment-

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight-age for course content.(Normally last three modules) covered after MSE.

Course Contents:

Unit 1:--- Basics of Signals & Systems Definition of signals, classification of signals, study of some standard signals viz . Impulse signal, step signal, ramp signal, rectangular pulse function, signum function, sinc function, exponential signal, properties of standard signals, basic operations on signals, Definition of system, classification of systems.	**6 Hrs**
Unit 2:--- Linear Time Invariant Systems Concept of Eigen function in the development of convolution theory, properties of Eigen function, Concept of convolution in Discrete and Continuous time domain, concept of Linear Time Invariant systems and its properties, concept of correlation, Autocorrelation and Cross Correlation, similarity and difference between convolution and correlation, time domain analysis of CT systems.	**6 Hrs.**
Unit 3: --- Fourier Series Representation of Signals Introduction to Continuous Time Fourier Series (CTFS), Direchlet's conditions for the existence of Fourier series, properties of CTFS, FS representation of Amplitude and Phase Spectrum, relation between Fourier series and Fourier Transform.	**6 Hrs.**

Unit 4: --- Fourier Transform (FT) Continuous Time and Discrete Time Concept and interpretation of FT, concept of magnitude and phase spectrum, existence of Fourier series, properties of FT, analysis of LTI systems using FT.	**8 Hrs.**
Unit 5:--- Laplace Transform (LT) Introduction to Laplace Transform, Existence of LT, Concept of Region of Convergence and its properties, definition of Inverse LT, Properties of LT, Analysis of CT-LTI systems using LT, stability and Causality of CT-LTI system using LT, block diagram representation and system realization of CT-LTI system.	**7 Hrs.**
Unit 6:--- Z- Transform Introduction to Laplace Transform, Existence of LT, Concept of region of Convergence and its properties, definition of Inverse LT, Properties of LT, Analysis of CT-LTI systems using LT, stability and Causality of CT-LTI system using LT, block diagram representation and system realization of CT-LTI system.	**7 Hrs.**

Textbooks:

1. B.P.Lathi, "Signals & systems"

References:

1.Alan Oppenheim, Alan S, "Signals and Systems" (second edition), Willesky Pearson publication.
2.Simon Haykin, "Signals and Systems".

Unit wise Measurable students Learning Outcomes:

1.The students will be able to understand the Concept of signals and systems.
2.The students will be able to understand the concept of LTI system.
3.The students will be able to explain the concept of Fourier Series.
4.The students will be able to understand Fourier Transform.
5.The students will be able to understand the concept of Laplace transform.
6.The students will be able to explain the concept of Z-transform.

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Title of the Course :Environmental Studies	L	T	P	Credit
Course Code: UELE0461	02	-	-	-

Course Pre-Requisite: Basic knowledge of Environment, and basic science and technology.

Course Description:
This course contains knowledge about Natural Resources, Ecosystems, Biodiversity and Environment Problems, conservation of environment.

Course Objectives:

1. Study scope and importance of natural resources, ecosytems, biodiversity for creating awareness and their conservation in multiple disciplines.
2. Learn various types of pollution, their impacts and control measures for mimimizing pollution and sustainable development.
3. Understand social issues related environment ,environmental ethics and human rights towards environment.
4. Study various laws and regulations related to environment and its applicability in society and industries.

Course Outcomes:

COs	After the completion of the course the The students will be able to	Blooms level	Descriptor
CO1	**Describe** natural resources, importance of ecosystems and conservation of biodiversity with respect to multiple disciplines.	I	Remembering
CO2	**Explain** causes ,effects, solutions for various pollution problem and its minimization strategies.	II	Understanding
CO3	**Discuss** environmental ethics and their implementation for betterment of environment and human life.	II	Understanding
CO4	**Differentiate** between requirements of laws and regulations for environmental conservation and applicability of legislation in society and industries.	II	Understanding
CO5	**Prepare** detailed project report on selected topic based on environmental issues/problems.	III	Applying

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							2					1		1
CO2	3											1		1
CO3						2		1				1		1
CO4						1		2				1		1
CO5										2	2	1		1

Assessments :

Teacher' Assessment:

It consists of one End Semester Examination (ESE) having 100% weight.

Assessment	Marks
ESE	100

ESE: Assessment is based on 100% course content with 100% weightage for course content

Course Contents:

Unit 1:--- Nature of Environmental Studies. Definition, scope and importance, Multidisciplinary nature of environmental studies, Need for public awareness.	**2Hrs**
Unit 2:---Natural Resources and Associated Problems. a) Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide problems. e) Energy resources: Growing energy needs, renewable and non-renewable energy resources, use of alternate energy sources.Solar energy, Biomass energy, Nuclear energy. f) Land resources: Solar energy , Biomass energy, Nuclear energy,Land as a resource, land degradation, man induced landslides, soil erosion and desertification.Role of an individuals in conservation of natural resources.	**4 Hrs.**
Unit 3: ---Ecosystems Concept of an ecosystem.Structure and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the ecosystem.Ecological succession.Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem :-	**4Hrs.**

a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem, d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).	
Unit 4: ---Biodiversity and its Conservation Introduction- Definition: genetic, species and ecosystem diversity.Bio-geographical classification of India.Value of biodiversity: consumptive use, productive use, social, ethical,aesthetic and option values.India as a mega- diversity nation.WesternGhat as a biodiversity region.Hot-spot of biodiversity.Threats to biodiversity habitat loss, poaching of wildlife, man- wildlife conflicts.Endangered and endemic species of India.Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	**5Hrs.**
Unit 5:--- Environmental Pollution Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of a individual in prevention of pollution.	**5Hrs.**
Unit 6:--- Social Issues and the Environment Disaster management: floods, earthquake, cyclone, tsunami and landslides. Urban problems related to energy Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions. Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.Wastelandreclamation.Consumerism and waste products.	**4Hrs.**
Unit 7:--- Environmental Protection From Unsustainable to Sustainable development.Environmental Protection Act.Air (Prevention and Control of Pollution) Act.Water (Prevention and control of Pollution) Act.Wildlife Protection Act.Forest Conservation Act.Population Growth and Human Health, Human Rights.	**4Hrs.**
Textbooks: 1.Environmental Studies by Dr. P.D.Raut (Shivaji University, Kolhapur)	

References :

1. Miller T.G. Jr., “Environmental Science”. Wadsworth Publications Co.(TB).
2. Odum, E.P.1971, “Fundamentals of Ecology”, W.B.Saunders Co. USA,574p.
3. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I and II, Environmental Media (R).

Unit wise Measurable students Learning Outcomes:

1.The students will be describe scope and importance of environmental studies.
2. The students will be describe types of natural resources their use and conservation.
3. The students will be explain structure and functions of ecosystem their types and importance.
4. The students will be discuss biodiversity, endangered species and methods of biodiversity conservation.
5. The students will be explain causes, effects and solutions to pollution problem.s
6. The students will be discuss environmental ethics and various social issues related to environment
7. The students will be discuss laws and regulations for conservation of environment.

Title of the Course :AC Machines LAB	L	T	P	Credit
Course Code:UELE0431	-	-	02	01

Course Pre-Requisite: Basic Electrical Engineering, AC machines.

Course Description: This course contains experimentation to familiarize and operate and control electric machines studied in electric machines-II theory course.

Course Objectives:

1. This course intends to demonstrate performance operation of synchronous and asynchronous machines.
2. It intends to develop skills to analyze operation and performance of asynchronous and synchronous machines.

Course Outcomes:

COs	After the completion of the course the students will be able to	Blooms level	Descriptor
CO1	**Find** electrical characteristics of any induction motor in real life.	III	Applying
CO2	**Find** electrical characteristics of synchronous machines	III	Applying
CO3	**Analyze** performance of induction motor.	IV	Analyzing
CO4	**Analyz**e performance of synchronous machines.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1								3		1			2
CO2									2		1			2
CO3	1			2					3					2
CO4				3					2		1			2

Assessments:

Teachers' assessment-

In Semester Evaluation (ISE), and End Semester Examination (ESE) having 50% weightage each

Assessment	Marks
ISE	25
ESE(POE)	50

ISE is based on at least two of the assessment tools like performance of student in laboratory, experimental write-up, presentation, oral, and test (surprise/declared/quiz). ESE Assessment is based on performance in a practical examination and oral test thereafter, at the end of the semester.

Course Contents:	
Experiment No.1:--- No load and Blocked rotor test on 3 phase induction motor and circle diagram.	**2Hrs**
Experiment No.2:--- Starters for 3 phase induction motor.	**2Hrs**
Experiment No.3:--- Direct load test on 3 phase induction motor.	**2Hrs**
Experiment No.4:--- Speed control of Induction Motor. .	**2Hrs**
Experiment No.5:--- Voltage regulation of alternator using direct load method.	**2Hrs**
Experiment No.6:--- Voltage regulation of alternator using Synchronous Impedance method.	**2Hrs**
Experiment No.7:--- Voltage regulation of alternator using MMF method.	**2Hrs**
Experiment No.8:--- Voltage regulation of alternator using Zero power factor method.	**2Hrs**
Experiment No.9:--- Synchronization of alternator with bus bar.	**2Hrs**

Textbooks:

1. M. G. Say. "Performance Design of AC Machines", CBS Publishers, 3rd Edition.
2. O. E. Taylor, "Performance Design of AC commutator motors", Wheeler Publisher, 15th Reprint

References:

1.1. J. Chapman, "Electrical Machine", 3/E, S Mc Graw Hill.
2. J. B. Gupta, "Electrical Machines", SK Kataria and Sons, New Delhi.
3. Fitzerald and Kingsley, "Electric Machine", Tata McGraw Hill.

Experiment wise Measurable students Learning Outcomes:

Experiment no.1-The students will be to draw circle diagram of induction motor and evaluate performance parameters from it.

Experiment no.2-The students will be to compare performance of different starters for induction motor.

Experiment no.3- The students will be to perform direct load test Induction motor starters.

Experiment no.4- The students will be to control speed of Induction motor.

Experiment no.5- The students will be to calculate voltage regulation of alternator using direct load method,
Experiment no.6- The students will be to Determine voltage regulation of alternator using Synchronous Impedance method.
Experiment no.7- The students will be to Determine of voltage regulation of alternator using MMF method.
Experiment no.8- The students will be to Determine of voltage regulation of alternator using Zero Power factor method.
Experiment no.9-The students will be to Synchronize an alternator with bus bar.

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Title of the Course :Digital Electronics LAB	L	T	P	Credit
Course Code:UELE0432	-	-	02	01

Course Pre-Requisite: Semiconductor Physics , Analog Electronics.

Course Description: This LAB course provides hands on training to students in Digital Electronics. They will be enabled to use logic gates , various digital circuits viz, counters, adders, ADC, DAC, digital memory and PLA, CPLD, FPGA etc .The course has vast applications in Industry as well as day to day life.

Course Objectives:

1. To study logic gates and circuits like adders.
2. To understand flip flops, shift registers.
3. To study sequential and combinational logic circuits.
4. To study synchronous and asynchronous counters.
5. To study PLA,CPLD,FPGA.

Course Outcomes:

COs	After the completion of the course the students will be able to	Blooms level	Descriptor
CO1	Demonstrate truth tables of logic gates, flip flops.	II	Understanding
CO2	Understand concepts of PLA,FPGA.	II	Understanding
CO3	Apply digital circuits in different tasks.	III	Applying
CO4	Compare between synchronous and asynchronous counters.	IV	Analyzing

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1									1					
CO2									1	2				2
CO3			2					2		3			1	
CO4			1						1		3			1

Assessments:

Teachers' assessment-

In Semester Evaluation (ISE), and End Semester Examination (ESE) having 50% weightage each

Assessment	Marks
ISE	25
ESE(POE)	50

ISE is based on at least two of the assessment tools like performance of student in laboratory, experimental write-up, presentation, oral, and test (surprise/declared/quiz). ESE Assessment is based on performance in a practical examination and oral test thereafter, at the end of the semester.

Course Contents:
Experiment No.1:---- Verification of truth tables of logic gates.
Experiment No.2:---- Validation of truth tables of different types of flip-flops.
Experiment No.3:---- Implementation of adders.
Experiment No.4: ---- Implementation shift registers, sequential logic circuits.
Experiment No.5: ----Design of synchronous counters.
Experiment No.6: ---- Design asynchronous counters.
Experiment No. 7:---- Performance evaluation of ADC and DAC.
Experiment No.8: ----Comparison of different types of memory.
Experiment No.9:---- Performance evaluation of PLA, FPGA.
Textbooks: 1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
References: 1.M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016. 2.A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016. 3.Data Sheets.
Experiment 1: The students will be able to verify truth tables of logic gates.
Experiment 2: The students will be able to verify truth tables of different types of flip-flops.
Experiment 3: The students will be able to use adders.
Experiment 4: The students will be able to use IC shift registers, sequential logic circuits.
Experiment 5: The students will be able to analyze operation of synchronous counters.
Experiment 6: The students will be able to analyze operation of asynchronous counters.
Experiment 7: The students will be able to use ADC and DAC.
Experiment 8: The students will be able to understand types of memory.
Experiment 9: The students will be able to analyze working of PLA, FPGA.

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Title of the Course :Software LAB I	L	T	P	Credit
Course Code:UELE0433	-	-	02	01

Course Pre-Requisite: Preliminary knowledge of computer programming (any one language), flowcharts.

Course Description: This course includes information about MATLAB programming and using MATLAB to solve typical problems in Electrical Engineering.

Course Objectives:

1. To provide basic knowledge of software for electrical engineering application for developing Programming techniques.
2. To impart skills to implement different tool boxes of software package used in this course.

Course Outcomes:

COs	After the completion of the course the students will be able to	Blooms level	Descriptor
CO1	**Grasp** the basics of software programming.	II	Understanding
CO2	**Solve** electrical engineering circuits and systems related mathematical equations.	II	Applying
CO3	**Solve** simple mathematical equations.	III	Analyzing
CO4	**Analyze** and program for any general engineering project.	III	Analyzing

Assessments:

Teachers' assessment-

In Semester Evaluation (ISE), and End Semester Examination (ESE) having 50% weightage each

Assessment	Marks
ISE	50

ISE is based on at least two of the assessment tools like performance of student in laboratory, experimental write-up, presentation, oral, and test (surprise/declared/quiz) .

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3				3					
CO2			3			1			3		2		3	3
CO3			2		1				3		2		3	3
CO4			2	2										

Course Contents:	
Experiment No.1:--- Outline of Programming with the software package used and Computation of arithmetic, exponential, trigonometric and complex form operation using MATLB programming.	**2Hrs**
Experiment No.2:--- Simple matrix and array manipulation with the software package used.	**2Hrs**
Experiment No.3:--- Control structures in the programming software.	**2Hrs**
Experiment No.4:--- Graph plotting (2D and 3D).	**2Hrs**
Experiment No.5:--- Programming with the software package used includes function, ordinary differential solver and calculus functions.	**2Hrs**
Experiment No.6:--- Analysis of electrical networks with the software package used programming.	**2Hrs**
Experiment No.7:--- Calculation of Laplace and Z transform, inverse Laplace and Z transform, partial fraction expansion and transfer function with the software package used	**2Hrs**
Experiment No.8:--- Introduction to toolbox in any one other the software package.	**2Hrs**
Experiment No.9:--- Solution of differential equation with the software package used.	**2Hrs**

Textbooks:

1. Dr. Shailendra Jain,"Modeling and simulation using MATLAB Simulink", Wiley Publication, Reprint :2013.
2. RudraPratap, "Getting started with MATLAB", Oxford University Press, Version 6.

References:

1. Stephen Chapman, "Matlab programming for Engineers", Thomson Learning publication, 3rd Edition.
2. Robert Strum and Donald Kirk, "Contemporary linear systems using MATLAB", Thomson Learning publication.
3. Duane Hanselman and Bruce little field,"Mastering MATLAB", Pearson Education, 2005.
4. Brain R. Hunt, Ronald L. Lipsman and Jonathan M. Rosenberg, "A guide to MATLAB", Cambridge University Press, 2002.
5. Martin Golubitsky, Michael Dellnitz,, "Linear Algebra and differential Equations using MATLAB", International Thomson, 1999.

Experiment wise Measurable students Learning Outcomes:

Experiment 1- The students will be to state the outline of programming with software package used.

Experiment 2- The students will be to perform mathematical operations on matrices with the software package used.

Experiment 3- The students will be to use control structures in with the software package used.

in a program.

Experiment 4- The students will be to plot graphs with the software package used.

Experiment 5- The students will be to use function, ordinary differential solver and calculus functions in the software package used.

Experiment 6- The students will be to analyze electrical circuits with the software package used.

Experiment 7- The students will be to calculate Laplace and Z transform, inverse Laplace and Z transform, partial fraction expansion and transfer function with the software package used.

Experiment 8- The students will be to state the use of any other software package.

Experiment 9- The students will be to. solve differential equation with the software package used.

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

Title of the Course : Mini Project-I LAB	L	T	P	Credit
Course Code: UELE0441	-	-	02	01

Course Pre-Requisite: Digital Design with VHDL, EDA Tools and architecture of PLDs like CPLD and FPGA, CPLD etc.

Course Description: This lab prepares students to develop thinking process to **solve social problems** by application of science and engineering in innovative manner. The group of students not more than 3 should identify social problems, perform requirement analysis. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of micro-project. As per requirements the group should develop specifications of final outcome of the project. The students should think critically and undertake design of the project with skills available with them to meet the requirements and specifications. The group is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester. The student is expected to exert on design, development and testing of the proposed work as per the schedule. The working model of the project will be demonstrated for internal submission.

Completed micro project and documentation in the form of micro project report is to be submitted at the end of semester. The project should complete in 12 weeks including field trails if any.

At the end of project the guide should advise students to protect Intellectual Property either in the form of Patent or registration of design or publish paper on work completed or participate in project competition

The probable areas of the project work (but not restricted to) are : Environment protection, global warming, safe drinking water, waste management, renewable energy utilities, biomedical engineering, accident prevention, enabling weaker section of society, efficiency/cost/ time improvements, human hardship reduction, prosthesis, smart city, smart transportation. .

Course Objectives:

1. Evaluate social needs.
2. Identify suitable problem that can be solved using first year engineering knowledge and basic knowledge of electronics engineering and C programming.
3. Design and implement the solution using hardware / software or both.
4. Testing of the implementation.
5. Write project report as per standard format.

Course Outcomes:

COs	After the completion of the course the students will be able to	Blooms level	Descriptor
CO1	**Analyze and build** logical/ mathematical/ mechanical model of the project.	III	Applying
CO2	**Identify** social problem that can be solved using first principles of science, engineering and skills like Programming, any other software, app etc. and knowledge of electrical engineering.	IV	Analyzing

CO3	**Develop** comprehensive report on project work as per prescribed format.	V	Evaluating
CO4	**Design / simulate** the model/ project work.	VI	Creating
CO5	**Implement** the project using resources available in the department.	VI	Creating

Assessments:

Teachers' assessment-

In Semester Evaluation (ISE), and End Semester Examination (ESE) having 50% weightage each

Assessment	Marks
ISE	50

ISE is based on at least two of the assessment tools like performance of student in laboratory, experimental write-up, presentation, oral, and test (surprise/declared/quiz).

PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2				1			1	3	3	1	1	1	2
CO2		3				2			3	3	1	1	1	2
CO3					1			1	3	2	1	1		2
CO4			3				2		3	3	1	1	1	2
CO5					3			1	3	1	1	1		2

Course Contents:

There are no fixed contents of this lab course. The probable areas of the project work (but not restricted to) are: Environment protection, global warming, safe drinking water, waste management, renewable energy utilities, biomedical engineering, accident prevention, enabling weaker section of society, efficiency/cost/ time improvements, human hardship reduction, prosthesis, smart city, smart transportation, energy audit and saving.

Measurable students Learning Outcomes:

1. The students will develop sensitivity towards social problems.
2. The students will be able to develop thinking process to solve social problems by application of science and engineering in innovative manner.
3. The students will be able to think critically and undertake design of the project with skills.
4. The students will be able to design, develop and test any assigned work.