Year: First Year **Semester: I**
Course: Applied Mathematics **Course Code: TDBS101**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Theory**	**Lab**	
3	1	-	4	10	20	10	10	----	50	----	100
Max. Time, End Semester Exam (Theory) -3Hrs.									**End Semester Exam (Lab) - ----**		

Prerequisite

1. Basic knowledge of fundamental mathematics.
2. Different Application of Mathematics

Course Objectives	
1.	To be familiar with linear differential equations of higher order applicable to control systems.
2.	To study complex functions, conformal mappings, contour integration applicable to electrostatics, digital filters, signal and image processing.
3.	To study differentiation and integration vectors.
4.	To be familiarize with Z- transform and their applications.
5.	To be thorough with applications to control systems and signal processing.

Course Content			
Unit No.	Module No.	Content	Hours
1	**I**	**Linear Differential Equations** :- Solution of linear differential equations of first order, solution of nth order linear differential equations with constant coefficients.	7
	II	**Applications of Linear Differential Equations:** Method of variation of parameters, applications in simple electrical circuit.	5
2	**I**	**Laplace Transform:** Laplace transforms, properties and Theorems on them, Laplace transform of standard functions, inverse Laplace transform.	6
	II	**Laplace transform of standard functions**: Laplace transform of some special functions like - periodic, unit step, unit impulse; applications of Laplace transform for solving differential equations.	6
3	**I**	**Z - Transform:** Introduction and definition of Z - Transform, standard properties of Z - Transform, Z - Transform of standard sequences and their region of convergence.	8
	II	**Inverse Z - Transform:** Inverse Z-transform, solution of difference equations by using Z-Transform.	4
4	**I**	**Vector Differentiation**: Basics of vector differentiation, vector differential operator, gradient, divergence and curl, directional	7

		derivative, solenoidal, irrotational fields, scalar potential.	
	II	**Vector Integration:** Standard vector identities, line integral, Green's Lemma and its applications	5
5	**I**	**Complex Variables:** Functions of complex variables, analytic functions, Cauchy-Riemann equations, Cauchy's integral Theorem	8
	II	**Complex Variables (continued):** Cauchy's integral Theorem, Cauchy's integral formula, residue Theorem, bilinear transformation.	4
		Total No. of Hrs	60

Course Outcome	
Students should able to	
CO1	Solve linear differential equations and apply them on simple electric circuit.
CO2	Gain the basic knowledge of Laplace transform and their applicability in solving initial value problems.
CO3	Understands the new notion of Z- transform and their usability in solving difference equations.
CO4	Solve the problems on vector derivatives and integrations.
CO5	Gain the knowledge of complex analysis and its application electrical engineering problem.

RecommendedResources	
Text Books	1. Ervin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley and Sons. 2. S.R.Sakhare, B.S.Waghe, S. M. Bhati, Naveen Mani, Engineering Mathematics- III (Electrical & Instrumentation Branch), Gigatech Publishing House, Pune [ISBN: 978-81-938081-0-8]
Reference Books	1.B. S. Grewal, Higher Engineering Mathematics, 43rd edition, Khanna Publishers.
E-Resources	http://nptel.ac.in/syllabus/108106070/

Year: First Year **Semester: I**
Course: Fundamentals of Electrical Engineering **Course Code: TDEE101**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab	Theory	Lab	
3	1	2	5	20	20	10	25	50	25	150
Max. Time, End Semester Exam (Theory) -3Hrs.								End Semester Exam (Lab) - 2Hrs.		

Course Objectives	
1	Understand various parameters and quantities used in electric circuit.
2	Understand the concept of capacitance.
3	Understand various terms involved in magnetic circuit.
4	To know the basic concept of magnetic circuit.
5	To understand the fundamentals of AC system and application to simple circuit.
6	To understand the principle of Transformer and its operational details

Course Content

Unit No.	Content	Hours
1	**Basic Concepts** **DC Circuit:** **Basic Terminology** Types of Voltage and current sources, Introduction to circuit elements-Resistance, Inductance and Capacitance, Ideal and practical Voltage Sources, Ideal and practical Current Sources, Open and short circuit. **KCL & KVL** Series and Parallel circuit, Voltage divider and current divider rule, KCL and KVL analysis, Mesh and Nodal Analysis.	
2	**Capacitors** Concept and Definition of Capacitor, Parallel Plate Capacitor :(Derivation and Simple Numerical), Uniform Di-electric Medium, Medium Partly Air, Various connections of capacitances (Simple Numerical), Equivalent capacitance of capacitors in series. :(Derivation and Simple Numerical) Equivalent capacitance of capacitors in parallel. :(Derivation and Simple Numerical), Calculations of Equivalent Capacitance of Series Parallel :(Simple Numerical), Energy Stored in Capacitor. (No Derivation and Simple Numerical) ,Types of Capacitors and their Applications: Electrolytic ,Non-Electrolytic (Paper, Mica, Film, Ceramic, Glass)	
3	**Magnetic Circuits** Concept of magnet and electromagnetic, Concept of magnetic lines of force., Magnetic Circuit – Definition of magnetic circuit, Ohm's law of Magnetic Circuit, Definitions Concerning Magnetic Circuit: Magneto-Motive-Force (MMF), Ampere Turns (AT), Reluctance, Permeance, Reluctivity.	

	Comparison Between Electric and Magnetic circuit, Concept Series Magnetic Circuit and Parallel Magnetic Circuit, Concept of Leakage Flux, Useful Flux & Fringing, Magnetisation Curve (B - H Curve) (No Derivation and No Numerical), Magnetisation Curve for Magnetic and Non-Magnetic Materials, Magnetic Hysteresis, Hysteresis Loop. Area of Hysteresis Loop, Hysteresis Loss. Applications of magnet: Permanent Magnet Electromagnet.	
4	**A.C. Circuit:** **AC fundamentals** Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak(maximum), average and r.m.s. values, frequency , cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and rectangular and polar representation of phasors.	
5	**Electromagnetic induction** Definition of Electromagnetic Induction, Faradays Laws, Fleming's right hand rule, Lenz's Law, Statically and dynamically induced emf. Self-inductance, mutual inductance and coefficient of coupling. **Transformers:** Definition, Principal of operation, classification. Construction; core & Shell type, voltage and current ratios, Transformation ratios, Emf equation, losses & efficiency	
6	**Single phase A.C. Circuits**: A.C. circuits consisting of pure resistance, pure inductance, pure capacitance and corresponding voltage-current phasor diagrams and waveforms. Reactance and impedance.	
	Total	

Course Outcome	
Students should able to	
CO1	Analyze circuit systems using direct application of Kirchoff's Current and Voltage Laws along with Ohm's Law.
CO2	Analyze Single Phase AC Circuits.
CO3	Apply basic concept of electromagnetic induction in electrical machine.
CO4	Understand and apply properties of logic gates in combinational and sequential circuit.
CO5	Uunderstand basic semiconductor physics.

List of Experiments	
Sr. No.	**Description**
1	To measure e.m.f. of d.c. source and to calculate its internal resistance by connecting it to an external load
2	To determine the equivalent Capacitance of Series connected Capacitor
3	To determine the equivalent Capacitance Parallel connected capacitor
4	To plot the charging and discharging curves of a capacitor(C) through resistor (R) and to determine the time constant of RC circuit analytically and graphically.

5	To plot B-H curve for a given magnetic material
6	To verify the KCL & KVL.
7	To determine transformation ratio of the transformer.
8	Study AC circuit and its response for Circuit consists of R , L & C

Recommended Resources	
Text Books	1. V.N. Mittale, Basic Electrical Engineering , Tata McGraw-Hill 2. V.K.Mehta, Basic Electrical Engineering, , S. Chand and Company Ltd., New Delhi. 3. S.Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI, II Edition
Reference Books	1. R.P. Jain, "Principles of Digital Electronics", TMH 2. B. L. Theraja , Fundamentals of Electrical Engineering and Electronics, S. Chand & Company Ltd.
E-Resources	http://nptel.ac.in/courses/108108076/

Year: First Year **Semester: I**
Course: Fundamental of Power Electronics **Course Code: TDEE102**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab	Theory	Lab	
3	1	2	5	20	20	10		50		100
Max. Time, End Semester Exam (Theory) -3Hrs.								End Semester Exam (Lab) - 2Hrs.		

Course Objectives	
1	State purpose of power conversion.
2	Identification of power electronics devices with justification.
3	Identify different types of converters for required applications.
4	List different types of inverters and applications.
5	Selection of SCR control circuit as per the requirement of application.

Course Content		
Unit No.	**Content**	**Hours**
1	**Power Electronics Devices** Necessity of Power conversion using solid state devices, Applications of Power Electronics, Power Transistor- Construction working, V-I characteristics and Applications, IGBT- Construction working, V-I characteristics and Applications, Construction and application of DIAC & TRIAC	3
2	**Thyristor Family Devices** Characteristics and symbolic representation of SCR, GTO, SUS, LASCR, SCR: Construction, operation, V-I characteristics and Applications, Two transistor analogy, Triggering methods of SCR- Voltage triggering, dv/dt triggering, Light triggering, Gate triggering, DC gate triggering, Turn Off methods of SCR- Class-A, Class- B, Class-C, Class-D and Class-E, SCR Specifications/Ratings: Voltage, Current, Power, Temperature, SCR selection factors, SCR testing, Protection circuits- Current overload and voltage overload protection, Snubber and Crowbar.	
3	**Phase Controlled Rectifier (Converters)** Necessity of Convertors, Concept of firing angle and conduction angle, Single phase fully controlled half wave converter With resistive load, RL load without freewheeling diode, RL load with freewheeling diode, Single phase full wave controlled converter - With resistive load, With RL load, Single phase fully controlled bridge converter- With resistive load, With RL load, Comparison of 3Ø and 1Ø converters on the basis of efficiency, ripple factor, RMS Values and average values.	
4	**Inverters and Chopper** Need of Inverter, Classification of inverter, Operation of basic series inverter , Advantageous and disadvantageous, Parallel inverters: Operation of basic parallel inverter circuit, Single Phase Bridge Inverter -Half bridge inverter, Full bridge inverter with resistive load , Chopper principle, Control	

	techniques: Constant Frequency System, Variable Frequency System, Classification of choppers :Class A, class B, class C, class D, class E.	
5	**Industrial Control Circuits and Applications** Speed control of DC series motor, Burglar alarm system, Emergency light system, Temperature control using SCR , SMPS, UPS- online & Offline, Static circuit breaker(DC and AC), Battery charger control	
	Total	

Course Outcome	
Students should able to	
CO1	Understand the physical processes for the switching of a thyristor.
CO2	Develop logic about the turning off mechanism of a thyristor and get acquainted with some methods of turning a thyristor off.
CO3	Become familiar with other members of the thyristor family as well as other powerelectronic devices
CO4	Know the characteristics of different power electronic devices
CO5	Know the working of rectifiers, choppers, inverters and industrial applications of the thyristor.

List of Experiments	
Sr. No.	**Description**
1	To study V-I characteristics of SCR and measure latching and holding currents.
2	To study UJT trigger circuit for half wave and full wave control.
3	To study single-phase half wave controlled rectified with (i) resistive load (ii) inductive load with and without freewheeling diode.
4	To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5	To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.
6	To study single-phase ac voltage regulator with resistive and inductive loads.
7	To study single phase cyclo-converter
8	To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor

Recommended Resources	
Text Books	1. M. D. Singh K. B. Khanchnadani Power Electronics Tata Mcgraw Hill 2. S. K. Bhatacharya S. Chattarjee Ttti Chandigad Industrial Electronics & control Tata Mcgraw Hill 3. P. C. Sen Power Electronics Tata Mcgraw Hill
Reference Books	1. M. D. Rashid Power Electronics Pearson 2. V. R. Moorthi Power Electronics OXFORD
E-Resources	www.learnerstv.com/Free-Engineering-Video-lectures-ltv127

Year: First Year **Semester: I**
Course: Network Analysis **Course Code: TDEE103**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab	Theory	Lab	
3	-	2	4	20	20	10	25	50	25	150
Max. Time, End Semester Exam (Theory) -3Hrs.								End Semester Exam (Lab) - 2Hrs.		

Course Objectives	
1	Understand generation of a.c. supply and concept of phasor
2	Calculate current, reactance and impedance of series a.c. circuit
3	Calculate various powers, and p.f. of parallel a.c. circuit
4	Solve examples of simple d.c. circuits by mesh or node analysis.
5	Calculate current, reactance and impedance of each phase of polyphase a.c. circuit.
6	Calculate the current in a given network by applying proper theorem.

Course Content

Unit No.	Content	Hours
1	**Review Of Basic Concepts Of Electric Circuit:** Basic Definitions: Active and Passive Circuit Parameters, Linear Circuit and Non-linear Circuit, Unilateral Circuit and Bi-lateral Circuit, Simple one loop a.c. generator to produce sinusoidal a.c. emf. Sinusoidal a.c. waveform and definitions of various terms such as frequency, time-period, cycle, amplitude, average value, rms value, crest factor, form factor .(Simple numerical) **,** Concept of phasor, Phasor representation of alternating quantity and concept of phase Angle Response of pure R, L, and C to sinusoidal a.c. supplies. .(Simple numerical)	
2	**Single Phase A.C. Series Circuits:** Series a.c. circuits R-L, R-C and R-L-C circuits. Impedance, reactance, phasor diagram, impedance triangle, power factor, active(real) power, apparent power, reactive power, power triangle (Derivations and Numerical). Series Resonance, quality factor (Derivations and Numerical)	
3	**Single Phase A.C. Parallel Circuits:** Parallel AC circuits: Resistance in parallel with pure inductance, Resistance in parallel with capacitance. Series combination of resistance and inductance in parallel with capacitance, Concept of Admittance, Conductance & Susceptance, Parallel resonance, quality factor, Comparison of series and parallel circuits.	
4	**Principles of Circuit Analysis (Only DC Circuits):** Important terms related to electrical circuits: Electric Network, Passive and Active Network, Node, Branch, Loop, Mesh, Kirchhoff's Laws (Simple Numerical with two equations only), Kirchhoff's Current Law , Kirchhoff's Voltage Law, Mesh analysis (Numerical with two equations), Node analysis (Numerical with two equations), Star/delta & Delta/star transformations (Simple Numerical).	

5	**Polyphase A.C. Circuits:** Advantages of polyphase circuits over single phase circuits, Generation of three phase e. m. f., Phase sequence, polarity marking, Types of three-phase connections, Concept of unbalanced load and balanced load, Line, phase quantities and power in three phase system with balanced star, and Delta connected load & their interrelationship (Derivations and numerical).	
6	**Network Theorems** Superposition Theorem for both AC Voltage & DC Source, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem	

Course Outcome	
Students should able to	
CO1	Analyze circuit systems using direct application of Kirchoff's Current and Voltage Laws along with Ohm's Law.
CO2	Apply theorem to express complex circuits in their simpler equivalent forms.
CO3	Demonstrate graph theory and Coupled circuit.
CO4	Apply basic concept to compute time response of RL, RC and RLC circuits in the time domain

List of Experiments	
Sr. No.	**Description**
1	To determine impedance, phase angle and plot phasor diagram of R-L a.c. series circuit. To calculate also active, reactive and apparent power consumed in R-L series circuit.
2	To determine impedance, phase angle and plot phasor diagram of R-C a.c. series circuit. To calculate also active, reactive and apparent power consumed in R-C series circuit.
3	To determine impedance, phase angle and plot phasor diagram of R-L-C a.c. series circuit.
4	To obtain resonance in R-L-C a.c. series circuit By varying L or C.
5	To measure current of each branch of RL-C parallel a. c. circuit. To calculate also p.f., active, reactive and apparent power taken by the a. c. circuit.
6	To verify line and phase values for balanced three phase load and to calculate all types of power Star connected & Delta connected.
7	To verify superposition theorem.
8	To verify Thevenin's and Norton's theorem.
9	To verify maximum power transfer theorem.

RecommendedResources	
Text Books	1. M. E. Van Valkenburg, "Network Analysis", 3e, Prentice Hall of India Private Limited. 2. Ravish R Singh, "Network Analysis and synthesis", 3e, McGraw Hill education (India) Pvt. Ltd.
Reference Books	1. William H. Hayt, Jr. Jack E. Kemmerly, "Engineering Circuit Analysis"," McGraw Hill Publication.
E-Resources	http://nptel.ac.in/courses/108108076/

Year: First Year **Semester: I**

Course: Communication Skill (HSS) **Course Code: TDHS111**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Orals**	**Lab**	
2	-	2	**3**	10	20	10	10	50	50		150
Max. Time,End Semester Exam									**End Semester Orals –1 Hr.**		

Prerequisite	1. Functional grammar-Parts of speech, Tenses, Sentence pattern 2. Formal letter 3. Fluency in reading and speaking

Course Objectives	
1	To acquire basic language skills (LSRW) to communicate with speakers of English language.
2	To develop their intellectual, personal and professional abilities.
3	To develop skill to communicate fluently.
4	To enhance team building and time management skills.
5	To inculcate employability skills among students.

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**English Vocabulary building:** Affixes, Prefixes & Suffixes	3
	II	Word building- Compound words, Standard Abbreviations	2
	III	Antonyms and Synonyms- functional usage	2

	IV	Active & Passive voice	2
2	I	**Writing skills:** Parts of speech	3
	II	Paragraph writing	2
	III	Use of Idioms, Phrases and Proverbs in sentences	2
	IV	Basic sentence pattern	1
	V	Importance of punctuation	1
3	I	**CALL- Computer Assisted Language Laboratory** Listening exercises- Extempore	4
	II	Vocabulary building -Task based Lab Activities	5
	III	Language fluency Linguistic accuracy & Communicative fluency	5
	IV	Listening to varied registers-Role play - Situational Dialogues	2
	V	Pronunciation, Intonation, Stress and Rhythm- Public speaking	4
4	I	**Oral & Written Presentation** Tenses	2
	II	Ice breaking, reporting, Question & answer skill	2
	III	Formal & Informal speech	3
		Total No. of Hrs	45

Beyond the Syllabus
Self Introduction, SWOT/SWOC, Group Discussion

Course Outcome	
Students should able to	
CO1	Students will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
CO2	Students will be able to write formal letters effectively.
CO3	Students will be able to prepare, organize and deliver oral presentation.

CO4	Students will develop reading speed and build academic vocabulary.
CO5	Students will demonstrate behavior and attitudes appropriate to university environment.

List of Experiments	
Sr. No.	**Description**
1	**Module 1** **CALL- Computer Assisted Language Laboratory** Listening exercises- Extempore
2	**Module 2** Vocabulary building -Task based Lab Activities
	Module 3 Language fluency Linguistic accuracy & Communicative fluency
	Module 4 Listening to varied registers-Role play - Situational Dialogues
	Module 5 Pronunciation, Intonation, Stress and Rhythm- Public speaking

Recommended Resources

Text Books	1. Communication Skills by Sanjay Kumar and PushpaLata, Oxford University Press. 2. Developing Communication Skill by Krishna Mohan, MeeraBanerji, McMillan India Ltd. 3. English for Business Communication by Simon Sweeney, Cambridge University Press
Reference Books	1. Ethics in Engineering Practice and Research by Caroline &Whitbeck, Cambridge University Press. 2. Basic Managerial Skills by E. H. McGrath, Eastern Economy Edition, Prentice hall India.
E-Resources	https://www.britishcouncil.in/sites/default/files/esfe_report.pdf https://www.britishcouncil.org/sites/default/files/english-soft-skills-maghreb-research-report.pdf http://nptel.ac.in/courses/109104030/references/references.pdf http://promeng.eu/downloads/training-materials/ebooks/soft-skills/effective-communication-skills.pdf

Year: First Year **Semester: II**
Course: Electrical & Electronic Measurement **Course Code: TDEE201**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab	Theory	Lab	
3	-	2	4	20	20	10	25	50	25	100
Max. Time, End Semester Exam (Theory) -3Hrs.								End Semester Exam (Lab) - 2Hrs.		

Course Objectives	
1	Understand different terms in measurement system.
2	Explain development of different torques in measurement system.
3	Know Significance of power factor in power measurement.
4	Use appropriate method for power measurements using wattmeter
5	Make connections of single phase energy meter.
6	Calibrate 1-ph energy meter.

Unit No.	Contents	Hours
1	**Fundamentals of Measurements:** Significance and purpose of electrical measurement systems, Various electrical effects employed in measuring instruments. Desirable characteristics of measuring instruments: accuracy, sensitivity, selectivity, reproducibility, precision, errors, drift, Common errors in analog measuring instruments. Classification of measuring instruments. Different torques in analog instruments: Deflecting, controlling and damping torque, Methods of developing these torques.	
2	**Measurement of Voltage and Current:** Constructional features and working principles used in PMMC and MI instruments, Comparison between PMMC and MI instruments, Basic arrangements of using above instruments for measurement of voltage and current in single phase circuits. Extension of Range of ammeters and voltmeters. D. C. Ammeters: Using Shunts: calculations of shunt resistance and simple numerical, D. C. Voltmeters: Using Multipliers: calculations of multiplier resistance and simple numerical.	
3	**Power Measuring Instruments:** Concept of impedance triangle in A.C. circuit-R-L,R-C and R-L-C series circuit, Concept of Power factor and its significance. Active, Reactive and apparent power, their equations, relations and units. Power Triangle concept of lagging and leading power factor, Constructional features of Dynamometer type instruments and its use as a wattmeter for single phase circuits. Multiplying factor of wattmeter, Different errors in wattmeter and their compensations.	
4	**Measurement of three phase a. c. Power:** One wattmeter method: Measurement of active and reactive power, Advantages and Limitations, Two wattmeter method: Measurement of active and reactive power, Advantages and Limitations Effect of Power factor on wattmeter reading in two wattmeter method, Extension of ranges	

5	**Measurement of three phase a. c. Energy:** Concept of electrical energy, Constructional features and working principle of single phase and three phase induction type energy meter. Different types of errors and their compensations. Calibration of single phase induction type energy meter by direct loading, Digital Energy meter: Working principle, advantages over analog meter. **Measurement of Circuit Parameters:** Classification of resistance.-Low, Medium and High, Methods of measurement of low and medium resistance by simple V-I method and by using digital multimeter, Constructional features working principles and applications of megger and earth tester, Comparison and applications of –analog and digital multimeter	
	Total	

Course Outcome	
Students should able to	
CO1	Understand various characteristics of electrical measuring instruments and their working.
CO2	Understand the range extension methods for DC & AC instruments.
CO3	Apply measurement techniques for measurement of resistance.
CO4	Understand calibration procedure of energy meter.
CO5	Apply operation of transducer in instrumentation.

List of Experiments	
Sr. No.	**Description**
1	Extension of instrument range: ammeter, voltmeter, watt meter using CT & PT.
2	Measurement of resistance by ammeter voltmeter method
3	Measurement of low resistance using Kelvin's double bridge.
4	Measurement of active & reactive power in three phase circuit using two wattmeter methods (balanced & unbalanced loads).
5	Measurement of active & reactive power in three phase balanced circuit using one wattmeter method with two way switch
6	Calibration of single-phase static energy meter at di_erent power factors.
7	To verify superposition theorem.
8	To verify Thevenin's and Norton's theorem.
9	To verify maximum power transfer theorem.

Recommended Resources:	
Text Books	1. A K. Sawhney, _A Course in Electrical and Electronic Measurements & Instrumentation_, Dhanpat Rai & Co. 2. R. K. Jain, _Mechanical and Industrial Measurements_, Khanna Publishers.
Reference Books	1. E. W. Golding & F. C. Widdies, _Electrical Measurements & Measuring Instruments_, Wheeler Pub.
E-Resources	http://nptel.ac.in/syllabus/108106070/ Approved

Year: First Year **Semester: II**
Course: Electric Motors & Transformer **Course Code: TDEE202**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab	Theory	Lab	
3	-	2	4	20	20	10	25	50	25	100
Max. Time, End Semester Exam (Theory) -3Hrs.								End Semester Exam (Lab) - 2Hrs.		

Course Objectives	
1	Identify the different parts of DC Machines
2	Identify different types of DC generators from connection diagram
3	Control the speed of DC motors
4	Determine the efficiency of DC motor.
5	To identify polarity and phases of three-phase transformer.
6	Perform various tests on transformers

Unit No.	Contents	Hours
1	**DC Generators :** Principle of operation of DC generator, Fleming's right hand rule, Construction of DC machine, Parts and functions, Different materials used for different parts, E.m.f. equation of generator (derivation), Numerical on e.m.f. equation, Types of DC generators, Connection diagrams of different types of DC generators Applications of DC generators	8
2	**DC Motors:** Principle of operation of DC motor, Fleming's left hand rule, Back e.m.f. and its significance, Voltage equation and power equation of DC motor, Types of DC motors Characteristics of DC motors. Efficiency of DC Motor Losses in DC motor Power stages, Condition for maximum efficiency Numerical on efficiency. Selection of motors for particular applications, Speed control of DC series motor by using Flux control method and Armature resistance control method (No numerical), DC motor starters, Necessity of DC motor starters	9
3	**Single Phase Transformer:** Introduction, Principle of operation, Faradays law of electromagnetic induction, Construction of single phase transformer: Magnetic circuit, Electric circuit, Dielectric circuit, Types of transformers, EMF equation of transformer, Ideal& Practical transformer, Equivalent circuit, Voltage regulation and Efficiency	8
4	**Three Phase Transformer:** Introduction, transformers connections as per IS:2026 (part IV)-1977, Scott Connection, Comparison between Distribution transformer and Power transformer, Selection of transformer as per IS: 10028 (Part I)-1985, Parallel operation of three phase transformer, Specification of three-phase distribution transformer as per IS:1180 (part I)-1989, Tests on Three-phase Transformer, Three- phase auto transformer	10
5	**Testing of Single phase Transformer:** Testing of transformer as per Indian standard, Polarity test, Parallel operation of single phase transformers, load test, Open circuit and short circuit tests, determination of equivalent circuit parameters and voltage regulation Auto-transformer: - construction, working, application	10
	Total	45

Course Outcome	
Students should able to	
CO1	Apply Basic field theory to Learn Electrical Machines.
CO2	Test the Transformer for Direct and Indirect Tests for Analysis.
CO3	Select transformer according to the requirement of delta or star application
CO4	Classified the DC machine.
CO5	Control the speed of DC Motors using armature voltage control and Flux control for specific Drive Operation.

List of Experiments	
Sr. No.	**Description**
1	To perform O.C. and S.C. test on single phase Transformer.
2	To perform Polarity test on single phase and three phase transformer.
3	To perform Parallel operation of two single phase transformers and study of their load sharing under various conditions of voltage ratios and leakage impedances.
4	To study the Scott connection of transformer and verify different types of connection of three phase transformer.
5	To perform determine of regulation and efficiency of a single or three phase transformer by direct load test.
6	To perform speed control of D.C. Shunt motor and study of starters.
7	To perform brake test on D.C. Shunt motor.
8	To study Load characteristics of D.C. series motor.
9	To verify maximum power transfer theorem.

Recommended Resources:	
Text Books	1.S. K. Bhattacharya, _Electrical Machine_, 2e, Tata Mc Graw Hill 2 Ashfaq Husain, _Electrical Machines_, Dhanpat Rai & Sons 3 I.J. Nagrath & D.P. Kothari, _Electrical Machines_, Tata MGH
Reference Books	1.P.S.Bimbhra, _Electrical Machines_, Khanna Pub.
E-Resources	http://nptel.ac.in/courses/108105017

Year: First Year **Semester: II**
Course: Applied Mechanics **Course Code: TDEE203**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Theory**	**Lab**	
3	0	2	4	10	20	10	10	25	50	25	150
Max. Time, End Semester Exam (Theory) -3Hrs.									**End Semester Exam (Lab) – 2 Hrs.**		

Prerequisite	1. Basic knowledge of fundamental of physics. **2.** To understand the principles of force,energy,workdone.

Course Objectives	
1	To provide a comprehensive knowledge of force, work and energy
2	to calculate work done, power required and efficiency for various simple
3	To understand the importance and application of various laws of mechanics.

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Introduction :** Scalar and vector quantity, like force ,pressure, velocity, acceleration, Static and dynamic parameter and its conversion along with FPI AND METRIC parameter, overall application field related to the quantity and the parameter.	9
2	I	**Coplanar Concurrent Forces**: Force –units, elements Laws/Principles of forces such as Principle of Superposition, Principle of transmissibility Composition & Resolution of Forces Resultant &Equilibrium forces conditions of equilibrium Analytical & graphical method for Law of Parallelogram, Law of Triangle, Lami's law of theorem and Law of polygon.	9
3	I	**Coplanar Non Concurrent:** Forces: Principal of Moment Moment, Couple, application ,properties of couple, conditions of equilibrium Types of supports, end conditions– Hinge, free end ,roller, fix, Types of loads like point load ,U.D.L, U.V.L, Couple ,Analytical method to Evaluate reactions in statically determinate beam subjected to point load and/or U.D.L by analytical method of solving Statically determinate	9
4	I	**Centroid & Centre of Gravity**: First moment of area; to find Centroid– standard shapes ofI, L, Channel & T sections, axis of symmetry First moment of mass; to find C.G of standard solids sections, Axis of symmetry	9
5	I	**Friction**: Friction, Laws of Friction, Angle of Friction, Angle of Repose ,types of friction Application of Lami's theory and theory of	9

		resolution of forces ,example son friction for a block resting on horizontal plane &on inclined plane	
		Total No. of Hrs	**45**

Course Outcome	
Students should able to	
CO1	At the end of of the course students will able to solve simple problem of work and energy
CO2	At the end of of the course students will able to understand the importance and application of various laws of mechanics.

List of Experiments

Sr. No.	**Description**
1	Verify and calculate resultant force through Law of Parallelogram.
2	Verify and calculate resultant force through Law of Polygon Law of Forces, Lami's Theorem
3	Verify reactions in beam through Graphical& analytical method .
4	Calculate Centroid of lamina and Centroid of different sections
5	Calculate Coefficient of Sliding Friction for different surfaces–Wood,Glass
6	Work-out M.A & Efficiency of Simple purchase crab, simple wheel and axle, simple

Recommended Resources	
Text Books:	1. Engineering Mechanics RS Khurmi S. Chand, New Delhi 2 Engineering Mechanics D S Kumar S. K. Kataria & Sons,
Reference Books:	1. Engineering Mechanics Bear & Jonstan New media
E-Resources:	http://nptel.ac.in/courses/

Year: First Year **Semester: II**
Course: Industrial Measurements **Course Code: TDEE204**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab	Theory	Lab	
3	-	2	4	20	20	10	25	50	25	150
Max. Time, End Semester Exam (Theory) -3Hrs.								End Semester Exam (Lab) - 2Hrs.		

Course Objectives	
1	State basic block diagram of instrumentation system
2	Classify the transducers on the basis their application
3	Select appropriate transducer as per application
4	Identify different applications of OP-AMP in signal conditioning
5	State various techniques of input signal conditioning in DAS
6	State working principle of analog-to-digital and digital-to-analog

Unit No.	Contents	Hours
1	**Introduction to Instrumentation System:** Identify static and dynamic characteristic, Basic block diagram, Basic instrumentation system, Precision, repeatability and reproducibility , Static characteristics of instruments, Dynamic characteristics of instruments, Calibration, Principles of calibration, Calibration chain and traceability.	
2	**Data Acquisition System:** Generalized Data acquisition system, Generalized Data acquisition system: Block diagram. & explanation. Signal conditioning in DAS, Ratio metric conversion, Logarithmic Conversion , DAS Types-Single channel, multi-channel DAS only block diagram. Analog-to-digital and digital-to-analog conversion , Study of different techniques of Analog to Digital convertors ADC and Digital to Analog converters DAC only working principle.	
3	**Transducers :** Transducers, Measurement of strain, Definition of stress and strain, Measurement of Force and Torque, Measurement of torque using torque cell, Temperature Measurement, Resistance thermometer (RTD), working principle, characteristics ranges of common RTD elements, self heating effect, advantages of platinum resistance thermometer, three wire and four wire configurations, Displacement measurement, Flow measurement, Measurement of magnetic field, Level measurement, Rotational velocity.	
4	**Signal Conditioning Circuits:** Operational Amplifier and its characteristic parameters, OP-AMP basic circuits, Block diagram and features of OPAMP (all stages) Circuit Symbols and Terminals. OPAMP IC's: 741 pin diagram and pin function Ideal op-amp: electrical characteristics. Ideal voltage transfer curve Definitions of parameters of op-amp CMMR, SVRR, Close loop configuration: Inverting, non- inverting, differential amplifier, unity gain amplifier (voltage follower), inverter(sign changer), Adders, Subtractor, Integrator, Differentiator, Sample and hold circuit (IC LF 398 , Pin diagram, specification and pin functions), ZCD	
5	**Instrument Transformers:** Construction, connection of CT & PT in the circuit, advantages of CT / PT over shunt and multipliers, transformation ratio, turns ratio, nominal ratio, burden, ratio and phase angle error. (descriptive treatment only) Range	

	extension of voltmeter, ammeter & wattmeter using CT/ PT. Measurement of Resistance: Measurement of low, medium and high resistance. Wheatstone bridge, Kelvin's double bridge, ammeter-voltmeter method, Megger, loss of charge method.	
	Total	

Course Outcome: Students are able to	
1	Draw basic block diagram of instrumentation system
2	understand the transducers on the basis their application
3	Select appropriate transducer as per application
4	Use OP-AMP in signal conditioning Applications
5	Apply various techniques of input signal conditioning in DAS
6	Understand working principle of analog-to-digital and digital-to-analog

List of Experiments	
Sr. No.	**Description**
1	Calibration of Instruments Like Ammeter and Voltmeter
2	Analysis of precision and repeatability of industrial Meters
3	Conversion of analog voltage in digital format
4	Conversion of Digital to analog and display on CRO
5	Measurement of Strain using Appropriate Transducer
6	Measurement of Displacement Using appropriate Transducer
7	Measurement of resistance using Kelvins Double Bridge
8	Measurement of resistance using Wheatstone Bridge

Recommended Resources:	
Text Books	1. A K. Sawhney, _A Course in Electrical and Electronic Measurements & Instrumentation_, Dhanpat Rai & Co. 2. R. K. Jain, _Mechanical and Industrial Measurements_, Khanna Publishers.
Reference Books	1. E. W. Golding & F. C. Widdies, _Electrical Measurements & Measuring Instruments_, Wheeler Pub.
E-Resources	http://nptel.ac.in/syllabus/108106070

Year: First Year **Semester: I**
Course: Technical Communication Skill (HSS) **Course Code:TDHS201**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Orals**	**Lab**	
2	-	2	**3**	10	20	10	10	50	50	-	150
Max. Time,End Semester Exam									**End Semester Orals –1 Hr.**		

Prerequisite	**4.**	Functional grammar-Parts of speech, Tenses, Sentence pattern
	5.	Formal letter
	6.	Fluency in reading and speaking

Course Objectives	
1	To acquire basic language skills (LSRW) to communicate with speakers of English language.
2	To develop their intellectual, personal and professional abilities.
3	To develop skill to communicate fluently.
4	To enhance team building and time management skills.
5	To inculcate employability skills among students.

Course Content			
Unit	Module	Content	Hours
1	I	**English Vocabulary building:**	3
	II	Word building- Compound words, Standard Abbreviations	2
	III	Antonyms and Synonyms- functional usage	2
	IV	Active & Passive voice	2
2	I	**Writing skills:**	3
	II	Paragraph writing	2
	III	Use of Idioms, Phrases and Proverbs in sentences	2
	IV	Basic sentence pattern	1
	V	Importance of punctuation	1
3	I	**CALL- Computer Assisted Language Laboratory**	4
	II	Vocabulary building -Task based Lab Activities	5
	III	Language fluency	5
	IV	Listening to varied registers-Role play - Situational Dialogues	2
	V	Pronunciation, Intonation, Stress and Rhythm- Public speaking	4
4	I	**Oral & Written Presentation**	2
	II	Ice breaking, reporting, Question & answer skill	2
	III	Formal & Informal speech	3
		Total No. of Hrs	45

Course Outcome	
Students should able to	
CO1	Students will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
CO2	Students will be able to write formal letters effectively.
CO3	Students will be able to prepare, organize and deliver oral presentation.
CO4	Students will develop reading speed and build academic vocabulary.
CO5	Students will demonstrate behavior and attitudes appropriate to university environment.

List of Experiments	
Sr. No.	**Description**
1	**Module 1** **CALL- Computer Assisted Language Laboratory** Listening exercises- Extempore
2	**Module 2** Vocabulary building -Task based Lab Activities
	Module 3 Language fluency Linguistic accuracy & Communicative fluency
	Module 4 Listening to varied registers-Role play - Situational Dialogues
	Module 5 Pronunciation, Intonation, Stress and Rhythm- Public speaking

Recommended Resources	
Text Books	1. Communication Skills by Sanjay Kumar and PushpaLata, Oxford University Press. 2. Developing Communication Skill by Krishna Mohan, MeeraBanerji, McMillan India Ltd. 3. English for Business Communication by Simon Sweeney, Cambridge University Press.
Reference Books	1. Ethics in Engineering Practice and Research by Caroline &Whitbeck, Cambridge University Press. 2. Basic Managerial Skills by E. H. McGrath, Eastern Economy Edition, Prentice hall India.
E-Resources	https://www.britishcouncil.in/sites/default/files/esfe_report.pdf https://www.britishcouncil.org/sites/default/files/english-soft-skills-maghreb-research-report.pdf http://nptel.ac.in/courses/109104030/references/references.pdf http://promeng.eu/downloads/training-materials/ebooks/soft-skills/effective-communication-skills.pdf