MA205 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	**L**	**T**	**P**	**C**
	3	0	0	3

Course Objectives: To study the application of transform techniques to solve linear ordinary and partial differential equations and to solve boundary value problems by using Fourier series

Prerequisites: Knowledge of Integral Calculus, Ordinary differential equations, Complex variables

Laplace Transform of Standard functions, derivatives and integrals – Inverse Laplace transform – Convolution theorem-Periodic functions – Application to ordinary differential equations and simultaneous equations with constant coefficients and integral equations

Fourier series – Dirichlet's conditions - Half range Fourier cosine and sine series - Parseval's relation - Fourier series in complex form - Harmonic analysis

Fourier transforms - Fourier cosine and sine transforms - inverse transforms - convolution theorem and Parseval's identity for Fourier transforms - Finite cosine and sine transforms

Formation of partial differential equations eliminating arbitrary constants and functions - solution of first order equations - four standard types - Lagrange's equation - homogeneous and non-homogeneous type of second order linear differential equation with constant coefficients

One-dimensional wave equation and one-dimensional heat flow equation - method of separation of variables - Fourier series solution

Text Books:

1. *Veerarajan, T., 'Engineering mathematics', Tata McGraw-Hill (Education) India Pvt.Ltd, 2006.*

Reference Books:

1. *Venkataraman, M.K., 'Engineering Mathematics Vol.4', National publishing company, 2004.*
2. *Grewal.B.S. 'Higher Engineering Mathematics', Khanna Publishers, 2000.*

COURSE OUTCOMES:

Upon completion of this course , students will be able to

1. Understand the basics of transformation techniques.
2. Apply the transform techniques for solving ordinary differential equations and partial differential equations.

EE201 DC MACHINES AND TRANSFORMERS

L	T	P	C
3	1	0	4

Course Objectives: This course aims to equip the students with a basic understanding of DC machines and Transformer fundamentals, machine parts and help to gain the skills for operating DC machines and Transformers . The course also equips students with ability to understand and analyze the equivalent circuits of DC machines and Transformers.

Prerequisites: Engineering Physics and Basic Electrical Engineering

Principles of Energy conversion – basic magnetic circuit analysis Faradays law of electromagnetic induction – singly and doubly excited magnetic field systems – torque production in rotating machines and general analysis of electro mechanical system.

DC Generator – construction, principle of operation – emf equation – types Characteristics commutation - armature reaction.

DC motor – principle of operation – torque equation – types – electrical & mechanical characteristic–starting – speed control – various testing – braking.

Transformers – principle of operation – types – basic construction – equivalent circuit - regulation and efficiency – auto transformer.

Three phase transformer connection-Scott connection – all day efficiency - Sumpner's test - parallel operation of transformers

Text Books:

1. *Dr. P.S. Bhimbra, 'Electrical Machinery', Khanna Publications, 7th Edition, 2007.*
2. *Nagrath, I.J.and Kothari, D.P., 'Electrical Machines',Tata McGraw Hill Education Private Limited Publishing Company Ltd., 4th Edition, 2010.*

Reference Books:

1. *Arthur Eugene Fitzgerald and Charles Kingsley, 'Electric Machinery', Tata McGraw Hill Education Publications, 6th Edition, 2002.*
2. *Vincent Del Toro, 'Electrical Engineering Fundamentals', 2nd Edition, Prentice hall Publications, 2003.*
3. *Parkar Smith, N.N., 'Problems in Electrical Engineering', 9th Edition, CBS Publishers and Distributers, 1984.*

COURSE OUTCOMES:

Upon the completion of the course, The student will be able to

1. Understand the constructional details and principle of operation of DC machines and Transformers.
2. Analyze the performance of the DC Machines under various operating conditions using their various characteristics.
3. Evaluate the performance of Transformers using phasor diagrams and equivalent circuits.
4. Select appropriate DC motor as well as to choose an appropriate method of speed control for any industrial application

EE203 CIRCUIT THEORY

L	T	P	C
3	1	0	4

Course Objectives: To provide the key concepts and tools in a logical sequence to analyze and understand electrical and electronic circuits.

Prerequisites: Higher secondary mathematical concepts such as solution of ordinary differential equations, calculus, matrix algebra and elementary concepts of physics such as electricity and magnetism

Fundamental concepts of R, L and C elements, DC circuits, series and parallel circuits - loop and nodal analysis, A.C circuits - complex impedance - phasor diagram, real and reactive power - loop and nodal analysis applied to AC circuits.

Voltage source –current source transformations, Various Network theorems and applications to dc and ac circuits, star-delta transformations.

Resonance in series and parallel circuits, self and mutual inductances, coefficient of coupling - dot convention - analysis of coupled circuits.

Three - phase star and delta circuits with balanced and unbalanced loads power measurements - power factor calculations.

Time response of RL, RC and RLC circuits for step and sinusoidal inputs.

Text Books:

1. *Hayt, W. H, Kemmerly J. E. & Durbin, 'Engineering Circuit Analysis', McGraw Hill Publications, 8th Edition, 2013.*
2. *Charles K. Alexander, Matthew N. O. Sadiku, 'Fundamentals of Electric Circuits', McGraw-Hill Publications, 3rd Edition, 2007.*

Reference Books:

1. *Joseph. A. Edminister, 'Electric Circuits - Schaum's outline series', McGraw Hill Publications, 6th Edition, 2003.*
2. *Robins & Miller, 'Circuit Analysis Theory and Practice', Delmar Publishers, 5th Edition, 2012.*

COURSE OUTCOMES:

Upon completion of this course the students will be able to,

1. Understand the technical representation of common electrical systems.
2. Analyze and compute the time domain behavior of linear (AC and DC) electric circuits with single or multiple power sources.
3. Compute the performance of AC Networks (1 port) which may be 1-phase or 3-phase using phasor analysis.
4. Understand flow of real and reactive power components in AC systems.
5. Analyze simple electro-magnetic circuits.

EE205 ELECTRON DEVICES

L	T	P	C
3	0	0	3

Course Objectives: To educate on the construction and working of common electronic devices and to prepare for application areas.

Prerequisites: Semiconductor materials

Semi-conductors - charge carriers, electrons and holes in intrinsic and extrinsic semi-conductors – Hall effect

Diodes – PN junction – current equation – junction capacitance - breakdown characteristics, Zener, tunnel, Schottky diodes

Bipolar junction transistors – Characteristics – analysis of CB, CE, CC amplifier configurations

Unipolar devices – FET, MOSFET, UJT and Opto-Electronic devices – theory and characteristics

Rectifiers and switched mode power supplies – theory and design, filter circuits, applications

Text Books:

1. *David, A.Bell, 'Electronic Devices and Circuits', PHI, 5th Edition, 2008.*
2. *Millman and Halkias, 'Electronic Devices and Circuits', McGraw-Hill International student Edition, 5th Reprint 1993.*

Reference Books:

1. *Allen Mottershead, 'Electronic Devices and Circuits-An Introduction', PHI, 18th Reprint, 2006.*
2. *Albert Malvino and David J Bates, 'Electronic Principles', McGraw Hill, 7th Edition, 2007.*

COURSE OUTCOMES:

Upon completion of this course , students will be able to

1. Understanding the semiconductor physics of the intrinsic, p and n materials and various devices and characteristics.
2. Analyze simple diode circuits under DC and AC excitation.
3. Analyze and design simple amplifier circuits using BJT in CE,CC and CB configurations
4. Understand the analysis and salient features of CE, CC & CB amplifier circuits.
5. Understand the construction and characteristics of FET, MOSFET and UJT

EE207 DIGITAL ELECTRONICS

L	T	P	C
3	0	0	3

Course Objectives: This subject exposes the students to digital fundamentals

Prerequisites: Basics of Electron Devices

Review of number systems, binary codes, error detection and correction codes. Digital Logic Families – Introduction to RTL, DTL, TTL, ECL and MOSL families – wired and operation, characteristics of digital logic family – comparison of different logic families

Combinational logic - representation of logic functions – SOP andPOS forms K-map representations – minimization using K maps - simplification and implementation of combinational logic – multiplexers and demultiplexers – code converters, adders, subtractors.

Sequential logic- SR, JK, D and T flip flops – level triggering and edge triggering –counters – asynchronous and synchronous type – Modulo counters – Shift registers – Ring counters.

Synchronous Sequential Logic circuits-state table and excitation tables-state diagrams-Moore and Melay models-design of counters-analysis of synchronous sequential logic circuits-state reduction and state assignment.

Asynchronous sequential logic circuits-Transition table, flow table – race conditions – circuits with latches, analysis of asynchronous sequential logic circuits – introduction to design –implication table-hazards-programmable logic array and devices.

Text Books:

1. *Morris Mano.M, 'Digital logic and computer design', Prentice Hall of India, 3rd Edition, 2005.*
2. *Donald D. Givone, 'Digital Principles and Design', Tata McGraw Hill, 1st Edition, 2002.*

Reference Books:

1. *Tocci R.J.,Neal S. Widmer, 'Digital Systems: Principles and Applications', Pearson Education Asia, 2014.*
2. *Donald P Leach, Albert Paul Malvino, Goutam Sha, 'Digital Principles and Applications', The McGraw Hill, 7th edition, 2010.*

COURSE OUTCOMES:

Upon completion of this course , students will be able to

1. Interpret, convert and represent different number systems
2. Manipulate and examine Boolean algebra, logic operations, Boolean functions and their simplification
3. Design and analyze combinational and sequential logic circuits

ME231 THERMODYNAMICS AND MECHANICS OF FLUIDS

L	T	P	C
4	0	0	4

Course Objectives:

- To achieve an understanding of principles of thermodynamics and to be able to use it in accounting for the bulk behavior of the simple physical systems.
- To provide in-depth study of thermodynamic principles, thermodynamics of state, basic thermodynamic relations, Properties of pure substances
- To enlighten the basic concepts of air standard cycles
- To provide basic awareness about fluid properties and its flow
- To impart knowledge about hydraulic machines

Prerequisites: Concepts and principles dealing with thermodynamic cycles, thermodynamic relations and generalized charts, mixtures of fluids, chemical reactions, chemical and phase equilibrium, thermodynamic aspects of fluid flow.
Basic knowledge of mathematics.

Basic concepts: Thermodynamic equilibrium, quasi-static process, zeroth law, work and heat interactions, first law for a cycle and a process, steady flow processes, second law statements, reversibility, Carnot theorem, Clausius inequality, entropy principle.

Heat engines: Otto, diesel and dual cycles, Brayton cycle with regeneration, inter cooling reheat, Joule-Thompson effect, Rankine cycle, reheat and regenerative cycle, properties of ideal gas, Stirling and Ericson cycles

Available energy: Availability and irreversibility, properties of pure substances, phase equilibrium diagrams.

Classification of fluids and their physical properties, Fluid statics, manometers, pressure on submerged bodies. Basics of fluid properties - Vapour Pressure – Pressure at a point its variation – Measurement with Piezo meter, manometers and gauges - Continuity equation in one dimension – Bernoulli's equation – Venturi meters and Orificie meters

Pumps – General principles of displacement and Centrifugal pumps – Efficiency and Performance Curves of Pumps – Cavitation in Pumps – Turbines – Efficiency – Governing of turbines

Text Books:

1. *Gordan Van Wylen, Richard Sonntag., 'Fundamentals of Classical Thermodynamics', John Wiley and Sons, 1994*
2. *Yunus A.Cengel and Michel A.Boles, 'Thermodynamics: An Engineering Approach', McGraw-Hill Higher Education, 2006*
3. *T.R.Banga and S.C.Sharma, 'Hydraulic Machines', Khanna Publishers, 2004*

Reference Books:

1. *Kothandaraman. C.P., `A Course in Thermodynamics and Heat Engines', Dhanpat, Rai and Sons, 1992.*
2. *Nag, P.K., `Engineering Thermodynamics', Tata McGraw Hill, 1997.*
3. *R.K.Rajput, 'Thermal Engineering', Laxmi publications, 2006.*
4. *Nagarathnam, S. 'Fluid Mechanics', Khanna Publishers, New Delhi, 1995.*
5. *Dr.R.K.Bansal ,'A text book of Fluid Mechanics and hydraulic machines' ,Laxmi Publications(P) Ltd,2005*

COURSE OUTCOMES:

Upon the completion of the course, the students will be able to

1. Understand the fundamentals of first and second laws of thermodynamics and their application to a wide range of systems.
2. Familiarize with calculations of the efficiencies of heat engines and other engineering devices.
3. Familiarize the construction and principles governing the form of simple and complex one-component phase diagrams such as pressure-temperature , volume-temperature & and pressure-volume and the steam tables in the analysis of engineering devices and systems.
4. Calculate various fluid flow parameters
5. Determine the optimum working conditions for hydraulic machines

EE 209 DC MACHINES AND TRANSFORMERS LABORATORY

L	T	P	C
0	0	3	2

Course Objectives: The main objective of the course is to give the students an insight into the constructional details of the dc machines and transformers with a view of better understanding of their working principles. The course also equips the students to test and evaluate the performance of various dc machines and single phase transformers by conducting appropriate experiments.

Prerequisites: Basic knowledge in electric circuit analysis, constructional details and operational principles of various dc machines and transformers.

List of Experiments

A demonstration of the static and rotational electrical machines (constructional details) is ought to be done in an introductory class.

1. Open circuit and load characteristics of DC shunt/compound generator
2. Swinburne's test and Speed control of DC shunt motor
3. Load test on DC shunt motor
4. Load test on DC series motor
5. Open circuit and short circuit test on single phase transformer
6. Load test on single phase transformer
7. Sumpner's test
8. Parallel operation of single phase transformer
9. Electrical braking in DC shunt motor
10. Three phase transformer connections

Mini-project

COURSE OUTCOMES:

Upon completion of the course, the students will be able to

1. Interpret the constructional details of the DC machines and Transformers and also understand the significance of different connections of three phase transformers
2. Estimate or test the performance of any DC machine (shunt, series or compound) and single phase transformer, by conducting suitable experiments and report the results.
3. Experiment and analyze, the various speed control and braking techniques for dc motors
4. Develop simulation models and prototype modules in view of implementing any control technique upon dc motors and single phase transformers for various applications

EE211 CIRCUITS AND DEVICES LABORATORY

L	T	P	C
0	0	3	2

Course Objectives:

- To understand and analyze the basic theorems of Circuit theory
- Understand and analyze series & parallel circuits and measurement of single and three phase power.
- Understand and analyze different applications of diode and characteristics of Transistor.

Prerequisites: Basic electrical and electronics elements (R, L, C, diode, Transistor)

List of Experiments

1. Verification of Thevenin's and Maximum Power Transfer Theorem.
2. Verification of KCL, KVL and Super Position Theorem.
3. Basic operation of AC R-L-C Series & Parallel Circuit
4. Measurement of Power and Power Factor in Single Phase AC circuits
5. Verification of Resonance in Electrical Circuit.
6. Verification of 3-Phase Star & Delta Connection.
7. Design of full wave Rectifiers (Centre –tapped and Bridge).
8. Design of Clipping and Clamping circuits
9. Volt-ampere characteristics of rectifier diode and Zener diodes as a voltage regulator circuit.
10. Characteristics of CE configuration of BJT

COURSE OUTCOMES:

Upon completion of the course, the students will be able to

1. Verify the network theorems and operation of typical electrical and electronic circuits.
2. Choose the appropriate equipment for measuring electrical quantities and verify the same for different circuits.
3. Prepare the technical report on the experiments carried.