Mandsaur University

Subject Code: - MAT030
Subject Name: - Engineering Mathematics with Application-III
Semester:-III

L	T	P	C
3	-	-	3

Course Objectives:

- To fulfill the needs of Engineers to understand the Applications of Fourier Series and Fourier Transform.
- To understand the basics of Laplace Transform, Inverse Laplace Transform and their methods.
- Revise basic knowledge of Functions and Differentiation with application.

Fourier series and Fourier Transform

Introduction of Fourier Series, Fourier Series for Discontinuous Functions, Euler's Formula, Dirichlet's Conditions, Fourier Series for Even and Odd Function, Half Range Series, Paresevel's Formula, Complex Form of Fourier Series. Introduction of Fourier Transform, Properties of Fourier Transform, Sine and Cosine Transform, Convolution and Paresevel's Formula for Fourier Transform.

Laplace Transform

Introduction of Laplace Transform, Laplace Transform of Elementary Functions, Properties of Laplace Transform, Change of Scale Property, Second Shifting Property, Laplace Transform of the Derivative, Inverse Laplace Transform & Its Properties, Convolution Theorem, Applications of L.T. to Solve the Ordinary Differential Equations.

Complex Variables

Analytic Function, Harmonic Conjugate Function, Cauchy-Riemann Equation, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem, Application of Residues Theorem for Evaluation of Real Integrals.

Vector Calculus

Differentiation of Vectors, Scalar and Vector Point Function, Geometrical Meaning of Gradient, Unit Normal Vector and Directional Derivative, Physical Interpretation of Divergence and Curl. Line Integral, Surface Integral and Volume Integral, Green's Theorem, Stoke's Theorem and Gauss Divergence Theorem.

Numerical Solution of Algebraic, Transcendental & Ordinary Differential Equations

Solution of Algebraic & Transcendental Equations: Regula Falsi, Newton-Raphson, Iterative and Secant Method.
Solution of Simultaneous Linear Equations: Gauss Elimination, Gauss Jordan, Jacobi's and Gauss-Siedel Iterative Methods.
Solution of Ordinary Differential Equations: Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector Method.

Course Outcomes:

- Useful for the field of Analog & Digital Communication and Signal Analysis.

- Useful for the field of Control Systems, Circuit Analysis, Signal Processing.
- Useful for the field of Control system, Network analysis, Transmission Lines.
- Applicable in the field of Physics, EMT and Transmission Line.
- Applied in the field of instrumentation in order to check accuracy, precision and error.

References:

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
2. Advance Engineering Mathematics by D.G.Guffy
3. Mathematics for Engineers by S. Arumungam, SCITECH Publuication
4. Engineering Mathematics by S S Sastri P.H.I.
5. Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication

Mandsaur University

Subject Code: - EEE200
Subject Name: - Energy Conservation & Management
Semester:-III

L	T	P	C
3	-	-	3

Course Objectives:

- To Understand and Analyze the Energy Data of Industries.
- Carryout Energy Accounting and Balancing.
- Conduct Energy Audit and Suggest Methodologies for Energy Savings.
- Utilize the Available Resources in Optimal ways.

Unit-I: General Energy Problem
Energy use Patterns and Scope for Conservation. Energy Audit: Energy Monitoring, Energy Accounting and Analysis, Auditing and Targeting. Energy Conservation Policy, Energy Management & Audit, Energy Audit, Types of Energy Audit, Energy Management (Audit), Qualities and Function of Energy Managers, Loss of Energy in Material Flow, Energy Performance, Maximizing System Efficiency, Energy Auditing Instruments, Material Load Energy Balance Diagram.

Unit-II: Thermodynamics
Thermodynamics of Energy Conservation, Basic principle, Irreversibility and Second Law Efficiency Analysis of Systems, Primary Energy Sources, Optimum Use of Prime Movers, Energy Efficient House-keeping, Energy Recovery in Thermal Systems, Waste Heat Recovery Techniques, Thermal Insulation. Thermal Energy Audit in Heating, Ventilation and Air Conditioning.

Unit-III: Financial Management
Restructuring of Electric Tariff from Energy Conservation Consideration, Economic Analysis Depreciation Method, Replacement Analysis, and Special Problems Inflation Risk Analysis. Payback Period, Energy Economics, Cost Benefit Risk Analysis, Payback Period, Load Curve Analysis & Load Management DSM.

Unit-IV: Electric Drives
Energy Efficient Electric Drives, Energy Efficient Motors V.S.D. Power Factor Improvement in Power System. Energy Conservation in Transportation System Especially in Electric Vehicle. Energy Flow Networks, Matrix Chart.

Unit-V: Energy Conservation
Energy Conservation Task Before Industry, Energy Conservation Equipments, Co-Generation, Energy Conservation Process, Industry Sugar, Textiles, Cement Industry etc, Electrical Energy Conservation in Building, Heating and Lighting. Domestic Gadgets.

Course Outcomes:
Upon completion of this course, students can able to analyze the energy data of industries. Students can carry out energy accounting and balancing and can suggest methodologies for energy savings.

References:

1. Energy Management – W.R. Murphy & G. Mckey Butler worths.
2. Energy Management Head Book- W.C. Turner, John Wiley
3. Energy Management Principles- Craig B. Smith, Pergamon Press
4. Energy Conservation- Paul O Callagan- Pergamon Press
5. Design & Management of Energy Conservation. Callaghan,
6. Elect, Energy Utilization & Conservation. Dr. Tripathi S.C.

Mandsaur University

Subject Code: - EEE210
Subject Name: - Electrical Machine –I
Semester:-III

L	T	P	C
2	1	2	4

Course Objectives:

- To learn the conversion principle of magnetic, electrical and mechanical energy.
- To know the construction and working principles of single, three phase transformer and induction machine and their types.
- To learn the characteristics and its performance of transformer and induction machine.

Unit-I
Transformer-I
Working principle, e.m.f. equation, construction, phasor diagrams, equivalent circuit, voltage regulation, losses, separation of hysteresis and eddy current losses, efficiency, tests: open circuit and short circuit, condition for maximum efficiency and regulation, power and distribution transformer, all-day efficiency, excitation phenomenon, autotransformer: working, advantages , its equivalent circuit and phasor diagram.

Unit II
Transformer-II
Three phase transformer: Different types of winding connections; Scott connection; parallel operation of three phase transformers: application, advantages, requirement and load sharing; tap changers, cooling, conservator and breather.

Unit III
Three Phase Induction Motor- I
Working principle, construction, comparison of slip ring and squirrel cage motors, concept of slip, steady state analysis, phasor diagram and equivalent circuit, power flow diagram, torque-speed and power-speed characteristics, losses and efficiency, no load and block rotor test

Unit IV
Three Phase Induction Motor-II
Starting methods of induction motors, Cogging & Crawling, double cage & deep bar indication motor, impact of unbalanced supply and harmonics on performance, speed control, braking, and induction generator. Applications

Unit V
Single Phase Motors:
Single phase induction motor; double revolving field theory, equivalent circuit and its determination, performance calculation, starting methods and types of single phase induction motors: their working principle and applications, comparison with three phases induction motor.

Course Outcomes:
The Students will be able to:

- Understand the basics of energy conversion and identify the different features of single, three phase transformer and induction machine.
- Choose suitable transformer and induction machine for specific applications.
- Prepare a written and oral presentation on an issue of transformer and induction machine design, operation & control.

Reference Books:

1. M. G. Say, Alternating Current Machines', (5th Ed.) ELBS, 1986.
2. V. Del Toro, "Electrical Machines & Power Systems", 1985, Prentice-Hall, Inc., Englewood Cliffs.
3. V. Del Toro, "Electromechanical Devices for Energy Conversion & Control Systems", PHI Pvt. Ltd.,1975.

Text Books:

1. Electrical Machines by Dr.P.S.Bimbhra (Khanna).
2. Electrical Machines by Ashfaq Hussain. (Dhanpat Rai).
3. Electrical Machines by Nagrath and Kothari (TMH).
4. A.C. Machines by Langs dorf (McGraw-Hill)

Suggested List of Experiment:

1. To Study Constructional Features of Single Phase Transformer.
2. To Perform Open Circuit Short Circuit Test on Single Phase Transformer.
3. To Perform Polarity Test on Two Single Phase Identical Transformers.
4. To Perform Parallel Operation on Two Single Phase Identical Transformers.
5. To Study Constructional Features of Induction Motor.
6. To Perform Starting of Three Phase Induction Motor by Star-Delta Starter.
7. To perform Testing of Welding Machine.

Mandsaur University

Subject Code: - EEE220
Subject Name: - Electronics Devices & Circuits
Semester:-III

L	T	P	C
2	1	2	4

Course Objectives:-
The students should be able to:

- Identify different diodes on their construction, characteristics and applications.
- Prepare different types of rectifier and filter circuits.
- To learn different configurations of Bipolar Junction Transistor circuits.
- Explain the constructional and characteristic difference of different types of FET's.
- Identify different types of FET biasing circuit.
- To learn various types of oscillator circuits.

Unit I
Semiconductors: Energy Bands in Solids (Metal, Semiconductor and Insulators), Intrinsic and Extrinsic Semiconductors: N-Type and P-Type, Mobility of Charge Carriers, Recombination, Life Time, Drift Current, Diffusion Current, Fermi Levels. Semiconductor Diodes: PN Diodes, Forward and Reverse Biasing, I-V Characteristics, Zener Diode, Varactor Diode, Schottky Diode, Tunnel Diode.

Unit II
Semiconductor Diode & Applications: Diffusion and Transition Capacitance, PIV Rating of a Diode, Rectifiers, Ripple and Efficiency of Half Wave & Full Wave Rectifiers, Filter Circuits, Clipping and Clamping Circuits, Zener Diode as a Voltage Regulator.

Unit III
Bipolar Junction Transistors (BJT): PNP and NPN Transistors, Symbols, Transistor Action, CB and CE Configurations: Input and Output Characteristics, Current Gains and their Relationship, Comparison of CB, CE and CC Configurations. Field Effect Transistors (FET): JFET: Construction and Working, Channel Formation, Pinch-off Voltage, Transfer Characteristics, MOSFET: Construction and Working, I-V Characteristics, Enhancement and Depletion Modes, UJT.

Unit IV
Transistor Biasing and Stabilizing: Transistor Biasing: Need for Biasing, DC Load Line and Operating Point, Thermal Instability, Stability Factor, Fixed Bias, Collector to Base Bias, Emitter Bias, Voltage Divider Bias.

Unit V
Optoelectronic Devices: PN Photo Diode and Its Applications, Photoconductive Cells, PIN Photodiodes, Photovoltaic Effect, Solar Cells, LED, Alpha-Numeric Display, LCD.

Course Outcomes:
After Successful Completion of the Course, The Students will be able to

- Apply the Concept of Semiconductor Physics.

- Apply the Concepts of Basic Electronic Devices to Design Various Circuits.
- Understand Operation of Diodes, Transistors in Order to Design Basic Circuits.
- Analyze Electronic Circuits.

Suggested List of Experiment:

1. To Study PN Junction Diode and its Characteristics.
2. To Study Voltage Regulation by Zener Diode.
3. To Study Transistor as a Switch.
4. To Study BJT Characteristics in CB Mode.
5. To Study BJT Characteristics in CE Mode.
6. To Study FET Characteristics.
7. To Study UJT Characteristics.

Mandsaur University

Subject Code: - EEE230
Subject Name: - Network Analysis
Semester:-III

L	T	P	C
2	1	2	4

Course Objectives:
This Course Introduces Examination of Electrical & Electronic Circuit Analysis & Techniques Such as the Laplace Transform Nodal Analysis & Two Port Network Theory.

Unit-I
Circuit Variables and Circuit Elements and Sources:
E.M.F, Potential and Potential Difference, Current and Current Density, Ideal and Practical Voltage and Current Sources. Conversion from One Source into Other. Internal Impedance of Voltage and Current Source Relative to Load. Two- Terminal Capacitance, Two-Terminal Inductance, Independent and Dependent Electrical Sources, Power and Energy Relations for Two-Terminal Elements Classification of Two-Terminal Elements Multi-terminal Circuit Elements, Dot Convention.

Unit-II
Nodal Analysis and Mesh Analysis of AC and DC Circuits:
Nodal Analysis of Circuits Containing Resistors, Inductor, Capacitor and Independent and Dependent Sources. Source Transformation Theorem for Circuits with Independent and Dependent Sources. Nodal Analysis of Circuits Containing Dependent Sources Mesh Analysis of Circuits with Resistors and Independent Voltage Sources. Mesh Analysis of Circuits with Independent Sources Mesh Analysis of Circuits Containing Dependent Sources. Steady State Analysis. Concept of Phasor & Vector, Impedance & Admittance, Network Topology, Concept of Network Graph, Tree, Tree Branch & Link, Incidence Matrix, Cut Set and Tie Set Matrices.

Unit-III
Circuit Theorems for AC and DC Networks and Their Application in Electric Networks:
Thevenin's & Norton's, Superposition, Reciprocity, Compensation, Substitution, Maximum Power Transfer, and Millman's Theorem, Tellegen's Theorem, Problems with Dependent & Independent Sources. Duality Theorem and Duality between Electricity and Magnetism.

Unit-IV
Time Domain Response of First Order RL and RC Circuits:
Mathematical Preliminaries-Source Free Response-DC Response of First Order Circuits. Discharging of a Capacitor through an Inductor, Source Free Second Order Linear Networks, and Second Order Linear Networks with Constant Inputs. Switching in RLC Circuits. Switched Capacitor Circuits and Conservation of Charge. Initial Conditions in Elements, Procedure for Evaluating Initial Conditions, Solution of Circuit Equations by Using Initial Conditions.

Unit-V
Laplace Transform Analysis and Circuit Applications:
Notions of Impedance and Admittance, Manipulation of Impedance and Admittance. Notions of Transfer Function, Equivalent Circuits for Inductors and Capacitors. Nodal and Loop Analysis in the s-Domain.

Unit-VI

Laplace Transform Analysis and Transfer Function Applications:

Poles, Zeros and the S-Plane. Classification of Responses Computation of Sinusoidal Steady State Response for Stable Networks and Systems.

Unit-VII

Network Function & Two Port Networks

Concept of Complex Frequency, Network & Transfer Functions for One Port & Two Ports, Poles and Zeros, Necessary Condition for Driving Point & Transfer Function. Two Port Parameters –Z, Y, ABCD, Hybrid Parameters, Their Inverse & Image Parameters, Relationship Between Parameters, Interconnection of Two Ports Networks, Terminated Two Port Networks.

Course Outcomes:

Student after successful completion of course must be able to apply the Thevenin's, Norton's, nodal and mesh analysis to express complex circuits in their simpler equivalent forms and to apply linearity and superposition concepts to analyze RL, RC, and RLC circuits in time and frequency domains and also to analyze resonant circuits both in time and frequency domains.

Suggested List of Experiment:

1. To Verify Thevenin's Theorem.
2. To Verify Superposition Theorem.
3. To Verify Reciprocity Theorem.
4. To Verify Maximum Power Transfer Theorem.
5. To Verify Millman's Theorem.
6. To Determine Open Circuit and Short Circuit Parameters of a Two Port Network.
7. To Determine A, B, C, D Parameters of a Two Port Network.
8. To Determine h parameters of a Two Port Network.
9. To Find Frequency Response of RLC Series Circuit in MATLAB.
10. To Find Frequency Response of RLC parallel Circuit in MATLAB.

References:

1. M.E. Van Valkenburg, Network Analysis, Pearson
2. William H Hayt & Jack E. Kemmerly, Steven M Durbin; Engineering Circuit Analysis; McGraw-Hill
3. Richard C Dorf, James A Svoboda, Introduction to Electric Circuits, Wiley India, 2015
4. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits; McGrawHill
5. J David Irwin, Robert M Nelms, Engineering Circuit Analysis, Wiley India,2015
6. Robert L Boylestad, Introductory Circuit Analysis, Pearson,2016
7. M S Sukhija, T K Nagsarkar; Circuits and Networks, Oxford University Press, 2015
8. Samarajit Ghosh, Network Theory Analysis and Synthesis

Mandsaur University

Subject Code: - EEE240
Subject Name: - Simulation Lab-I
Semester:-III

L	T	P	C
2	-	4	4

Course Objectives:
The Objective of Simulation Laboratory is to Impart Hands on Experience in Verification of Circuit Laws and Theorems, Measurement of Circuit Parameters, Study of Circuit Characteristics Using MATLAB. It Also Gives Practical Exposure to the Usage of Different Circuits with Different Condition.

Unit- 1
MATLAB Basics
Simulation Mechanism and Simulation Tools, Starting and Ending MATLAB, MATLAB Desktop, Help Browser, Types of Files, Command Input Assistance, Operators and Special Characters, Variables and Arrays, Handling Arrays, Useful Built-in Functions, Control Structures, Input/output Commands, File Handling.

Unit- 2
Introduction to Plotting
The Plot Command, Formatting and Labeling a Plot, Multiple Plots, Adding Legend, Sub Plots, Plotting Complex Data, 2-D and 3-D Plots, Plotting a Function, Plot Editor, Interactive Plotting Using Plotting Tool.

Unit- 3
Programming in MATLAB
MATLAB Editor, MATLAB Programming, Debugging MATLAB Programs, MATLAB Debugger, Functions and Function Files, Differential Equation Solver, Symbolic Mathematics, Programming Examples.

Course Outcomes:
At the successful completion of this course, the students are expected to gain the following skills:

- Become familiar with the basic circuit components and know how to connect them to make a real electrical circuit.
- Become familiar with basic electrical measurement instruments and know how to use them to make different types of measurements.
- Be able to verify the laws and principles of electrical circuits, understand the relationships and differences between theory and practice.
- Be able to gain practical experience related to electrical circuits, stimulate more interest and motivation for further studies of electrical circuits and be able to carefully and thoroughly document and analyze experimental work.

References:

1. M.E. Van Valkenburg, Network Analysis, Pearson
2. William H Hayt & Jack E. Kemmerly, Steven M Durbin; Engineering Circuit Analysis; McGrawHill

3. Richard C Dorf, James A Svoboda, Introduction to Electric Circuits, Wiley India, 2015
4. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits; McGrawHill
5. J David Irwin, Robert M Nelms, Engineering Circuit Analysis, Wiley India,2015
6. Robert L Boylestad, Introductory Circuit Analysis, Pearson,2016
7. M S Sukhija, T K Nagsarkar; Circuits and Networks, Oxford University Press, 2015
8. Samarajit Ghosh, Network Theory Analysis and Synthesis.

Suggested List of Experiment:

1. To Verify Thevenin's Theorem Using MATLAB.
2. To Verify Superposition Theorem Using MATLAB.
3. To Verify Reciprocity Theorem Using MATLAB.
4. To Verify Maximum Power Transfer Theorem Using MATLAB.
5. To Find Frequency Response of RLC Series Circuit in MATLAB.
6. To Find Frequency Response of RLC Parallel Circuit in MATLAB.
7. MATLAB Simulation of Nodal Analysis for Dc Circuits.
8. MATLAB Simulation of D.C. Network With Sub Circuit
9. Analysis of Single Phase AC Circuit.
10. To Find Network Parameters Using MATLAB Simulation.