Mandsaur University

Subject Code: - ELE020
Subject Name: - Electrical & Electronics Material
Semester-III

L	T	P	C
3	1	-	4

Course Objective: To understand the different types of material.

Unit-I: Conducting Materials
Hardening, Annealing - Low Resistive Materials – Requirements – Properties and Applications of Copper and Aluminum - Comparison Between Copper and Aluminum - ACSR Conductors, AAAC, - High Resistive Materials – Requirements- Properties and Applications.

Unit-II: Semi Conducting Materials
Semi-Conductors - Intrinsic and Extrinsic Semi- Conductors-`P' and `N' Type Materials.

Unit-III: Insulating Materials
Properties -Insulation Resistance - Factors Affecting Insulation Resistance - Classification of Insulation Materials - Properties – Applications.

Unit-IV: Di- Electric Materials
Permittivity of Di - Electric Materials- Polarisation - Dielectric Loss – Application of Dielectrics – Colour Codes.

Unit-V: Magnetic Materials
Classification of Magnetic Materials - Soft & Hard Magnetic Materials- B-H Curves - Hysteresis Loop - Hysteresis Loss - Steinmetz Constant - Eddy Current Loss -- Curie Point – Magnetostriction.

Unit-VI: Special Purpose Materials
Protective Materials – Thermocouple - Bi-Metals- Soldering- Fuses -Galvanizing and Impregnating - Nano Materials.

Unit-VII: Batteries
Primary Cell and Secondary Cells-Lead Acid, Nickel Iron and Nickel – Cadmium- Chemical Reactions During Charging and Discharging – Charging of Batteries- Constant Current Method and Constant Voltage Method-Trickle Charging - Capacity of Battery - Ampere-Hour Efficiency and Watt-Hour Efficiency - Maintenance Free Batteries.

Course Outcomes:
Upon completion of the course the student shall be able to understand the conducting materials, semi conducting materials, insulating materials, di-electric materials, magnetic materials, and special purpose materials.

References:

1. Electronic Components -Dr. K.Padmanabham
2. Electronic Components -D.V.Prasad
3. Electrical Engineering Materials – N.I T.T.T.R Publications
4. Introduction to EngineeringMmaterials – B.K.Agarwal.
5. TTTI Madras; Electrical Engineering Materials; TMH.

Mandsaur University

Subject Code: - ELE030
Subject Name: - Basic Electronics
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 Semiconductor Physics PN Junction Diode:
Germanium & Silicon Intrinsic Semiconductor, Extrinsic P type & N Type Semiconductor, Effect of Temperature on Semiconductor. Germanium Diode, Silicon Diode, Their Construction, Working Under no Bias Forward Bias & Reverse Bias Condition. Forward & Reverse Characteristics. Important Specifications (Ratings) of a PN Junction Diode. Diode Applications: Diode as a Switch. Zener Diode: Construction, Characteristics, Various Specifications (Ratings). Application in a Simple Voltage Regulator Circuit.

UNIT-II Diode Applications
Rectifiers & Filters: Half Wave Rectifier (HWR), Full Wave Rectifier (FWR) - Centre Tap Transformer and Bridge Type. Their Comparison on the Basis of Circuit Operation, Waveforms, Average(dc) Value of Rectifier Output, Ripple Factor, Ripple Frequency, Transformer Utilization Factor, Rectification Efficiency, Advantages and Disadvantages.
Clipping & Clamping Circuits: Types and Applications.

UNIT-III Bipolar Junction Transistor (BJT):
Construction, Working Principle of PNP and NPN Transistors, Characteristics of CB, CE and CC Configurations. DC and AC Current Gains α, β, γ. Requirement of Biasing, Different Types of Biasing Circuits Fixed, Bias Circuit with Emitter Resistor, Collector to Base Biasing Circuit, Voltage Divider Biasing Circuit and Emitter Bias Circuit. Thermal Stability Factor. Comparison of Each on the Basis of Thermal Stability. Transistor Specifications. Transistor Testing. Applications of BJT.

UNIT-IV Field - Effect Transistors:
Introduction, Construction & Characteristics of Junction Field Effect Transistor (JFET).Transfer Characteristics. Their Important Specifications (Parameters) Mentioned in Manufacturer's Data Sheets. Metal Oxide Semiconductor Field Effect Transistor (MOSFET). Depletion Type, Enhancement-Type MOSFET's. Their Construction, Characteristics & Parameters. Vertical MOSFET (VMOS) & Complementary MOSFET (CMOS). JFET Voltage Variable Resistor (VVR) and CMOS Inverter Switch Applications.

UNIT-V Feedback and Oscillator Circuits:
Concept of Negative & Positive Feedback. Types of Negative Feedback Amplifier Circuits. Principle of Oscillator, Barkhausen Circuit Criteria for Oscillation.
Types of Oscillators: Phase Shift Oscillator, Resonance – Circuit LC Oscillator, Wein Bridge Oscillator, Colpits Oscillator, Hartley Oscillator, Crystal Oscillator, RC Phase shift, Wien Bridge, Hartley and Colpitt Oscillator Circuits.

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 plot the V-I Characteristics of a – (a) Silicon Diode (b) Germanium Diode
2. To verify the V-I Characteristics of Zener Diode.
3. To verify the Action of Diode as a Positive Clipper and Negative Clipper.
4. To verify the action of diode as a Positive Clamper and Negative Clamper.
5. To Obtain the Input and Output Transistor Characteristics for CB Configuration.
6. To Obtain the Input and Output Transistor Characteristics for CE Configuration.
7. To Obtain the Input and Output Transistor Characteristics for CC Configuration.
8. To Verify the Operation of FET as a Switch.
9. To Verify the V-I Characteristics of UJT.
10. To Setup the Circuit and Verify the Waveforms of HW Rectifier.
11. To Setup the Circuit and Verify the Waveforms of FW Rectifier.
12. To Setup the Circuit and Verify the Waveforms of Bridge Rectifier.
13. To Setup a RC Phase Shift Oscillator and Analyze its Operation.
14. To Analyze the Performance of a Class A Amplifier.
15. To Verify the Action of UJT as a Relaxation Oscillator.
16. To Setup a RC Phase Shift Oscillator and Analyze its Operation.

References:

1. Electronics Principles by Malvino
2. Electronic Devices & CKTs by Mottershead
3. Integrated Electronics by Millian & Halikyas
4. Electronic Devices & Circuits By Robert Boylestad
5. Electronic Devices and Circuits by Millman & Halkias
6. Electronic Devices and Circuits by Mathur & Chadha
7. Solid State Devices by Streetman
8. Basic Electronics by V.K. Mehta
9. Electronic Principles,7th Edition by Albert Paul Malvino, (Tata McGraw - Hill Publishing Company Ltd).

Mandsaur University

Subject Code: - ELE040
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, losses and efficiency, tests: open circuit and short circuit, condition for maximum efficiency, power and distribution transformer, all-day efficiency, autotransformer: working, advantages, and its equivalent circuit.

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, 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, induction generator applications.

Unit V Single Phase Motors:
Single phase induction motor; double revolving field theory, equivalent circuit, 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 Step up Operation on a Single Phase Transformer.
3. To Perform Step Down Operation on a Single Phase Transformer.
4. To Perform Open Circuit Test of Single Phase Transformer.
5. To Perform Short Circuit Test of Single Phase Transformer.
6. To Perform Polarity Test on Two Single Phase Identical Transformers.
7. To Perform Parallel Operation on Two Single Phase Identical Transformers.
8. To Perform Load Sharing Operation on Two Single Phase Identical Transformers.
9. To Perform Voltage Regulation Test on a Single Phase Transformers.
10. To Study Constructional Features of Autotransformer.
11. To Perform Step up Operation by Autotransformer.
12. To Perform Step Down Operation by Autotransformer.
13. To Study Constructional Features of Single Phase Induction Motor.
14. To Perform Starting of Single Phase Induction Motor.
15. To Perform no Load Test on Single Phase Induction Motor.
16. To Perform Block Rotor Test on Single Phase Induction Motor.
17. To Study Constructional Features of Three Phase Induction Motor.
18. To Perform Starting of Three Phase Induction Motor by Star-delta Starter.
19. To Perform no Load Test on Three Phase Induction Motor.
20. To Perform Block Rotor Test on Three Phase Induction Motor.

Mandsaur University

Subject Code: - ELE050
Subject Name: - Circuit Theory
Semester-III

L	T	P	C
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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: Basic Circuits Analysis
Ohm's Law, Kirchhoff's Laws for DC and AC Circuits. Resistors in Series and Parallel Circuits. Mesh Current and Node Voltage Method of Analysis for D.C and A.C. Circuits, Phasor Diagram, Power, Power Factor and Energy.

Unit II: Network Reduction and Network Theorems for DC and AC Circuits
Network Reduction: Voltage and Current Division, Source Transformation. Star Delta Conversion. Thevenins and Norton's Theorem, Superposition Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

Unit III: Resonance and Coupled Circuits
Series and Parallel Resonance and their Frequency Response, Quality Factor and Bandwidth, Self and Mutual Inductance, Coefficient of Coupling, Tuned Circuits, Single tuned Circuits.

Unit IV: Transient Response for DC Circuits
Transient Response of RL, RC and RLC Circuits Using Laplace Transform.

Unit-V: Network Function & Two Port Networks
Concept of Complex Frequency, Network & Transfer Functions for One Port & Two Ports, Poles and Zeros. Characterization of Two Port Networks in Terms of Z,Y, h and ABCD Parameters. Relationship between Parameters, Interconnection of Two Ports Networks.

Unit VI: Single Phase AC Circuits
Representation of AC Quantity by Phasor Methods, Rectangular and Polar Coordinates RLC Series and Parallel Combinations. Impedance, Power in Single Phase Circuits. Concepts of Power Factor, Conductance Admittance and Susceptance. Series and Parallel Circuits. Resonance in Series and Parallel Circuits, Q Factor, Resonance Frequency Bandwidth and Selectivity.

Unit VII: Three Phase Circuits
Three Phase Balanced / Unbalanced Voltage Sources- Analysis of Three Phase 3-Wire and 4-Wire Circuits with Star and Delta Connected Loads, Balanced & Un-Balanced – Phasor Diagram of Voltages and Currents–Power and Power Factor Measurements in Three Phase Circuits.

Course Outcomes:

Student after successful completion of course must be able to apply the Thévenin's, Norton, 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 Kirchhoff's Law..
2. To Verify Thevenin's Theorem.
3. To Verify Superposition Theorem.
4. To Verify Reciprocity Theorem.
5. To Verify Maximum Power Transfer Theorem.
6. To Verify Millman's Theorem.
7. To Determine Open Circuit and Short Circuit Parameters of a Two Port Network.
8. To Determine A,B, C, D Parameters of a Two Port Network
9. To Determine h Parameters of a Two Port Network
10. To Study Transients in Series RL Circuit Using MATLAB.
11. To Study Transients in Series RC Circuit Using MATLAB.
12. To Find Frequency Response of RLC Series Circuit in MATLAB
13. To Find Frequency Response of RLC Parallel Circuit in MATLAB
14. To Study 1-Phase & 3-Phase Networks.
15. To Study Different Types of Meters Used in Electrical Measurements.

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

Mandsaur University

Subject Code: - ELE060
Subject Name: - Fundamental of Electrical Engineering
Semester-III

L	T	P	C
2	1	2	4

Course Objectives:

- To provide strong foundation in basic science and mathematics necessary to formulate, solve and analyze electrical and electronics problems.
- Understand the basic concepts of magnetic circuits, AC & DC circuits.
- Explain the working principle, construction, applications of DC & AC machines.

Unit I

D.C. Circuits: Ohm's Law, Kirchhoff's Law, Superposition Theorem, Thevenin's theorem and their Application for Analysis of Series and Parallel Resistive Circuits Excited by Independent Voltage Sources, Power & Energy in such Circuits. Mesh & Nodal Analysis, Star Delta Circuits.

Unit II

1- Phase AC Circuits : Generation of Sinusoidal AC Voltage, Definition of Average Value, R.M.S. Value, Form Factor and Peak Factor of AC Quantity , Concept of Phasor, Concept of Power Factor, Concept of Impedance and Admittance, Active, Reactive and Apparent Power, Analysis of RL, RC, RLC Series & Parallel Circuit.

Unit III

3-phase AC Circuits: Necessity and Advantages of Three Phase Systems, Meaning of Phase Sequence, Balanced and Unbalanced Supply and Loads. Relationship between Line and Phase Values for Balanced Star and Delta Connections. Power in Balanced & Unbalanced Three Phase System and their Measurements

Unit IV

Transformers-Review of Laws of Electromagnetism, mmf, Flux, and their Relation, Analysis of Magnetic Circuits. Single-Phase Transformer, Basic Concepts and Construction Features, Voltage, Current and Impedance Transformation, Equivalent Circuits, Phasor Diagram, Voltage Regulation, Losses and Efficiency, OC and SC Test.

Unit V

Rotating Electric Machines- Constructional Details of DC Machine, Induction Machine and Synchronous Machine, Working Principle of DC Machine and Induction Machine, Emf Equation of DC Machine and Induction Machine, Classification of DC and AC Machine.

Course Outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic concepts of core electrical engineering subjects. The topics covered under this subject will help to enhance the basic understanding of electrical machines and power systems.

References:

1. D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, Latest Edition.
2. S.N. Singh , Basic Electrical Engineering, P.H.I.,2013
3. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall,2014
4. M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and Electronics Engineering, Oxford University Press,2012
5. C.L. Wadhwa, Basic Electrical Engineering. New Age International.

Suggested List of Experiment:

1. Perform Experiment to Verify Kirchhoff's Voltage Law Using Two Mesh Circuit.
2. Perform Experiment to verify Kirchhoff's Current Law Using Two Mesh Circuit.
3. Perform Experiment to Verify Thevenin's Theorem Using Trainer kit.
4. Perform Experiment to Verify Superposition Theorem Using Trainer kit.
5. The Study of R-L Series Circuit and Draw its Phasor Diagram.
6. The Study of R-C Series Circuit and Draw its Phasor Diagram.
7. The Study of R-L-C Series Circuit and Draw its Phasor Diagram.
8. Perform Experiment to Measure Active and Reactive Power Consumed by Single Phase Inductive Load While Connected to Single Phase AC Supply.
9. Performing Experiment to Measure Line Voltage, Line Current, Phase Voltage, Phase Current and Total Power Consumed by the Balanced 3- Phase Resistive Load.
10. To Verify the Voltage and Current Relations in Star Connected Systems.
11. To Verify the Voltage and Current Relations in Delta Connected Systems.
12. Study of B-H Curve of a Magnetic Core.
13. To Perform O.C. Test on 1-Ph Transformer and Determine Equivalent Circuit Parameters.
14. To Perform S.C. Test on 1-Ph Transformer and Determine Equivalent Circuit Parameters.
15. Study of Construction and Working Principle of 3-Phase Induction Motor.
16. Study of Construction and Working Principle of DC Motor.
17. Study of Construction and Working Principle of DC Generator.

Mandsaur University

Subject Code: - ELE070
Subject Name: - Professional Activity-II
Semester-III

L	T	P	C
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Course Objectives:

- To allow for professional development of students as per the demand of engineering profession.
- To provide time for organization of student chapter activities of professional bodies (i.e. Institute of engineers, ISTE or computer society of India etc.)
- To allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.

Detailed Instructions to Conduct Professional Activities:

A. Study Hours, If Possible should be given Greater Time Slot with a Minimum of Two Hrs/Week to a Maximum of Four Hrs/Week.

B. This Course should be evaluated on the Basis of Mark Sheet of Students.

C. Assessment of Performance in PA is to be Done Internally by the Institution, Twice in a Semester/Term through a Simultaneous Evaluation of the Candidate by a Group of Three Teachers of the Department Concerned Group of Teachers will Jointly Award the Marks to Candidate in the Assessment. Best of the Marks Obtained by the Student in these Two Assessments shall be finally taken on the Mark Sheet of the Respective Semester/Term.

D. While Awarding the Marks for Performance in PA, Examining Teacher Should Reach the Final Consensus Based on the Attendance, Punctuality, Interest, Presentation Skills in Seminar on the Topic Assigned (Collection of Relevant Data, Observations, Analysis, Findings/Conclusion) and Its Written report, Awareness of Latest Developments in the Chosen Programme of Study.

E. Institution shall maintain the Record of Marks Awarded to all the Students in PA for a Period of 1 year.

F. It shall be Mandatory for Students to Submit a Compendium for his PA in the Form of a Journal.

G. Compendium shall Contain Following:
I. Record of Written Quiz.
II. Report/Write up of Seminar Presented
III. Abstract of the Guest Lecturers Arranged in the Institution.
IV. Topic and Outcome of the Group Discussion Held.
V. Report on the Problems Solved through Case Studies.

VI. Report on Social Awareness Camps (Organized for Social and Environmental Prevention).
VII. Report on Student Chapter Activities of Professional Bodies like ISTE, IE (India), CSI etc.

H. PA is not a Descriptive Course to be taught in the Classroom by a Particular Teacher.

Various Activities Involved in the Achievement of Objectives of this Course should be Distributed to a Number of Teachers so that the Talent and Creativity of Group of Teacher's benefit the Treatment of the Course Content.

These Activities should preferably be conducted in English Language to Maintain Continuity and Provide Reinforcement to Skill Development.

Small Groups shall be Formed Like in Tutorials, Group Discussion, Case Studies, Seminar, Project Methods, Roll Play and Simulation to make the Development of Personality Affective.

Treatment of PA Demands Special Efforts, Attention, Close Co-Operation and Creative Instinct on the Part of Teachers of Department Concerned. Since this Course is Totally Learner Centered, Many of the Activities Planned Under this Course shall come out from the Useful Interaction of Student, among themselves and with the Teachers. The Guide Teacher/s shall best act as a Facilitator of these Creative Hunts/ Exercises, which unfold many of the Hidden Talents of the Students or Bring out Greater Amount of Confidence in them, to Execute Certain Activity.