

Fundamentals of Electrical Engineering

1.1 Course Number: ECE202

1.2 Contact Hours: 3-0-0 Credits: 09

1.3 Semester-offered: 2nd Year-Even

1.4 Prerequisite: None

1.5 Syllabus Committee Member: Dr. Umakant Dhar Dwivedi, Dr. Abhishek Kumar Singh, Dr. Sajal Agarwal, and Dr. Shivanshu Shrivastava

2. **Objective:** To introduce the students to the basics of theoretical and practical aspects of broader area of Electrical Engineering

3. **Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Capacitors and Inductors and Second Order Circuits	Capacitors and Inductors: Series and Parallel combinations, its applications First Order Circuits: The Source-free RC and RL Circuits, Step Response of an RC and RL Circuits, First order Op Amp Circuits and applications Second Order Circuits: The Source-free series RLC and parallel RLC Circuits, Step Response of a Series RLC and parallel RLC Circuits and applications.	10
2	AC Circuits	Sinusoids and Phasors: Phase Difference, Lagging, Leading and In-Phase Quantities, Phasor Representation, Rectangular and Polar Representation of Phasors. Sinusoidal Steady State Analysis. AC Power Analysis: Instantaneous and Average Power, Maximum Average Power Transfer, Effective or RMS Value, Apparent Power and Power Factor, Complex Power, Conservation of AC Power, Power Factor Correction. AC Circuits Concept of three-phase supply and phase sequence: Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams. Power in a Balanced System.	9

4	Magnetic Circuits	Magnetic Circuits, Equivalent Circuit and Performance, Mutually Coupled Circuits, Single Phase Transformers: Construction, principle of working, E.M.F. equation, voltage and current ratios, Losses, definition of regulation and efficiency, determination of these by direct loading method, Autotransformers and dimmer stats.	9
5	Machines	Direct-Current Machines: Construction, Equivalent Circuit, Torque-Speed Characteristics, Applications Induction Machines: Construction, Equivalent Circuit, Torque-speed characteristics, Speed Control, Starting and Applications Synchronous Machines: Construction, Equivalent Circuit and Applications.	12
		Total	40

4. Readings

4.1 Textbook:

- (1) Charles K. Alexander, Matthew N.O. Sadiku, Fundamentals of electrical circuits, McGraw-Hill 5th Edition 2013
- (2) Nagrath & Kothari. Basic Electrical Engineering,
- (3) Basic Electrical Engineering, S. N. Singh

5. Outcome of the Course:

The student will learn about fundamentals of Electrical Engineering. They will also be able to learn transformer and Electrical Machines