Course Type	Course Code	Name of Course	L	T	P	Credit
ESC	NEEE101	Electrical Devices and Circuits	3	0	0	3

Course Objective

The objective of the course is to provide knowledge of DC and AC circuits, Single-phase Transformers, DC Machines and Three-phase Induction Motor. Additionally, it aims to develop the ability to analyze circuits and machines for a variety of applications.

Learning Outcomes

Upon successful completion of this course, students will

- be able to solve electric circuits.
- have a knowledge of basic electrical machines.
- develop ability of solving problems.

Unit No.	Topics to be covered	Lecture Hours	Learning Outcome
1	**DC Circuits:** Circuit components, Nodal and mesh analysis, Dependent voltage and current sources, Linear circuits and Superposition theorem, Thevenin and Norton equivalent circuits, Maximum power transfer theorem.	8	Knowledge of DC circuits and network theorems.
2	**AC Circuits:** Phasor diagram, R/RL/RC/R-L-C circuits, Power factor, three-phase AC circuits with balanced and unbalanced loads, Measurement of three-phase power by two-wattmeter method.	8	Knowledge of single-phase and three-phase AC circuits, and their analysis with balanced and unbalanced loads.
3	**Single-phase Transformers:** Principle, Construction, Types, EMF equation, Equivalent circuit, Phasor diagram, Regulation, Efficiency, Applications.	8	Understanding the operation of single-phase transformers and their applications.
4	**DC Machines:** Working principle of motor and generator, EMF Equations, Torque and speed equations, Types of excitations (separately excited, series, shunt, compound), Performance characteristics, Applications.	9	Understanding the operation of different types of DC machines and their applications.
5	**Three-phase Induction Motor:** Construction, Types, Operation, Torque equation, Torque-slip characteristics, Starting Methods, Applications.	9	Understanding the operation of three-phase induction motor and its applications.

Text Books:

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, “Engineering Circuits Analysis”, McGraw Hill publishers, 2013.
2. Electric Machines – D. P. Kothari and I. J. Nagrath (Tata McGraw Hill), 5th Edition, 2017.

Reference Books:

1. M.E. Van Valkenburg, ‘Network Analysis’, Pearson, 2015.
2. Electrical Machinery – P. S. Bimbhra (Khanna Publ.), 2021.
3. Electric Machinery – A. E. Fitzgerald, Charles Kingsley Jr., S. D. Umans (McGraw Hill).