

ESC101-A	Basic Electrical Technology	L:T:P- 3:2:2	3 credits
-----------------	------------------------------------	---------------------	------------------

Course Outcomes:

- To analyze and solve D. C. networks by different analysis methods and theorems.
- To formulate and solve complex AC single phase and three circuits
- To identify the type of electrical machines and their applications
- To introduce the components of low voltage electrical installations

Module 1: DC Circuits (8 hours)

Basic definitions, Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law and its limitations, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation by mesh analysis and node analysis, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems.

Module 2: AC Circuits (8 hours)

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.

Module3: Poly Phase Systems (5 hours)

Advantages of 3-phase systems, generation of 3-phase voltages, three phase connections (star and delta), voltage and current relations in star and delta connections, three phase powers, analysis of 3-phase balanced circuits, measurement of 3-phase power- 2 wattmeter method.

Module 4: Transformers (6 hours)

Magnetic Circuits, construction and working of single phase transformer, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency, Auto-transformer

Module 5: Electrical Machines (8 hours)

Induction motor: Construction, principle and working of a three-phase induction motor, Single-phase induction motor: Construction, principle and working, Applications

DC machine: Construction, principle and working of dc motor and generator. Applications

Synchronous machine: Construction, principle and working of synchronous motor and generators. Applications

Module 6: Electrical Installations (6 hours)

Components of LT Switchgear: Fuses, MCB, ELCB, MCCB, Types of Wires, Earthing, Power factor improvement.

Suggested Text / Reference Books

- (i) D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
- (ii) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

- (iii) L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
- (iv) E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
- (v) V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

Online Recourses:

1. **NPTL Web Course, Basic Electrical Technology**, Prof. G. D. Roy, Prof. N. K. De, Prof. T.K. Bhattacharya, IIT Kharagpur
[\(https://nptel.ac.in/courses/108/105/108105053/\)](https://nptel.ac.in/courses/108/105/108105053/)
2. **NPTL Web Course, Electrical Machines-I**, Prof. P. Sasidhara Rao, Prof. G. Sridhara Rao, Dr. Krishna Vasudevan, IIT Madras
[\(https://nptel.ac.in/courses/108/106/108106071/\)](https://nptel.ac.in/courses/108/106/108106071/)
3. **NPTL Web Course, Electrical Machines-II**, Prof. P. Sasidhara Rao, Prof. G. Sridhara Rao, Dr. Krishna Vasudevan, IIT Madras
<https://nptel.ac.in/courses/108/106/108106072/>