

NIRMA UNIVERSITY  
Institute of Technology  
Electrical Engineering Department  
(Course Offering for B. Tech. All Branches)  
(Semester – I/II)

w.e.f.: Academic Year 2018-19

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| <b>Course Code</b>  | <b>EE103</b>  |
| <b>Course Title</b> | <b>Elements of Electrical and Electronics Engineering</b> |

**Course Learning Outcomes (CLO):**

At the end of the course, students will be able to –

1. interpret the importance of electrical energy and relate its usage in various applications,
2. illustrate the role of circuit elements in different system conditions,
3. distinguish the operational aspects of ac-dc systems and comprehend the principles of electromechanical energy conversion,
4. recognise the functions of electronic devices and basic circuits,
5. apply the concepts of number based conversion and Boolean algebra for digital logic design.

**Syllabus:**

**Teaching Hours: 45**

**Unit-1**

**Review of DC Circuits**

**Teaching Hours: 10**

Kirchhoff's laws, solution of star-delta circuits, Joule's law of electric heating, relationship between various energy units, charging and discharging of capacitor, series-parallel magnetic circuits, fringing effect, comparison between electric and magnetic circuit, Concept of induced emfs, series-parallel connection of inductors, rise and decay of current in inductive circuit.

**Unit-2**

**Single-Phase AC Circuits**

**Teaching Hours: 08**

Generation of alternating emf, instantaneous, rms, peak, average values and related other terms, vector representation of AC quantities, Steady state analysis of R, L, C series and parallel circuits, power triangle, resonance in series and parallel circuits.

**Unit-3**

**Three-Phase AC Circuits**

**Teaching Hours: 07**

Generation of three-phase emf, star connection, delta connection, relationship between line and phase quantities, power measurement in three-phase circuit, variation in wattmeter reading with power factor.

**Unit-4**

**Electromechanical Energy Conversion**

**Teaching Hours: 05**

Concept of electro-mechanical conversion, energy balance, elementary concept of electrical machines, types of rotating electrical machines.

**Unit-5**

**Analog Electronics**

**Teaching Hours: 08**

Half and full wave rectifiers, special purpose diodes, regulator, BJT and its applications, amplifier, oscillator, overview of opto-electronics devices, opto-couplers, transducers, Operational amplifier,

Comparator, Timer IC and multivibrators.

## **Unit-6**

### **Digital Electronics**

**Teaching Hours: 07**

Number systems and its arithmetic, binary codes, Boolean-algebra & simplification of Boolean expression; logic gates, concept of universal logic; implementation of Boolean expressions using logic gates, application of digital circuits (e.g. adder, subtractor, multiplexer, de-multiplexer, analog to digital converter, digital to analog converter)

### **Self Study:**

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

### **Laboratory Work:**

This shall consist of at least 10 practical based on the above syllabus.

### **Suggested Readings:**

1. B. L. Theraja, and A.K. Theraja, Textbook of Electrical Technology Volume I –, S. Chand & Co.
2. A. E. Fitzgerald, Arvin Grabel, and David E. Higginbotham, Textbook of Basic Electrical Engineering –TMH Publishing Co.
3. U. A. Patel, Textbook of Elements of Electrical Engineering, Mahajan Publishing House, Ahmedabad.
4. J. Nagrath, Basic Electrical Engineering, TMH Publishing Co. Ltd.
5. Vincent Del Toro, Textbook of Principles of Electrical Engg., Prentice Hall of India Pvt. Ltd., New Delhi.
6. S. Samaddar, Textbook of Electric Wiring, New Central Book Agency (P) Ltd., Calcutta.
7. Surjit Singh, Textbook of Electrical Design Estimating and Costing, Dhanpat Rai & Sons.
8. Robert Boylestad, and Louis Nashelsky, Electronics Devices and Circuit Theory, Pearson
9. M. Morris Mano, Digital Logic and Computer Design, PHI