

NIRMA UNIVERSITY
Institute of Technology
Electrical Engineering Department
B. Tech. Programme (All Branches Except EE)
Open Elective Course

L	T	P	C
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Course Code	2EEOE02
Course Title	Electrical Power Utilisation and Safety

Course Outcomes (COs):

After successful completion of the course, student will be able to:

1. infer the importance various parameters in electrical system
2. suggest and apply suitable electric heating, welding, refrigeration and air conditioning for a system
3. analyze and design illumination scheme, electrification, earthing system and protection system for an application

Syllabus:

Teaching Hours: 45

Unit-1: Electric Heating and Welding **08**

Advantages of electric heating, resistance heating, types of furnaces, induction heating, types of induction furnaces, dielectric heating, types of welding- arc and resistance

Unit-2: Refrigeration and Air Conditioning **06**

Introduction to refrigeration and air-conditioning, principles of a refrigerator, domestic refrigerator, electrical circuit of refrigerator, need of voltage regulator, water cooler, air conditioner, thermo-electric refrigeration, air purification, central air conditioning systems

Unit-3: Illumination Scheme **07**

Basic terms used in illumination scheme, Electric lamps, Recommended levels of illumination, types of lighting schemes, design of lighting schemes, factory lighting, street lighting, Flood lighting

Unit-4: Electrical Installation, Estimating and Costing **08**

Types of load, Load assessment, Electrical supply systems, Wiring systems, Permissible voltage drops and conductor size calculations, Estimating and costing for residential and commercial service connections (single phase and three phase)

Unit-5: Power Factor **05**

Effects of power factor, causes of low power factor, disadvantages of low power factor, methods of improving power factor, most economical power factor.

Unit-6: Electrical Safety, Earthing System and Protective Devices **11**

Electrical shock mechanisms, factors influencing the electric shock, body current thresholds (tolerable body current limit), thevenin's concepts and accidental equivalent circuits (step and touch potentials), protection against electric shock, purpose of earthing, IS rules for earthing of electrical installations, factors governing the resistance of earth electrode, methods of

earthing, measurement of earth resistance, methods of reducing earth resistance, fuse, miniature circuit breakers (MCB) and earth leakage circuit breakers (ELCB)

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.

Suggested Readings:

1. E. Openshaw Taylor, Utilisation of Electrical Energy, Universities Press.
2. H. Partab, Art and Science of Utilisation of Electrical Energy, Dhanpat Rai & Co.
3. J. B. Gupta, Utilization of Electric Power and Electric Traction, S. K. Kataria & Sons, New Delhi.
4. G. C. Garg, Utilization of Electric Power and Electric Traction, Khanna Publishers, Delhi.
5. R. K. Rajput, Utilisation of Electrical Power, Laxmi Publications (P) Ltd., New Delhi.
6. N. V. Suyranarayana, Utilisation of Electric Power Including Electric Drives and Electric Traction, New Age Publishers, New Delhi.
7. J. B. Gupta, A Course in Electrical Installation Estimating and Costing, S. K. Kataria & Sons, New Delhi.
8. Dr. J. G. Jamnani, Elements of Electrical Design, Mahajan Publishing House

L = Lecture, T = Tutorial, P = Practical, C = Credit

w.e.f. academic year 2020-21 and onwards

