

NIRMA UNIVERSITY
Institute of Technology
B. Tech. in Electrical Engineering
Semester –V

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| Course Code | 2EEDE03 |
| Course Title | Utilization of Electric Power |

Course Outcomes (COs):

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

1. apply different techniques to use electrical energy to obtain heating, welding, illumination, refrigeration and electrolysis process
2. design illumination scheme to obtain required lux level at given location
3. comprehend the importance of refrigeration and air – conditioning using electrical energy
4. design and propose solution complying with energy efficient and green building requirements

Syllabus:

Teaching Hours: 45

Unit-1: Electric Heating and Welding

12

Types of electric furnaces resistance, arc, induction, dielectric and microwave- concept and operation of each type, temperature control of furnaces.

Types of welding: arc and resistance, electric supply for arc welding, concept and operation of each type, choice of welding time, welding techniques.

Unit-2: Electrolytic Process

04

Basic principle of electro deposition, application of electrolysis, electric supply for electrolytic process.

Unit-3: Illumination

11

Nature of light, terminologies and units, basic laws of illumination, determination of luminous flux ,light sources and their characteristics, light production by excitation and ionization, sources of light, filament lamp ,halogen lamp, discharge lamp ,fluorescent tube, compact fluorescent lamp, LED lamp technologies and their applications, LED drivers, energy considerations, design of energy efficient lighting scheme, photometry, direct, diffused and mixed reflection, reflection factor, transmission factor, refractors, light fittings, street lighting, flood lighting, factory lighting, interior lighting, sports lighting.

Unit-4: Refrigeration and Air-Conditioning

10

Introduction, terminology, refrigeration system, domestic refrigerator, troubleshooting and maintenance of domestic refrigerator, refrigeration components and controls, comfort air conditioning, industrial air conditioning, room air conditioners, central air conditioning system, smart air conditioning, rating of electrical equipment in air conditioning.

Unit-5: Energy Efficient Buildings

08

Significance of energy efficiency in residential and non-residential usage, estimate for electrical energy consumption in existing building, strategies involved in management of electrical energy consumption at consumer end, application of adjustable speed drive and energy efficient motor in energy saving for residential and industrial sector, smart appliances and application of IoT in buildings, Load Shifting and use of Battery Energy Storage Systems, Concepts of green building and role of Electrical Engineers.

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 Reading:

1. E.O. Taylor, Utilization of Electric Energy, Orient Longman.
2. H. Pratab, Art and Science of Utilisation of Electrical Energy, Dhanpat Rai & Son
3. Frank Kreith and Ronald E. West, Handbook of Energy Efficiency, CRC Press.
4. Jack L. Lindsey, Scott C. Dunning, Applied Illumination Engineering, Fairmont Press
5. C. L. Wadhwa, Generation Distribution and Utilization of Electrical Energy, New Age International
6. J. B. Gupta, Utilization of Electric Power and Electric Traction, S.K.Kataria & Sons
7. Er. R. K. Rajput, Utilisation of Electric Power, Laxmi Publications
8. J. Nanda and M.L. Kothari, Emerging Trends in Power System, Proceedings of the Eight NPSC.

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

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