

3/4 B.Tech. FIFTH SEMESTER**EE5T3****UTILIZATION OF ELECTRICAL ENERGY****Credits: 3****Lecture: 3 periods/week****Internal assessment: 30 marks****Tutorial: 1 period /week****Semester end examination: 70 marks****Course Objective:**

This subject deals with the fundamentals of illumination and its classification and the electric heating and welding. It gives the detailed study of all varieties of Electric drives and their application to electric traction system.

Course Outcomes:

After completing this course, student is able to

1. Maintain electric drives used in an industries
2. Identify a heating/ welding scheme for a given application
3. Maintain/ Trouble shoot various lamps and fittings in use
4. Figure-out the different schemes of traction schemes and its main components
5. Design a suitable scheme of speed control for the traction systems

Unit I**Electric Drives**

Type of electric drive, choice of motor, starting and running characteristics, speed control, selecting motor power rating for continuous, intermittent and short time rating duty, heating and cooling of motors, temperature rise, particular applications of electric drives, type of industrial loads, load equalization ,flywheel and its applications.

Unit II**Electric Heating & Electric Welding**

Advantages and methods of electric heating, methods of heat transfer, Stefan's law, resistance heating, design of heating elements, losses and efficiency, construction and working principle of induction furnaces, arc furnaces and dielectric heating and control equipment.

Type of welding, resistance and arc welding, comparison between A.C and D.C Welding.

Unit III**Illumination Fundamentals & Methods**

Introduction, Terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light. Incandescent lamps, Discharge lamps, MV and SV lamps, fluorescent lamps-CFL-LED lamps, Induction lamps, effect of voltage variation on lamp efficiency , lamp ratings and efficiency.

Basic principles of light control, Type and design of lighting schemes, factory lighting, flood lighting and street lighting, calculations.

Unit IV**Electric Traction-I**

System of electric traction and traction electrification, Diesel electric traction systems in India, Special features of traction motors, methods of electric braking-plugging, rheostatic braking and regenerative braking, Speed-time curves for different services- trapezoidal and quadrilateral speed time curves.

Unit V**Electric Traction- II**

Mechanics of train movement ,Calculations of tractive efforts and power output of traction motor, Specific energy consumption for given run, effect of varying acceleration and breaking retardation, adhesive weight and braking retardation and coefficient of adhesion.OHE in traction system, collectors and modern electric locomotive.

Learning Resources**Text Books:**

1. Utilization of Electrical Energy - by E. Openshaw Taylor, Orient Longman,2003.
2. Art & Science of Utilization of Electrical Energy - by Partab, Dhanpat Rai & Sons,12th edition,2012.

Reference Books:

1. Utilization of Electrical Power including Electric drives and Electric traction by J.B.Gupta, S.K. Kataria & Sons,10th edition, 2012
2. Generation, Distribution and Utilization of Electrical Energy – by C.L.Wadhwa New Age international (P) Limited,Publishers,2000.