4/4 B.Tech. FIRST SEMESTER

EE7T3 UTILIZATION OF ELECTRICAL ENERGY Credits: 4

Lecture: 4 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Objectives:

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.

Learning Outcomes:

1. Able to maintain electric drives used in an industries
2. Able to identify a heating/ welding scheme for a given application
3. Able to maintain/ Trouble shoot various lamps and fittings in use
4. Able to figure-out the different schemes of traction schemes and its main components
5. Able to design a suitable scheme of speed control for the tractiuon systems
6. Able to identify the job/higher education / research opportunities in Electric Utilization industry.

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
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.

Unit III Electric Welding
Type of welding, resistance and arc welding, electric welding equipment, comparison between A.C and D.C Welding.

Unit IV Illumination Fundamentals
Introduction, Terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

UNIT V Illumination Methods
Incandescent lamps, Discharge lamps, MV and SV lamps, fluorescent lamps-arc lamps, effect of voltage variation on lamp efficiency
Basic principles of light control, Type and design of lighting schemes, factory lighting, flood lighting and street lighting, calculations.

Unit VI Electric Traction
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.

Unit VII Traction Mechanics -I
Mechanics of train movement ,Speed-time curves for different services- trapezoidal and quadrilateral speed time curves, Calculations of tractive efforts and power output of traction motor.

Unit VIII Traction Mechanics -II
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
2. Art & Science of Utilization of Electrical Energy - by Partab, Dhanpat Rai & Sons

Reference books:
1. Utilization of Electrical Power including Electric drives and Electric traction – byJ.B.Gupta, S.K. Kataria & Sons, .
2. Generation, Distribution and Utilization of Electrical Energy – by C.L.Wadhwa New Age international (P) Limited,Publishers,1997