

EE414 UTILIZATION OF ELECTRICAL ENERGY (Dept. Elective - V)

Course Description & Objectives:

To understand types of drives, speed control and applications of motors. To understand electric heating and welding concepts. To understand types of lamps and lightning schemes and light control methods. To understand different types traction systems, features, braking mechanisms and Train movement and energy consumption.

Course Outcomes:

- I Able to apply the speed control and drive concepts in industries.
- I Able to apply the heating and welding concepts in industries.
- I Able to apply the lightning control and lighting schemes in industries.
- I Able to apply the braking and specific energy consumption calculation in traction systems.

UNIT I - Utilization and Control of Electric Drives:

Introduction, Factors governing selection of Electric motors, Type of electric drives, starting and running characteristics, speed control, temperature rise, Choice of Rating of motor, Control devices for Industrial motors, Motors for particular services, load equalization.

UNIT II - Electric Heating and Electric Welding:

Introduction, Methods of Transfer of Heat, Classification of Electric Heating methods, resistance heating induction heating and dielectric heating. Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT III - Illumination Engineering:

Introduction, terms used in illumination, laws of illumination, polar curves,

photometry, integrating sphere, sources of light, MV and SV lamps, tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types of Lighting schemes, flood lighting, Methods of Lighting Calculations.

UNIT IV - Traction Systems:

Introduction, Different systems of Traction, Systems of electric traction, Systems of track electrification. General features of traction motor, Operating characteristics of D.C Motors, Three Phase Induction motor methods of electric braking-plugging, Rheostatic braking and regenerative braking.

UNIT V - Train movement and energy consumption:

Mechanics of train movement. Typical Speed-time curves for different services – trapezoidal and quadrilateral speed time curves Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

TEXT BOOKS:

1. E. Openshaw Taylor, "Utilisation of Electric Energy" 1st ed., Orient Longman, 2006.
2. Partab, "Art & Science of Utilization of electrical Energy" 3rd ed., Dhanpat Rai & Sons, 2006.