

3/4 B.Tech. FIRST SEMESTER

EE5T6 UTILIZATION OF ELECTRICAL ENERGY

Credits: 4

Lecture: 4 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Objective:

This subject gives a comprehensive idea in utilization of electrical power such as drives, electric heating, electric welding and illumination, electric traction, electrolysis, refrigeration air-conditioning and automobile electric 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 tracteriun systems
6. Able to identify the job/higher education / research opportunities in Electric Utilization industry.

UNIT I Electric Drives

Advantages of electric drive, factors governing selection of motors – nature of electrical supply – group and individual drive – consideration for the selection of motor, nature of mechanic load – matching of characteristics of load and motor – losses in motor – methods of heat dissipation – sized rating of motor – mechanical features – types of bearings

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

Introduction, Terms used in illumination, laws of illumination, sources of light.

Incandescent lamps, Discharge lamps, MV and SV lamps, fluorescent lamps- effect of voltage variation on lamp efficiency - Type of lighting schemes, factory lighting, flood lighting and street lighting.

UNIT V Electric Traction

System of electric traction and traction electrification, Diesel electric traction systems in India, Special features of traction motors, overhead electrical equipment – collectors – modern electric locomotive – methods of track electrification.

UNIT VI Electrolytic Process

Introduction – basic principle of electric deposition – laws of electrolysis – applications of electrolysis – electro deposition – electro plating – electro forming - electro typing – manufacturing of chemicals – analyzing – electro extraction – electro refining

UNIT VII Refrigeration & Air-conditioning

Applications of refrigeration – systems of refrigeration – vapour compression cycle – absorption and thermo electric refrigeration – unit of refrigeration – domestic refrigerator, water cooler air-conditioning – window air-conditioner

UNIT VIII Automobile Electric System

Introduction – types of electric system in automobile – ignition system – spark ignition – magneto ignition system – comparison – electronic ignition system – charging system – starting system – lighting system

Learning resources

Text Books:

1. Art & Science of Utilization of Electrical Energy - by Partab, Dhanpat Rai & Sons
2. Utilization of Electrical Power including Electric drives and Electric traction – by J.B.Gupta, S.K. Kataria & Sons, .
3. Automobile Engineering by Dr Kirpal Singh , Stadar Publishers and Distributors

Reference Books:

1. Generation, Distribution and Utilization of Electrical Energy – by C.L. Wadhwa New Age international (P) Limited, Publishers, 1997