

EE4107PE: Utilization of Electrical Engineering**B.Tech. IV Year I Sem.**

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Prerequisite: Power Systems & Power Electronics**Course Objectives:**

- To compare EHV AC and HVDC systems
- To analyze Graetz circuit and also explain 6 and 12 pulse converters
- To control HVDC systems with various methods and to perform power flow analysis in AC/DC systems
- To describe various protection methods for HVDC systems and Harmonics

Course Outcomes: On completion of the course, the students will be able to

- Acquire knowledge on electric drives characteristics and their applicability in industry
- Identify the methods of electric heating and welding.
- Understand the fundamentals of illumination and good lighting practices
- Describe the concept of electric traction and its working principle
- Analyze the energy consumption and braking retardation of electric traction

UNIT-I

Electric Drives: Type of electric drives, choice of motor, starting and running characteristics, speed control, heating and cooling curves, particular applications of electric drives, steady state stability, multi quadrant Dynamics, acceleration, deceleration, starting & stopping of drive, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT- II

Electric Heating: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating.

Electric Welding: Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT-III

Illumination: Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

Various Illumination Methods: Discharge lamps, MV and SV lamps - comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT- IV

Electric Traction – I: System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostat braking and regenerative braking .

Mechanics of train movement: Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT-V

Electric Traction-II: Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and coefficient of adhesion.

TEXT BOOKS:

1. E. Openshaw Taylor, Utilisation of Electric Energy - by University press, 1961.
2. Partab, H., 'Art and Science of Utilisation of Electrical Energy', Dhanpat Rai and Sons, New Delhi, 1986.

REFERENCE BOOKS:

1. N. V. Suryanarayana, Utilization of Electrical Power including Electric drives and Electrictraction, New Age International (P) Limited, Publishers, 1996.
2. C. L. Wadhwa, Generation, Distribution and Utilization of electrical Energy, NewAgeInternational (P) Limited, Publishers, 1997.
3. Tripathy, S.C., 'Electric Energy Utilisation and Conservation', Tata McGraw HillPublishing Company Ltd. New Delhi, 1991