

DEPARTMENT OF ELECTRICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY JAMSHEDPUR
JHARKHAND – 831014

AUTUMN SEMESTER 2020-21

Course Handout

Date: 25/08/2020

Course Code : EE1514

Course Title : Utilization of Electrical Power (Professional Elective-I)

Instructor-in-charge : Dr. Om Hari Gupta

Course Description:

Electrical drives, review of motor performance characteristics, mechanical features, different types of industrial loads, standard rating, selection of motors, rating for different duty cycles, efficient operation of motors.

Electric heating and its applications, various laws governing the electric heating.

Illumination: photometric terms and laws, types of lamps, principles of lighting calculations.

Electric traction: electric and diesel traction systems, speed-time curves, traction motors, speed control and methods of braking.

Economic aspects: economic choice of equipment initial cost and efficiency reduction of energy costs, cost of renewals, effects of power factor, costing of electrical energy.

Scope:

- To provide good fundamental concepts in Electric Drives, Heating, Illumination, Traction, and tariff.
- To study the characteristics of drives and their compatibility with different loads.
- To study different laws of heating and applications.
- To study principles of lighting calculations, different types of lamps and modern trends in lighting system
- To study the comparative analysis between electric and diesel traction systems and recent trends in electric traction
- To study different aspects of economics of power generation, utilization, and cost of energy.

Objectives:

- At the end of this course, the students will be able to understand the various aspects related to utilization of electric power at consumer end.
- At the end of this course, the student will be able to understand how efficient utilization can affect the electric tariffs or the cost of electric energy.

Text Books:

- T1. R. K. Rajput, "Utilization of Electrical Power", Laxmi Publications, India
- T2. H. Pratab "Art and Science of Utilization of Electrical Energy" Dhanpat Rai & Company, New Delhi

Reference Books:

- R1. Wemer Leonhard, "Control of Electrical Drives", Springer-Verlag Berlin Heidelberg, Berlin, Germany
- R2. Gopal K. Dubey, "Fundamentals of Electrical Drives", Alpha Science International Limited, Pangbourne, UK
- R3. E. Openshaw Taylor, "Utilization of electric energy", English Universities Press Limited, London
- R4. C.L. Wadhwa, "Generation, distribution and utilization of electrical energy", New Age International (P) Limited, New Delhi

Course Plan:

Lecture No.	Learning Objectives	Major Topics	Book & course material
1-10	Electrical drives, review of motor performance characteristics, mechanical features, different types of industrial loads, standard rating, selection of motors, rating for different duty cycles, efficient operation of motors.	Characteristics, application, load-motor compatibility and closed-loop control of motors	R1, R2
11-20	Electric heating and its applications, various laws governing the electric heating.	Heating laws and applications	T1, R3
21-25	Illumination: photometric terms and laws, types of lamps, principles of lighting calculations	Illumination principles and types of lamps	T1, R4
26-29	Electric traction: electric and diesel traction systems, speed-time curves, traction motors, speed control and methods of braking.	Speed Control and Braking of Motors	T2, R4
30-34	Economic aspects: economic choice of equipment initial cost and efficiency reduction of energy costs, cost of renewals, effects of power factor, costing of electrical energy.	Depreciation and Tariff	T2, R4

***Evaluation Scheme:**

EC No.	Evaluation Component	Duration	Weightage	Nature of Component
1.	Mid-Term Exam	120 Min.	30%	Closed Book
2.	End-Term Exam	180 Min.	50%	Closed Book
3.	Assignment	--	5%	Take Home
4.	Class Assignment	30 Min.	5%	Closed Book
5.	Attendance	--	10%	--

***The evaluation scheme may change as per institute directives**

Consultation Hour: Friday, 11:00 AM to 01:00 PM

Notices: All notices regarding the course will be displayed only on the ~~Department of Electrical Engineering notice board~~. Online on Institute website

Instructor In-Charge