

Subject Code: 1ET4030403	Subject Title: Utilization of Electrical Energy
Pre-Requisite	--

RATIONALE:

Electricity is used in every walk of life whether it is home, office, industry or farm. It is being used for lighting, heating, refrigeration, cooking, air conditioning, operating machines/computers, welding, traction, irrigation and so on. In this era of energy crisis it is must that electricity is consumed efficiently. Every diploma electrical engineer therefore should know to operate and maintain main electrical utilities for their efficient operations. This course will enable the students to develop skills to maintain /troubleshoot various electrical equipment / gadgets/appliances in domestic, commercial and industrial sector. The students will be able to make proper selection of equipment according to requirement to ensure economical and efficient use of electricity. Essential theoretical and practical knowledge will be achieved by this course.

COURSE OBJECTIVE:

1. To study various lamps and fittings in use.
2. To study about various electric heating and welding equipments used in industries
3. To study about different Electric Drive and elevator used in industries.
4. To study about electrical traction system.
5. To study about different domestic appliances.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment
4	-	2	5	60	40	20	30

DETAILS OF COURSE CONTENTS:

Sr No	Topics and Sub-topics	Total Hours	% Weightage
1	Electrical Heating 1.1 Electric Heating and its classification 1.2 Requirements of Heating Element materials. 1.3 Resistance and arc heating 1.4 Resistance Heating: Direct(Salt bath Furnace), Indirect, Resistance Ovens. 1.5 Arc Heating and Its Applications	08	15



	1.6 Types of arc furnaces 1.7 Methods of temperature control 1.8 Induction Heating and its application 1.9 Types of Induction Furnace 1.10 Dielectric Heating and its applications		
2	Welding 2.1 Quality of a good weld, welding defects 2.2 Principle of resistance welding. 2.3 Types of resistance welding and its applications 2.4 Principle of Electric arc welding. 2.5 Types of electric arc welding and its applications 2.6 Comparison of (1) A.C and D.C welding (2) resistance welding and arc welding.	04	10
3	Illumination 3.1 Terms Related to Illumination: solid and plane angle, Luminous flux, Luminous intensity, Lumen, Candle power, Lux, Lamp efficiency, glare, space height ratio, Utilization factor, Maintenance factor, Absorption factor, reflection factor 3.2 Laws of Illumination 3.3 Construction, working and application of different types of Lamps	12	20
4	Electric Drives and Elevators 4.1 Electric Drives 4.2 A. C and D.C Drives 4.3 Factors affecting selection of Electric motor 4.4 Group and Individual Drive 4.5 Types of load and its characteristics 4.6 Speed-Torque Characteristics of different motors 4.7 Elevators : Types of Elevators 4.8 Hydraulic Elevators 4.9 Traction Elevators 4.10 Power transmission gear and braking. 4.11 Safety in elevators 4.12 List and elevators Act: such as Gujarat Lift Act Nov 2001 and Others.	12	20
5	Electric Traction 5.1 Requirements of ideal Traction System. 5.2 Types of traction system. 5.3 Different Electric traction system: Supply system: DC System, A.C System, Composite System, 5.4 Traction Mechanics: Types of Services, Speed Time	10	20

	Curve.		
6	Domestic Electrical Appliances 6.1 Electric Iron, Electric water heater, Electric toaster, Microwave oven, fans, washing machine, Grinder /Mixer/ Juicer, Vacuum cleaner, Flour Mill, Air Conditioner. 6.2 Concept of Star System for Energy Conservation.	10	15

COURSE OUTCOME:

The students will be able to

1. Maintain/ troubleshoot various lamps and fittings in use.
2. Maintain various electric heating and welding equipments used in industries
3. Maintain different Electric Drive and elevator used in industries.
4. Understand the various electrical traction system.
5. Maintain different domestic appliances.

LIST OF PRACTICAL:

1. Measure Illumination at different places in college by luxmeter.
2. Prepare a survey report after collecting technical information of various lamps available in the local market.
3. Prepare an industrial visit report after visiting nearby lamp manufacturing industry (otherwise from internet)
4. Prepare a report of specification of various heating furnaces used in industries.
5. Prepare a report of specification of various electrical welding machines available in college workshop.
6. Prepare a report on various elevators after visiting nearby elevators manufacturing/repairing industry.
7. Compare various Electric Drives for Traction
8. Given a specific load condition determine the rating of a motor (motor for a pump, motor for a lift).
9. Prepare a report after visiting nearby electric-traction substation. (otherwise from Internet)
10. Prepare a report /chart on various types traction systems.
11. Prepare a report/chart on speed time curves.
12. Prepare a report on various parts and their function of any two domestic appliances.
13. Prepare a report on procedure for servicing of any two domestic appliances.
14. Prepare a comparative chart of two different manufacturing company in India for any two electrical domestic appliances.

LIST OF REFERENCES:

1. J.B.Gupta, Utilization of Electric power and Electric Traction
2. G. C Garg, Utilization of Electric power and Electric Traction
3. H. Pratap, Art & Science of Utilization of Electrical Energy.
4. [www. nptel.iitm.ac.in](http://www.nptel.iitm.ac.in)
5. www.google.com
6. [www. vlab.com](http://www.vlab.com)