

COURSE CODE: 1152EE132	COURSE TITLE: <b>UTILIZATION OF ELECTRICAL ENERGY</b>	L	T	P	C
		3	0	0	3

**COURSE CATEGORY:**

Program Elective

**PREAMBLE :**

This course will provide knowledge on illumination of lighting, Traction, Electrical heating, Electro mechanical energy conversion and various electrical loads.

**PREREQUISITE COURSES:**

- Basic Electrical Engineering

**RELATED COURSES:**

Product Development & Design, LED Lighting Technology

**COURSE EDUCATIONAL OBJECTIVES:**

The objectives of the course are to make the students,

- Introduce various methods of effectively and efficiently utilizing Electrical Energy for different and desired applications
- Teach the various Electrical Lighting principles and their applications.
- Impart knowledge on effective utilization of Electrical Drives, Electrical Traction and Electro Mechanical process

**COURSE OUTCOMES :**

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's taxonomy)
C01	Determine of MHCP and MSCP of various lighting system.	K2
C02	Illustrate the Electric Heating, Welding & Furnace process	K2
C03	Select the drives based on application, Calculation of Power Requirement for motor load utilization.	K2
C04	Understand the role and requirement of electrical energy in traction application.	K3
C05	Explain the Electro Mechanical Process and Calculation of Energy Requirements	K2

**CORRELATION OF COs AND POs**

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO
CO1	M		M		M			L		L	M	
CO2	L		H					M	H		H	
CO3		L		L					H	H		

CO4	H			L			M			H		
CO5	H		H			M			M		M	
<b>COURSE CONTENT:</b>												
<b>UNIT I</b>	<b>ILLUMINATION</b>										<b>9</b>	
Production of light – Determination of MHCP and MSCP – Polar curves of different types of sources – Rouseau's construction – Lighting schemes and calculations – Factory lighting – Flood lighting – Electric lamps – Gaseous discharge – High pressure and low pressure.												
<b>UNIT II</b>	<b>ELECTRIC HEATING AND WELDING</b>										<b>9</b>	
Resistance, Inductance and Arc furnaces – Construction and fields of application – Losses in oven and efficiency - High frequency - Dielectric heating – Characteristics of carbon and metallic arc welding – butt welding – spot welding.												
<b>UNIT III</b>	<b>ELECTRIC DRIVES AND CONTROL</b>										<b>9</b>	
Group drive – Individual drive – selection of motors – starting and running characteristics– Running characteristics - Mechanical features of electric motors – Drives for different industrial applications - Choice of drives – power requirement calculation – power factor improvement.												
<b>UNIT IV</b>	<b>ELECTRIC TRACTION</b>										<b>9</b>	
Traction system – Speed time characteristics – Series and parallel control of D.C motors - Open circuited, shunt and bridge transitions – Tractive effort calculation – Electric braking – Tramways and trolley bus – A.C traction and recent trend. Magnetic deviation												
<b>UNIT V</b>	<b>ELECTROMECHANICAL PROCESSES</b>										<b>9</b>	
Electrolysis – polarization factor – preparation work for Electro plating – Tanks and other equipments – Calculation of energy requirements – Methods of charging and maintenance – Ni-iron and Ni- cadmium batteries –Lead acid batteries ,Components and materials – Chemical reactions – Capacity rating of batteries – Battery charges.												
												<b>TOTAL: 45 PERIODS</b>
<b>TEXT BOOKS:</b>												
<ol style="list-style-type: none"> <li>1. Uppal S.L, "Electric Power", Khanna Publishers, 1988</li> <li>2. Open Shaw Taylor, "Utilization of Electrical Energy", Oriented Longmans Limited (Revised in SI Units), 1971.</li> <li>3. Soni A. Chakrabarti, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, “ A text book on Power System Enggineering”, Khanna Publishers, 2000.</li> <li>4. A.I.Starr, “Generation, Transmission and Utilization of Electric Power”, ELBS, 1978.</li> </ol>												
<b>REFERENCE BOOKS:</b>												
<ol style="list-style-type: none"> <li>1. PSCAD User Manual.</li> <li>2. Power Quality in Electrical Systems - Alexander Kusko ,McGraw-Hill Professional</li> </ol>												