Third Year (Semester-V) B. Tech. Electrical Engineering

BEE3508: Utilization of Electrical Energy

Teaching Scheme			Examination Scheme	
Lectures	3 Hrs/week		**CT-1**	15 Marks
Tutorial	0 Hrs/week		**CT-2**	15 Marks
Total Credit	3		**CA**	10 Marks
			ESE	60 Marks
			Total	100 Marks
			Duration of ESE: 03 Hrs 00 Min.	

Course Contents

Unit I	**Electric Heating and Welding** : I) Electric Heating: Types and methods of electrical heating, advantages of electrically produced heat, types & application of electric heating equipment II) Importance, Advantages & Disadvantages of welding, classification of welding processes, Resistance welding, Electric arc welding, Ultrasonic welding, electron beam welding, laser beam welding.
Unit II	**Illumination and Lighting Systems:** Nature of light, terms used in illumination, solid angle, laws of illumination, polar curves, basics of CFL, LED & Plasma, Lux level requirements for various applications, classification of light fittings and luminaries, factors affecting the design of indoor lighting installations, total lumen method of calculation, Lighting design for indoor applications, Outdoor lighting system design for street lighting and flood lighting.
Unit III	**Refrigeration & Air conditioning**: Terminology, refrigeration cycle, refrigeration systems (Vapor compression, vapor absorption), domestic refrigerator, drinking water cooler, desert air cooler. Air conditioning: Factors involved in air conditioning, comfort air conditioning, industrial air conditioning, effective temperature, summer / winter air conditioning systems, types of air conditioning systems, room air conditioning, and central air conditioning.
Unit IV	**Electric Traction:** Traction system, requirement of an ideal traction system, different systems for traction, system of railway electrification, comparison between AC and DC systems, power supply for electric traction system, overhead equipments (collector gear for overhead equipments, conductor-rail equipment)Speed- Time curve for train movement, crest speed, average speed and schedule speed, simplified speed-time curve.
Unit V	**Fans & Pumps:** Fans and Blowers: Fan types, fan performance evaluation & efficient system operation, fan design & selection criteria, flow control strategies, fan performance assessment, energy saving opportunities. Pumps: Pump types, system characteristics.Pump curves, factors affecting pump performance, efficient pumping system operation, flow control strategies, energy conservation opportunities in pumping system. Compressors and DG Sets: Compressors: Compressor types, Compressor efficiency,Compressed air system components. Diesel Generating Systems: Introduction, selection and installation factors, operational factors, energy performance assessment in DG sets, energy saving measures for DG sets.

Text Books	
1	J.B. Gupta, "Utilization of Electric Power & Electric Traction", Kataria & Sons, 1st Edition, 2013
2	H Partap, "Art and Science of Utilization of Electrical Energy", Dhanpat Rai & Sons, Delhi, 2014
3	Dr N. V. Suryanarayana, "Utilization of Electrical Power", Wiley Eastern Ltd, New Age International Publisher, 2nd Edition, 2017.
Reference Books	
1	E. Openshaw Taylor, "Utilization of Electric Energy", The Orient Blackswan Publisher, 1971
2	Guide book for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency
Useful Links	
1	https://www.youtube.com/watch?v=PW44aMos2YA
2	NPTEL :: Electrical Engineering - Illumination Engineering
3	https://www.youtube.com/watch?v=cvQ5tss5sfA

	Course Outcomes:	CL	Class Session
EE3508.1	**Understand** the process and application of Electric Heating and Welding equipments	2	9
EE3508.2	**Calculate** illumination parameters for specific conditions by using illumination methods.	3	9
EE3508.3	**Analyze** the Refrigeration & Air conditioning with applications.	4	9
EE3508.4	**Analyze** Electric Traction system with its power supply structure.	4	9
EE3508.5	**Select** proper rating of DG sets, know the operational factor.	3	9