

Program : Diploma in Electrical and Electronics Engineering	
Course Code : 6032B	Course Title: Energy Conservation & Management
Semester : 6	Credits: 4
Course Category: Program Elective	
Periods per week: 4 (L:3 T:1 P:0)	Periods per semester: 60

Course Objectives

- To address energy crisis and related issues.
- To identify the need of energy conservation.
- To observe standard practices based on energy conservation act.
- To familiarize the process of energy auditing and apply good engineering practices to reduce energy loss.

Course Prerequisites:

Topic	Course code	Course name	Semester
Power and energy		Applied Physics-I	1
Power and energy		Fundamentals of Electrical & Electronics Engineering	2

Course Outcomes

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

CO _n	Description	Duration (Hours)	Cognitive Level
CO1	Explain various renewable energy sources and its importance	15	Understanding
CO2	Summarize various energy management techniques	14	Understanding
CO3	Explain various practices for energy conservation in buildings.	14	Understanding

CO4	Summarize the concept of energy audit in electrical systems.	15	Understanding
	Series Test	2	

CO-PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						
CO2	2						
CO3	2						
CO4	2						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcome	Description	Duration (Hours)	Cognitive level
CO1	Explain various renewable energy sources and its importance.		
M1.01	Classify various energy sources with examples.	2	Understanding
M1.02	Illustrate the various methods of solar energy conversion	4	Understanding
M1.03	Explain the wind and ocean energy conversion systems.	4	Understanding
M1.04	Illustrate the energy conversion from geothermal and bio resources	5	Understanding

Contents:

Energy sources - classification - examples - conventional - non conventional - need of renewable energy - advantages - disadvantages

Solar energy - basic principle - advantages - disadvantages - applications. - solar photovoltaic cell- definitions - solar radiation - solar irradiation - solar insolation.

Wind energy - basic principle - advantages - disadvantages - applications. - components of a typical wind energy system

Ocean energy - basic principle - tidal energy - wave energy - advantages - disadvantages

Geothermal Energy - basic principle - resources - advantages - disadvantages

Bio gas - definition - list the constituents - applications - biogas plants - types - construction - working - dome type - drum type.

Biomass - definition - various resources

CO2	Summarize various energy management techniques		
M2.01	Outline the current energy scenario in India.	2	Remembering
M2.02	Explain various energy management techniques.	4	Understanding
M2.03	Explain various elements of energy efficiency.	4	Understanding
M2.04	Interpret star labelling, needs and its benefits.	4	Understanding
	Series Test I	1	

Contents:

Energy Scenario:current global energy scenario-coal, oil and natural gas reserve- statistical data- energy consumption in various sectors in india. (review in industrial, agriculture and residential sectors)-long term energy scenario for india-environmental impacts due to the use of conventional energy sources- solutions for environmental issues.

Energy management-definition-objectives-functions- importance of energy management-energy management techniques- self knowledge and awareness-reengineering and evaluation-technology upgradations.

Energy efficiency-concept- benefits- elements of energy efficiency-efficient energy usage-energy conversion efficiency-energy conservation

Star labelling-need - benefits- types of label- comparative label-endorsement label-criteria for selection of home appliances --BEE (Bureau of Energy Efficiency) star rating-list of appliances covered under Standards & Labelling program-

CO3	Explain various practices for energy conservation in buildings.		
M3.01	Outline the importanceand principles of energy conservation	2	Understanding
M3.02	Explain the various energy conservation activities in buildings	4	Understanding
M3.03	Summarize various energy conservation opportunities in HVAC system.	4	Understanding
M3.04	Explain energy conservation techniques in lighting systems.	4	Understanding

Contents:

Energy conservation- definition-need- importance -principles .

Energy conservation in buildings- energy saving tips- domestic sector- commercial sector- energy conservation activities in buildings

HVAC system-components- energy conservation opportunities in HVAC system-thermal insulation and energy efficiency-thermal energy conservation opportunities in buildings-

Energy conservation techniques in lighting systems-general energy saving opportunities in lighting

CO4	Summarize the concept of energy audit in electrical systems.		
M4.01	Interpret the objectives of energy audit	3	Understanding
M4.02	List various instruments used for energy audit.	4	Remembering
M4.03	Explain the methodology for conducting energy audit.	6	Understanding
M4.04	Illustrate energy flow diagram (Sankey diagram).	2	Understanding
	Series Test II	1	

Contents:

Energy Audit of Electrical systems-definition(as per EC Act)-need of energy audit-salient features of bureau of energy efficiency regulations(list the manner and intervals of time for conduct of energy audit only).types of energy audit -preliminary -targeted - detailed audit.

Instruments and metering for Energy Audit- name of instruments-purpose

Various stages for preparing energy audit- formation of energy audit team-energy audit forms and data sheets-various phases of energy audit-ten steps methodology(as per BIS standard)-energy audit report format (familiarization only).

Energy flow diagram (Sankey Diagram)-role and objective in energy analysis (brief idea only)

Text /Reference:

T/R	Book Title/Author
T1	Gks No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency (A Statutory body under Ministry of Power, Government of India) (Fourth Edition 2015).
T2	Dr. Sanjeev Singh et.al, Energy management ,S K Kataria& Sons , New Delhi, ISBN:978-93-5014-101-4
R1	O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
R2	G.D.Rai, Non Conventional Energy Sources, Khanna Publishers
R3	Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN: 978-195606539
R4	Turner, W. C., Energy Management Handbook, Fairmount Press, 2012, ISBN 9781304520708
R5	Sharma, K. V., Venkateshaiah; P., Energy Management and Conservation, I K International Publishing House Pvt. Ltd; 2011 ISBN 9789381141298
R6	Mehta ,V. K., Principles of Power System, S. Chand &Co.New Delhi, 2016, ISBN 9788121905947

Online resources:

Sl.No	Website Link
1	https://beeindia.gov.in/
2	http://indianpowersector.com/
3	http://keralaenergy.gov.in/
4	https://powermin.nic.in/