SARDAR RAJA COLLEGE OF ENGINEERING, ALANGULAM

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

MICRO LESSON PLAN



Subject Code : EE - 81

Subject Name: ELECTRICAL ENERGY GENERATION, UTILIZATION

& CONSERVATION

Year & Semester: IV & VIII SEM

STAFF: Mrs. R.NAFEENA,

A.P/EEE

EE81 ELECTRIC ENERGY GENERATION AND UTILISATION AND CONSERVATION

1. POWER GENERATION

Review of conventional methods – thermal, hydro and nuclear based power generation. Nonconventional methods of power generation – fuel cells – tidal waves – wind – geothermal – solar bio-mass - municipal waste. Cogeneration. Effect of distributed generation on power system operation.

2. ECONOMIC ASPECTS OF GENERATION

Economic aspects of power generation – load and load duration curves – number and size of units – cost of electrical energy – tariff. Economics of power factor improvement – power capacitors – power quality. Importance of electrical energy conservation – methods – energy efficient equipments. Introduction to energy auditing.

3. ILLUMINATION

Importance of lighting – properties of good lighting scheme – laws of illumination – photometry - types of lamps – lighting calculations – basic design of illumination schemes for residential, commercial, street lighting, and sports ground – energy efficiency lamps.

4. INDUSTRIAL HEATING AND WELDING

Role electric heating for industrial applications – resistance heating – induction heating – dielectric heating - electric arc furnaces Brief introduction to electric welding – welding generator, welding transformer and the characteristics.

5. ELECTRIC TRACTION

Merits of electric traction – requirements of electric traction system – supply systems – mechanics of train movement – traction motors and control – braking – recent trends in electric traction.

TOTAL : 45 PERIODS

TEXT BOOKS

1. C.L. Wadhwa, 'Generation, Distribution and Utilization of Electrical Energy', New Age International Pvt. Ltd, 2003.

2. B.R. Gupta, 'Generation of Electrical Energy', Eurasia Publishing House (P) Ltd, New Delhi, 2003.

REFERENCES

1. H. Partab, 'Art and Science of Utilisation of Electrical Energy', Dhanpat Rai and Co, New Delhi, 2004.

2. E. Openshaw Taylor, 'Utilization of Electrical Energy in SI Units', Orient Longman Pvt. Ltd, 2003.

3. J.B. Gupta, 'Utilization of Electric Power and Electric Traction', S.K.Kataria and Sons, 2002.

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SUBJECT DESCRIPTION AND OBJECTIVES

DESCRIPTION

Electricity generation is the process of generating electric energy from other forms of energy. The fundamental principles of electricity generation were discovered during the 1820s and early 1830s by the British scientist Michael Faraday. His basic method is still used today. Electricity is generated by the movement of a loop of wire, or disc of copper between the poles of a magnet. For electric utilities, it is the first process in the delivery of electricity to consumers. The other processes, electricity transmission, distribution, and electrical power storage and recovery using pumped-storage methods are normally carried out by the electric power industry. Electricity is most often generated at a power station by electromechanical generators, primarily driven by heat engines fueled by chemical combustion or nuclear fission but also by other means such as the kinetic energy of flowing water and wind.

Indeed, life without electricity is now unimaginable. Electric power systems form the basic infrastructure of a country. Even as we read this, electrical energy is being produced at rates in excess of hundreds of giga-watts (1 GW = 1,000,000,000 W).

This subject reveals the knowledge of Power system by learning the milestones below

Features:

- Electrical Energy Resources
- Electric Heating
- Illumination
- Electric Traction
- Energy Conservation Techniques

AIM

To expose students to the main aspects of generation, utilization and conservation.

OBJECTIVES

To impart knowledge on

i. Generation of electrical power by conventional and non-conventional methods.

ii. Electrical energy conservation, energy auditing and power quality.

iii. Principle and design of illumination systems and methods of heating and welding.

- iv. Electric traction systems and their performance.
- v. Industrial applications of electric drives.

MICRO LESSON PLAN

HOURS	LECTURE TOPICS	READING	
UNIT I- POWER GENERATION			
1,2	Review of conventional methods – thermal, hydro	T2	
3,4	Nuclear based power generation	T2	
5	Non-conventional methods of power generation – fuel cells – tidal waves	T1	
6	Wind-Geothermal	T1	
7	Solar - bio-mass	T1	
8	Municipal waste.	T1	
9	Cogeneration. Effect of distributed generation on power system operation.	T1	
UNIT II- ECONOMIC ASPECTS OF GENERATION			
10	Economic aspects of power generation	T1	
11	Load and load duration curves	T1	
12	number and size of units	T1	
13	Cost of electrical energy – tariff.	T1	
14	Economics of power factor improvement	T1	
15	Power capacitors – power quality.	T2	
16	Importance of electrical energy conservation methods	T2	
17	Energy efficient equipments.	T2	
18	Introduction to energy auditing	T2	

	UNIT III- ILLUMINATION		
19	Importance of lighting – properties of good lighting scheme	T1	
20	Laws of illumination - Photometry	T1	
21,22	Types of lamps	T1	
23	Lighting calculation	T1	
24-26	Basic design of illumination schemes for residential, commercial , street lighting and sports ground	T1	
27	Energy efficiency lamps	T1	
UNIT IV-INDUSTRIAL HEATING AND WELDING			
28	Role electric Heating for industrial applications	T1	
29	Resistance heating	T1	
30	Induction heating	T1	
31	Dielectric heating	T1	
32	Electric arc furnace	T1	
33	Brief Introduction to electric welding	T1	
34	Welding generator	T1	
35,36	Welding transformer and the characteristics	T1	
UNIT V- ELECTRIC TRACTION			
37	Merits of electric traction	T1	
38	Requirements of electric traction	T1	
39	Supply system	T1	
40	Mechanics of train movement	T1	
41,42	Traction motor and control	T1	
43,44	Braking	T1	
45	Recent trends in electric traction	T1	