		L	T	P	C
EE 0454	**POWER GENERATION SYSTEMS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To familiarize the students with different types of power generating systems and the economics associated with power generation.

INSTRUCTIONAL OBJECTIVES

At the end of course the students will be able to:

1. To learn generation of electrical power from different types of power plants like thermal nuclear and hydro power stations.
2. To understand the concepts of generation of electrical power using non conventional energy resources
3. To learn the economics connected with power generation

ECONOMICS OF GENERATION

Load and load duration curve – Load, demand and diversity factors – Plant capacity and plant use factors – choice of type of generation – choice of size and number of unit – cost of energy generated – Tariffs.

THERMAL POWER PLANTS

Location, Layout and working of steam and diesel power plants - Types of boilers and turbines and other accessories for steam and gas power plants, Environmental issues.

NUCLEAR POWER PLANTS

Principles of nuclear power generation, Types of nuclear power plants and their comparison, Layout and working of nuclear power plants, Advantages and disadvantages of nuclear energy, Reactor control, Reactor safety, Environmental issues.

HYDRO POWER STATIONS

Layout and working, Types of turbines for high medium and low head plants, Advantages of hydro generation, Environmental issues, Hydro-Thermal scheduling problem.

NON CONVENTIONAL POWER PLANTS (Block Diagram and Explanation In Respect Of Power Generation)

Basic concepts, Principle of working and layout of MHD, Solar, Wind, Tidal, Biomass and Geothermal Power Generation Systems.

TEXT BOOKS

1. Uppal, S.L., *Electrical Power*, Khanna Publishers , New Delhi, 1997.
2. Soni, Gupta, Bhatnagar, *A Course in Electrical Power*, Dhanpat Rai & Sons, Delhi.1992.

REFERENCE BOOKS

1. Nagrath and Kothari , Modern Power System Analysis, Tata Mc Graw Hill.1989
2. Wadhwa, C.L., Generation, Distribution and Utilization of Electric Energy, New Age International Ltd.1998.
3. Deshpande MV, Elements of Electrical Power Station design, Pitman, New Delhi.1991.

EE 0454 - POWER GENERATION SYSTEMS (SE)												
Course designed by		Department of Electrical and Electronics Engineering										
1	Student outcomes	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**

		x					**x**				**x**			**x**	
2	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)				
											x				
3	Broad area (for 'P'category	Electrical machines		Circuit and systems			Electronics				Power Systems				
		x									**x**				
4	Course Coordinator	Mr CS.BOOPATHI													

Mapping of Student Outcomes with Instructional Objectives

Mapping of Program Instructional Objectives Vs Student Outcomes

Student Outcomes	Program Instructional objectives		
	To learn generation of electrical power from different types of power plants like thermal nuclear and hydro power stations.	To understand the concepts of generation of electrical power using non conventional energy resources	To learn the economics connected with power generation
(a) an ability to apply knowledge of mathematics, science, and engineering	x	x	x
(b) an ability to identify, formulate, and solve engineering problems			x
(c) the broad education necessary to understand the impact of engineering solutions in a global perspective.	x	x	x
(d) a knowledge of contemporary issues	x	x	x

Mapping of Program Educational Objectives with Student Outcomes

CRITERION 3 (a–k OUTCOMES)	PROGRAM EDUCATIONAL OBJECTIVES			
	1	2	3	4
(a) an ability to apply knowledge of mathematics, science, and engineering	x			
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	x			
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability			x	
(d) an ability to function on multidisciplinary teams			x	x
(e) an ability to identify, formulate, and solve engineering problems			x	
(f) an understanding of professional and ethical responsibility			x	
(g) an ability to communicate effectively in both verbal and written form.				x
(h) the broad education necessary to understand the impact of engineering solutions in a global perspective.		x		
(i) a recognition of the need for, and an ability to engage in life-long learning		x		
(j) a knowledge of contemporary issues		x		
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.		x	x	

Assessment Evidences for Student Outcomes

SRM University
Department of Electrical and Electronics Engineering

Course Code: EE0454
Course Title: Power Generation Systems

INSTRUCTIONAL OBJECTIVE	STUDENT OUTCOME	EVIDENCE
To learn generation of electrical power from different types of power plants like thermal nuclear and hydro power stations.	(a) an ability to apply knowledge of mathematics, science, and engineering	Cycle Test 2,Model Exam
	(b) the broad education necessary to understand the impact of engineering solutions in a global perspective.	Cycle Test 2,Model Exam
	(c) a knowledge of contemporary issues	Cycle Test 2,Model Exam
To understand the concepts of generation of electrical power using non conventional energy resources	(d) an ability to apply knowledge of mathematics, science, and engineering	Model Exam
	(e) the broad education necessary to understand the impact of engineering solutions in a global perspective.	Model Exam
	(f) a knowledge of contemporary issues	Model Exam
To learn the economics connected with power generation	(g) an ability to apply knowledge of mathematics, science, and engineering	Cycle Test 1,Model Exam
	(h) an ability to identify, formulate, and solve engineering problems	Cycle Test 1,Model Exam
	(i) the broad education necessary to understand the impact of engineering solutions in a global perspective.	Model Exam
	(j) a knowledge of contemporary issues	Cycle Test 1,Model Exam

Course Plan mapped with Student Outcomes

Required TEXT BOOKS

1.Uppal, S.L., *Electrical Power*, Khanna Publishers , New Delhi, 1997.
2.Soni, Gupta, Bhatnagar, *A Course in Electrical Power*, Dhanpat Rai & Sons, Delhi.1992.

REFERENCE BOOKS

1.Nagrath and Kothari , Modern Power System Analysis, Tata Mc Graw Hill.1989
2.Wadhwa, C.L., Generation, Distribution and Utilization of Electric Energy, New Age International Ltd.1998.
3.Deshpande MV, Elements of Electrical Power Station design, Pitman, New Delhi.1991.
4.V.K.Metha, Rohit Metha, Principles of power systems, S.Chand ,

Web Resources :

- www.energyblogs.com
- www.powergeneration.in

Prerequisite : Nil

INSTRUCTIONAL OBJECTIVES:

After the completion of this course successfully the students will know:

The generation of electrical power from different types of power plants likes thermal nuclear and hydro power stations.
The concepts of generation of electrical power using non conventional energy resources
The economics connected with power generation

Assessment Details

Cycle Test – I	:	10 Marks
Surprise Test	:	05 Marks
Cycle Test – II	:	10 Marks
Model Exam	:	20 Marks
Attendance	:	05 Marks
Total	:	50 Marks

Outcomes

Student who have successfully completed this course,

Instructional Objective	Student outcome

1.To learn generation of electrical power from different types of power plants like thermal nuclear and hydro power stations. 2.To understand the concepts of generation of electrical power using non conventional energy resources 3.To learn the economics connected with power generation	a).An ability to apply knowledge of mathematics, science, and engineering. e).An ability to identify, formulate, and solve engineering problems (h) the broad education necessary to understand the impact of engineering solutions in a global perspective. (j) a knowledge of contemporary issues

Detailed Session Plan

UNIT-I ECONOMICS OF GENERATION

Load and load duration curve – Load, demand and diversity factors – Plant capacity and plant use factors – choice of type of generation – choice of size and number of unit – cost of energy generated – Tariffs.

Session No.	Topics to be covered	Text book	Chap.no & Page No.	Instructional Objective	Student Outcome
1	Introduction	V.K.Mehtha, Rohit Mehtha, Principles of power systems, S.Chand	3&42-43	To learn the economics connected with power generation	(a) an ability to apply knowledge of mathematics, science, and engineering (b) an ability to identify, formulate, and solve engineering problems (c) the broad education necessary to understand the impact of engineering solutions in a global perspective. (d) a knowledge of contemporary issues
2	Load and load duration curve		3&44,47,50-58		
3	Load, demand and diversity factors		3&45-47		
4	Plant capacity and plant use factors		3&45-47		
5	Choice of type of generation, choice of size and number of unit		3&59-64		
6	Cost of energy generated		4&69-85		
7	Tariffs		5&87-99		

UNIT-II THERMAL POWER PLANTS

Location, Layout and working of steam and diesel power plants - Types of boilers and turbines and other accessories for steam and gas power plants, Environmental issues.

Session No.	Topics to be covered	Text book	Chap.no & Page No.	Instructional Objective	Student Outcome
8	Location, Layout and working of steam power plant	V.K.Metha, Rohit Metha, Principles of power systems, S.Chand	2&9-14	To learn generation of electrical power from different types of power plants like thermal nuclear and hydro power stations.	(a) an ability to apply knowledge of mathematics, science, and engineering (b) the broad education necessary to understand the impact of engineering solutions in a global perspective. (c) a knowledge of contemporary issues
9	Location, Layout and working of diesel power plants		2&28-31		
10	Types of boilers and other accessories for steam power plant.	B.R.Guptha Generation of electrical Energy	7&105-120		
11	Types of boilers and other accessories for steam power plant		7&105-120		
12	Types of turbines and other accessories for steam power plant		7&105-120		
13	Layout and working of gas power plants	V.K.Metha, Rohit Metha,	2&35-39		

14	Environmental issues	Principles of power systems, S.Chand	2&37-38		

UNIT – III NUCLEAR POWER PLANTS

Principles of nuclear power generation, Types of nuclear power plants and their comparison, Layout and working of nuclear power plants, Advantages and disadvantages of nuclear energy, Reactor control, Reactor safety, Environmental issues

Session No.	Topics to be covered	Text book	Chap.no & Page No.	Instructional Objective	Student Outcome
15	Principles of nuclear power generation	B.R.Guptha Generation of electrical Energy	9&160-165	To learn generation of electrical power from different types of power plants like thermal nuclear and hydro power stations	(a) an ability to apply knowledge of mathematics, science, and engineering (b) an ability to identify, formulate, and solve engineering problems (c) the broad education necessary to understand the impact of engineering solutions in a global perspective. (d) a knowledge of contemporary issues
16	Layout and working of nuclear power plants	V.K.Metha, Rohit Metha, B.R.Guptha Generation of electrical Energy	2&31-35		
17	Types of nuclear power plants and their comparison		9&165-170		
18	Advantages and disadvantages of nuclear energy, Reactor control, Reactor safety	B.R.Guptha Generation of electrical Energy	9&170-175		
19	Environmental issues		9&170-175		

UNIT – IV HYDRO POWER STATIONS

Layout and working, Types of turbines for high medium and low head plants, Advantages of hydro generation, Environmental issues, Hydro-Thermal scheduling problem.

Session No.	Topics to be covered	Text book	Chap.no & Page No.	Testing Methods	Instructional Objective	Student Outcome
20	Layout and working of hydro power plant	V.K.Metha, Rohit Metha, Principles of power systems, S.Chand	2&18-22		To learn generation of electrical power from different types of power plants like thermal compulsory nuclear and hydro power stations	(a) an ability to apply knowledge of mathematics, science, and engineering (b) an ability to identify, formulate, and solve engineering problems (c) the broad education necessary to understand the impact of engineering solutions in a global perspective. (d) a knowledge of contemporary issues
21	Types of turbines for high medium and low head plants	B.R.Guptha Generation of electrical Energy	133-134			
22	Pumped storage power plant		144-145			
23	Environmental issues. Comparison between conventional power plants		148-149			

24	Hydro-Thermal scheduling problem.		11&211-222		
25	Hydro-Thermal scheduling problem.		11&211-222		

UNIT _ V NON CONVENTIONAL POWER PLANTS (Block Diagram and Explanation In Respect Of Power Generation)

Basic concepts, Principle of working and layout of MHD, Solar, Wind, Tidal, Biomass and Geothermal Power Generation Systems.

Session No.	Topics to be covered	Text book	Chap.no & Page No.	Instructional Objective	Student Outcome
26	Principle of working and layout of MHD	B.R.Guptha Generation of electrical Energy	322-325	To understand the concepts of generation of electrical power using non conventional energy resources	(a) an ability to apply knowledge of mathematics, science, and engineering (b) an ability to identify, formulate, and solve engineering problems (c) the broad education necessary to understand the impact of engineering solutions in a global perspective. (d) a knowledge of contemporary issues
27	Principle of working and layout of solar		329-334		
28	Principle of working and layout of wind		342-349		
29	Principle of working and layout of tidal		351-354		
30	Principle of working and layout of Biomass and Geothermal		347-351		