

# MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN							
Department of Mechanical Engineering							
Name of the Subject	Power Plant Engineering	Name of the handling Faculty	Mrs.Yamini.S				
Subject Code	ME 8792	Year / Sem	IV/VII				
Acad Year	2022-23	Batch	2019-23				
Course Objective							
Providing an overview of Power Plants and detailing the role of Mechanical Engineers in their operation and maintenance							
Course Outcome							
CO1-Explain the layout, construction and working of the components inside a thermal power plant.							
CO2-Explain the layout, construction and working of the components inside a diesel, gas And combined cycle power plants.							
CO3-Explain the layout, construction and working of the components inside nuclear power plants.							
CO4-Explain the layout, construction and working of the components inside renewable energy power plants.							
CO5-Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.							
Lesson Plan							
Sl. No.	Topic(s)	T / R*	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc )	Blooms Level (L1-L6)	CO	PO
		Book					
UNIT I COAL BASED THERMAL POWER PLANTS							
1	Rankine cycle - improvisations	T1	1	PPT	L1,L2,L3,L4	CO1	PO1, PO2, PO3, PO6
2	Layout of modern coal power plant, Super Critical Boilers	T1	2	PPT	L1	CO1	PO1, PO2, PO3
3	FBC Boilers, Turbines, Condensers, Steam & Heat rate	T1	1	PPT/NPTEL	L1,L2	CO1	PO1, PO7, PO6
4	Subsystems of thermal power plants	T1	2	PPT	L1	CO1	PO7, PO3, PO6
5	Fuel and ash handling, Draught system, Feed water treatment.	T1	2	PPT	L1,L2	CO1	PO1, PO2, PO3, PO6
6	Binary Cycles and Cogeneration systems	T1	1	PPT	L1,L2	CO1	PO1, PO2, PO7, PO6
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
*Assignments given							
Evaluation method							
* Answers are evaluated through answer sheets							
UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS							
7	Otto Cycle	T1	1	PPT	L1,L2,L3,L4	CO2	PO1, PO2, PO3, PO6

8	Diesel Cycle	T1	1	PPT	L1,L2,L3,L4	CO2	PO1, PO2, PO3, PO6
9	Dual & Brayton Cycle	T1	1	PPT	L1,L2,L3,L4	CO2	PO1, PO2, PO3, PO6
10	Analysis & Optimization	T1	2	PPT	L3,L4	CO2	PO1, PO2, PO3, PO6
11	Components of Diesel Turbine power plants.	T1	1	PPT	L1	CO2	PO1, PO2
12	Components of Gas Turbine power plants.	T1	1	PPT	L1	CO2	PO1, PO2
13	Combined Cycle Power Plants.	T1	1	PPT	L1,L2	CO2	PO1, PO2
14	Integrated Gasifier based Combined Cycle systems	T1	1	PPT	L1,L2	CO2	PO6, PO7

**Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any**

\*Assignments given

**Evaluation method**

\* Answers are evaluated through answer sheets

### UNIT III NUCLEAR POWER PLANTS

15	Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants	T1	1	PPT	L1,L2	CO3	PO1, PO2, PO6, PO7
16	Working of Nuclear	T1	2	PPT	L1,L2,L3	CO3	PO1,PO2
17	Reactors : Boiling Water Reactor (BWR)	T1	1	PPT	L1,L2	CO3	PO3, PO6, PO7
18	Pressurized Water Reactor (PWR), CANada Deuterium-	T1	1	PPT	L1,L2	CO3	PO3, PO6, PO7
19	Uranium reactor (CANDU), Breeder	T1	1	PPT	L1,L2	CO3	PO3, PO6, PO7
20	Gas Cooled and Liquid Metal Cooled Reactors	T1	1	PPT	L1,L2	CO3	PO3, PO6, PO7
21	Safety measures for Nuclear Power plants	T1	2	PPT	L1,L2	CO3	PO3, PO6, PO7

**Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any**

\*Assignments given

**Evaluation method**

\* Answers are evaluated through answer sheets

### UNIT IV POWER FROM RENEWABLE ENERGY

22	Hydro Electric Power Plants	R2	2	PPT	L1,L2	CO4	PO1,PO2,PO3,PO4,PO5
23	Classification	R2	1	PPT	L1,L2	CO4	PO1,PO2
24	Typical Layout and associated components including Turbines	R2	1	PPT	L1	CO4	PO1,PO2
25	Principle, Construction and working of Wind	R2	1	PPT	L1,L2	CO4	PO1,PO2,PO3,PO4,PO5
26	Principle, Construction and working of Tidal	R2	1	PPT	L1,L2	CO4	PO1,PO2,PO3,PO4,PO5
27	Solar Photo Voltaic (SPV),	R2	1	PPT	L1	CO4	PO1,PO2,PO3,PO4,PO5
28	SolarThermal, Geo Thermal	R2	1	PPT	L1,L2	CO4	PO1,PO2,PO3,PO4,PO5
29	Biogas and Fuel Cell power systems	R2	1	PPT	L1,L2	CO4	PO1,PO2,PO3,PO4,PO5

**Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any**

\*Assignments given

<b>Evaluation method</b>										
* Answers are evaluated through answer sheets										
<b>UNIT V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS DRIVES</b>										
30	Power tariff types,	T1	2	PPT	L1,L2,L3,L4	CO5	PO3, PO6, PO7			
31	Load distribution parameters, load curve	T1	1	PPT	L1,L2,L3	CO5	PO3, PO6, PO7			
32	Comparison of site selection criteria	T1	1	PPT	L1,L2	CO5	PO3, PO6, PO7			
33	relative merits & demerits	T1	1	PPT	L1	CO5	PO1, PO2			
34	Capital & Operating Cost of different power plants	T1	2	PPT	L1	CO5	PO3, PO6, PO7			
35	Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants	T1	2	PPT	L1,L2	CO5	PO1, PO2, PO3			
<b>Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any</b>										
*Assignments given										
<b>Evaluation method</b>										
* Answers are evaluated through answer sheets										
<b>Content Beyond the Syllabus Planned</b>										
1	Powerplant instrumentation and control									
<b>Text Books</b>										
1	T1. Power Plant Engineering, PK Nag, TataMcGraw Hill publications									
<b>Reference Books</b>										
1	R1. Power Plant Technology, M.M. El-Wakil, Tata McGraw – Hill Publishing Company Ltd									
2	R2. Renewable energy, Godfrey Boyle, Oxford University Press									
3	R3. Standard Handbook of Power Plant Engineering, Thomas C. Elliott, Kao Chen and, McGraw – Hill.									
<b>Website / URL References</b>										
1	<a href="https://nptel.ac.in/courses/112/107/112107291">https://nptel.ac.in/courses/112/107/112107291</a>									
<b>Blooms Level</b>										
<b>Level 1 (L1) : Remembering</b>		Lower Order Thinking	Fixed Hour Exa ms	<b>Level 4 (L4) : Analysing</b>					Higher Order Thinking	Projects / Mini Projects
<b>Level 2 (L2) : Understanding</b>				<b>Level 5 (L5) : Evaluating</b>						
<b>Level 3 (L3) : Applying</b>				<b>Level 6 (L6) : Creating</b>						
<b>Mapping syllabus with Bloom’s Taxonomy LOT and HOT</b>										
<b>Unit No</b>	<b>Unit Name</b>	<b>L1</b>	<b>L2</b>	<b>L3</b>	<b>L4</b>	<b>L5</b>	<b>L6</b>	<b>LOT</b>	<b>HOT</b>	<b>Total</b>
<b>Unit 1</b>	COAL BASED THERMAL POWER PLANTS	6	4	1	1	0	0	11	1	12
<b>Unit 2</b>	DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS	7	5	4	3	0	0	16	3	19
<b>Unit 3</b>	NUCLEAR POWER PLANTS	7	7	1	0	0	0	15	0	15
<b>Unit 4</b>	POWER FROM RENEWABLE ENERGY	8	6	0	0	0	0	14	0	14
<b>Unit 5</b>	POWER FROM RENEWABLE ENERGY	6	4	2	1	0	0	12	1	13

Total						34	26	8	5	0	0	68	5	73
Total Percentage						46.58	36	10.9589	6.849	0	0	93	6.84932	100
CO PO Mapping														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2			2	2							
CO2	2	2	2			3	2						1	
CO3	1	1	2			3	3							
CO4	3	3	3			3	3							1
CO5	3	2	2			2	2							
Avg	3	2	2			3	2						1	1
Justification for CO-PO mapping														
CO1	PO1: Applying the knowledge of maths / science agreed moderatly PO2: Identifying and formulating the complex engineering problems agreed moderatly PO3: Getting solutions for complex engineering problems agreed moderatly PO6: Applying the knowledge to the society in safe and healthy way agreed moderatly PO7: Understanding of engineering solutions and demonstrating that for sustainable agreed moderatly													
CO2	PO1: Applying the knowledge of maths / science agreed moderatly PO2: Identifying and formulating the complex engineering problems agreed moderatly PO3: Getting solutions for complex engineering problems agreed moderatly PO6: Applying the knowledge to the society in safe and healthy way agreed strongly PO7: Understanding of engineering solutions and demonstrating that for sustainable agreed moderatly													
CO3	PO1: Applying the knowledge of maths / science agreed lowerely PO2: Identifying and formulating the complex engineering problems agreed lowerely PO3: Getting solutions for complex engineering problems agreed moderatly PO6: Applying the knowledge to the society in safe and healthy way agreed strongly PO7: Understanding of engineering solutions and demonstrating that for sustainable agreed strongly													
CO4	PO1: Applying the knowledge of maths / science agreed strongly PO2: Identifying and formulating the complex engineering problems agreed strongly PO3: Getting solutions for complex engineering problems agreed strongly PO6: Applying the knowledge to the society in safe and healthy way agreed strongly PO7: Understanding of engineering solutions and demonstrating that for sustainable agreed strongly													
CO5	PO1: Applying the knowledge of maths / science agreed strongly PO2: Identifying and formulating the complex engineering problems agreed moderatly PO3: Getting solutions for complex engineering problems agreed moderatly PO6: Applying the knowledge to the society in safe and healthy way agreed moderatly PO7: Understanding of engineering solutions and demonstrating that for sustainable agreed moderatly													
3		High level			2		Moderate level			1		Low level		
Name & Sign of Faculty Incharge : Mrs.Yamini.S														
Name & Sign of Subject Expert : Mr.Muhammed Irfan.A.A														
Head of the Department :														