

Academic lesson plan for Refrigeration and Air conditioning (Summer-2026)

Discipline:		Semester:	Name of the Teaching Faculty:	
MECHANICAL ENGG.		4th	DHARMA PRAKASH SAMAL	
Subject:		No. of days/per week class allotted: 03 Periods	Semester From date: 22/12/2025	
Refrigeration and Air conditioning			To date:	
			No of weeks: 15	
week	Class day	PERIODS	Theory Topics to be covered	
			UNIT-I: Introduction to Refrigeration	
1st	1	1	Definition of Refrigeration; Refrigerating effect- unit of	
	2	2	Definition of Refrigeration; Refrigerating effect- unit of refrigeration- Coefficient of performance;	
	3	3	Types of Refrigeration-Ice, dry ice, Steam jet, Throttling, Liquid	
2nd	1	4	Types of Refrigeration-Ice, dry ice, Steam jet, Throttling, Liquid	
	2	5	Carnot refrigeration	
	3	6	Carnot refrigeration	
3rd	1	7	Air refrigeration- Bell - Coleman cycle	
	2	8	PV& TS diagram; Advantage and disadvantages in air	
	3	9	PV& TS diagram; Advantage and disadvantages in air	
4th	1	10	Recap & Quiz	
			UNIT-II: Refrigeration systems:	
	2	11	Basic Components, Flow diagram of working of Vapour	
	3	12	Representation of the vapour compression cycle on P-H, T-S & P-	
5th	1	13	Expression for Refrigerating effect, work done and power	
	2	14	internal energy, internal latent heat, entropy of wet, dry and	
	3	15	Effects of super heating and under cooling, its advantages and	
6th	1	16	Simple Vapour absorptions cycle	
	2	17	Simple Electrolux system for domestic units; Comparison of	
	3	18	Steam calorimeters: Separating, throttling	
7th	1	19	Simple problems on vapour compression cycle.	
	2	20	Recap & Quiz	
			UNIT-III: Refrigeration equipment	
	3	21	Compressor - types of compressors; Hermetically sealed and Semi	
8th	1	22	Compressor - types of compressors; Hermetically sealed and Semi	
	2	23	Condensers - Air Cooled, water cooled, natural and forced	
	3	24	Condensers - Air Cooled, water cooled, natural and forced	
9th	1	25	Advantages and disadvantages	
	2	26	Advantages and disadvantages	
	3	27	Evaporators -natural, convection, forced convection types.	
10th	1	28	Recap & Evaluation	
	2	29	UNIT-IV:Steam Nozzles:Capillary tube; Automatic Expansion	
	3	30	Thermo- static expansion valve; High side and low side float	
11th	1	31	Thermo- static expansion valve; High side and low side float	
	2	32	Solenoid valve; Evaporator pressure regulator.	
	3	33	Application of refrigeration	
12th	1	34	Slow and quick freezing; Cold storage and Frozenstorage; Dairy	
	2	35	Ice making industry; Water coolers.	
	3	36	Recap & Quiz	
				UNIT-V: Air conditioning:
13th	1	37	Introduction to Air conditioning; Factors affecting Air	
	2	38	Psychometric process-sensible heating and cooling, Humidifying	
	3	39	Psychometric process-sensible heating and cooling, Humidifying	
14th	1	40	Adiabatic saturation process; Equipment used in air conditioning	
	2	41	Refrigeration and Air-conditioning tools: Tools used in	
	3	42	Air	
15th	1	43	Faults in refrigeration and air conditioning system; Servicing	
	2	44	Faults in refrigeration and air conditioning system; Servicing	
	3	45	Final Review & Test	

Dharma Prakash Samal

**DHARMA PRAKASH SAMAL
LECTURER STAGE-II, GOVT POLYTECHNIC
BHUBANESWAR**

Academic lesson plan for Thermal Engg-II(Summer-2026)

Discipline:		Semester:	Name of the Teaching Faculty:
MECHANICAL ENGG.		4th	DHARMA PRAKASH SAMAL
Subject:		No. of days/per week class allotted: 03 Periods	Semester From date: 22/12/2025
THERMAL ENGG-II			To date:
			No of weeks: 15
week	Class day	PERIODS	Theory Topics to be covered
			UNIT-I: Gas Turbines,Jet Propulsion:
1st	1	1	Air-standard Brayton cycle; Description with p-v and T-S
	2	2	Gas turbines Classification: open cycle gas turbines and closed cycle gas turbines; comparison of gas turbine with reciprocating
	3	3	General lay-out of Open cycle constant pressure gas turbine; P-V
2nd	1	4	General lay-out of Closed cycle gas turbine; P-V and T-S
	2	5	Principle of jet propulsion; Fuels used for jet propulsion;
	3	6	Applications of jet propulsion; Working of a turbojet engine
3rd	1	7	Principle of Ram effect; Working of a Ram jet engine; Principle
	2	8	Working principle of a rocket engine; Applications of rocket
	3	9	Comparison of jet and rocket propulsions.
4th	1	10	Recap & Quiz
			UNIT-II: Properties of Steam:
	2	11	Formation of steam under constant pressure; Industrial uses of
	3	12	liquid region, vapor region, wet region, superheat region, critical
5th	1	13	dryness fraction, wetness fraction, saturated steam, superheated
	2	14	internal energy, internal latent heat, entropy of wet, dry and
	3	15	Isochoric process, Isobaric process, Hyperbolic process
6th	1	16	Isothermal process, Isentropic process, Throttling process
	2	17	Polytropic process; Simple direct problems on the above using
	3	18	Steam calorimeters: Separating, throttling
7th	1	19	Combined Separating and throttling calorimeters – problems.
	2	20	Recap & Quiz
			UNIT-III: Steam Generators:
	3	21	Function and use of steam boilers; Classification of steam boilers
8th	1	22	Comparison of water tube and fire tube boilers; Description with
	2	23	Boiler mountings: Pressure gauge, water level indicator, fusible
	3	24	(dead weight type, spring loaded type, high pressure and low
9th	1	25	super heater and air preheater; Study of steam traps & separators;
	2	26	boiler horse power and boiler efficiency; Formula for the above
	3	27	Draught systems (Natural, forced & induced)
10th	1	28	Recap & Evaluation
	2	29	UNIT-IV:Steam Nozzles:Flow of steam through nozzle;
	3	30	Mollier chart
11th	1	31	Discharge of steam through nozzles
	2	32	Critical pressure ratio; Methods of calculation of cross- sectional
	3	33	exit for maxi- mum discharge
12th	1	34	Effect of friction in
	2	35	Super saturated flow in nozzles
	3	36	Working steam jet injector
13th	1	37	Simple numerical problems.
	2	38	Recap & Quiz
			UNIT-V: Steam Turbines
	3	39	Classification of steam turbines with examples; Difference
14th	1	40	Principle of working of a simple De-lavel turbine with line
	2	41	Expression for work done, axial thrust, tangential thrust, blade
	3	42	Working principle with line diagram of a Parson’s Reaction
15th	1	43	reaction turbine including data on
	2	44	Governing of steam turbines: Throttle, By-pass & Nozzle control
	3	45	Final Review & Test

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Academic lesson plan for Power station engineering (Summer-2026)

Discipline:		Semester:	Name of the Teaching Faculty:
MECHANICAL ENGG.		6th	DHARMA PRAKASH SAMAL
Subject:		No. of days/per week class allotted: 04 Periods	Semester From date: 22/12/2025
Power station engineering			To date:
			No of weeks: 15
week	Class day	PERIODS	Theory Topics to be covered
			UNIT-I: Introduction
1st	1	1	Describe sources of energy.
	2	2	Explain concept of Central and Captive power station
	3	3	Classify power plants.
	4	4	Importance of electrical power in day today life.
2nd	1	5	Overview of method of electrical power generation
			UNIT-II: THERMAL POWER STATIONS
	2	6	Layout of steam power stations.
	3	7	Steam power cycle. Explain Carnot vapour power cycle with P-V,
	4	8	Explain Rankine cycle with P-V, T-S & H-s diagram and
3rd	1	9	Explain Rankine cycle with P-V, T-S & H-s diagram and
	2	10	Solve Simple Problems.
	3	11	List of thermal power stations in the state with their capacities
	4	12	Boiler Accessories: Operation of Air pre heater, Operation of
4th	1	13	Expression for Refrigerating effect, work done and power
	2	14	Operation Electrostatic precipitator and Operation of super heater.
	3	15	Draught systems (Natural draught, Forced draught & balanced
	4	16	Simple Electrolux system for domestic units; Comparison of
5th	1	17	Draught systems (Natural draught, Forced draught & balanced
	2	18	team prime movers: Advantages & disadvantages of steam
	3	19	Performance of steam turbine: Explain Thermal efficiency, Stage
	4	20	Steam condenser: Function of condenser,
6th	1	21	Classification of condenser. function of condenser auxiliaries
	2	22	Condensers - Air Cooled, water cooled, natural and forced
	3	23	Classification of condenser. function of condenser auxiliaries
	4	24	Advantages and disadvantages
7th	1	25	air extraction pump, and circulating pump.
			Unit-03 NUCLEAR POWER STATIONS
	2	26	Classify nuclear fuel (Fissile & fertile material)
	3	27	Explain fusion and fission reaction.
	4	28	Explain working of nuclear power plants with block diagram .
08th	1	29	Explain the working and construction of nuclear reactor
	2	30	Compare the nuclear and thermal plants
	3	31	Explain the disposal of nuclear waste.
	4	32	Selection of site for nuclear power stations
09th	1	33	Selection of site for nuclear power stations
	2	34	List of nuclear power stations.
	3	35	Recap & Quiz
			Unit-04 DIESEL ELECTRIC POWER STATIONS
	4	36	State the advantages and disadvantages of diesel electric power
10th	1	37	Explain briefly different systems of diesel electric power stations:
	2	38	Explain briefly different systems of diesel electric power stations:
	3	39	Fuel storage and fuel supply system,
	4	40	Lubrication system,
11th	1	41	starting system,
	2	42	governing system.
	3	43	Selection of site for diesel electric power stations
	4	44	Performance and thermal efficiency of diesel electric power
12th	1	45	Final Review & Test
			unit-05 HYDEL POWER STATIONS:
	2	46	State advantages and disadvantages of hydroelectric power plant.
	3	47	Classify and explain the general arrangement of storage type
	4	48	hydroelectric project and explain its operation.
13th	1	49	hydroelectric project and explain its operation.
	2	50	Selection of site of hydel power plant
	3	51	List of hydro power stations with their capacities and number of
	4	52	Types of turbines and generation used.
14th	1	53	Simple problems.
	2	54	Simple problems.

	3	55	Final Review & Test
			unit-06 GAS TURBINE POWER STATIONS
	4	56	Selection of site for gas turbine stations.
15th	1	57	Fuels for gas turbine
	2	58	Elements of simple gas turbine power plants
	3	59	Merits, demerits and application of gas turbine power plants.
	4	60	Final Review & Test

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