APATI INSTITUTE OF ENGINERING & TECHNOLOGY(Polytechnic),JAGATPUR,CUTTACK

DEPARTMENT OF MECHANICAL ENGINEERING.

LESSON PLAN-2026 SUMMER

Discipline: **MECHANICAL ENGG**	Semester: **4th**	Name of the Teaching Faculty: **BHABANI SANKAR SAHOO**
Subject: **THERMAL ENGINEERING-II [MEPC-204 Th:2]**	No. of days/per week Class allotted:**03**	Semester From date:**22.12.2025** To Date :**18.04.2026** No. of Weeks:**15**

Week	Class Day	Theory Topics
1ST	1ST	I. Gas Turbines: Air-standard Brayton cycle; Description with P-V and T-S diagrams.
	2ND	Gas turbines Classification: open cycle gas turbines and closed cycle gas turbines.
	3RD	Comparison of gas turbine with reciprocating I.C. engines and steam turbines. Applications and limitations of gas turbines.
2ND	1ST	General lay-out of Open cycle constant pressure gas turbine P-V and T-S diagrams and working
	2ND	General lay-out of Closed cycle gas turbine; P-V and T-S diagrams and working.
	3RD	Jet Propulsion: Principle of jet propulsion; Fuels used for jet propulsion; Applications of jet propulsion
3RD	1ST	Working of a turbojet engine.
	2ND	Principle of Ram effect; Working of a Ram jet engine.
	3RD	Principle of Rocket propulsion; Working principle of a rocket engine.
4TH	1ST	Applications of rocket propulsion; Comparison of jet and rocket propulsions.
	2ND	II. Properties of Steam: Formation of steam under constant pressure. Industrial uses of steam
	3RD	Basic definitions: saturated liquid line, saturated vapor line, liquid region, vapor region, wet region, superheat region, critical point, saturated liquid, saturated vapor, saturation temperature
5TH	1ST	Sensible heat, latent heat, wet steam, dryness fraction, wetness fraction, saturated steam, superheated steam, degree of superheater.
	2ND	Determination of enthalpy, internal energy, internal latent heat, entropy of wet, dry and superheated steam at a given pressure using steam tables
	3RD	Determination of enthalpy, internal energy, internal latent heat, entropy of wet, dry and superheated steam at a given pressure using Mollier chart
6TH	1ST	Isochoric process, Isobaric process
	2ND	Hyperbolic process, Isothermal process,
	3RD	Isentropic process, Throttling process, Polytropic process
7TH	1ST	Simple direct problems on the above using tables and charts; .
	2ND	Steam calorimeters: Separating, throttling, Combined Separating and throttling calorimeters – problems
	3RD	CLASS TEST
	1ST	III. Steam Generators: Function and use of steam boilers; Classification of steam

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8TH		boilers with examples
	2ND	Brief explanation with line sketch of Cochran. Brief explanation with line sketch of Babcock and Wilcox Boilers;
	3RD	Boiler mountings: Pressure gauge, water level indicator, fusible plug, blow down cock, stop valve, safety valve, (dead weight type, spring loaded type, high pressure and low water safety alarm)
9TH	1ST	Boiler accessories: feed pump, economizer, super heater and air preheater
	2ND	Study of steam traps & separators; Explanation of the terms: Actual evaporation, equivalent evaporation, factor of evaporation, boiler horse power and boiler efficiency
	3RD	Formula for the above terms without proof; Simple direct problems on the above
10TH	1ST	Draught systems (Natural, forced & induced).
	2ND	IV. Steam Nozzles: Flow of steam through nozzle.
	3RD	Velocity of steam at the exit of nozzle in terms of heat drop using analytical method
11TH	1ST	Velocity of steam at the exit of nozzle in terms of heat drop using Mollier chart
	2ND	Simple numerical problems
	3RD	Discharge of steam through nozzles
12TH	1ST	Critical pressure ratio
	2ND	Methods of calculation of cross- sectional areas at throat and exit for maxi- mum discharge
	3RD	Effect of friction in nozzles and Super saturated flow in nozzles. Working steam jet injector. Simple numerical problems
13TH	1ST	Simple numerical problems.
	2ND	CLASS TEST
	3RD	V. Steam Turbines: Classification of steam turbines with examples; Difference between impulse & reaction turbines
14TH	1ST	Principle of working of a simple De-lavel turbine with line diagrams- Velocity diagrams
	2ND	Expression for work done, axial thrust, tangential thrust, blade and diagram efficiency, stage efficiency, nozzle efficiency
	3RD	Methods of reducing rotor speed; compounding for velocity, for pressure or both pressure and velocity
15TH	1ST	Working principle with line diagram of a Parson's Reaction turbine–velocity diagrams; Simple problems on single stage impulse turbines (without blade friction)
	2ND	Reaction turbine including data on blade height. Bleeding, re-heating and re-heating factors(Problems omitted
	3RD	Governing of steam turbines: Throttle, By-pass & Nozzle control governing.

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Learning Resources:

SL.NO.	Name of the Book	Author Name	Publisher
01.	A Course in Thermal Engineering	S. Domkundwar & C. P. Kothandaraman	Dhanpat Rai & Publication, New Delhi
02.	Thermal Engineering	P. L. Ballaney	Khanna Publishers,2002
03.	Treatise on Heat Engineering in MKS and SI Units	V. P. Vasandani & D.S. Kumar	Metropolitan Book Co. Pvt. Ltd, New Delhi.
04.	Thermal Engineering	R. K. Rajput	Laxmi publications Pvt Ltd, New Delhi.

Prepared By

BHABANI SANKAR SAHOO
Lecturer, Mechanical Engg. Deptt.
G.I.E.T (Polytechnic), Jagatpur, Cuttack

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Jagatpur,cuttack

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Signature of sr.lect.
GIET(polytechnic)
Jagatpur,cuttack
Mechanical Engg. Deptt.
GIET (Polytechnic) Jagatpur

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Signature of Principal.
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Jagatpur,cuttack
Principal
GIET (Polytechnic)
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