GANAPATI INSTITUTE OF ENGINERING & TECHNOLOGY(Polytechnic),JAGATPUR,CUTTACK
DEPARTMENT OF MECHANICAL ENGINEERING.
LESSON PLAN-2026 WINTER

Discipline: **MECHANICAL ENGG**	Semester: **3RD**	Name of the Teaching Faculty: **Er.BHABANI SANKAR SAHOO**
Subject: **THERMAL ENGINEERING-I [MEPC-209 Th:5]**	No. of days/per week Class allotted:**03**	Semester From date:**01.07.2026** To Date :**05.11.2026** No. of Weeks:**15**
Week	**Class Day**	**Theory Topics**
1ST	1ST	**I. Introduction to Thermodynamics**: Thermodynamic Systems (closed, open, isolated).
	2ND	Thermodynamic properties of a system (pressure, volume, temperature, entropy, enthalpy, Internal energy and units of measurement) Intensive and extensive properties.
	3RD	Define thermodynamic processes, path, cycle, state, path function, point function.
2ND	1ST	Thermodynamic Equilibrium Quasi-static Process.
	2ND	Laws of thermodynamics (statements only)
	3RD	Sources of Energy: Brief description of energy Sources Classification of energy sources Renewable, Non-Renewable; Fossil fuels (CNG & LPG)
3RD	1ST	Solar Energy: Flat plate and concentrating collectors & its applications (working principles of Solar Water Heater, Photovoltaic Cell, Solar Distillation)
	2ND	Definitions of Wind Energy; Tidal Energy ,Ocean Thermal Energy
	3RD	Definitions of Geothermal Energy; Biogas, Biomass, Biodiesel
4TH	1ST	Definitions of Hydraulic Energy, Nuclear Energy, Fuel cell.
	2ND	**II. Internal Combustion Engines**: Assumptions made in air standard cycle analysis; Brief description of Carnot with P-V and T-S diagrams
	3RD	Brief description of Otto cycles with P-V and T-S diagrams
5TH	1ST	Brief description of Diesel cycles with P-V and T-S diagrams
	2ND	Internal and external combustion engines, advantages of I.C. engines over external combustion engines; classification of I.C. engines
	3RD	Neat sketch of I.C. engine indicating component parts, Function of each part and materials used for the component parts - Cylinder, crank case, crank pin, crank, crank shaft, connecting rod, wrist pin, piston, cooling pins cylinder heads, exhaust valve, inlet valve
6TH	1ST	Working of four-stroke and two stroke petrol engines
	2ND	Working of four-stroke and two stroke diesel engines

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	3RD	Comparison of two stroke and four stroke engines, Comparison of C.I. and S.I. engines
7TH	1ST	Valve timing and port timing diagrams for four stroke and two stroke engines.
	2ND	III I.C. Engine Systems: Fuel system of Petrol engines, Principle of operation of simple and Zenith carburetors
	3RD	Fuel system of Diesel engines, Types of injectors and fuel pumps
8TH	1ST	Cooling system: air cooling, water cooling system with thermo siphon method of circulation and water cooling system with radiator and forced circulation (description with line diagram).
	2ND	Cooling system: air cooling, water cooling system with thermo siphon method of circulation and water cooling system with radiator and forced circulation (description with line diagram).
	3RD	Comparison of air cooling and water cooling system;
9TH	1ST	Ignition systems – Battery coil ignition and magneto ignition (description and working). Comparison of two systems
	2ND	Types of lubricating systems used in I.C. engines with line diagram
	3RD	Types of governing of I.C. engines – hit and miss method, quantitative method, qualitative method and combination methods of governing; their applications
10TH	1ST	Objective of super charging.
	2ND	IV. Performance of I.C. Engines: Brake power; Indicated power Frictional power
	3RD	Brake and Indicated mean effective pressures;
11TH	1ST	Brake thermal efficiency and Indicated thermal efficiency
	2ND	Mechanical efficiency , Relative efficiency
	3RD	Performance test Morse test
12TH	1ST	Simple numerical problems
	2ND	Heat balance sheet
	3RD	Methods of determination of B.P., I.P. and F.P.
13TH	1ST	Simple numerical problems on performance of I.C. engines.
	2ND	Unit-V: Air Compressors: Functions of air compressor, Uses of compressed air, Types of air compressors.
	3RD	Single stage reciprocating air compressor - its construction and working (with line diagram) using P-V diagram
14TH	1ST	Multi stage compressors – Advantages over single stage compressors
	2ND	Rotary compressors: Centrifugal compressor, axial flow type compressor and vane type compressors
	3RD	Refrigeration & Air-conditioning: Refrigeration, Refrigerant, COP
15TH	1ST	Air Refrigeration system: components, working & applications, Vapour Compression system: components, working & applications
	2ND	Air conditioning: Classification of Air-conditioning systems, Comfort and Industrial ,Window Air Conditioner
	3RD	Air-Conditioning: Summer Air-Conditioning system, Winter Air-Conditioning system, Year-round Air-Conditioning system

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Learning Resources:

SL.NO.	Name of the Book	Author Name	Publisher
01.	Introduction to Renewable Energy.	Vaughn Nelson	CRC Press
02.	Thermal Engineering	P. L. Ballaney	Khanna Publishers,2002
03.	A Course in Thermal Engineering	S. Domkundwar & C.P. Kothandaraman.	Dhanpat Rai.
04.	Thermal Engineering	R. S. Khurmi and J.K. Gupta.	18th Edition, S. Chand & Co, New Delhi.
05.	Thermal Engineering	R. K. Rajput	8th Edition, Laxmi publications Pvt Ltd, New Delhi.

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Prepared By

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