

GOVT. POLYTECHNIC, NAYAGARH

3rd SEMESTER MECHANICAL ENGINEERING

LESSON PLAN (2025-26)

SUBJECT: THERMAL ENGINEERING-I

TOTAL PERIODS-48

NAME OF FACULTY: Mrs. Monalisa Sahoo, Br. Lect., & HOD

THEORY-3P/WEEK

W.E.F: 14/07/2025 to 15/11/2025

Sl No.	week	Day	Topics to be covered
1	1 st	1 st day	Introduction to Thermodynamics: Thermodynamic Systems (closed, open, isolated);
		2 nd day	Thermodynamic properties of a system (pressure, volume, temperature, entropy, enthalpy, internal energy and units of measurement)
		3 rd day	Intensive and extensive properties
Topics to be covered			
2	2 nd	1 st day	Define thermodynamic processes, path, cycle, state, path function, point function;
		2 nd day	Sources of Energy: Brief description of energy sources: Classification of energy sources: Renewable, Non-Renewable; Fossil fuels (CNG & LPG)
		3 rd day	Solar Energy: Flat plate and concentrating collectors & its applications (working principles of Solar Water Heater, Photovoltaic Cell, Solar Distillation)
Topics to be covered			
3	3 rd	1 st day	Definitions of Wind Energy; Tidal Energy; Ocean Thermal Energy; Geothermal Energy; Biogas, Biomass, Bio-diesel; Hydraulic Energy, Nuclear Energy; Fuel cell.
		2 nd day	Internal Combustion Engines: Assumptions made in air standard cycle analysis; Brief description of Carnot, Otto and Diesel cycles with P-V and T-S diagrams
		3 rd day	Internal and external combustion engines; advantages of I.C. engines over external combustion engines; classification of I.C. engines;
Topics to be covered			
4	4 th	1 st day	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
		2 nd day	Working of four-stroke and two stroke petrol and diesel engines;
		3 rd day	Comparison of two stroke and four stroke engines; Comparison of C.I. and S.I. engines;
Topics to be covered			
5	5 th	1 st day	Valve timing and port timing diagrams for four stroke and two stroke engines.
		2 nd day	I.C. Engine Systems: Fuel system of Petrol engines; Principle of operation of simple and Zenith carburetors
		3 rd day	Fuel system of Diesel engines; Types of injectors and fuel pumps
6		1 st day	Cooling system: air cooling, water cooling system with thermo siphon method of circulation and water cooling system with radiator and forced circulation
		2 nd day	Comparison of air cooling and water cooling system

		3rd day	Ignition systems – Battery coil ignition and magneto ignition (description and working).
SI No.	week	Day	Topics to be covered
7		1st day	Comparison of two systems;;
		2nd day	Types of lubricating systems used in I.C. engines with line diagram
		3rd day	Types of governing of I.C. engines – hit and miss method, quantitative method, qualitative method and combination methods of governing; their applications
SI No.	week	Day	Topics to be covered
8		1st day	Objective of super charging
		2nd day	Performance of I.C. Engines: Brake power; Indicated power; Frictional power; Brake and Indicated mean effective pressures;
		3rd day	Brake and Indicated thermal efficiencies; Mechanical efficiency; Relative efficiency;
SI No.	week	Day	Topics to be covered
9		1st day	Performance test; Morse test; Heat balance sheet
		2nd day	Methods of determination of B.P., I.P. and F.P.;
		3rd day	Simple numerical problems on performance of I.C. engines
SI No.	week	Day	Topics to be covered
10		1st day	Simple numerical problems on performance of I.C. engines
		2nd day	Air Compressors: Functions of air compressor; Uses of compressed air;
		3rd day	Types of air compressors;
SI No.	week	Day	Topics to be covered
11		1st day	Single stage reciprocating air compressor - Its construction and working (with line diagram) using P-V diagram;
		2nd day	Multi stage compressors – Advantages over single stage compressors;
		3rd day	Rotary compressors:
SI No.	week	Day	Topics to be covered
12		1st day	Centrifugal compressor,
		2nd day	axial flow type compressor and vane type compressors.
		3rd day	Refrigeration & Air-conditioning: Refrigeration; Refrigerant; COP
SI No.	week	Day	Topics to be covered
13		1st day	Air Refrigeration system: components, working & applications;
		2nd day	Vapour Compression system: components, working & applications
		3rd day	Air conditioning; Classification of Air- conditioning systems;

Sl No.	week	Day	Topics to be covered
14		1st day	Comfort and Industrial Air-Conditioning
		2nd day	Window Air- Conditioner;
		3rd day	Summer Air-Conditioning system,
Sl No.	week	Day	Topics to be covered
15		1st day	Winter Air-Conditioning system,
		2nd day	Year-round Air-Conditioning system
		3rd day	REVISION

REFERENCES:

- 1 Introduction to Renewable Energy – Vaughn Nelson, CRC Press
- 2 Thermal Engineering – P. L. Ballaney, Khanna Publishers, 2002
- 3 A Course in Thermal Engineering – S. Domkundwar & C.P. Kothandaraman, Dhanpat Rai.
- 4 Thermal Engineering – R. S. Khurmi and J.K. Gupta, 18th Edition, S. Chand & Co, New Delhi.
- 5 Thermal Engineering – R. K. Rajput, 8th Edition, Laxmi publications Pvt Ltd, New Delhi.


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