

**GOVT. POLYTECHNIC, NAYAGARH****3<sup>rd</sup> SEMESTER MECHANICAL ENGINEERING****LESSON PLAN (2025-26)****SUBJECT- THERMAL ENGINEERING-I****TOTAL PERIODS-45****NAME OF FACULTY: Mrs. Monalisa Sahoo, Sr.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 <sup>st</sup>	1 <sup>st</sup> day	<b>Introduction to Thermodynamics:</b> Thermodynamic Systems (closed, open, isolated) ;
		2 <sup>nd</sup> day	Thermodynamic properties of a system (pressure, volume, temperature, entropy, enthalpy, Internal energy and units of measurement)
		3 <sup>rd</sup> day	Intensive and extensive properties
Sl No.	week	Day	Topics to be covered
2	2 <sup>nd</sup>	1 <sup>st</sup> day	Define thermodynamic processes, path, cycle , state, path function, point function;
		2 <sup>nd</sup> day	<b>Sources of Energy:</b> Brief description of energy Sources: Classification of energy sources: Renewable, Non-Renewable; Fossil fuels (CNG & LPG)
		3 <sup>rd</sup> day	Solar Energy: Flat plate and concentrating collectors & its applications (working principles of Solar Water Heater, Photovoltaic Cell, Solar Distillation)
Sl No.	week	Day	Topics to be covered
3	3 <sup>rd</sup>	1 <sup>st</sup> day	Definitions of Wind Energy; Tidal Energy; Ocean Thermal Energy; Geothermal Energy; Biogas, Biomass, Bio-diesel; Hydraulic Energy, Nuclear Energy; Fuel cell.
		2 <sup>nd</sup> day	<b>Internal Combustion Engines:</b> Assumptions made in air standard cycle analysis; Brief description of Carnot, Otto and Diesel cycles with P-V and T-S diagrams
		3 <sup>rd</sup> day	Internal and external combustion engines; advantages of I.C. engines over external combustion engines; classification of I.C. engines;
Sl No.	week	Day	Topics to be covered
4	4 <sup>th</sup>	1 <sup>st</sup> 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 <sup>nd</sup> day	Working of four-stroke and two stroke petrol and diesel engines;
		3 <sup>rd</sup> day	Comparison of two stroke and four stroke engines; Comparison of C.I. and S.I. engines;
Sl No.	week	Day	Topics to be covered
5	5 <sup>th</sup>	1 <sup>st</sup> day	Valve timing and port timing diagrams for four stroke and two stroke engines.
		2 <sup>nd</sup> day	<b>I.C. Engine Systems:</b> Fuel system of Petrol engines; Principle of operation of simple and Zenith carburettors
		3 <sup>rd</sup> day	Fuel system of Diesel engines; Types of injectors and fuel pumps
6		1 <sup>st</sup> day	Cooling system: air cooling, water cooling system with thermo siphon method of circulation and water cooling system with radiator and forced circulation
		2 <sup>nd</sup> day	Comparison of air cooling and water cooling system



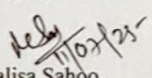
		3 <sup>rd</sup> day	Ignition systems – Battery coil ignition and magneto ignition (description and working).
Sl No.	week	Day	Topics to be covered
7		1 <sup>st</sup> day	Comparison of two systems;;
		2 <sup>nd</sup> day	Types of lubricating systems used in I.C. engines with line diagram
		3 <sup>rd</sup>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



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