

Discipline: Mechanical Engg.	3RD SEMESTER	Name of the Teaching Faculty: PRABIR KUMAR SWAI Designation: Lecturer S-II(MECHANICAL)
Subject: Thermal engineering -i (Th.5)	CLASS DAY/WEK	Semester From date: 01.07.2026 To date: 05.11.2026 No. of weeks: 19 Total class:
Week		Theory Topics
1ST	1ST	Introduction to thermal engineering and syllabus discussion.
	2ND	Thermodynamic Systems (closed, open, isolated)
	3RD	Thermodynamic properties of a system (pressure, volume, temperature, entropy, enthalpy, Internal energy and units of measurement)
2ND	1ST	Intensive and extensive properties ;
	2ND	Define thermodynamic processes, path, cycle , state, path function
	3RD	point function; Thermodynamic Equilibrium ;
3RD	1ST	Quasi-static Process ; Laws of thermodynamics (statements only)
	2ND	Sources of Energy: Brief description of energy Sources
	3RD	Classification of energy sources: Renewable, Non-Renewable; Fossil fuels (CNG & LPG)
	1ST	Solar Energy: Flat plate and concentrating collectors & its applications

4 TH	2 ND	(working principles of Solar Water Heater, Photovoltaic Cell, Solar Distillation)
	3 RD	(working principles of Solar Water Heater, Photovoltaic Cell, Solar Distillation)
5 TH	1 ST	(working principles of Solar Water Heater, Photovoltaic Cell, Solar Distillation)
	2 ND	Definitions of Wind Energy; Tidal Energy; Ocean Thermal Energy; Geothermal Energy; Biogas, Biomass, Bio-diesel; Hydraulic Energy, Nuclear Energy;
	3 RD	Fuel cell.
6 TH	1 ST	Assumptions made in air standard cycle analysis;
	2 ND	Brief description of Carnot cycle with P-V and T-S diagrams
	3 RD	Brief description of Otto cycle with P-V and T-S diagrams
7 TH	1 ST	Brief description Diesel cycles with P-V and T-S diagrams

	2 ND	Internal and external combustion engines; advantages of I.C. engines over external combustion engines;
	3 RD	classification of I.C. engines; 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;
8 TH	1 ST	Working of four-stroke and two stroke petrol and diesel engines
	2 ND	Working of four-stroke and two stroke petrol and diesel engines
	3 RD	Comparison of two stroke and four stroke engines; Comparison of C.I. and S.I. engines
9 th	1 ST	Valve timing and port timing diagrams for four stroke and two stroke engines.
	2 ND	I.C. Engine Systems: Fuel system of Petrol engines; Principle of operation of simple a carburettors
	3 RD	Principle of operation of Zenith carburettors;
	1 ST	Fuel system of Diesel engines; Types of injectors and fuel pumps;

10 TH	2 ND	Fuel system of Diesel engines; Types of injectors and fuel pumps
	3 RD	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).
11 TH	1 ST	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).
	2 ND	Comparison of air cooling and water cooling system; Ignition systems – Battery coil ignition
	3 RD	magneto ignition (description and working)
12 TH	1 ST	Comparison of two systems; Types of lubricating systems used in I.C. engines with line diagram;
	2 ND	Types of governing of I.C. engines – hit and miss method, quantitative method, qualitative method and combination methods of governing; their applications; Objective of super charging.
	3 RD	Types of governing of I.C. engines – hit and miss method, quantitative method, qualitative method and combination methods of governing; their applications; Objective of super charging.
13 TH	1 ST	Performance of I.C. Engines: Brake power; Indicated power; Frictional power; Brake and Indicated mean effective pressures
	2 ND	Brake and Indicated thermal efficiencies; Mechanical

		efficiency;Relative efficiency
14 th	3 RD	Performance test; Morse test; Heat balance sheet; Methods of determination of B.P., I.P. and F.P.;
	1 ST	Simple numerical problems on performance of I.C. engines.
	2 ND	Simple numerical problems on performance of I.C. engines.
	3 RD	Simple numerical problems on performance of I.C. engines.
15 th	1 ST	Air Compressors: Functions of air compressor; Uses of compressed air; Types of air compressors; Single stage reciprocating air compressor - its construction and working (with line diagram) using P-V diagram;
	2 ND	Air Compressors: Functions of air compressor; Uses of compressed air; Types of air compressors; Single stage reciprocating air compressor - its construction and working (with line diagram) using P-V diagram;
	3 RD	Multi stage compressors – Advantages over single stage compressors;
16 th	1 ST	Rotary compressors: Centrifugal compressor
	2 ND	axial flow type compressor
	3 RD	vane type compressors
	1 ST	Refrigeration & Air-conditioning: Refrigeration; Refrigerant; COP; Air Refrigeration system: components, working & applications

17 th	2 ND	Vapour Compression system: components, working & applications
	3 RD	Air conditioning; Classification of Air- conditioning systems; Comfort and Industrial Air-Conditioning
18 th	1 ST	Window Air- Conditioner; Summer Air-Conditioning system
	2 ND	Winter Air-Conditioning system
	3 RD	Year-round Air-Conditioning system.
19 th	1 ST	revision
	2 ND	revision
	3 RD	revision

Prepared by:
Prabir Kumar Swain

Prabir kumar swain
Lecturer stage-II (Mechanical)
Govt. Polytechnic, Sonepur

Checked by

H. B. D.

Dept. of Mech. Engg.
Govt. Polytechnic, Sonepur

Approved by

Academic Coordinator
Govt. Polytechnic, Sonepur