Lesson plan

Name of the Faculty : Preeti
Discipline : Mechanical Engg.
Semester : 3rd
Subject : TD-1
Lessonplanduration: 15weeks(fromSeptember2023toDecember2023)

Week	Theory		Practical	
	Lecture Day	Topic (including assignments /tests)	Practical Day	Topic
Week 1st	1st	**Fundamental Concepts**: Thermodynamic state and system, boundary, surrounding, universe, thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic,	1st	Determination of temperature by Thermocouple
	2nd	properties of system – intensive and extensive, thermodynamic equilibrium, quasi – static process,		
	3rd	reversible and irreversible processes, Zeroth law of thermodynamics, definition of properties like pressure, volume, temperature, enthalpy and internal energy.		
Week 2nd	1st	**Laws of Perfect Gases:** Definition of gases, explanation of perfect gas laws – Boyle's law, Charle's law,	1st	Determination of temperature by Pyrometer
	2nd	Avagadro's law, Regnault's law, Universal gas constant, Characteristic gas constants and its derivation.		
	3rd	Specific heat at constant pressure, specific heat at constant volume of a gas, derivation of an expression for specific heats with characteristics, simple numerical problems on gas equation.		
Week 3rd	1st	Thermodynamic Processes Types of thermodynamic processes – isochoric, isobaric	1st	Determination of temperature by Infrared thermometer
	2nd	isothermal, adiabatic, isentropic, polytropic and throttling processes, equations representing the processes		
	3rd	Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for isochoric, isobaric		
Week 4th	1st	Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for isothermal, adiabatic	1st	Study the working of Nestler boiler.
	2nd	Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for isentropic, polytropic and		

		throttling processes		
	3rd	**Laws of Thermodynamics** Laws of conservation of energy, first law of thermodynamics (Joule's experiment) and its limitations, Steady flow energy equation		
Week 5th	1st	Application of steady flow energy equation for turbines, pump, boilers, compressors, nozzles, and evaporators	1st	Study of working of high pressure boiler.
	2nd	Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement, Classius statement,		
	3rd	equivalency of statements, Perpetual motion Machine of first kind, second kind		
Week 6th	1st	Carnot engine, Introduction of third law of thermodynamics, concept of irreversibility and concept of entropy	1st	Demonstration of mountings and accessories on a boiler.
	2nd	**Steam Generators** Uses of steam, classification of boilers, comparison of fire tube and water tube boilers.		
	3rd	Construction and working of Nestler boiler,		
Week 7th	1st	Construction and working of Babcock & Wilcox Boiler.	1st	Determination of dryness fraction of steam using calorimeter.
	2nd	function of various boiler mounting and accessories,		
	3rd	Introduction to modern boilers – Benson boiler.		
Week 8th	1st	**Properties of Steam:** Formation of steam and related terms, thermodynamic properties of steam, steam tables,	1st	Demonstrate the working of air compressor
	2nd	sensible heat, latent heat, internal energy of steam		
	3rd	entropy of water, entropy of steam, T- S diagrams, Mollier diagram (H – S Chart),		
Week 9th	1st	Expansion of steam, Hyperbolic, reversible adiabatic and throttling processes,	1st	Determination of temperature by Infrared thermometer
	2nd	determination of quality of steam (dryness fraction),		
	3rd	**Ideal and Real Gases** Concept of ideal gas, enthalpy and specific heat capacities of an ideal gas		
Week 10th	1st	P – V – T surface of an ideal gas, triple point,	1st	Demonstrate the working of air compressor
	2nd	real gases, Vander-Wall's equation		
	3rd	**Air Compressors** Functions of air compressor – uses of compressed air		
Week 11th	1st	, type of air compressors	1st	Determination of dryness fraction of steam using calorimeter
	2nd	Single stage reciprocating air compressor, its construction and working,		
	3rd	representation of processes involved on P – V diagram, calculation of work done		

Week 12th	1st	Multistage compressors –– advantages over single stage compressors,	1st	Study the working of Nestler boiler.
	2nd	use of air cooler, condition of minimum work in two stage compressor (without proof).		
	3rd	Rotary compressors – types		
Week 13th	1st	working and construction of centrifugal compressor	1st	Demonstrate the working of air compressor
	2nd	working and construction of axial flow compressor, vane type compressor		
	3rd	working and construction of vane type compressor		
Week 14th	1st	REVISION	1st	Determination of dryness fraction of steam using calorimeter
	2nd	test		
	3rd	Previous year papers		
Week 15th	1st	REVISION	1st	Viva question
	2nd	test		
	3rd	Previous year papers		

				- Taper turning operation - Circular interpolation
	2nd	Concept of Actuators & its types		
	3rd	Transducers & its types		
Week 6th	1st	Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement	1st	**Practice**
	2nd	Classius statement, equivalency of statements		
	3rd	Perpetual motion Machine of first kind, second kind		
Week 7th	1st	Carnot engine	1st	Develop a part programme for the following milling operation and make the job on CNC milling - Plain milling - Slot milling
	2nd	Introductionofthirdlawofthermodynamics,concept ofirreversibilityandconceptofentropy		
	3rd	Unit – Ideal and Real Gases Conceptofidealgas,enthalpyandspecificheat capacities of an idealgas,		
Week 8th	1st	P – V – T surface of an ideal gas, triple point	1st	Develop a part programme for the following milling operation and make the job on CNC milling Contouring - Pocket milling
	2nd	Real gases, Vander-Wall's equation		
	3rd	Unit- Properties of Steam Formationofsteamandrelatedterms		
Week 9th	1st	Thermodynamicpropertiesofsteam,steamtables, sensibleheat,latentheat,internalenergyofsteam	1st	Preparation of work instructions for machine operator
	2nd	Entropy of water, entropy of steam, T- S diagrams		
	3rd	Mollier diagram (H – S Chart), Expansion ofsteam,		
Week 10th	1st	Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement	1st	Practice
	2nd	Classius statement, equivalency of statements		
	3rd	Perpetual motion Machine of first kind, second kind		
Week 11th	1st	Carnot engine	1st	Preparation of preventive maintenance schedule for CNC machine.
	2nd	Introductionofthirdlawofthermodynamics,concept ofirreversibilityandconceptofentropy		

	3rd	Common problems in CNC machines related to pneumatic, PC components &electronic components.		

Week 12th	1st	diagnostic study of common problems and remedies,	1st	Demonstration through industrial visit for awareness of actual working of FMS in production.
	2nd	use of on-line fault finding diagnosis tools in CNC machines, methods of using discussion forums, environmental problems.		
	3rd	**Automation and NC system-** Automation, suitability of production system to automation		
Week 13th	1st	types, emerging trends in automation, automatic assembly,	1st	Use of software for turning operations on CNC turning center
	2nd	manufacture of printed circuit boards, manufacture of integrated Circuits		
	3rd	Overview of FMS, AGV, ASRS, Group technology,		
Week 14th	1st	CAD/CAM and CIM	1st	Use of software for milling operations on machine centres.
	2nd	Automated Identification system ,		
	3rd	concept of AI, Robotics, nomenclature of joints, motion		
Week 15th	1st	Revision	1st	Viva question
	2nd	Revision		
	3rd	Test		