

Academic Lesson Plan for Thermal Engineering-1 (Winter-2023)		
Discipline: Mechanical Engineering	Semester: 3rd	Name of Faculty: Dharma Prakash Samal
Subject: Thermal Engineering - 1	No. of days/ per week Class Allotted: 4	Semester from: 01/08/2023-30/11/2023
		No. of weeks: 15
Week	Class Day	Theory Topics
1st	1st	1) THERMODYNAMIC CONCEPTS AND TERMINOLOGY - Introduction
	2nd	Thermodynamics systems and its types - pressure, volume
	3rd	Temperature and its different scale of measurement
	4th	Macroscopic and microscopic approach of thermodynamics
2nd	1st	Basic of Entropy, Enthalpy and Internal Energy
	2nd	Intensive and Extensive properties
	3rd	Basic concept of process, path, cycle and state
	4th	Path function, Point function and its Difference
3rd	1st	State Thermodynamic equilibrium (what is Thermal, chemical and mechanical equilibrium)
	2nd	Discuss about Quasi static process
	3rd	Concept of Energy and its sources
	4th	Define Work and Heat and its comparison
4th	1st	Mechanical equivalent of heat, work transfer and Displacement work
	2nd	2) LAWS OF THERMODYNAMICS - State and Explain Zeroth law of Thermodynamics
	3rd	Zeroth law explanation and its application

	4th	State and Explain 1st Law of Thermodynamics
5th	1st	1st law of thermodynamics for process and cycle for closed system
	2nd	Limitation of 1st law of thermodynamics
	3rd	1st law of thermodynamics for open system and basic of control volume
	4th	Define steady flow energy equation and its derivation for open system
6th	1st	Define steady flow energy equation and its derivation for open system
	2nd	Application of 1st law of thermodynamic equation in Turbine and Compressor
	3rd	Introduction to 2nd law of thermodynamics
	4th	Discussion about Kelvin-Planck and Clausius statement
7th	1st	State and define heat engine, heat pump and refrigerator
	2nd	Efficiency calculation of heat engine and COP calculation of heat pump and refrigerator
	3rd	Numerical practice on SFEE, and efficiency of heat engine and COP of heat pump and refrigerator
	4th	3) PROPERTIES PROCESSES OF PERFECT GAS - INTRODUCTION
8th	1st	Define perfect gas and real gas and its difference, Boyle's law
	2nd	Define Charles's law and Gay-Lussac's law
	3rd	Define Avogadro's law and Dalton's law of partial pressure
	4th	Discuss about General gas equation, characteristics gas constant and universal gas constant

9th	1st	Explains specific heat of Gas (C_p and C_v), relation between C_p and C_v
	2nd	Define Enthalpy of Gas, derive relation between enthalpy, internal energy, pressure and volume
	3rd	work done during non flow process of Isobaric, Isochoric and Isothermal process
	4th	Derive work done of isothermal and adiabatic process
10th	1st	Derive work done of polytropic process
	2nd	Discussion of free expansion and throttling process
	3rd	Numerical on Boyle's law, Charles' law, Gay-Lussac law
	4th	Numerical on Avogadro's law and Dalton's law of partial pressure and General gas equation
11th	1st	Numerical on work transfer and heat transfer for different non flow process
	2nd	Numerical on enthalpy, specific heat C_p , C_v
	3rd	4) INTERNAL COMBUSTION ENGINE-INTRODUCTION
	4th	Explain and classify IC Engine
12th	1st	Terminology of IC Engines such as bore, dead centre, stroke volume, piston speed and RPM
	2nd	Explain the working principle of 4-stroke SI engine
	3rd	Discussion of difference between 4-stroke SI and CI engine
	4th	Explain the working principle of 2-stroke SI engine
	1st	Explain the working principle of 2-stroke CI engine

13th	2nd	Discussion of difference between 2-stroke SI and CI engine
	3rd	Discussion of Clausius inequality and explanation of entropy
	4th	Entropy calculation for different process and phase change
14th	1st	Discussion of Carnot theorem and its proof, Explanation of Carnot cycle and its derivation
	2nd	Numerical on both Carnot theorem and Carnot cycle
	3rd	Explanation about Diesel cycle and its efficiency derivation
	4th	Comparison between Otto, Diesel and Dual cycle
15th	1st	5) FUELS AND COMBUSTION-INTRODUCTION
	2nd	Define fuel and its types explanation
	3rd	Application of different types of fuel
	4th	Heating value of fuel and its types

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Academic Lesson REFRIGERATION AND AIR CONDITIONING-(Winter-2023)		
Discipline: Mechanical Engineering	Semester: 5TH	Name of Faculty: Dharma Prakash Samal
Subject: Rac	No. of days/ per week Class Allotted: 4	Semester from: 01/08/2023-30/11/2023
		No. of weeks: 15
Week	Class Day	Theory Topics
1st	1st	AIR REFRIGERATION CYCLE, Definition of refrigeration and unit of refrigeration
	2nd	Definition of COP
	3rd	Refrigerating effect (R.E)
	4th	Principle of working of open and closed air system of refrigeration
2nd	1st	Calculation of COP of Bell-Coleman cycle
	2nd	numerical on Calculation of COP of Bell-Coleman cycle
	3rd	numerical on Calculation of COP of Bell-Coleman cycle
	4th	SIMPLE VAPOUR COMPRESSION REFRIGERATION SYSTEM , schematic diagram of simple vapors
3rd	1st	Types of simple vapors compression refrigeration system
	2nd	Cycle with dry saturated vapors after compression.
	3rd	Cycle with wet vapors after compression.
	4th	Cycle with superheated vapors after compression.
4th	1st	Cycle with superheated vapors before compression.
	2nd	Cycle with subcooling of refrigerant
	3rd	Representation of above cycle on temperature
	4th	Numerical on above (determination of COP, mass

5th	1st	VAPOUR ABSORPTION REFRIGERATION SYSTEM,
	2nd	Practical vapor absorption refrigeration system
	3rd	Practical vapor absorption refrigeration system
	4th	COP of an ideal vapor absorption refrigeration system
6th	1st	Numerical on COP
	2nd	REFRIGERATION EQUIPMENTS, REFRIGERANT COMPRESSORS
	3rd	Principle of working and constructional detail of
	4th	Centrifugal compressor only theory
7th	1st	Important terms.
	2nd	Hermetically and semi hermetically sealed compressor.
	3rd	CONDENSERS , Principle of working and
	4th	Heat rejection ratio
8th	1st	Cooling tower and spray pond.
	2nd	EVAPORATORS , Principle of working and constructional
	3rd	Types of evaporator
	4th	Bare tube coil evaporator, finned evaporator,
9th	1st	REFRIGERANT FLOW CONTROLS, REFRIGERANTS
	2nd	Capillary tube
	3rd	Automatic expansion valve
	4th	Thermostatic expansion valve
10th	1st	REFRIGERANTS , Classification of refrigerants
	2nd	Desirable properties of an ideal refrigerant.
	3rd	Designation of refrigerant.
	4th	Thermodynamic Properties of Refrigerants.
11th	1st	Chemical properties of refrigerants.
	2nd	commonly used refrigerants, R-11, R-12, R-22, R-134a, R-717
	3rd	Substitute for CFC

	4th	Applications of refrigeration, cold storage
12th	1st	dairy refrigeration
	2nd	ice plant
	3rd	water cooler
	4th	frost free refrigerator
13th	1st	PSYCHOMETRICS & COMFORT AIR CONDITIONING SYSTEMS,
	2nd	Adiabatic saturation of air by evaporation of
	3rd	Psychrometric chart and uses.
	4th	Psychrometric processes
14th	1st	Sensible heating and cooling
	2nd	Cooling and dehumidification
	3rd	Heating and humidification
	4th	Adiabatic cooling with humidification
15th	1st	Total heating of a cooling process
	2nd	SHF, BPF,
	3rd	Adiabatic mixing, Problems on above, Effective temperature and comfort chart
	4th	AIR CONDITIONING SYSTEMS, Factors affecting comfort air

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