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DEPARTMENT OF MCHANICAL ENGINEERING

LESSON PLAN

Discipline: Mechanical	**Semester: 4th**	**Name of the Teaching faculty: SUSHANTA KUMAR MOHANTA**
Subject: TE-II	**No of Days/Week class alloted: 3**	**Semester from Date: 22/12/25 To Date: 18/04/26** **No of weeks: 15**
Week	**Class Day**	**Topics**
1st	1st	**UNIT:1 Gas Turbines:Air-standard Brayton cycle; Description with p-v and T-Sdiagrams**
	2nd	Gas turbines Classification: open cycle gas turbines and closed cycle gas turbine
	3rd	comparison of gas turbine with reciprocating I.C. engines and steam turbines
2nd	1st	Applications and limitations of gas turbines; General lay-out of Open cycle constant pressure gas turbine
	2nd	P-V and T-S diagrams and working; General lay-out of Closed cycle gas turbine; P-V and T-S diagrams and working.
	3rd	Jet Propulsion: Principle of jet propulsion; Fuels used for jet propulsion
3rd	1st	Applications of jet propulsion; Working of a turbojet engin
	2nd	Principle of Ram effect; Working of a Ram jet engine; Principle of Rocket propulsion
	3rd	Working principle of a rocket engine;
4th	1st	Applications of rocket propulsion; Comparison of jet and rocket propulsions.
	2nd	**Unit :2 Properties of Steam:Formation of steam under constant pressure; Industrial uses**
	3rd	Basic definitions: saturated liquid line, saturated vapor line, liquid region, vapor region, wet region, superheat region, critical point, saturated liquid, saturated vapor
5th	1st	saturation temperature, sensible heat, latent heat, wet steam, dryness fraction, wetness fraction,
	2nd	saturated steam, superheated steam, degree of superheat;
	3rd	Determination of enthalpy, internal energy, internal latent heat, entropy of wet, dry and superheated steam at a given pressure using steam tables and Mollier chart Isochoric process, Isobaric process
6th	1st	Hyperbolic process,Isothermal process, Isentropic proces
	2nd	Throttling process, Polytropic process
	3rd	Simple direct problems on the above using tables and charts

7th	1st	Simple direct problems on the above using tables and charts
		Steam calorimeters: Separating, throttling, Combined Separating and throttling calorimeters – problems
	2nd	**UNIT 03:Steam Generators**:Function and use of steam boilers; Classification of steam boilers with examples
	3rd	Brief explanation with line sketches of Cochran, Babcock and Wilcox Boilers; Comparison of water tube and fire tube boilers
8th	1st	Description with line sketches and working of modern high pressure boilers Lamont and Benson boilers; Boiler mountings
	2nd	Pressure gauge, water level indicator, fusible plug, blow down cock, stop valve, safety valve,
	3rd	(dead weight type, spring loaded type, high pressure and low water safety alarm)
		INTERNAL ASSESMENT
9th	1st	Boiler accessories: feed pump, economizer, super heater and air preheater; Study of steam traps & separators;
	2nd	Explanation of the terms: Actual evaporation, equivalent evaporation, factor of evaporation, boiler horse power and boiler efficienc
	3rd	Formula for the above terms without proof; Simple direct problems on the above
10th	1st	Draught systems (Natural, forced & induced
	2nd	**UNIT 04 :Steam Nozzles** Flow of steam through nozzle
	3rd	Velocity of steam at the exit of nozzle in terms of heat drop
11th	1st	analytical method
	2nd	Mollier chart
	3rd	Discharge of steam through nozzles
12th	1st	Critical pressure ratio
	2nd	Methods of calculation of crosssectional areas
	3rd	at throat and exit for maxi- mum discharge
13th	1st	Simple numerical problems.
	2nd	Simple numerical problems.
	3rd	**UNIT 05: Steam Turbines:**Classification of steam turbines with examples; Difference between impulse & reaction turbines
14th	1st	Principle of working of a simple De-lavel turbine with line diagrams- Velocity diagram
	2nd	Expression for work done, axial thrust, tangential thrust, blade and diagram efficiency, stage efficiency, nozzle efficiency
	3rd	Methods of reducing rotor speed; compounding for velocity, for pressure or both pressure and velocity
	1st	Working principle with line diagram of a Parson's Reaction turbine–velocity diagrams

15th	2nd	Simple problems on single stage impulse turbines (without blade friction)
	3rd	reaction turbine including data on blade height. Bleeding, re-heating and re-heating factors(Problems omitted) ; Governing ofsteam turbines: Throttle, By-pass & Nozzle control governing.

REFERENCES:

1. A Course in Thermal Engineering – S. Domkundwar & C. P. Kothandaraman, Dhanpat Rai & Publication, New Delhi
2. Thermal Engineering – R. K. Rajput, Laxmi Publication New Delhi
3. Thermal Engineering – P. L. Ballaney, Khanna Publishers, 2002
4. Treatise on Heat Engineering in MKS and SI Units – V. P. Vasandani & D.S. Kumar, Metropolitan Book Co. Pvt. Ltd, New Delhi.

Signature of Faculty