

Lesson Plan

Name of the Faculty : Mr. Pardeep
 Discipline : Mechanical Engineering
 Semester : 5th
 Subject : Fluid Machines (PCC-ME- 309G)
 Lesson Plan Duration : 15 Weeks (from Aug. 2020 to Nov. 2020)
 ** Work Load (Lecture) per week (in hours): Lectures-02, Practicals-01

Week	Theory		Practical	
	Lecture Day	Topic (including assignment/test)	Practical day	Topic
1 st	1 st	Impact of free jets: Impulse – momentum principle, jet impingement - on a stationary flat plate, inclined plate and a hinged plate,	1.	To study the constructional details of a Pelton turbine and draw its fluid flow circuit
	2 nd	Impact at the centre of a stationary vane, on a moving flat plate, inclined plate, a moving vane and a series of vanes		
2 nd	3 rd	Jet striking tangentially at the tip of a stationary vane and moving vane(s), jet propulsion of ships, Problems	2.	To draw the following performance characteristics of Pelton turbine-constant head, constant speed and constant efficiency curves
	4 th	Impulse Turbines: Classification – impulse and reaction turbines, water wheels, component parts, construction, operation and governing mechanism of a Pelton wheel,		
3 rd	5 th	work done, effective head, available head and efficiency of a Pelton wheel, design aspects, speed ratio, flow ratio, jet ratio,	3.	To study the constructional details of a Francis turbine and

	6 th	number of jets, number of buckets and working proportions, Performance Characteristics, governing of impulse turbines, Problems		draw its fluid flow circuit.
4 th	7 th	Francis Turbines: Component parts, construction and operation of a Francis turbine, governing mechanism,	4.	To draw the constant head, constant speed and constant efficiency performance characteristics of Francis turbine.
	8 th	work done by the turbine runner, working proportions and design parameters, slow, medium and fast runners		
5 th	9 th	degree of reaction, inward/outward flow reaction turbines, Performance Characteristics, Problems.	5.	To study the construction details of a Kaplan turbine and draw its fluid flow circuit.
	10 th	Propeller and Kaplan turbines: Component parts, construction and operation of a Propeller, Kaplan turbine,		
6 th	11 th	differences between the Francis and Kaplan turbines, draft tube - its function and different forms, Performance Characteristics	6.	To draw the constant head, speed and efficiency curves for a Kaplan turbine
	12 th	Governing of reaction turbine, Introduction to new types of turbine, Deriaz (Diagonal), Bulb, Tubular turbines		
7 th	13 th	Dimensional Analysis and Model Similitude: Dimensional homogeneity, Rayleigh's method and Buckingham's π theorem,	7.	To study the constructional details of a Centrifugal Pump and draw its characteristic curves.

	14 th	model studies and similitude, dimensionless numbers and their significance. Unit quantities, specific speed and model relationships for turbines,		
8 th	15 th	scale effect, cavitations – its causes, harmful effects and prevention,	8.	To study the constructional details of a Reciprocating Pump and draw its characteristics curves.
	16 th	Thomas cavitation factor, permissible installation height, Problems.		
9 th	17 th	Centrifugal Pumps: Classification, velocity vector diagrams and work done, manometric efficiency, vane shape, head capacity relationship and pump losses	9.	To study the construction details of a Gear oil pump and its performance curves
	18 th	pressure rise in impeller, minimum starting speed, design considerations, multi-stage pumps		
10 th	19 th	Similarity relations and specific speed, net positive suction head, cavitation and maximum suction lift,	10.	To study the constructional details of a Hydraulic Ram and determine its various efficiencies.
	20 th	performance characteristics. Brief introduction to axial flow, mixed flow and submersible pumps, Problems.		
11 th	21 th	Reciprocating Pumps: Construction and operational details, discharge coefficient, volumetric efficiency and slip		
	22 nd	work and power input, effect of acceleration and friction on indicator diagram (pressure – stroke length plot),		
12 th	23 nd	separation, air vessels and their utility, rate of flow into or from the air		

		vessel, maximum speed of the rotating crank		
	24 nd	characteristic curves, centrifugal vs reciprocating pumps, brief introduction to screw, gear, vane and radial piston pumps		
13 th	25 nd	Hydraulic systems: Function, construction and operation of Hydraulic accumulator		
	26 nd	hydraulic intensifier, hydraulic crane, hydraulic lift and hydraulic press		
14 th	27 nd	Fluid coupling and torque converter, Hydraulic ram, Problems.		
	28 nd	Revision		
15 th	29 nd	Revision		
	30 nd	Revision		