

LESSON PLAN

DEPARTMENT OF MECHANICAL ENGINEERING, ITT, CHOUDWAR

SUBJECT: HYDRAULIC MACHINES & INDUSTRIAL FLUID POWER

Periods: 4 per week

NAME OF FACULTY: SRIKANTA KUMAR PANIGRAHI, LECTURER(MECH)

SEMESTER: 5th

No. of weeks: 15

Week	Class Day	Theory / Practical Topics
1st	1 st	Hydraulic Turbines: Definition and classification of hydraulic machines & turbines, General Layout of Hydroelectric Power Plant
	2 nd	Various terminologies relating to turbines- Gross head, Net Head, Hydraulic Efficiency, Mechanical Efficiency, Volumetric Efficiency, Overall Efficiency
	3 rd	Distinguish between impulse turbine and reaction turbine Construction with various parts and working principle of Impulse turbine/ Pelton Wheel with neat diagram.
	4 th	Velocity diagram of moving blades, work done and derivation of various efficiencies of Impulse turbine, Condition for maximum Hydraulic Efficiency and Maximum Hydraulic Efficiency
2 nd	1 st	Points to remember for solving Problems on Pelton Wheel. Solving Problems on Pelton Wheel
	2 nd	Solving Problems on Pelton Wheel
	3 rd	Solving Problems on Pelton Wheel
	4 th	Fundamentals regarding Reaction Turbine- Inward radial flow reaction turbine, Outward radial flow reaction turbine, Mixed flow Turbine.
3 rd	1 st	Construction with various parts and working principle of Francis turbine with neat diagram.
	2 nd	Velocity diagram of moving blades, work done and derivation of various efficiencies of Francis turbine
	3 rd	Points to remember for solving Problems on Francis Turbine. Solving Problems on Francis Turbine
	4 th	Solving Problems on Francis Turbine
4 th	1 st	Solving Problems on Francis Turbine
	2 nd	Construction with various parts and working principle of Kaplan turbine with neat diagram.
	3 rd	Velocity diagram of moving blades, work done and derivation of various efficiencies of Kaplan turbine
	4 th	Solving Problems on Kaplan turbine
5 th	1 st	CENTRIFUGAL PUMPS: Definition and classification of pump, Construction and working principle of centrifugal pumps
	2 nd	Derivation for Work done and various efficiencies of centrifugal pump
	3 rd	Important terms like Suction Head, Delivery Head, Manometric Head and various efficiencies like Manometric Efficiency, Mechanical Efficiency, Overall Efficiency and relationship between the efficiencies.
	4 th	Solving numerical problems relating to Centrifugal Pumps
6 th	1 st	Solving numerical problems relating to Centrifugal Pumps
	2 nd	RECIPROCATING PUMPS Definition of reciprocating pump, construction & working principle of single acting reciprocating pump
	3 rd	Derivation of the formula for discharge and power required to drive the single acting pump.
	4 th	Construction & working principle of Double acting reciprocating pump
7 th	1 st	Derivation of the formula for discharge and power required to drive the Double acting reciprocating pump
	2 nd	Definition of slip, Positive Slip and Negative slip, relationship between slip &

		coefficient of discharge.
	3 rd	Solving numerical problems relating to Reciprocating Pumps
	4 th	HYDRAULIC CONTROL SYSTEM Fluid Power systems, types and its various components, Applications, Real life examples, its merits and demerits
8 th	1 st	Basic theory behind how the Hydraulic control systems work. A simple problem to show the power of fluid and operations it can perform
	2 nd	Fluid power pumps: Positive Displacement pump, Gear Pump-External and Internal gear pumps
	3 rd	Vane pump, Radial piston pumps
	4 th	Pressure control valves like Pressure Relief valves (DARV, Compound relief valve)
9 th	1 st	Pressure reducing valve, Sequence valve
	2 nd	Counter Balance valve(CBV), Unloading Valve
	3 rd	Actuators- Definition, its function, its types with diagram and description
	4 th	Flow control valves- Definition, function, its types with symbol-Fixed, Adjustable, pressure compensated flow control valve
10 th	1 st	Pressure compensated and Non-pressure compensated flow control valves.
	2 nd	Meter-in and Meter-out Circuit explanation with diagram
	3 rd	Hydraulic accumulators- Definition, its function, its types- Spring loaded type, Weight loaded type,
	4 th	Various types of Gas loaded type accumulators- Non-separator type, Separator type
11 th	1 st	ANSI Symbols and reasons of using symbols, ANSI symbols of various hydraulic components Flow lines, Reservoirs, Pumps, Direction Control Valves,
	2 nd	ANSI Symbols of Flow Control Valves, Pressure Control Valves, Motors,
	3 rd	ANSI Symbols of Check Valves, Cylinders, Filters, Heat Exchangers, Accumulators
	4 th	Hydraulic circuits: Direct control of single acting cylinder with diagram
12 th	1 st	Operation of double acting cylinder with diagram
	2 nd	Operation of double acting cylinder with metering in and metering out control
	3 rd	Comparison of Hydraulic and Pneumatic system
	4 th	PNEUMATIC CONTROL SYSTEM Fundamentals of Pneumatic Control Systems, its various components, Applications, Real life examples, its merits and demerits
13 th	1 st	Air Compressor: Reciprocating piston Compressor, Diaphragm Compressor, Rotary piston Compressor, Screw Compressor, vane compressor
	2 nd	Reservoirs, Inlet filters, Air dryers and its types
	3 rd	Service unit: Filter, Regulator and Lubricator (FRL), Air filters- Standard Filter, Coalescing Filter, Vapor Absorbing Filter
	4 th	Air Regulators- Non-relieving Air regulator, Relieving Air regulator
14 th	1 st	Air Lubricator, FRL trio diagram
	2 nd	Various types of Pneumatic actuators with neat diagram
	3 rd	Direction control valves and its functions, 2/2 DCV, 3/2DCV, 4/2 DCV, 5/2 DCV,5/3DCV explanation with ANSI symbols
	4 th	Flow control valves and Throttle valves, Supply Air throttling and Exhaust Air throttling
15 th	1 st	Quick exhaust valves and Shuttle valve explanation with neat diagram
	2 nd	ANSI Symbols of pneumatic components
	3 rd	Pneumatic circuits: Direct control of single acting cylinder
	4 th	Operation of double acting cylinder, Metering in and metering out control
		Remedial Class
		Remedial Class
		Remedial Class

