Academic Lesson Plan for Hydraulic Machines and Industrial Fluid Power (Summer-2025)

Discipline: Mechanical	**Semester: 5th**	**Name of the teaching faculty:** RANJAN KU ROUT
Subject: Hydraulic Machines and Industrial Fluid Power	**No. of days/per week Class Allotted: 4**	
		No. of weeks:15
Week	**Class day**	**Theory Topics**
1st	1st	1.0 HYDRAULIC TURBINES: Introduction to Turbines.
	2nd	1.1 Definition and classification of hydraulic turbines
	3rd	1.1 Definition and classification of hydraulic turbines
	4th	1.2 Construction and working principle of impulse turbine.
2nd	1st	1.2 Construction and working principle of impulse turbine.
	2nd	1.3 Velocity diagram of moving blades, work done and derivation of various efficiencies of impulse turbine.
	3rd	1.3 Velocity diagram of moving blades, work done and derivation of various efficiencies of impulse turbine.
	4th	1.4 Velocity diagram of moving blades, work done and derivation of various efficiencies of Francis turbine.
3rd	1st	1.4 Velocity diagram of moving blades, work done and derivation of various efficiencies of Francis turbine.
	2nd	1.5 Velocity diagram of moving blades, work done and derivation of various efficiencies of Kaplan turbine.
	3rd	1.5 Velocity diagram of moving blades, work done and derivation of various efficiencies of Kaplan turbine.
	4th	1.6 Numerical on above
4th	1st	1.6 Numerical on above
	2nd	1.7 Distinguish between impulse turbine and reaction turbine.
	3rd	1.7 Distinguish between impulse turbine and reaction turbine.
	4th	2.0 CENTRIFUGAL PUMPS: Introduction to Pumps.
5th	1st	2.1 Construction and working principle of centrifugal pumps

	2nd	2.2 work done and derivation of various efficiencies of centrifugal pumps.

	3rd	2.2 work done and derivation of various efficiencies of centrifugal pumps.
	4th	2.3 Numerical on above
6th	1st	3.0 RECIPROCATING PUMPS: Introduction to Reciprocating Pumps
	2nd	3.1 Describe construction & working of single acting reciprocating pump
	3rd	3.1Describe construction & working of single acting reciprocating pump
	4th	3.2 Describe construction & working of double acting reciprocating pump.
7th	1st	3.3 Derive the formula foe power required to drive the pump (Single acting & double acting)
	2nd	3.5 Define slip.
	3rd	3.5 State positive & negative slip & establish relation between slip & coefficient of discharge.
	4th	3.6 Solve numerical on above
8th	1st	4.0 PNEUMATIC CONTROL SYSTEM 4.1Elements – filter-regulator-lubrication unit
	2nd	4.2 Pressure control valves
	3rd	4.2.1 Pressure relief valves
	4th	4.2.2 Pressure regulation valves
9th	1st	4.3 Direction control valves
	2nd	4.3.1 3/2DCV,5/2 DCV,5/3DCV
	3rd	4.3.1 3/2DCV,5/2 DCV,5/3DCV
	4th	4.3.2 Flow control valves
10th	1st	4.3.3. Throttle valves
	2nd	4.4 ISO Symbols of pneumatic components
	3rd	4.5. Pneumatic circuits 4 .5.1 Direct control of single acting cylinder.
	4th	4.5.2 Operation of double acting cylinder.
11th	1st	4.5.3 Operation of double acting cylinder with metering in and metering out control.
	2nd	5.0 HYDRAULIC CONTROL SYSTEM 5.1 Hydraulic system, its merit and demerits

	3rd	5.2 Hydraulic accumulators 5.3.1 Pressure control valves

	4th	5. 3.2 Pressure relief valves
12th	1st	5.3.3 Pressure regulation valves.
	2nd	5.3 Direction control valves 5.3.1 3/2DCV,5/2 DCV,5/3DCV
	3rd	5.3.2 Flow control valves.
	4th	5.3.3 Throttle valves
13th	1st	5.4 Fluid power pumps
	2nd	5.4.1 External and internal gear pumps
	3rd	5.4.2 Vane pump
	4th	5.4.3 Radial piston pumps
14th	1st	5.5 ISO Symbols for hydraulic components.
	2nd	5.6 Actuators
	3rd	5.7 Hydraulic circuits 5.7.1 Direct control of single acting cylinder
	4th	5.7.2 Operation of double acting cylinder
15th	1st	5.7.3 Operation of double acting cylinder with metering in and metering out control.
	2nd	5.7.3 Operation of double acting cylinder with metering in and metering out control.
	3rd	5.8 Comparison of hydraulic and pneumatic system
	4th	5.8 Comparison of hydraulic and pneumatic system