Lesson Plan

Name of the faculty: Sh. Kuldeep Singh, Lecturer in Mechanical Engg.

Discipline: Mechanical

Semester: 4th Mechanical A & B

Subject: Hydraulics and Pneumatic

Lesson Plan Duration: 15 weeks (From January 2025 to May 2025)

Work Load (Lecture/ Practical) per week (in hours): Lecturers- 03, practicals-02

Week	Theory		Practical	
	Lecture day	Topic (including assignment / test)	Practical Day	Topic
1st	1st	Introduction to Hydraulics and Pneumatics. Fluid, types of fluid	1st	1. Measurement of pressure head by employing. i) Piezometer tube ii) Simple U-tube manometer iii) Bourdon.s tube pressure gaug
	2nd	Properties of fluid viz mass density, weight density (specific weight), specific volume, capillarity, specific gravity, viscosity,	2nd	2. Verification of Bernoulli's theorem.
	3rd	Compressibility, surface tension, kinematic viscosity and dynamic viscosity and their units. Simple numeric problems related to properties of fluids.		

2ND	1st	Concept of pressure, Intensity of pressure, static pressure and pressure head. Types of Pressure (Atmospheric Pressure, Gauge Pressure, Absolute Pressure).		3. Measurement of flow by using venturimeter.
	2nd	Pressure measuring devices: Manometers and Mechanical Gauges		
	3rd	Manometers: Piezometer, Simple U-tube Manometer, Micromanometer, Differential U-tube Manometer, Inverted U-tube,		
3RD	1st	Manometers Construction, working and application , including simple numerical problems.		4. To find out the value of coefficient of discharge for a venturimeter
	2nd	Mechanical Gauges: Bourdon Tube pressure gauge, Diaphragm Pressure Gauge, Dead weight pressure gauge. Construction, working and application.		
	3rd	Statement of Pascal's law and its applications.		
4TH	1st	revise numerical problems		5. To find coefficient of friction for a pipe (Darcy's equation).
	2nd	revise numerical problems		
	3rd	revise numerical problems		

5TH	1st	Types of fluid flow – Steady and Unsteady, Uniform and Non-uniform, Laminar and Turbulent; Rate of flow (Discharge) and its units		
	2nd	Continuity Equation of Flow; Hydraulic Energy of a flowing fluid ; Total head		6. To study a single stage centrifugal pump and reciprocating pump for constructional details with the help of cut section models.
	3rd	Bernoulli's Theorem statement (without proof) and its applications. Discharge measurement with the help of Venturimeter		
6TH	1st	Orifice meter, Pitot-tube, limitations of Bernoulli's theorem , simple numerical problems on above topics.		
	2nd	Pipe and pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient; loss of head due to friction		
	3rd	Chezy's equation and Darcy's equation of head loss (without proof)		
7TH	1st	Reynold's number and its effect on pipe friction; Water hammer. Simple numerical problems on pipe friction.		

	2nd	Nozzle - definition, velocity of liquid flowing through the nozzle, power developed		7. Study the working of Pelton wheel, Francis and Kaplan turbine with the help of working model.
	3rd	revise numerical problems		
8TH	1st	revise numerical problems		
	2nd	revise numerical problems		
	3rd	revise numerical problems		
9TH	1st	Description, operation and application of – hydraulic press		8. Study of hydraulic circuit of any available machine or working model
	2nd	hydraulic jack		
	3rd	hydraulic accumulator		
10TH	1st	hydraulic brake		
	2nd	hydraulic ram		
	3rd	hydraulic door closer		
11TH	1st	Concept of hydraulic pump. Classification of pumps.		9. Study of pneumatic circuit of any available machine or working model
	2nd	Construction, operation and application of Single acting reciprocating pump ,		
	3rd	vane, screw and gear pumps.		
12TH	1st	Construction, operation and application of centrifugal pump		
	2nd	Trouble shooting and problems in centrifugal pumps and remedial measures, pitting, cavitation, priming		
	3rd	Concept of a turbine, classification of		

		turbines		
13TH	1st	types of turbines - impulse and reaction type (concept only) difference between them.		
	2nd	Construction and working of pelton wheel, Francis turbine		
	3rd	Kaplan turbines.		
14TH	1st	Introduction to oil power hydraulics and pneumatic system. Relative Merits and Demerits as oil power hydraulic and pneumatic system.		
	2nd	Industrial applications of oil power hydraulic and pneumatic system.		
	3rd	Basic components of hydraulic system, definition and functions of each component in a hydraulic circuit. Hydraulic oils- Classification and their properties. Seals and packing- classification of seals, sealing materials.		
15TH	1st	Maintenance of hydraulic system: common faults in hydraulic system, simple visual checks of oil, causes of contamination, preventive measures		
	2nd	Basic Components of Pneumatic Systems , definition and functions of each component in a Pneumatic circuit. Necessity of Filter, Regulator and		

		Regulator(FLR).		
	3rd	Common problems in pneumatic systems. Maintenance schedule of pneumatic systems.		