Lesson Plan

Name of the Faculty : Sh. Deepak Malhotra

Discipline : Mechanical Engineering

Semester : 4th

Subject : **HYDRAULICS AND PNEUMATICS**

Lesson Plan duration : 15 weeks (from 22nd March, 2021 to 2nd July, 2021)

Work load per week : Lecture – 03, Practical – 02

Week	Theory		Practical	
	Lecture Day	Topic (Including assessment/test)	Practical Day	Topic
1st	1st	**Unit 1: Introduction** Introduction to Hydraulics and Pneumatics.	1st	Introduction about the Lab and brief discussion over the practical work to be conducted
	2nd	Fluid, types of fluid; properties of fluid viz mass density, weight density (specific weight), specific volume, capillarity, specific gravity, viscosity,		
	3rd	compressibility, surface tension, kinematic viscosity and dynamic viscosity and their units.		
2nd	4th	Simple numeric problems related to properties of fluids.	2nd	Measurement of pressure head by employing. i) Piezometer tube ii) Simple U-tube manometer
	5th	**Unit 2: Pressure and its Measurement** 2.1 Concept of pressure, Intensity of pressure, static pressure and pressure head. Types of Pressure (Atmospheric Pressure, Gauge Pressure, Absolute Pressure).		
	6th	2.2. Pressure measuring devices: Manometers and Mechanical Gauges Manometers: Piezometer, Simple U- tube Manometer,		
3rd	7th	Micromanometer, Differential U-tube Manometer, Inverted U-tube, Manometers Construction, working and application , including simple numerical problems.	3rd	Measurement of pressure head by employing. iii) Bourdon.s tube

	8th	Mechanical Gauges: Bourdon Tube pressure gauge, Diaphragm Pressure Gauge,		pressure gauge
	9th	Dead weight pressure gauge. Construction, working and application.		
4th	10th	2.3 Statement of Pascal's law and its applications.	4th	Verification of Bernoulli's theorem.
	11th	**Unit 3. Flow of Fluids** 3.1 Types of fluid flow – Steady and Unsteady, Uniform and Non-uniform, Laminar and Turbulent; Rate of flow (Discharge) and its units;		
	12th	Continuity Equation of Flow; Hydraulic Energy of a flowing fluid ; Total head ;		
5th	13th	Bernoulli's Theorem statement (without proof) and its applications. Discharge measurement with the help of	5th	Measurement of flow by using venturimeter.
	14th	Venturimeter, Orifice meter,		
	15th	Pitot-tube, limitations of Bernoulli's theorem , simple numerical problems on above topics.		
6th	16th	**1st sessional test (Tentative)**	6th	Checking of practical file
	17th	**Assessment**		
	18th	3.2 Pipe and pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient; loss of head due to friction;		
7th	19th	Chezy's equation and Darcy's equation of head loss (without proof),	7th	To find out the value of coefficient of discharge for a venturimeter.
	20th	Reynold's number and its effect on pipe friction; Water hammer.		
	21st	Simple numerical problems on pipe friction.		
8th	22nd	3.3 Nozzle - definition, velocity of liquid flowing through the nozzle, power developed.	8th	To find coefficient of friction for a pipe (Darcy's Equation).
	23rd	**Unit 4. Hydraulic Machines** Description, operation and application of – hydraulic press, hydraulic jack,		
	24th	hydraulic accumulator, hydraulic brake ,		
9th	25th	hydraulic ram, hydraulic door closer.	9th	To study a single stage centrifugal pump for constructional details with the help of cut section models.
	26th	**Unit 5. Pumps and Water Turbines** 5.1 Concept of hydraulic pump. Classification of pumps.		
	27th	5.2 Construction, operation and application of Single acting reciprocating pump , vane, screw and gear pumps.		
10th	28th	5.3 Construction, operation and application of centrifugal pump.	10th	Checking of practical

	29th	**2nd sessional test (Tentative)**		file
	30th	**Assessment**		
11th	31st	Trouble shooting and problems in centrifugal pumps and remedial measures, pitting, cavitation, priming.	11th	To study a reciprocating pump for constructional details with the help of cut section models.
	32nd	5.4 Concept of a turbine, classification of turbines, types of turbines - impulse and reaction type (concept only), difference between them.		
	33rd	Construction and working of pelton wheel, Francis turbine and Kaplan turbines.		
12th	34th	**Unit 6. Oil power Hydraulic and Pneumatic systems**: 6.1 Introduction to oil power hydraulics and pneumatic system. Relative Merits and Demerits as oil power hydraulic and pneumatic system.	12th	Study the working of Pelton wheel, Francis and Kaplan turbine with the help of working model.
	35th	6.2 Industrial applications of oil power hydraulic and pneumatic system.		
	36th	6.3 Basic components of hydraulic system, definition and functions of each component in a hydraulic circuit.		
13th	37th	Hydraulic oils- Classification and their properties. Seals and packing- classification of seals, sealing materials.	13th	Study of hydraulic circuit of any available machine or working model
	38th	6.4 Maintenance of hydraulic system: common faults in hydraulic system, simple visual checks of oil, causes of contamination, preventive measures.		
	39th	6.5 Basic Components of Pneumatic Systems , definition and functions of each component in a Pneumatic circuit.		
14th	40th	Necessity of Filter, Regulator and Regulator(FLR).	14th	Study of pneumatic circuit of any available machine or working model
	41st	6.6 Common problems in pneumatic systems. Maintenance schedule of pneumatic systems.		
	42nd	**3rd sessional test (Tentative)**		
15th	43rd	**Assessment**	15th	Checking of practical file & Evaluation
	44th	Revision		
	45th	Revision		