LESSON PLAN

Name of Faculty: Deepak Puniya

Discipline: Mechanical Engg.

Semester: 4th

Subject: Hydraulics & Pneumatics (HPS)

Lesson Plan Duration: 15 Weeks

Work Load: <u>Theory-</u> 3 Lectures/Week**, Practical -** 1 Turn/Group/Week (2 Periods/ Turn)

		THEORY	
WEEK	**LECT NO.**	**TOPIC**	**Covered on Date**
1	1	**UNIT-1 <u>INTRODUCTION</u>** (03 Periods) Introduction to Hydraulics and Pneumatics. Fluid, types of fluid;	
	2	properties of fluid viz mass density, weight density (specific weight), specific volume, capillarity, specific gravity, viscosity, compressibility, surface tension, kinematic viscosity and dynamic viscosity and their units.	
	3	Simple numeric problems related to properties of fluids	

2	4	**Unit-2 <u>Pressure and its Measurement</u>** (07 Periods)
		     2.1 Concept of pressure, Intensity of pressure, static pressure and pressure head.
		     Types of Pressure (Atmospheric Pressure, Gauge Pressure, Absolute Pressure).	

	5	2.2. Pressure measuring devices: Manometers and Mechanical Gauges Manometers: Construction, working and application , including simple numerical problems. Piezometer,	
	6	Simple U- tube Manometer, Micromanometer,	
3	7	Differential U-tube Manometer, Inverted U-tube, Manometers	
	8	Mechanical Gauges: Bourdon Tube pressure gauge	
	9	Diaphragm Pressure Gauge, Dead weight pressure gauge. Construction, working and application.	
4	10	2.3 Statement of Pascal's law and its applications	
	11	**UNIT-3 <u>Flow of Fluids</u>** (11 Periods) 3.1 Types of fluid flow – Steady and Unsteady, Uniform and Non-uniform, Laminar and Turbulent; Rate of flow (Discharge) and its units;	
	12	Continuity Equation of Flow; Hydraulic Energy of a flowing fluid ; Total head	

5	13	Bernoulli's Theorem statement (without proof) and its applications.	
	14	Discharge measurement with the help of Venturimeter,	
	15	Orifice meter, Pitot-tube, limitations of Bernoulli's theorem ,	
6	16	simple numerical problems on above topics.	
	17	3.2 Pipe and pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient.	
	18	loss of head due to friction; Chezy's equation and Darcy's equation of head loss (without proof), Reynold's number and its effect on pipe friction; Water hammer.	
7	19	Simple numerical problems on pipe friction.	
	20	3.3 Nozzle - definition, velocity of liquid flowing through the nozzle, power developed.	
	21	Numerical Problems	
8	22	**UNIT-4 Hydraulic Machines** (4 Periods) Description, operation and application of – hydraulic press,	
	23	hydraulic jack, hydraulic accumulator,	
	24	hydraulic brake , hydraulic ram,	
9	25	hydraulic door closer.	
	26	**UNIT 5: Pumps and Water Turbines** (10 Periods) **5.1** Concept of hydraulic pump. Classification of pumps.	
	27	5.2 Construction, operation and application of Single acting reciprocating pump	
10	28	vane, screw and gear pumps.	
	29	5.3 Construction, operation and application of centrifugal pump.	
	30	Trouble shooting and problems in centrifugal pumps and remedial measures, pitting, cavitation, priming.	
11	31	5.4 Concept of a turbine, classification of turbines,	
	32	types of turbines - impulse and reaction type (concept only), difference between them.	
	33	Construction and working of pelton wheel,	

	34	Construction and working of Francis turbine and	
	35	Construction and working of Kaplan turbines.	
12	36	**UNIT-6 <u>Oil power Hydraulic and Pneumatic systems</u>** (10 Periods) 6.1 Introduction to oil power hydraulics and pneumatic system. Relative Merits and Demerits as oil power hydraulic and pneumatic system.	
13	37	6.2 Industrial applications of oil power hydraulic and pneumatic system.	
	38	6.3 Basic components of hydraulic system, definition and functions of each component in a hydraulic circuit.	
	39	Hydraulic oils- Classification and their properties. Seals and packing-classification of seals, sealing materials.	
14	40	6.4 Maintenance of hydraulic system: common faults in hydraulic system, simple visual checks of oil, causes of contamination, preventive measures.	
	41	6.5 Basic Components of Pneumatic Systems	
	42	definition and functions of each component in a Pneumatic circuit	
15	43	Necessity of Filter, Regulator and Regulator(FLR).	
	44	6.6 Common problems in pneumatic systems.	
	45	Maintenance schedule of pneumatic systems.	

PRACTICAL		
TURN	EXPERIMENT	DATE
1	1. Measurement of pressure head by employing. i) Piezometer tube ii) Simple U-tube manometer iii) Bourdon.s tube pressure gauge	
2	**Repeat of Experiment-1**	
3	**2.** Verification of Bernoulli's theorem.	
4	**Repeat of Experiment-2**	
5	3. Measurement of flow by using venturimeter.	
6	**4.** To find out the value of coefficient of discharge for a venturimeter	
7	**5.** To find coefficient of friction for a pipe (Darcy's equation).	
8	**Repeat of Experiment-5**	
9	**6.** To study a single stage centrifugal pump and reciprocating pump for constructional details with the help of cut section models.	
10	**Repeat of Experiment-6**	
11	**7** Study the working of Pelton wheel, Francis and Kaplan turbine with the help of working model.	
12	**8.** Study of hydraulic circuit of any available machine or working model	
13	**9** Study of pneumatic circuit of any available machine or working model	
14	**Repeat of Experiment-9**	
15	**VIVA**	