Lession Plan

Name of faculty member	HITESH AGGARWAL
Discipline	MECHANICAL ENGINEERING
Semester	4th
Subject	HYDRAULICS AND PNEUMATICS
Lession plan duration	15 week
Work Load (Lecturer/ Practical) per week (In hours)	Lectures-03, Practicals-02 (each group)

Week	Theory		Practical	
	Lecturer day	Topic (including assignment/test)	Practical day	Topic
1st	1st	**Unit 1- Introduction** Fluid, types of fluid; properties of fluid viz mass density, weight density (specific weight), specific volume, capillarity, specificgravity and their units	1st	Measurement of pressure head by employing. i) Piezometer tube ii) Single and double column manometer (Groups-G1, G2 and G3)
	2nd	Properties of fluid- viscosity, compressibility, surface tension and their units		
	3rd	Properties of fluid- kinematic viscosity and dynamic viscosity and their units		
2nd	4th	**Unit 2- Pressure and Measurement** Concept of pressure (Atmospheric Pressure, gauge pressure, absolute pressure), Pascal's Law, Static Pressure	2nd	To find out the value of coefficient of discharge for a venturimeter (Groups-G1,G2 and G3)
	5th	Pressure measuring devices: peizometer tube manometers -simple U-tube, differential single column		
	6th	Pressure measuring devices: Inverted U-tube, micromanometer		
3rd	7th	Concept and simple problems on pressure measuring devices simple U-tube, differential single column	3rd	Revision of Ist and 2nd practicals
	8th	Concept and simple problems on pressure measuring devices Inverted U-tube, micromanometer		
	9th	Bourdon pressure gauge, Diaphragm pressure gauge, deadweight pressure gauge * Assignment-Different Pressure measuring devices		
4th	10th	Test of Ist and IInd unit	4th	Measurement of flow by using venturimeter (Groups-G1, G2 and G3)
	11th	**Unit 3-Flow of Fluids** Types of fluid flow – steady and unsteady, uniform and non-uniform, laminar and turbulent; rate of flow and their units		
	12th	Continuity equation of flow		
5th	13th	Potential energy of a flowing fluid; total head	5th	Verification of Bernoulli's theorem (Groups-G1, G2 and G3)
	14th	Bernoulli's theorem (statement and proof) and its applications		
	15th	Discharge measurement with the help of venturi-meter, orifice meter		
6th	16th	Discharge measurement with the help of pitot-tube	6th	Revision of 3rd and 4th practicals
	17th	Limitations of Bernoulli's theorem		
	18th	Simple Problems of flow of fluids		
7th	19th	Revision of 1st, 2nd and 3rd units * Assignment- Bernouli's theorem and continuity equation	7th	To find coefficient of friction for a pipe (Darcy's friction) (Groups-G1, G2 and G3)
	20th	**Unit 4-Flow through Pipes** Definition of pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient; loss of head due to friction; Chezy's equation and Darcy's equation of head loss (withoutproof)		
	21st	Reynold's number and its effect on pipe friction; siphon, Nozzle - definition		
8th	22nd	Velocity of liquid flowing through the nozzle, power developed	8th	To study hydraulic circuit of an automobile brake and hydraulic ram (Groups-G1, G2 and G3)
	23rd	Water hammer, anchor block, syphon, surge tank (concept only)		
	24th	Loss of head in pipes due to sudden enlargement, sudden contraction, obstruction on flow path (without proof)		
9th	25th	Loss of head in pipes due to change of direction and pipefittings (without proof)	9th	Revision of 5th and 6th practicals
	26th	Test of 4th unit		
	27th	**Unit 5-Flow through Orifices** Cc, Cv, Cd, flow through drowned orifices		
10th	28th	Flow through partially drowned orifices	10th	Study the working of a Pelton wheel and Francis turbine (Groups-G1, G2 and G3)
	29th	Time for emptying a tank through a circular orifice		

	30th	Simple Problems of flow through orifices * Assignment-Chezy's equation and Darcy's equation of headloss and loss of heads in pipes under various conditions		
11th	31st	**Unit 6-Hydraulic Machines** Description, operation and application of hydraulic systems – hydraulic ram, hydraulic jack	11th	To study a single stage centrifugal pumpfor constructional details and its operation to find out its normal head anddischarge (Groups-G1, G2 and G3)
	32nd	Description, operation and application of hydraulic systems – hydraulic brake, hydraulic accumulator		
	33rd	Description, operation and application of hydraulic systems – hydraulic door closer, hydraulic press		
12th	34th	Selection of specification of above systems for different applications	12th	Revision of 7th and 8th practicals
	35th	Revision of 5th and 6th units * Assignmeint- Different hydraulic systems		
	36th	**Unit 7-Water Turbines and Pumps** Concept of a turbine, types of turbines –impulse and reaction type (concept only), difference between these turbines		
13th	37th	Construction and working of pelton wheel, Francis turbine	13th	Revision of 1st, 2nd and 3rd practicals
	38th	Construction and working of Propeller and Kaplan turbines		
	39th	Unit speed, unit power, unit discharge, specific speed of turbines, selection of turbines based on specific speed		
14th	40th	Concept of hydraulic pump, single acting reciprocating pump (construction and operation only)	14th	Revision of 4th, 5th and 6th practicals
	41st	Concept of vane, screw and gear pumps (construction and operation only)		
	42nd	Construction, working and operation of centrigual pump		
15th	43rd	Performance, efficiencies and specifications of a centrifugal pump	15th	Revision of 7th and 8th practicals
	44th	Trouble shooting and problems in centrifugal pumps and remedial measures, pitting, cavitation, priming *Assignment-Difference between Reaction and Impulse turbines and hydraulic pumps		
	45th	Test of unit7		