Government Polytechnic , Mandkola (Palwal)

Lesson Plan

Name of Faculty : Mr. Ravindra Kumar (Theory / Practical)

Discipline : Mechanical Engineering

Semester : 4th

Subject : Hydraulics and Pneumatics

Lesson Plan Duration : 15 weeks (from March 2023 to June 2023)

Work Load (Lectures / Practical) per week (in hours): Lectures-03, Practicals-02

WEEK	THEORY		PRACTICAL	
	Lecture Day	Topic (Including Assignment/Test)	Practical Day	Topic
1st	1st	**1.Introduction** Fluids: Types and properties: mass density, weight density, specific volume, capillarity	1st	**1.**Measurement of pressure head by employing i) Piezometer tube ii) Single and double column manometer.
	2nd	Specific gravity, viscosity, compressibility	2nd	do
	3rd	Surface tension, kinematic viscosity and dynamic viscosity and their units		
2nd	4th	**Simple Problems**	3rd	do
	5th	**2. Pressure and its measurement** Concept of pressure (Atm. Pressure, gauge and absolute pressure)	4th	do
	6th	Pascal's law and static pressure Types of Pressure (Atmospheric Pressure, Gauge Pressure, Absolute Pressure).		
3rd	7th	Pressure measuring device Piezometer tube manometer, simple U-tube, differential single column, inverted U-tube Micrometer including simple problems	5th	**2.** To find out the value of coefficient of discharge for a Venturimeter.
	8th	Piezometer tube manometer, simple U-tube, differential single column,	6th	Do

		inverted U-tube		
	9th	Pressure gauge • Bourdon		
4th	10th	• Diaphragm • Dead weight	7th	Do
	11th	Assignments	8th	Do
	12th	**3 Flow of fluids** • Types of fluids flow: steady and unsteady		
5th	13th	• Uniform and non-uniform • Laminar and turbulent flow	9th	**3.** Measurement of flow by using Venturimeter
	14th	Rate of flow and their units Continuity equation of flow	10th	Do
	15th	Potential energy of a flowing fluid Total head		
6th	16th	Bernoulli's theorem (without proof) and its applications	11th	Do
	17th	Discharge measurement with the help of • Venturimeter • Orifice meter	12th	Do
	18th	• Pitot-tube		
7th	19th	Limitations of Bernoulli's theorem simple problems	13th ,14th	**4.** Verification of Bernoulli's theorem.
	20th	Flow through pipes Definition of pipe flow, wetted perimeter		
	21st	hydraulic mean depth, hydraulic gradient Loss of head due to friction • Chezy's equation Darcy's equation		
8th	22nd	Re number and its effect on pipe friction, siphon.	15th	Do
	23rd	Nozzle Velocity of liquid flowing through nozzle, power developed	16th	Do

	24th	Water hammer, siphon and surge tank		
9th	25th	Simple problems	17th	**5.** To fine coefficient of friction for a pipe (Darcy's friction)
	26th	**Assignment**		
	27th	**4. Hydraulic Machines** Description, operation and applications of hydraulic system		
10th	28th	Hydraulic ram, jack and		
	29th	brake Hydraulic accumulator, door closer and press Selection of specification of above systems for different applications		
	30th	**5.Pumps and Water turbines** Concept of hydraulic pump. Classification of pumps.		
11th	31st	• Single acting reciprocating pump	21st ,22nd	**6.** To study hydraulic circuit of any working model.
	32nd	Vane, screw and gear pumps		
	33rd	Construction, operation and application of centrifugal pump.		
12th	34th	Trouble shooting and problems in centrifugal pumps and remedial measures,	23rd	Do
	35th	pitting, cavitation, priming.	24th	**7**. Study the working of a Pelton wheel and Francis turbine.
	36th	Concept of a turbine, classification of turbines, types of turbines - impulse and reaction type (concept only), difference between them		
13th	37th	Construction and working of Pelton wheel,	25th	Do
	38th	Francis turbine and Kaplan turbines.	26th	
	39th	Assignment		Do
14th	40th	**6.Oil power Hydraulic and**	27th	**8.** To study a single stage centrifugal pump

		Pneumatic systems Introduction to oil power hydraulics and pneumatic system. Relative Merits and Demerits as oil power hydraulic and pneumatic system.		for constructional details and its operation to find out its normal head and discharge.
	41st	Industrial applications of oil power hydraulic and pneumatic system. ,Basic components of hydraulic system, definition and functions of each component in a hydraulic circuit.		
	42nd	Hydraulic oils- Classification and their properties. Seals and packing- classification of seals, sealing materials.	28th	Do
15th	43rd	Maintenance of hydraulic system: common faults in hydraulic system, simple visual checks of oil, causes of contamination, preventive measures.	29th	Do
	44th	Basic Components of Pneumatic Systems , definition and functions of each component in a Pneumatic circuit. Necessity of Filter, Regulator and Regulator(FLR).	30th	Do
	45th	Common problems in pneumatic systems. Maintenance schedule of pneumatic systems.		
	46th	Revision……		
	47th	Revision……..		