UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA

LESSON PLAN

SESSION-2025-26

SEMESTER-THIRD

SUBJECT: FLUID MECHANICS & FLUID POWER (THEORY- 04)

DEPARTMENT OF

MECHANICAL ENGINEERING

Discipline: Mechanical Engineering	Semester: 3rd	Name of the Teaching Faculty: Er SISIR KUMAR DALAI, Sr. Lect. Mech.
Subject: Fluid Mechanics and Fluid Power (Th-4)	No of Days/Week Class Allotted: 03	Semester starts From Date:14.07.2025 to Date:15.11.2025 No of Week: 15
Week	**Class/Day**	**Theory/Practical Topics**
1st	1st	**PROPERTIES OF A FLUID AND HYDROSTATICS:** Definition of a fluid, classification of fluids, various fluid properties such as density, specific weight, specific gravity
	2nd	viscosity and surface tension and state the units
	3rd	fluid pressure, total pressure (hydrostatic force) and location of centre of pressure on vertical,
2nd	1st	horizontal, inclined and curved surfaces by fluid
	2nd	working of various measuring devices for pressure
	3rd	Principle of simple manometers
3rd	1st	Principle of differential and inverted types manometers
	2nd	Simple numericals on Manometer.
	3rd	Principle of buoyancy and floatation
4th	1st	**KINEMATICS AND DYNAMICS OF FLUID MECHANICS** Various types of flow, circulation and vorticity
	2nd	stream-line, path line and streak-line, various energies of fluid
	3rd	law of conservation of mass, energy equation -Bernoulli's theorem
5th	1st	the limitations of same-application of Bernoulli's equation, the working of venturimeter
	2nd	pitot tube, equation of flow rate and velocity with respect to venturimeter and pitot tube respectively,
	3rd	the working of flowmeter: current meter, Simple numericals
6th	1st	**FLOW THROUGH ORIFICES AND NOTCHES, PIPES:** Definition –orifice, orifice coefficient such as Cc, Cv, Cd, Relationship between orifice coefficients
	2nd	weir and notch, Discharge over rectangular notch and weir, triangular notch
	3rd	Simple numericals.
7th	1st	Simple numericals.
	2nd	Definition of a pipe. laws of fluid friction, Equation of loss of head through pipe due to friction
	3rd	Darcy's formula and Chezy's formula
8th	1st	hydraulic gradient and total energy line, Nozzle and its application
	2nd	Power transmission through nozzle The condition of maximum power transmission through nozzle
	3rd	Expression for diameter of nozzle for maximum power transmission.
9th	1st	**Turbines and Pumps:** Classification of hydraulic turbines
	2nd	Selection of turbine on the basis of head and discharge available, Construction and working principle of Pelton wheel,
	3rd	Francis and Kaplan turbines, Draft tubes – types and

		construction
10th	1st	Calculation of Work done, Power, efficiency of turbines.
	2nd	Simple numericals
	3rd	**Centrifugal Pumps:** Principle of working and applications,
11th	1st	Types of casings and impellers, Concept of multistage, Priming and its methods
	2nd	Manometric head, Work done, Manometric efficiency, Overall efficiency.
	3rd	Simple numericals
12th	1st	**Reciprocating Pumps:** Construction, working principle and applications of single acting reciprocating pumps
	2nd	Double acting reciprocating pumps, Concept of Slip, Negative slip, Cavitation and separation
	3rd	Simple numericals
13th	1st	**FLUID POWER:** Definition of fluid power, classification – hydraulic power and pneumatic power, Hydraulic Systems
	2nd	Basic principle of enclosed hydraulic system – Pascal's law
	3rd	Oil hydraulic system – reservoir, filter pressure limiting valves, direction control valves
14th	1st	accumulator, pipes and fittings, various positive displacement pumps-gear
	2nd	flow control valves, actuators (linear and rotary),
	3rd	vane, piston, drawing of hydraulic circuits
15th	1st	extension and retraction of linear actuator
	2nd	motion of rotary actuator
	3rd	holding a job, hydraulic press etc

11.07.2025

Er. Sisir Kumar Dalai (Sr. Lect)
Mechanical Engineering