Lesson Plan

Subject : Fluid Mechanics & Fluid Machines (MEC-204A)
& Fluid Mechanics & Fluid Machines Lab (MEC-210LA)

Lesson plan Duration : 15 Weeks

Work load (Lecture/Tutorial/Practical) per week: L / T / P: 3 / 2 / 4 (Hrs)

Lecture No	Theory	Practical	
		Practical Day	Topic
1	Introduction to subject	1	To verify the Bernoulli's Theorem
2	**Unit 1:** Definition of fluid, Newton's law of viscosity, Units and dimensions-Properties of fluids		
3	Mass density, weight density, specific volume, specific gravity, viscosity, compressibility, surface tension and capillarity.		
4	**Fluid Kinematics:** Types of fluid flows, stream, streak and path lines; flow rate and continuity equation,		
5	Differential equation of continuity in cartesian and polar coordinates	2	To determine coefficient of discharge of an orifice meter.
6	Rotation and vorticity, circulation, stream and potential functions, flow net. Problems.		
7	**Fluid Dynamics:** Concept of system and control volume, Euler's equation, Navier-Stokes equation		
8	Bernoulli's equation and its practical applications		
9	Derivation of Ventrimeter	3	To determine the coefficient of discharge of Venturimeter.
10	Derivation of orificemeter. Impulse momentum equation. Problems		
11	**Unit 2: Viscous Flow:** Flow regimes and Reynold's number		
12	Relationship between shear stress and pressure gradient.		
13	Exact flow solutions, Poisuielle flow, laminar flow through circular conduits.	4	To determine the coefficient of discharge of Notch.
14	Exact flow solutions, Couette flow, laminar flow through circular conduits.		
15	**Turbulent Flow Through Pipes:**Darcy Weisbach equation, friction factor,		
16	Moody's diagram, minor losses in pipes,		
17	Hydraulic gradient and total energy lines, series and parallel connection of pipes	5	To find critical Reynolds number for a pipe flow.

18	Branched pipes; equivalent pipe, power transmission through pipes. Problems		
19	**Boundary Layer Flow:** Concept of boundary layer, measures of boundary layer thickness		
20	Blasius solution, von- Karman momentum integral equation	6	To determine the friction factor for the pipes.
21	laminar and turbulent boundary layer flows, separation of boundary layer and its control. Problems.		
22	**Unit 3: Dimensional Analysis:** Need for dimensional analysis – methods of dimension analysis		
23	Dimensionless parameters – application of dimensionless parameters. Problems.		
24	**Hydraulic Pumps:** Introduction, theory of Rotodynamic machines	7	Determination of the performance characteristics of a centrifugal pump.
25	Classification, various efficiencies		
26	Velocity components at entry and exit of the rotor, velocity triangles;		
27	Centrifugal pumps, working principle, work done by the impeller		
28	Minimum starting speed, performance curves, Cavitation in pumps	8	Determination of the performance characteristics of a reciprocating pump.
29	Reciprocating pumps, working principle		
30	Indicator diagram, Effect of friction and acceleration, air vessels, Problems.		
31	**Unit 4: Hydraulic Turbines:** Introduction		
32	Classification of water turbines, heads and efficiencies	9	Determination of the performance characteristics of Pelton Wheel.
33	velocity triangles, Axial, radial and mixed flow turbines		
34	Pelton wheel working principle		
35	Francis turbine and Kaplan turbines, working principles,		
36	work done, design of turbines,	10	Determination of the performance characteristics of a Francis Turbine.
37	draft tube and types, Specific speed		
38	unit quantities, performance curves for turbines, governing of turbines		
39	Revision of Pumps		
40	Revision of Turbines		