

SYLLABUS

Fluid Mechanics and Hydraulic Machines

Course Code	Category	Hours/ Week			Credits	Maximum Marks		
ME2204PC	Core	L	T	P	4	CIA	SEE	TOTAL
		3	1	0		30	70	100
Contact Classes: 48	Tutorial Classes: 16	Practical Classes: Nil			Total Classes:64			

Prerequisites: Fluid Mechanics and Hydraulic Machines

UNIT - I:

Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity, and surface tension - vapour pressure and their influence on fluid motion- atmospheric, gauge and vacuum pressures – measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT - II:

Fluid kinematics: Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform & non-uniform, laminar & turbulent, rotational & irrotational flows-equation of continuity for one dimensional flow and three-dimensional flows.

Fluid dynamics: Surface and body forces –Euler’s and Bernoulli’s equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT - III:

Boundary Layer Concepts: Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

Closed conduit flow: Reynold’s experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: Pitot tube, venturimeter, and orifice meter, Flow nozzle.

UNIT - IV:

Basics of turbo machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

Hydraulic Turbines: Classification of turbines, Heads and efficiencies, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory- functions and efficiency.

Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic Curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer

UNIT - V:

Centrifugal pumps: Classification, working, work done – barometric head- losses and efficiencies specific speed- performance characteristic curves, NPSH.

Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

TEXT BOOKS:

1. Theory of Machines /S.S.Rattan / Mc Graw Hill.
2. Theory of Machines /Sadhu Singh/ Pearson.

REFERENCE BOOKS:

1. Theory of Machines and Mechanisms/Joseph E. Shigley / Oxford.
2. Theory of Machines / Rao,J.S & R.V. Duggipati/ New Age.