

Devi Ahilya Vishwavidyalaya, Indore, India Institute of Engineering & Technology				III Year B.Tech. (Civil Engineering)		
Course Code & Name	Instructions Hours per Semester and Credits					
5RVPC2 Fluid Mechanics – II	Classroom Instruction (CI)		Lab Instruction (LI)	Term Work (TW) and Self Learning (SL)	Total no. of Hours Per semester	Total Credits (Total Hours/30)
	L	T	P	TW+SL	120	4
	20	10	20	70		

### Course Learning Objectives:

1. To understand velocity distribution in turbulent flow.
2. To understand various pipe flow problems.
3. To study open channel flow and irregular flows.
4. To understand the components, function, and uses of centrifugal and reciprocating pumps.
5. To understand the components, function, and uses of Pelton wheel, Kaplan, and Francis turbines..

**Prerequisites:** Applied Mechanics and Fluid Mechanics - I

### COURSE CONTENTS

#### Unit-I

Turbulent flow: Laminar and turbulent boundary layers and laminar sublayer, hydrodynamically smooth and rough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes.

Pipe flow problems: Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes.

Pipe Network: Water Hammer (only quick closure case). Transmission of power. Hardy Cross Method

#### Unit-II

Uniform flow in open channels: Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow, and its computations, uniform flow and its computations, Chezy's and Manning's formulae, determination of normal depth and velocity, Normal and critical slopes, Economical sections, Saint Venet equation.

#### Unit-III

Non uniform flow in open channels: Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume.



**List of Practical Assignment:**

1. Study the performance characteristics of **Pelton Wheel**.
2. Study the performance characteristics of **Francis Turbine**.
3. Study the performance characteristics of **Kaplan Turbine**.
4. Calibration of **multistage (two-stage) pump** and study of characteristics of variable speed pump.
5. Study the performance and details of operation of **Hydraulic Ram**.
6. Determination of **coefficient of discharge** for a broad-crested weir and plotting of water surface profile over the weir.
7. Study of the characteristics of the **Reciprocating Pump**.