

B. Tech. Civil Engineering			
Course code: Course Title	Course Structure		Pre-Requisite
CE 210: Hydraulics & Hydraulic Machines	L	T	P
	3	0	2

Course Objective: After successful completion of this course, i) Students must be able to understand the different types of flow and flow profiles in an open channel and design of most economic channel sections of different shapes and ii) They are also able to understand the types of hydraulic machines like various types of turbines and pumps with the details like work done, efficiencies and their design.

S. No	Course Outcomes (CO)
CO1	Differentiate between Pipe flow and Open channel flow, and various types of flows in open channel flow, like Uniform flow, gradually varied flow, and Rapidly Varied flow.
CO2	Design the most economical channel. Understand specific energy and its applications in channel transitions.
CO3	Derive the GVF equation, the RVF equation, and their applications like the Backwater curve, Hydraulic Jump, etc.
CO4	Describe how to calculate the work done and various efficiencies of different types of Turbines.
CO5	Describe how to calculate the work done and various efficiencies of different types of Pumps.

S. No	Contents	Contact Hours
UNIT 1	Flow in Open Channels (Uniform Flow): Types of flow in channel, Geometrical properties of channel section, velocity distributions and pressure distributions in open channel flows, open channel equations for uniform flow, most economical channel sections.	8
UNIT 2	Non-Uniform Flow in Open Channel: Specific energy, critical depth, concept of specific energy, alternate depths, specific energy diagram. Differential equation of GVF, Different types of flow profiles, Flow controls. Hydraulic jump.	8