

UG

Course Code: **CH203**

Credit: **4**

Version: **1**

Prerequisite Course: **Nil**

Department: **Chemical Engineering**

Course Name: **Momentum Transfer Operations**

L-T-P: **3-1-0**

Approved on:

Continuity equation for compressible and incompressible fluids. Bernoulli's equation, Euler's equation, introduction to Navier-Stokes equation.

Types of flows, steady and unsteady, laminar and turbulent flows; Relationship between shear stress and pressure gradient, Hagen-Poiseuille equation. Prandtl's mixing length theory and eddy diffusivity losses in pipes and fittings, Darcy-Weisbach equation for frictional head loss, Moody diagram. Flow through packed and fluidized beds.

Velocity Profile and boundary layer calculations for turbulent flow.

Pumps and compressors for handling different fluids, types, NPSH and characteristics of centrifugal pumps. Valves, pipe fittings and their standards. Power requirement for flow. Pipe layout and economical pipe diameter.

Flow measuring devices such as orifice meter, venturimeter, rotameter, anemometer, etc.

Vacuum producing devices.

Introduction to Newtonian and non-Newtonian flow.

Books

1. Streeter, V. L. and Wylie, "Fluid Mechanics," 8th ed., McGraw-Hill, New York, 1985.
2. Gupta, S. K., "Momentum Transfer Operations," Tata McGraw-Hill.
3. Coulson, J. M. and Richardson, J. F., "Chemical Engineering," Vol. 1, Asian books, New Delhi.
4. McCabe, W.L., Smith, J.C., and Harriott, P., "Unit Operations of Chemical Engineering", 6th ed., McGraw Hill, 2001.