UG Department: **Chemical Engineering**
Course Code: **CH410** Course Name: **Process Piping and Design**
Credit: **3** L-T-P: **3-0-0**
Version: **1** Approved on:
Prerequisite Course: **Nil**

Classification of pipes and tubes, IS and BS codes for pipes used in chemical process industries and utilities.
Pipes for Newtonian and non-Newtonian fluids, sudden expansion and contraction effects, Pipe surface roughness effects, Pipe bends, Shearing characteristics.

Pressure drop for flow of Newtonian and non-Newtonian fluids through pipes, Resistance to flow and pressure drop. Effect of Reynolds and apparent Reynolds number.

Pipes of circular and non-circular cross section velocity distribution average velocityand volumetric rate of flow. Flow through curved pipes (Variable cross sections). Effects of pipe fittings on pressure losses.

Non-Newtonian fluid flow through process pipes, Shear stress, Shear rates behaviour, apparent viscosity and its shear dependence, Power law index, Yield Stress in fluids, Time dependant behaviour, Thixotropic and rheopetic behaviour, mechanical analogues, velocity pressure relationships for fluids, line.

Pipe line design and power losses in compressible fluid flow, Multiphase flow, gas-liquid, solid-fluid, flows in vertical and horizontal pipelines, Lockhart-Martinelli relations, Flow pattern regimes.

Books

1. Coulson, J.M. and Richardson, J.F., "Chemical Engineering," Vol. I and VI, Butterworth Heinemann, 1999.
2. Govier, G.W. and Aziz K., "The Flow of Complex Mixtures in Pipe," Krieger Publication, Florida, 1982.
3. Green D.W. and Malony, "Perry's, Chemical Engineers Handbook,"7th ed., McGraw Hill, New York 1997.