

Subject: Fluid Mechanics II

CHE-224	Fluid Mechanics-II	3CH	
		Theory+Lab (2+1)	
	Pre-req. Fluid Mechanics-I	Category	Engineering Breadth Courses
Course Contents			
<u>Contents:</u> • Flow Handling and Transportation • Centrifugal pump characteristics; NPSH and its application in chemical engineering; concept of specific speed; similarity laws in centrifugal pumps; pumps in series and parallel; • Positive displacement pumps, their classification, characteristics and selection; matching system characteristics with pump characteristics • Flow through porous media: Fluidization and types of fluidized beds and their use in chemical engineering • Particle and Regime classification, minimum fluidization and particulate fluidization, entrainment and elutriation, concept of hydrodynamic characteristics of fluidized beds, bubbling fluidization, turbulent fluidization, slurry bed fluidization. Industrial application of fluidization. • Fluid Motion • Fluid Motion in the Presence of Solid Particles, Relative motion between a fluid and a single particle, Effect of presence of other particles and wall on the particle velocity • Turbomachinery and its classifications. Compressors, their classification, characteristics and selection. • Flow of Compressible Newtonian Fluids • Introduction to non-Newtonian fluids. Flow through packed beds types of packing, hydrodynamics of packed column • Turbines, their classification and selection. Compressible flow and its application in chemical engineering, concept of choked flow.			
Weekly plan/ Reference Books			
1	Flow Handling and Transportation		
2-3	Centrifugal pump characteristics; NPSH and its application in chemical engineering; concept of specific speed; similarity laws in centrifugal pumps; pumps in series and parallel;		
4	Positive displacement pumps, their classification, characteristics and selection; matching system characteristics with pump characteristics		
5	Flow through porous media: Fluidization and types of fluidized beds and their use in chemical engineering		
6	Particle and Regime classification, minimum fluidization and particulate fluidization, entrainment and elutriation, concept of hydrodynamic characteristics of fluidized beds, bubbling fluidization, turbulent fluidization, slurry bed fluidization. Industrial application		

	of fluidization.
7-8	Fluid Motion in the Presence of Solid Particles, Relative motion between a fluid and a single particle, Effect of presence of other particles and wall on the particle velocity Turbo-machinery and its classifications. Compressors, their classification, characteristics and selection.
9-10	Mid Term Exams
11-12	Flow of Compressible Newtonian Fluids
13	Introduction to non-Newtonian fluids. Flow through packed beds types of packing, hydrodynamics of packed column
14	Turbines, their classification and selection. Compressible flow and its application in chemical engineering, concept of choked flow.
15-16	Drag force on a spherical particle Types of mixing and mixing mechanism, vortex formation Mixer design
17	Revision
18	End Semester Exam

TEXT AND REFERENCE BOOKS:

- Holland, F. A. Bragg, R. "Fluid flow for Chemical Engineers", 2nd Ed., Butterworth & Heinemann. 1995.
- White, F.M. "Fluid Mechanics", 7th Ed., McGraw-Hill. 2011.
- Noel-de-Nevers "Fluid Mechanics for Chemical Engineers" McGraw-Hill, 2004
- McCabe Warren L., Smith Julian C., Harriott Peter "Unit Operations of Chemical Engineering" 7th Ed., 2010. McGraw-Hill Inc.
- Coulson J.M., Richardson J.F. "Chemical Engineering" Vol-I. 6th 1999. Butterworth, Elsevier.
- Munson B.R., Huebsch W.W., Rothmayer A.P. "Fundamental of Fluid Mechanics" Wiley; 7th Ed., 2012
- Seppo A. Korpela, "Principles of Turbomachinery", 2012, Wiley.