Fluid Flow Operations

1.1 Course Number: CH222

1.2 Contact Hours: 2-1-0   Credits: 08

1.3 Semester -Offered: 2nd Year- odd

1.4 Prerequisite: Fluid Mechanics (CH121)

1.5 Syllabus Committee Member: Dr. Koushik Guha Biswas & Dr. G.K. Agrahari

2. **Objective:**

- To acquaint with incompressible flows in pipes and channels.
- To familiarize with flow of compressible fluids.
- To understand transportation and metering of fluids.

3**. Course Content**

Unit wise distribution of content and number of lectures

Unit	Topics	Sub-topics	Lectures
1	Basic Equations of Fluid Flow	Bernoulli equation and its correction effect for solid boundaries	2
2	Incompressible Flow in pipes and Channels	Incompressible flow in pipes and channels: Shear stress, skin friction, Hagen–Poiseuille equation, flow of non-Newtonian fluid, turbulent flow, universal velocity distribution, friction from changes in velocity and direction, pressure drop calculations	7
3	Compressible Flows	Flow of compressible fluids: Definitions and basic equations, Isentropic flow through nozzles, Adiabatic friction flow, Isothermal friction flow	6
4	Transportation and Metering of Fluids	Pipe, fittings and valve, Transportation of fluids: Pumps (positive displacement pumps, centrifugal pump, gear pump), Compressors	9
5	Measurement of Flowing Fluids	Venturimeter, Orificemeter, Rotameter and Pitot tube	4
		Total	**28**

4. **Readings**

4.1 Text Books:

1. Unit Operations of Chemical Engineering by Warren McCabe, Julian Smith, Peter Harriott, 7th Edition, McGraw-Hill
2. Unit operations by G.G. Brown, CBS Publisher

4.2 Reference Books:

1. An Introduction to Fluid Mechanics by Fox and Mcdonald, 7th Edition, John Wiley
2. Fluid Mechanics by Frank M White, 6th Edition, McGraw-Hill

5. **Outcome of the Course:**

- Identify and understand the basics of incompressible flow and fluid friction in pipes.
- Understand the basic applications of Bernoulli equation and learn about metering devices.
- Clear idea on transportation of fluids and its practical applications.