# UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA

## DEPARTMENT OF CHEMICAL ENGINEERING

### LESSON PLAN
### Semester – 3rd
### SUBJECT- MOMENTUM TRANSFER (CHEPC207)

### PREPARED BY- SUBASINI JENA

| WEEK | TOPICS COVERED |
|---|---|
| WEEK 1 | Basic concept of Fluid |
| | Difference between Solids and Fluids |
| | Properties of Fluid |
| WEEK 2 | Surface Tension, Viscosity |
| | Dynamic Viscosity and Kinematic Viscosity |
| | Newton's Law of Viscosity |
| WEEK 3 | Solve simple numerical problems |
| | Solve simple numerical problems |
| | Type of Fluid: Ideal and Real Fluid, Newtonian and Non-Newtonian Fluid |
| WEEK 4 | Concept of Fluid Pressure and its measurement |
| | Pascals Law, Hydrostatic Equilibrium, Manometer |
| | Piezometer, U-Tube, Differential, Barometer, |
| WEEK 5 | Concept of buoyancy and Archimedes" Principle |
| | Steady vs. Unsteady, Uniform vs. Non-Uniform, Compressible vs. Incompressible, Rotational vs. Irrotational |
| | Equation of Continuity, Mass Flow Rate, Volumetric Flow rate |
| WEEK 6 | Solve simple numerical problems |
| | Reynolds Experiment and its significance, Laminar, Transition and Turbulent Flows, Critical Velocity |
| | Bernoulli's Theorem and its practical applications, Derivation of Bernoulli's equation for ideal fluid and real fluid, |
| WEEK 7 | Solve simple numerical problems |

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| | Pressure drop and Frictional losses in pipes: Skin and Form Friction |
| | Effect of Roughness, Friction Factor, Fanning Equation, Hagen-Poiseuille Equation, |
| WEEK 8 | Solve simple numerical problems |
| | Venturimeter - Principle, Construction, Working, Co-efficient, Formula for flow rate measurement |
| | Solve simple numerical problems on flow rate measurement |
| WEEK 9 | Orificemeter - Principle, Construction, Working, Co-efficient, Formula for flow rate measurement |
| | Solve simple numerical problems on flow rate measurement |
| | Working Principle and diagram of Pitot Tube |
| WEEK 10 | Working Principle and diagram of Rotameter |
| | Simple numerical problems on flow rate measurement |
| | Solve simple numerical problems on flow rate measurement |
| WEEK 11 | Concepts of Pipe, Fitting and Valves and difference between pipe and tube |
| | Standard sizes of pipes, Wall Thickness, Schedule Number, Nominal Diameter, BWG Number |
| | Different types of Joints and Fittings |
| WEEK 12 | Concepts of Valves and their applications |
| | Gate Valve, Globe Valve, Ball Valve, Needle Valve, Non-return Value, Butterfly Valve, Diaphragm Valve, Pressure Relief Valve |
| | Concepts of Pumps, Classification of Pumps |
| WEEK 13 | Centrifugal Pump - Definition, Construction, Working, Advantages & Disadvantages, Characteristic Curves |
| | Priming, NPSH |
| | Cavitation and losses encountered |
| WEEK 14 | Applications of Reciprocating Pump |
| | Applications of Piston Pump, Plunger Pump |
| | Applications of Diaphragm Pump and Gear Pump |
| WEEK 15 | Concept of Fluidization, Conditions for fluidization |
| | Types of Fluidization |
| | Application of Fluidization |

**BOOKS FOR REFERENCE:**


- M. Narayanan & B. C Bhattacharya, „Unit operations and Processes" Vol-I, CBS Publishers & Distributors
- K A Gavhane, "Unit Operation-I" Nirali Prakashan,


| | Prepared by | Approved by |
|---|---|---|
| **Signature** | Jena 10/7/25 | 10/07/2025 |
| **Name** | **SUBASINI JENA** | **Er. Rajesh Tripathy** |
| **Designation** | **Lecturer-II** | **I/C HOD,Chemical** |
| **SESSION** | **2025-2026 (Semester from Date: 14.07.2025 to Date : 15.11.2025)** | |