DARBHANGA COLLEGE OF ENGINEERING

DARBHANGA

COURSE FILE

OF

FLUID MECHANICS

FACULTY NAME:

VIKASH KUMAR

ASSISTANT PROFESSOR

DEPARTMENT

OF

MECHANICAL ENGINEERING

Institute / College Name	Darbhanga College of Engineering		
Program Name	B. Tech 2nd Year (4th Sem.)		
Course Code			
Course Name	Fluid Mechanics		
L-T-P (per week)	3/0/3	**Course Credits**	4.5
Course Coordinator Name	Vikash Kumar		

1. Scope and Objectives of the course

Fluid mechanics is a fundamental subject of many disciplines of engineering and natural sciences. Irrigation system, pumps, turbine, flow in heat exchanger, car and aircraft aerodynamics, die casting etc. are example where fluid plays a very important role. Fluid mechanics knowledge is necessary to understand the nature of flowing medium. This knowledge certainly helps us to develop new devices and processes.

The objectives of this course are following:

1. The purpose of this course is to learn about the Fluid properties, different type of fluid and their nature.
2. To learn about flow measurement devices and understanding about hydrostatic law, principle of buoyancy and stability of a floating body. Also learn about the concept of hydrostatic force in dam.
3. To learn about basic equation of kinematics and also study about the velocity and acceleration of fluid flow.
4. To study about basic law of fluid dynamics and measurement of flow rate, velocity of fluid flow from fluid dynamics measuring device.
5. To study about the nature of flow, boundary layer and losses in pipes network.
6. To study about the dimensional analysis model similitude and their application.

2. Textbooks

TB1Fluid mechanics by SOM and BISWAS.
TB2 Fluid mechanics and machinery by Modi and Seth.

3. Reference Books

Fluid Mechanics by F.M. White.

Other reading and relevant websites

S. No.	Link of Journals, Magazines, Websites and Research Papers
1	http://nptel.ac.in/courses/112103019/1
2	http://nptel.ac.in/courses/105104148/

4. Course Plan

Lecture Number	Date of Lecture	Topics	Web Links for video Lecture	Text Book/ Reference Book/ Other reading material	Page numbers of Text Books
1-8		Module: 1			
		Definition of fluid, Units and dimensions, Newton's law of viscosity, Properties of fluids, mass, density, specific volume, specific gravity, viscosity, surface tension and capillarity, vapour pressure, compressibility and bulk modulus. Hydrostatics; fluid force on plane and curved surfaces, manometers, buoyancy, uniformly accelerated motion.	http://nptel.ac.in/courses/105104148/	**TBI, TB2,RB**	**TBI** 1-50 **TB2** 1-35
Tutorial 1					
9-12		Module: 2			
		Kinematics of fluid flow: Generalized continuity equation, Irrotational motion and solution to Laplace equation. Concept of stream lines, Equipotential Lines, Flow Nets.	http://nptel.ac.in/courses/105104148/	**TBI, TB2,RB**	**TB1** 51-95 **TB2** 93-154 & 155-189
Tutorial 2 Assignment 1					
13-18		Module: 3			
		Dynamics of fluid flow: Control volume and control surface, application of continuity equation and momentum equation, Bernoulli's equation and its applications.	http://nptel.ac.in/courses/112103019/14	**TBI, TB2,RB**	**TB1** 96-168 **TB2** 229-285
Tutorial 3					
19-22		Module: 4			

		Concept of boundary layer, boundary layer thickness, Displacement thickness, momentum thickness, energy thickness.	https://www.youtube.com/watch?v=3lMY62rrJWY	**TBI, TB2,RB**	**TB1** 168-210 **TB2** 286-382 &454-493
Tutorial 4 Assignment 2					
Mid- Semester Exam (Syllabus covered from 1-29 lectures)					
23-30		Module: 5			
		Laminar viscous flow through circular conduits, Couette and Poisuielle flow, Turbulent flow through pipes, Darcy Weisbach equation, friction factor for smooth and rough pipes, Moody's diagram.		**TBI, TB2,RB**	**TB1** 210-261 **TB2** 601-657 701-781
Tutorial 5 Assignment 3					
31-36		Module: 6			
		Need for dimensional analysis, methods of dimension analysis, Similitude and types of similitude, Dimensionless parameters, application of dimensionless parameters Model analysis.		**TBI, TB2,RB**	**TB1** 262-315 **TB2** 836-937
		Tutorial 6 Assignment 4			
37-42		Module: 7			
		Forces on immersed bodies, concepts of separation, drag force, circulation and lift force.			

5. Evaluation Scheme

Component 1	Mid Semester Examination	20
Component 2	Class test & Attendance	10
Component 3	End Term Examination**	70
	Total	100

** The End term Comprehensive Examination will be held at the end of the semester. The mandatory requirement of 75% attendance in all theory classes is to be met for being eligible to appear in this component.

SYLLABUS

Topics	No. of Lectures	Weightage (%)
Module: 1 Definition of fluid, Units and dimensions, Newton's law of viscosity, Properties of fluids, mass, density, specific volume, specific gravity, viscosity, surface tension and capillarity, vapour pressure, compressibility and bulk modulus. Hydrostatics; fluid force on plane and curved surfaces, manometers, buoyancy, uniformly accelerated motion.	8	19
Module: 2 Kinematics of fluid flow: Generalized continuity equation, Irrototional motion and solution to Laplace equation. Concept of stream lines, Equipotential Lines, Flow Nets.	4	9.5
Module: 3 Dynamics of fluid flow: Control volume and control surface, application of continuity equation and momentum equation, Bernoulli's equation and its applications.	6	14.2
Module: 4 Concept of boundary layer, boundary layer thickness, Displacement thickness, momentum thickness, energy thickness.	4	9.5
Module: 5 Laminar viscous flow through circular conduits, Couette and Poisuielle flow, Turbulent flow through pipes, Darcy Weisbach equation, friction factor for smooth and rough pipes, Moody's diagram.	8	19
Module: 6 Need for dimensional analysis, methods of dimension analysis, Similitude and types of similitude, Dimensionless parameters, application of dimensionless parameters Model analysis.	6	14.2
Module: 7 Forces on immersed bodies, concepts of separation, drag force, circulation and lift force.	6	14.2

This Document is approved by:

Designation	Name	Signature
Course Coordinator	Vikash kumar	
H.O.D.	Vishnu Singh	
Principal	Dr. Achintya	