No	Information of every subject	
1	Unit name:	Fluid Mechanics I
2	Code:	ME-51016
3	Classification:	Engineering subject
4	Credit value:	2.5
5	Semester/ Year Offered:	1/2
6	Pre-requisite:	EM in Differentiate, Integrate, Basic Engineering Thermodynamics Engineering Mechanics (Statics)
7	Mode of delivery:	Lecture, Practical
8	Practical	20%
	Mid-term/ final Examination	70%
	Viva	5%
	Tutorial	5%
9	Academic staff teaching unit:	
10	Course outcome of unit: a. To determine the streamline pattern and acceleration field given a velocity field. b. To calculate losses in straight portions of pipes as well as those in various pipe system components. c. To solve useful problems involving isentropic flow, constant duct flow with friction and frictionless duct flow with heat transfer including flows across normal shock waves. d. To calculate the lift and drag forces for various objectives.	
11	Synopsis of unit: This course is an introduction of fluid mechanics and emphasizes fundamental concepts a problems solving techniques. Topic to be covered includes kinematics of fluid flow, laminar flow, compressible flow, turbulent flow through pipes, and flow around immersed bodies.	
12	Topics **6 Kinematic of Fluid Flow** 6.1 Introduction 6.2 Visualization of the flow pattern 6.3 Streamlines and streamtubes	

6.4 Laminar and turbulent flows

6.5 Steady and unsteady flows

6.6 Uniform and non-uniform flows

6.7 Incompressible and compressible flows

6.8 Ideal and real fluids

6.9 Irrotational and rotational flows

6.10 One-dimension, two-dimension and three-dimensional flows

6.11 Continuity Equation

6.12 Mean Velocity

6.13 Acceleration of fluid particles

6.14 Stream function

6.15 Continuity equation in two- dimensional flow

6.16 Continuity equation in three- dimensional flow

6.17 Continuity equation in cylindrical co-ordinates

6.18 Circulation and vorticity

6.19 Velocity potential function

6.20 Flow net

13 Compressible Fluids

13.1 Introduction

13.2 Perfect gas

13.3 Isothermal and adiabatic process

13.4 Change in temperature in adiabatic process

13.5 Bulk modulus of elasticity of a gas in terms of pressure

13.6 Speed of sound wave

13.7 Bernoulli’s equation for compressible fluids

13.8 Integration of the Euler equation for compressible fluids

13.9 Stagnation pressure

13.10 Impulse-momentum equation

13.11 Subsonic and supersonic velocities

13.12 Flow through a convergent nozzle or an orifice

13.13 Flow through a convergent-divergent nozzle

13.14 Normal shock waves in a diffuser

13.15 Use of a constriction in a conduit for measurement of discharge

16 Laminar Flow

16.1 Introduction

16.2 Relationship between shear stress and pressure gradient

16.3 Laminar flow between parallel plates

16.4 Couette flow

16.5 Load supported by a slipper bearing

16.6 Power absorbed in bearing

16.7 Dashypot mechanisms

16.8 Hagen-poiseuille theory

16.9 Laminar flow through inclined pipes

16.10 Frictional resistance

16.11 Laminar flow through annulus

16.12 Laminar flow around a sphere

16.13 Laminar flow through porous media

16.14 Laminar flow in open channels

17 Turbulent Flow Through Pipes

17.1 Introduction

17.2 Variation of velocity with time

17.3 General expression for shear stress

17.4 Boussinesq's theory

17.5 Prandtl's mixing theory

17.6 Von Karman's similarity theory

17.7 Comparison of shear theories

17.8 Boundary layer in pipes

17.9 Universalvelocity distributionequation

17.10 Hydro-dynamically smooth and rough pipes

17.11 Velocity distribution in smooth pipes

17.12 Velocity distribution in rough pipes

17.13 Common equation for velocity distribution for both smooth and rough pipes

17.14 Coefficient of friction for turbulent flow in smooth pipes

	17.15 Coefficient of friction for turbulent flow in rough pipes 17.16 Staton's curves 17.17 Criteria for smooth and rough pipes 17.18 Coefficient of friction for commercial pipes 17.19 Roughening of the pipes with age **19 Flow Around Immersed Bodies** 19.1 Introduction 19.2 Drag and lift 19.3 Pressure and frictional forces 19.4 Drag 19.5 Deformation drag 19.6 Lift 19.7 Pressure drag on a cylinder 19.8 Variation of a drag on a cylinder with Reynlod's number 19.9 Drag coefficient for a sphere 19.10 Lift on an airfoil 19.11 Circulation around a cylinder 19.12 Circulation around in airfoil 19.13 Profile and inducted drags on an airfoil 19.14 Effect of fluid compressibility on drag 19.15 Effect of fluid compressibility on lift 19.16 Effect of free surface on drag
1 4	Main references: Fluid Mechanics, Hydraulics and Hydraulic Machines by Dr. K.R.ARORA
1 5	Additional references: Fundamentals of Fluid Mechanics (6th Edition) Bruce r. Munson Donald f. Young Fundamentals of Fluid Mechanics (Fundamentals and Applications) By YUNUS A.SENGEL JOHN M. CIMBALA