Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2019-2020

Course Handout Part II

01/08/2019

In addition to Part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No	: **CE F231**
Course Title	: Fluid Mechanics
Instructor-in-charge	: Komaragiri Srinivasa Raju
Chamber No.	: D-107

Scope and Objective of the Course:

This course is an introduction to the field of fluid mechanics. The study covers basic fundamentals of fluid transport which would include our understanding of governing laws of conservation of mass, energy and momentum. The emphasis in this course will be to stress more on the above governing laws and their various applications. The unified approach will enable students to tackle the real life problems in more comprehensive manner and provide a broader view on the subject.

Course Level Outcomes:

On completion of the course

1. Student will be able to explain the properties of fluids, concepts of fluid statics as well as buoyancy
2. Student will be able compare various methods of flow measurement.
3. Student will be able to analyze fluid flow through pipes
4. Student will able to derive expressions of non-dimensional parameters in model analysis

Text Book:

1. Modi, P.N. and Seth, S.M., Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, New Delhi, 2015

Reference Books:

1. Fox, R.W, Pritchard, P.J, and A.T McDonald, Introduction to Fluid Mechanics, Wiley India, New Delhi, 2010
2. White FM, Fluid Mechanics, McGrawHill Education, 2017.

Course Plan:

Lecture No	Learning Objectives	Topics to be covered	Chapter in the Text Book	SLO*
1-3	List the properties of fluids Relate salient properties of fluids	Mass density, Specific weight, Viscosity, Surface Tension, Compressibility and Capillarity	1	a
4-6	Discuss fluid pressure at point and variation of pressure Relate absolute gauge and vacuum pressure Categorize devices for measurement of pressure	Pascal's law, Manometer and its Variations	2	a, b
7-10	Compare the total pressure on plane and curved surface Draw pressure diagram for horizontal, vertical and inclined surfaces	Computation of pressure force, Center of pressure on various surfaces, Metacentric height, Stability Analysis	3,4	a, b
11-13	State and differentiate five major categories of fluid flow Describe the flow pattern in streamline, path lines and streak lines Outline three basic principles of fluid flow	Study of various flow pattern, Rigid body motion, Stream line, Path line, Streak line, Stream function, Velocity Potential, Flownet	6	a, b
14-17	Describe salient points of Euler's and Bernoulli's equation. Apply Bernoulli's equation in measurement of fluid flow List of devices used for measurement of flow	Bernoulli's Equation and its Applications i.e., Venturimeter, Orifice meter, Pitot tube etc.	7	a, b
18-19	Solve forces on pipe bends using Impulse momentum equation.	Momentum principle, pipe bends etc.	8	a, b
20-22	Classify orifices and Mouth pieces Compare and contrast the flow patterns through orifices and mouthpieces	Various types of orifices and mouthpieces	9	b, k
23-25	Categorize notches and weirs Describe flow pattern over notches and weirs	Various types of notches and weirs	10	b, k
26-31	Apply laws of fluid friction in flow	Darcy-Weisbach equation, Pipes in	11	a, b , k

	through pipes. Compare major and minor losses in pipes Assess flow through pipes in parallel, series and branched networks.	series, Parallel, Branching of pipes etc.		
32-35	Compare laminar through circular pipes, inclined pipes and parallel plates	Hagen-Poiseuille Law for circular pipes flows between two parallel plates.	13	a, b
36-42	Classify and explain two methods of Dimensional Analysis	Buckingham pie method, Model analysis	17	a, b, e

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid Semester Test	90 min.	30	30/9, 11.00 -- 12.30 PM	CB
Quiz	-	10	Will be announced	CB
Assignment	-	10	Continuous	OB
Project		10	Continuous	OB
Comprehensive	180 min	40	4/12 AN	CB

*** Student Learning Outcomes (SLOs) :**

SLOs are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Chamber Consultation Hour: On prior appointment.

Notices: All notices concerning the course will be displayed on CMS

Make-up Policy: Make-ups will not be granted under any circumstances.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE
CE F231