MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN							
Department of Mechanical Engineering							

Name of the Subject	**Fluid Mechanics and Machinery**			Name of the handling Faculty	**Dr.G.Ramesh**		
Subject Code	**CE3391**			Year / Sem	**II / III**		
Acad Year	**2022-2023**			Batch	**2021-2025**		

Course Objective

● The properties of fluids and concept of control volume are studied

● The applications of the conservation laws to flow through pipes are studied.

● To understand the importance of dimensional analysis

● To understand the importance of various types of flow in pumps.

● To understand the importance of various types of flow in turbines.

Course Outcome

CO1: Apply mathematical knowledge to predict the properties and characteristics of a fluid.

CO2: Analyse and calculate major and minor losses associated with pipe flow in piping networks.

CO3: Predict the nature of physical quantities mathematically

CO4: Analyse the performance of pumps

CO5: Analyse the performance of turbines.

Lesson Plan

Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
UNIT I: FLUID PROPERTIES AND FLOW CHARACTERISTICS							
1	Introduction to the subject, Units and dimension, defining the properties of fluids	T1	1	PPT	L1	CO1	PO1,PO2,PO3
2	Briefing mass density, specific weight, specific volume,	T1	1	PPT	L2	CO1	PO1,PO2,PO3
3	Viscosity and its related terms and derivation, compressibility	T1	1	PPT/BB	L2	CO1	PO1,PO2,PO3
4	Solving simple problems in fluid properties	T1	1	PPT/BB	L3	CO1	PO1,PO2,PO3
5	Solving problems under Viscosity	T1	1	PPT/BB	L3	CO1	PO1,PO2,PO3
6	Solving problems under Viscosity	T1	1	PPT/BB	L2	CO1	PO1,PO2,PO3
7	Discussing surface tension and capillarity	T1	1	PPT	L3	CO1	PO1,PO2,PO3
8	Solving problems in surface tension and capillarity	T1	1	PPT/BB	L2	CO1	PO1,PO2,PO3
9	Flow charactristics and control volume	T1	1	PPT	L2	CO1	PO1,PO2,PO3

10	Continuity equation and its application	**T1**	**1**	**PPT**	**L3**	CO1	PO1,PO2,PO3
11	Solving problems in continuity equation	**T1**	**1**	**PPT/BB**	**L3**	CO1	PO1,PO2,PO3
12	Concept of energy equation and momentum equation	**T1**	**1**	**PPT**	**L2**	CO1	PO1,PO2,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any.

Evaluation method: Assignment

UNIT II: FLOW THROUGH CIRCULAR CONDUITS

13	Introduction to unit II, Viscous flow and its classification	**T1**	**1**	**PPT**	**L1**	CO2	PO1,PO2,PO3
14	Reynolds experiment and Reynolds number	**T1**	**1**	**PPT**	**L1**	CO2	PO1,PO2,PO3
15	Viscous flow in circular conduit pipes derivation	**T1**	**1**	**PPT/BB**	**L2**	CO2	PO1,PO2,PO3
16	Solving problems in Viscous flow in circu;lar conduit pipes	**T1**	**1**	**PPT/BB**	**L3**	CO2	PO1,PO2,PO3
17	Darcy weisbach equation derivation and Chezy's equation	**T1**	**1**	**PPT/BB**	**L2**	CO2	PO1,PO2,PO3
18	Solving problems in pipe friction using Darcy weisbach equation	**T1**	**1**	**PPT/BB**	**L3**	CO2	PO1,PO2,PO3
19	Discussing the minor losses and derivatons	**T1**	**1**	**PPT**	**L2**	CO2	PO1,PO2,PO3
20	Solving problems in minor losses in pipes	**T1**	**1**	**PPT/BB**	**L3**	CO2	PO1,PO2,PO3
21	Pipes in series and parallel concepts	**T1**	**1**	**PPT**	**L3**	CO2	PO1,PO2,PO3
22	Boundary layer concept and various thickness	**T1**	**1**	**PPT**	**L2**	CO2	PO1,PO2,PO3
23	Modi diagram, minor and major losses in pipes	**T1**	**1**	**PPT**	**L1**	CO2	PO1,PO2,PO3
24	Hydraulic and energy gradient line concept, Solving problems in minor losses in pipes	**T1**	**1**	**PPT/BB**	**L2, L3**	CO2	PO1,PO2,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

Evaluation method: Tutorial

UNIT III: DIMENSIONAL ANALYSIS

25	Introduction to unit III, Need for dimensional analysis, uses and various dimensions	**T1**	**1**	**PPT**	**L1**	CO3	PO1,PO2,PO3
26	Units and dimensions for various standard parameters	**T1**	**1**	**PPT/BB**	**L1**	CO3	PO1,PO2,PO3
27	Dimensional homogeneity and methods of dimensional analysis	**T1**	**1**	**PPT**	**L2**	CO3	PO1,PO2,PO3
28	Rayleigh's method procedure and problems	**T1**	**1**	**PPT/BB**	**L2**	CO3	PO1,PO2,PO3
29	Solving problems in Rayleigh's method	**T1**	**1**	**PPT/BB**	**L3**	CO3	PO1,PO2,PO3
30	Buckingham pi theorem concept and procedure	**T1**	**1**	**PPT/BB**	**L2**	CO3	PO1,PO2,PO3
31	Solving problems in Buckingham pi theorem	**T1**	**1**	**PPT/BB**	**L3**	CO3	PO1,PO2,PO3
32	Solving problems in Buckingham pi theorem	**T1**	**1**	**PPT/BB**	**L3**	CO3	PO1,PO2,PO3
33	Concept of similitude and types of similarities	**T1**	**1**	**PPT**	**L2**	CO3	PO1,PO2,PO3
34	Dimension less numbers and its concepts Model analysis and Model laws	**T1**	**1**	**PPT**	**L1, L2**	CO3	PO1,PO2,PO3
35	Solving problems in similarities, Dimension less numbers and model analysis	**T1**	**1**	**PPT/BB**	**L3**	CO3	PO1,PO2,PO3

36	Solving problems in similarities, Dimension less numbers and model analysis	T1	1	PPT/BB	L3	CO3	PO1,PO2,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

Evaluation method: Tutorial

UNIT IV: PUMPS

37	Introduction to unit IV, Theory of rotodynamic machines and euler's equation concept	T1	1	PPT	L1	CO4	PO1,PO2,PO3
38	Discussing the various efficiencies of rotodynamic machines	T1	1	PPT	L2	CO4	PO1,PO2,PO3
39	Concept of velocity triangles at entry and exit of the rotor	T1	1	PPT/BB	L2	CO4	PO1,PO2,PO3
40	Centrifugal pump concept, working principle	T1	1	PPT	L1	CO4	PO1,PO2,PO3
41	Velocity triangle, workdone by the impeller and efficiencies	T1	1	PPT/BB	L2	CO4	PO1,PO2,PO3
42	Cavitation and priming concept	T1	1	PPT	L1	CO4	PO1,PO2,PO3
43	performance curves and its significance solving problems	T1	1	PPT/BB	L1	CO4	PO1,PO2,PO3
44	Solving problems in centrifugal pump and various effiencies	T1	1	PPT/BB	L3	CO4	PO1,PO2,PO3
45	Solving problems in centrifugal pump and various effiencies	T1	1	PPT/BB	L3	CO4	PO1,PO2,PO3
46	Reciprocating pump and its working principle	T1	1	PPT	L2	CO4	PO1,PO2,PO3
47	Solving problem in reciprocating pumps	T1	1	PPT/BB	L3	CO4	PO1,PO2,PO3
48	Types of Rotary pumps	T1	1	PPT	L2	CO4	PO1,PO2,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

Evaluation method: Case Study

UNIT V: TURBINES

49	Introduction to unit 5, Turbines and its classification	T1	1	PPT	L2	CO5	PO1,PO2,PO3
50	Various heads and efficiencies of turbine	T1	1	PPT	L1	CO5	PO1,PO2,PO4
51	Velocity triangle and its components of a turbine	T1	1	PPT/BB	L1	CO5	PO1,PO2,PO5
52	Discussing the types of flow in the turbine	T1	1	PPT	L1	CO5	PO1,PO2,PO6
53	Pelton wheel working principle, velocity triangle	T1	1	PPT/BB	L2	CO5	PO1,PO2,PO7
54	Solving problems on pelton wheel concept	T1	1	PPT/BB	L3	CO5	PO1,PO2,PO8
55	Solving problems on pelton wheel concept	T1	1	PPT/BB	L3	CO5	PO1,PO2,PO9
56	Working principle of Francis and Kaplan turbines	T1	1	PPT	L2	CO5	PO1,PO2,PO10
57	Velocity triangle and Draft tube	T1	1	PPT/BB	L1	CO5	PO1,PO2,PO11
58	Workdone and specific speed concept	T1	1	PPT	L2	CO5	PO1,PO2,PO12
59	Solving problems on turbines	T1	1	PPT/BB	L3	CO5	PO1,PO2,PO13
60	Performance curves and its significance and governing of turbines.	T1	1	PPT	L2	CO5	PO1,PO2,PO14

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

Evaluation method: Case Study

	Content Beyond the Syllabus Planned
1	Pressure measurement concept and methods
2	Pilot tube concept

Text Books

1	Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi 2013.

Reference Books

1	Graebel. W.P, "Engineering Fluid Mechanics", Taylor & Francis, Indian Reprint, 2011
2	Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2016
3	Robert W.Fox, Alan T. McDonald, Philip J.Pritchard, "Fluid Mechanics and Machinery", 2011.
4	Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010

Website / URL References

1	https://nptel.ac.in/courses/112/104/112104118/
2	https://nptel.ac.in/courses/112/105/112105171/
3	https://nptel.ac.in/courses/112/105/112105218/
4	https://nptel.ac.in/courses/112/105/112105183/
5	https://nptel.ac.in/courses/112/105/112105269/

Blooms Level

Level 1 (L1) : Remembering	Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing
Level 2 (L2) : Understanding			Level 5 (L5) : Evaluating
Level 3 (L3) : Applying			Level 6 (L6) : Creating

Higher Order Thinking | Projects / Mini Projects

Mapping syllabus with Bloom's Taxonomy LOT and HOT

Unit No	Unit Name	L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	Fluid Properties And Flow Characteristics	1	6	5	0	0	0	12	0	12
Unit 2	Flow Through Circular Conduits	3	5	5	0	0	0	13	0	13
Unit 3	Dimensional Analysis	3	5	5	0	0	0	13	0	13
Unit 4	Pumps	4	5	3	0	0	0	12	0	12
Unit 5	Turbines	4	5	3	0	0	0	12	0	12
Total		15	26	21	0	0	0	62	0	62
Total Percentage		24.194	41.935	33.871	0	0	0	100	0	100

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1										2	1
CO2	3	2	1										2	1
CO3	2	3	1										2	1
CO4	3	3	2										2	1
CO5	3	3	1										2	1
Avg	3	3	1										2	1

Justification for CO-PO mapping

CO1	PO1:Applying of engineering concept is more predominent, PO2: Applying the formulas and analyze the problems considered moderately, PO3: A very small impact is given to the complex problems.
CO2	PO1:Applying of engineering concept is more predominent, PO2: Applying the formulas and analyze the problems considered moderately, PO3: A very small impact is given to the complex problems.
CO3	PO1:Applying of engineering concept is more predominent, PO2: Applying the formulas and analyze the problems considered moderately, PO3: A very small impact is given to the complex problems.
CO4	PO1:Applying of engineering concept is more predominent, PO2: Applying the formulas and analyze the problems considered moderately, PO3: A very small impact is given to the complex problems.
CO5	PO1:Applying of engineering concept is more predominent, PO2: Applying the formulas and analyze the problems considered moderately, PO3: A very small impact is given to the complex problems.

3	**High level**	**2**	**Moderate level**	**1**	Low level

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Name & Sign of Subject Expert   : Dr.G.Ramesh

Head of the Department   : Dr.G.Ramesh

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