

SARDAR RAJA COLLEGE OF ENGINEERING, ALANGULAM

DEPARTMENT OF CIVIL ENGINEERING

MICRO LESSON PLAN



SUBJECT NAME : APPLIED HYDRAULIC ENGINEERING

SUBJECT CODE : CE2253

YEAR/SEM : II / IV

STAFF NAME : M.MATHAVAN

ASST.PROF / CIVIL

SYLLABUS

CE2253

APPLIED HYDRAULIC ENGINEERING

L T P C

3 1 0 4

OBJECTIVE

Student is introduced to open channel flow characteristics including hydraulic jump and surges. Hydraulic machines viz flow through turbines and pumps including their performance characteristics and design aspects are taught. Student, at the end of the semester will have the abilities to analyse flow characteristics in open channel and design hydraulic machines.

UNIT I OPEN CHANNEL FLOW

9+3

Open channel flow – Types and regimes of flow – Velocity distribution in open channel – Wide open channel – Specific energy – Critical flow and its computation – channel transition.

UNIT II UNIFORM FLOW

8+3

Uniform flow – Velocity measurement – Manning's and Chezy's formula – Determination of roughness coefficients – Determination of normal depth and velocity – Most economical sections – Non-erodible channels

UNIT III VARIED FLOW

9+3

Dynamic equations of gradually varied flow – Assumptions – Characteristics of flow profiles – Draw down and back water curves – Profile determination – Graphical integration, direct step and standard step method – Flow through transitions - Hydraulic jump – Types – Energy dissipation – Surges.

UNIT IV PUMPS

9+3

Centrifugal pump - minimum speed to start the pump – multistage Pumps – Jet and submersible pumps - Positive displacement pumps - reciprocating pump - negative slip - flow separation conditions - air vessels -indicator diagram and its variation - savings in work done - rotary pumps.

UNIT V TURBINES

10+3

Turbines - draft tube and cavitations – Application of momentum principle – Impact of jets on plane and curved plates - turbines - classification - radial flow turbines - axial flow turbines – Impulse and Reaction

TOTAL (L:45+T:15): 60 PERIODS

TEXT BOOKS

1. Subramanya K., "Flow in Open channels", Tata McGraw-Hill Publishing Company, 1994.
2. Modi, P.N, and Seth S.M. Hydraulic and Fluid Mechanics Standard Book House, 2000.
3. Bansal R.K, Fluid mechanics & Hydraulic machines, Laxmi Publishing Pvt Ltd, New Delhi - 2007

REFERENCES

1. Jain A.K., "Fluid Mechanics (including Hydraulic Machines)", Khanna Publishers, 8th edition, 1995.
2. Ranga Raju, K.G., "Flow through Open Channels", Tata McGraw-Hill, 1985

SUBJECT DESCRIPTION AND OBJECTIVES DESCRIPTION

This course covers fundamental aspects of fluid mechanics and hydraulics. It contains a review of the fundamental equations of Fluid Mechanics, an expansion of the methods of momentum analysis known from Thermofluids, and a detailed discussion of the powerful technique of Dimensional Analysis, which allows the systematic discovery of parameter sets that govern the characteristic features of a flow. Special emphasis will be given to friction effects in fluid flows. The course then examines several important applications in civil engineering, including friction and minor losses in single pipelines and pipe networks, pump-pipe systems and open channel flow; the latter will include friction losses and conservation of energy and momentum principles.

OBJECTIVES

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MICRO LESSON PLAN

HOURS	LECTURE TOPICS	READING
UNIT I OPEN CHANNEL FLOW		
1	Open channel flow	T3
2	Problems	
3	Types and regimes of flow	T3
4	Problems	
5	Velocity distribution in open channel(AV Class)	T3
6	Problems	
7	Wide open channel – Specific energy	T3
8	Problems	
9	Critical flow and its computation	T3
10	Problems	
11	channel transition.	T3
12	Problems	T3
UNIT II UNIFORM FLOW		
13	Uniform flow	T3
14	Problems	T3
15	Velocity measurement	T3
16	Problems	T3
17	Manning's and Chezy's formula	T3
18	Problems	T3
19	Determination of roughness coefficients	T3
20	Problems	T3
21	Determination of normal depth and velocity (AV Class)	T3
22	Most economical sections	T3
23	Non-erodible channels	T3
UNIT III VARIED FLOW		
24	Dynamic equations of gradually varied flow	T3
25	Problems	T3
26	Assumptions – Characteristics of flow profiles	T3
27	Problems	T3
28	Draw down and back water curves	T3
29	Profile determination	T3

30	Graphical integration, direct and standard step method	T3
31	Flow through transitions	T3
32	Hydraulic jump – Types (AV Class)	T3
33	Problems	T3
34	Energy dissipation	T3
35	Surges	T3
UNIT IV PUMPS		
36	Centrifugal pump	T3
37	Minimum speed to start the pump	T3
38	Multistage Pumps	T3
39	Jet and submersible pumps	T3
40	Positive displacement pumps	T3
41	Reciprocating pump (AV Class)	T3
42	Negative slip	T3
43	Flow separation conditions	T3
44	Air vessels	T3
45	Indicator diagram and its variation	T3
46	savings in work done - rotary pumps	T3
47	Problems	T3
UNIT V TURBINES		
48	Turbines	T3
49	Draft tube and cavitations	T3
50	Problems	T3
51	Application of momentum principle	T3
52	Problems	T3
53	Impact of jets on plane and curved plates	T3
54	Problems	T3
55	Turbines - classification (AV Class)	T3
56	Radial flow turbines	T3
57	Problems	T3
58	Axial flow turbines	T3
59	Problems	T3
60	Impulse and Reaction	T3

Staff : Mr. M.Mathavan AP/Civil