



**SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)**

Seetharamapuram, NARASAPUR - Pin: 534 280

DEPARTMENT OF CIVIL ENGINEERING

LESSON PLAN

Course Code	Course Title	Semester	Branches	Conduct Periods /Week	A.Y	Date of commencement of Semester
23CE4T04	HYDRAULICS AND HYRAULIC MACHINERY	IV	Civil Engineering	5	2025-26	10-12-2025

S.N	COURSE OUTCOMES	BTKL
CO1	Understand the characteristics of laminar and turbulent flows.	K2
CO2	Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels.	K3
CO3	Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows.	K3
CO4	Know the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine.	K2
CO5	Understand the principles, losses and its efficiencies of centrifugal pumps.	K2

UNIT	Out Comes/ BTKL	Topics No.	Topics/Activity	Text Book /Reference	Conduct Hour	Delivery Method
I	CO1. Understand the characteristics of laminar and turbulent flows. (K2)	1.Laminar & Turbulent flow in pipes				
		1.1	Laminar Flow- Laminar flow through	T ₁ & T ₂	1	Chalk, Talk, PPT
		1.2	Circular pipes	T ₁ &W ₁	2	
		1.3	Annulus and parallel plates	T ₁	2	
		1.4	Stoke's law	T ₁ & R ₁	1	
		1.5	Measurement of viscosity	T ₁ & R ₁	1	
		1.6	Reynold's experiment	T ₂ & R ₂	1	
		1.7	Transition from laminar to turbulent flow	T ₂ & R ₂	1	
		1.8	Resistance to flow of fluid in smooth and	T ₁	2	
		1.9	rough pipes-Moody's diagram	R ₁	1	
		1.10	Introduction to boundary layer theory	T ₁ & R ₁	1	
Total					13	



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II	CO2. Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels. (K3)	2. Uniform flow in Open Channels				Chalk, Talk & PPT
		2.1	Open Channel Flow	T_1 & T_2	1	
		2.2	Comparison between open channel flow and pipe flow	T_1 & R_1	1	
		2.3	geometrical parameters of a channel	T_1 & R_2	1	
		2.4	classification of open channels	T_1 & R_1	1	
		2.5	classification of open channel flow	T_1 & T_3	1	
		2.6	Velocity Distribution of channel section	T_1 & T_2	1	
		2.7	Hydraulically efficient channel sections	T_1 & R_1	2	
		2.8	Rectangular, trapezoidal channels	T_1 & R_2	1	
		2.9	and triangular channels	T_1 & R_1	1	
		2.10	Energy and Momentum correction factors	T_1 & R_1	2	
Total					12	
III	CO3 Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows. (K3)	3. Non-Uniform flow in Open Channels				Chalk, Talk & PPT
		3.1	Specific energy, critical flow	T_1 & T_2	1	
		3.2	discharge curve	T_1 & R_1	1	
		3.3	Specific force	T_1 & R_1	1	
		3.4	Specific depth, and Critical depth	T_1 & R_1	1	
		3.5	Measurement of Discharge and Velocity	T_1 & T_3	2	
		3.6	Gradually Varied Flow	T_1 & T_1	1	
		3.7	Dynamic Equation of Gradually Varied Flow	T_1 & T_2	2	
		3.8	Hydraulic Jump and classification	T_1 & R_1	1	
		3.9	Elements and characteristics	T_1 & R_2	1	
		3.10	Energy dissipation	T_1 & R_1	1	
Total					12	



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IV	CO4: Know the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine. (K2)	4. Impact of Jets				Chalk, Talk, & PPT, Experimental.
		4.1	Hydrodynamic force of jet on stationary moving flat	$T_1 \& T_2$	2	
		4.2	inclined and curved vanes	$T_1 \& T_2$	1	
		4.3	Velocity triangles at inlet and outlet	$T_1 \& T_2$	1	
		4.4	Work done and efficiency Hydraulic Turbines	$T_2 \& R_1$	2	
		4.5	Classification of turbines	$T_1 \& R_1$	1	
		4.6	Pelton wheel and its design	$T_1 \& R_1$	1	
		4.7	Francis turbine and its design and efficiency	$T_1 \& R_2$	2	
		4.8	Draft tube: theory	$T_1 \& R_1$	1	
		4.9	characteristic curves of hydraulic turbines	$T_1 \& R_1$	2	
		4.10	Cavitation: causes and effects	$T_1 \& R_1$	1	
Total					14	
V	CO5: Understand the principles, losses and its efficiencies of centrifugal pumps. (K2)	5. Pumps				Chalk, Talk & PPT, Experimental.
		5.1	Working principles of a centrifugal pump	$T_1 \& T_2$	1	
		5.2	work done by impeller	$T_2 \& R_1$	1	
		5.3	heads, losses and efficiencies	$T_1 \& R_1$	2	
		5.4	minimum starting speed	$T_1 \& R_2$	1	
		5.5	Priming; specific speed	$T_1 \& R_1$	1	
		5.6	limitation of suction lift	$T_1 \& T_2, R_2$	1	
		5.7	net positive suction head (NPSH)	$T_2 \& R_1$	1	
		5.8	Performance and characteristic curves	$T_2 \& R_2$	2	
		5.9	Cavitation effects	$T_1 \& R_1$	1	
		5.10	Multistage centrifugal pumps	$T_1 \& R_3$	1	
		5.11	troubles and remedies.	$T_1 \& T_2$	2	
Total					14	
Cumulative Proposed Periods					65	



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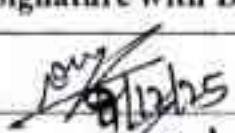
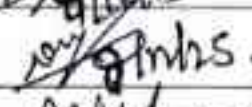
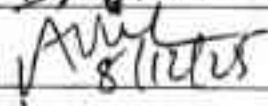
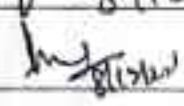
Text Books:

S.No	Authors, Book Title, Edition, Publisher, Year of Publication
T1	P.M.Modi and S.M.Seth, Hydraulics and Fluid Mechanics, Standard Book House, 2019
T2	K.Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2 nd edition 2018

Reference Books:

S.No.	Authors, Book Title, Edition, Publisher, Year of Publication
R1	R.K.Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11 th edition, 2024.
R2	Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9 th edition, 2022.
R3	C.S.P.Ojha, R.Berndtsson and P.N.Chandramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
R4	Introduction to Fluid Mechanics & Fluid Machines by SK Som, Gautam Biswas, S Chakraborty 3 rd edition 2011

Web-ref	1. https://nptel.ac.in/courses/105105203 2. https://archive.nptel.ac.in/courses/112/106/112106300/ 3. https://archive.nptel.ac.in/courses/112/103/112103249/
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S.NO.	Details	Name	Signature with Date
i.	Faculty	Mr. N. BULLI RAJU	
ii.	Course Coordinator	Mr. N. BULLI RAJU	
iii.	Module Coordinator	Dr. A. VENKATA KRISHNA	
iv.	Program Coordinator	Dr. G.V.L.N MURTHY	


Principal