

# SWARNANDHRA

## COLLEGE OF ENGINEERING & TECHNOLOGY

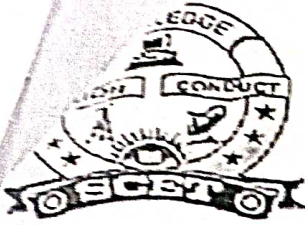
(AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3 32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kaknada Seetharampuram, W G DT, Narasapur-534280, (Andhra Pradesh)

### DEPARTMENT OF MECHANICAL ENGINEERING

#### LESSON PLAN

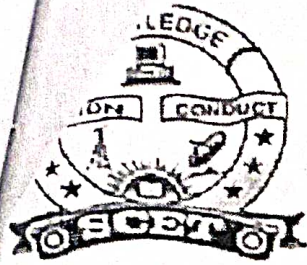
Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
20ME3T02	FLUID MECHANICS AND HYDRAULIC MACHINERY	III	Mechanical Engineering	6	2021-22	25-10-2021
<b>COURSE OUTCOMES</b>						
1	Define the fundamental properties of fluids and apply the concepts of fluid statics. [K1]					
2	Apply the principles of fluid kinematics and boundary layer concepts for fluid flow problems.[K3]					
3	Analyze the fluid flow through pipes. [K4]					
4	Understand the concept of hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes and explain the working and performance of various types of turbines. [K2]					
5	Explain working principles of hydraulic pumps. [K2]					
UNIT	Out Comes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
I	CO1. Define the fundamental properties of fluids and apply the concepts of fluid statics. [K1]	<b>1. BASIC CONCEPTS AND PROPERTIES</b>				
		1.1	Fluid – definition, distinction between solid and fluid	T1,R1	1	Chalk & Talk, PPT, Video Presentation
		1.2	Properties of fluids: density, specific weight, specific volume, specific gravity	T1,R1	1	
		1.3	temperature, viscosity	T1,R1	1	
		1.4	compressibility, vapour pressure	T1,R1	1	
		1.5	capillarity and surface tension	T1,R1,R4	2	
		1.6	Units and dimensions	T1,R1	1	
		1.7	Fluid statics: concept of fluid static pressure, absolute and gauge pressures	T1,R1	1	
		1.8	pressure measurements by manometers	T1,R1	2	
		1.9	pressure measurements by manometers	T1,R1	1	
		1.10	pressure gauges	T1,R1	1	
Content beyond Syllabus		Cohesion and Adhesion		T1,R1	1	
<b>Total</b>					<b>13</b>	
II	CO2. Apply the principles of fluid kinematics and boundary layer concepts for fluid flow	<b>2. FLUID KINEMATICS AND BOUNDARY LAYER CONCEPTS</b>				
		<b>FLUID KINEMATICS</b>				
		2.1	Flow visualization, lines of flow, types of flow	T1, R1,R4	1	Chalk & Talk, PPT, Video Presentation
2.2	continuity equation (one dimensional flow)	T1, R1	1			



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	problems. [K3]	<b>FLUID DYNAMICS</b>				
		2.3	equations of motion, Euler's equation along a streamline	T1, R1	1	
		2.4	Bernoulli's equation	T1, R1	1	
		2.5	applications	T1, R1	1	
		2.6	Venturimeter	T2, R1	2	
		2.7	Orifice meter	T1, R1	1	
		2.8	Pitot tube	T1, R1	1	
		2.9	boundary layer thickness	T1, R2	1	
		2.10	drag and lift coefficients	T1, R1	1	
		2.11	boundary layer separation	T1, R2	1	
		Content beyond Syllabus		Buoyancy force	T1, R1	
<b>Total</b>				<b>13</b>		
<b>3. FLOW THROUGH PIPES AND DIMENSIONAL ANALYSIS</b>						
<b>III</b>	CO3. Analyze the fluid flow through pipes. [K4]	<b>FLOW THROUGH PIPES</b>				Chalk & Talk, PPT, Video Presentation
		3.1	Darcy - Weisbach equation	T1, R1, R4	1	
		3.2	pipe roughness, friction factor	T1, T2, R1	1	
		3.3	minor losses	T1, R1	2	
		3.4	through pipes in series	T1, R2	1	
		3.5	and in parallel	T1, R1	1	
		3.6	power transmission	T1, R1	1	
		<b>DIMENSIONAL ANALYSIS</b>				
		3.7	Buckingham's $\pi$ theorem	T1, R1	2	
		3.8	applications	T1, R1	1	
3.9	similarity laws and models	T1, R1	1			
Content beyond Syllabus		Reynolds and Mach numbers	T1, R1	1		
<b>Total</b>				<b>12</b>		
<b>4. HYDRAULIC TURBINES</b>						
<b>IV</b>	CO4. Understand the concept of hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes and explain the working and performance of various types of turbines. [K2]	4.1	turbines: definition	T1, R1	1	Chalk & Talk, PPT, Students Seminars
		4.2	and classifications	T1, R1	1	
		4.3	Pelton turbine - working principles	T1, R2	1	
		4.4	velocity triangles, work done	T1, R1	2	
		4.5	Francis turbine - working principles	T1, R1	1	
		4.6	velocity triangles, work done	T1, R2	1	
		4.7	Kaplan turbine - working principles	T1, R1	1	
		4.8	velocity triangles, work done	T1, R1	2	
		4.9	specific speed	T1, R2	1	
		4.10	efficiencies	T1, R1	1	
		4.11	performance curves of turbines	T1, R4	1	
Content beyond Syllabus		Characteristics of the Turbines	T1, R1	1		
<b>Total</b>				<b>14</b>		



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5. HYDRAULIC PUMPS							
V	CO5.Explain working principles of hydraulic pumps. [K2]	5.1	Pumps- classifications	T1, R1	1	Chalk & Talk, PPT, Video Presentation	
		CENTRIFUGAL PUMP					
		5.2	classifications	T1, R1	1		
		5.3	working principles, priming	T1, R1	1		
		5.4	velocity triangles	T1, R1	2		
		5.5	specific speed, efficiency	T1, R1	1		
		5.6	and performance curves	T2, R1	1		
		RECIPROCATING PUMP					
		5.7	classification	T1, R1	2	Chalk & Talk, PPT, Video Presentation	
		5.8	working principles	T2, R1	1		
		5.9	Slip, performance curves	T1, R2	1		
5.10	work saved by air vessels	T1, R1	1				
5.11	cavitations in pumps	T1, R1	1				
Content beyond Syllabus		Submersible pump	T1, R1, R4	1			
<b>Total</b>					13		
<b>CUMULATIVE PROPOSED PERIODS</b>					65		

**Text Books:**

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
T1	R. K. Bansal, "A text book of Fluid Mechanics and Hydraulic Machines" Laxmi Publications, 9th edition 2018.
T2	Rajput. R. K., "A Textbook of Fluid Mechanics and Hydraulic Machines" S. Chand, 6th edition, 2015.

**Reference Books:**

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
R1	P.N. MODI and S.M. SETH "Hydraulics, fluid mechanics" Standard book house. 21st edition, 2017.
R2	Ramamirtham, S., "Fluid Mechanics and Hydraulics and Fluid Machines", Dhanpat Rai and Sons, Delhi, 2011.
R3	Som, S.K., Biswas, G., "Introduction to fluid mechanics and fluid machines", Tata McGraw-Hill, 4 <sup>th</sup> Edition, 2011.
R4	Kumar, K.L., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi (7 <sup>th</sup> edition), 2011
R5	Streeter, V.L., and Wylie, E.B., "Fluid Mechanics", McGraw-Hill, 2011.

**Web Details**

1	<a href="http://nptel.iitk.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Fluid%20Mechanics/New_index1.html">http://nptel.iitk.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Fluid%20Mechanics/New_index1.html</a>
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		Name	Signature with Date
i.	Faculty	Mr. N. Bulli Raju	
ii.	Faculty II (for common Course)	Ms. B. Harita	
iii.	Course Coordinator	Dr. R. Lalitha Narayana	
iv.	Module Coordinator	Dr. R. Lalitha Narayana	
v.	Programme Coordinator	Dr. A. Gopi Chand	

Principal