SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

Sree Sainath Nagar, A. Rangampet-517 102

Department of Mechanical Engineering
Lesson Plan

Name of the Subject:FLUID MECHANICS & HYDRAULIC MACHINERY (14BT40302)

Class& Semester   :II B.Tech II SEMESTER (MECHANICAL ENGINEERING)

Nameof the faculty Member: Mr.**D.RAGHURAMIREDDY**

S. No.	Topic	No. of periods	Book(s) followed	Topics for self-study
	UNIT – I: PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENT			
1	Introduction to Hydraulics and fluid mechanics, Dimensions & Units	1	T1& R1	*1.http://nptel. iitm.ac.in/cou rses 2.http://www. learnerstv.co m/Free-Engineering-Video-lectures-ltv078-Page1.htm*
2	Properties of fluids Mass density, Specific weight, Specific volume, Specific gravity; Viscosity, Kinematic Viscosity, Dynamic Viscosity	1	T1,T2 & R1	
3	surface tension & capillarity	1	T1,T2 & R1	
4	Vapor pressure and its influence on fluid motion, Bulk modulus, compressibility;	1	T1,T2 & R1	
5	Types of fluids: Ideal and real fluids; Newtonian and non Newtonian fluids.	1	T1,T2 & R1	
6	Pressure Measurement Absolute, Gauge, Atmospheric and vacuum Pressure	1	T1,T2 & R1	
7	Manometers: Piezometer, U-tube manometer and single column manometer	1	T1,T2 & R1	
8	Differential Manometers: U-tube differential manometers Inverted U-tube differential manometers	2	T1,T2 & R1	
	Total periods required:	**9**		
	UNIT – II: FLUID KINEMATICS &DYNAMICS			
9	Types of fluid flows Steady-Unsteady Uniform-Non-uniform Laminar & Turbulent Rotational, and Irrotational flows Compressible & incompressible flows	1	T1 & T2	*1.http://nptel.iit m.ac.in/courses/ 105101082/ 2.http://www.lea rnerstv.com/Fre e-Engineering-Video-lectures-ltv078-Page1.htm*
10	Path line, Stream line, streak line, and stream tube	1	T1, &R1	
11	Discharge Equation of continuity for one dimensional flow.	1	T1, T2 & R1	
12	Surface and body forces Different types of heads	1	T1, T2 & R1	
13	Euler's equation for motion Bernoulli's equation	2	T1, T2 & R1	
14	Practical applications of Bernoulli's equations: Venturimeter Orifice meter Pitot tube	2	T1, T2 & R1	

15	Impulse momentum equation and forces on pipe end	1	T1, T2 & R1	
Total periods required:		**9**		

UNIT-III: : FLOW THROUGH PIPES AND IMPACT OF JETS

16	Introduction: Reynold'sexperiment,	1	T1, T2 & R1	*1.http://nptel.iitm .ac.in/courses/10 5101082/ 2.http://www.lear nerstv.com/FreeE ngineering- Videolectures- ltv078Page1.htm*
17	Major energy losses in pipes i) Darcy Weisbach equation ii) Chezy's constant	1	T1, T2 & R1	
18	Minor losses in pipes a)Loss of head due to sudden enlargement b) Loss of head due to sudden contraction c)Loss of head due to an obstruction in the pipe d) Loss of head at entrance of a pipe e) Loss of head at exit of a pipe. f) Loss of head due to bends in pipes g) Loss of head in various pipe fittings	2	T1, T2 & R1	
19	Hydraulic gradient line & Total energy line	1	T1, T2 & R1	
20	Equivalent pipe Pipes in series Pipes in parallel	1	T1, T2 & R1	
21	**IMPACT OF JETS:** stationary flat plate: Force exerted by the jet on stationary flat plate held normal to the jet: Force exerted by the jet on stationary flat plate held inclined to the jet Force exerted on stationary curved plate : Jet strikes curved plate at centre Jet strikes the curved plate at one end tangentially when the plate is symmetrical Jet strikes the curved plate at one end tangentially when the plate is unsymmetrical	2	T1, T2 & R1	
22	Moving plate: Force exerted by the jet on moving plate held normal to the jet Force exerted by the jet on moving plate inclined to the direction of jet Force exerted on curved plate when the plate is moving in the direction of jet Force exerted by the jet on unsymmetrical moving curved plate when jet strikes tangentially at one of its tip.	2	T1, T2 & R1	
Total periods required:		**10**		

UNIT – IV: HYDRAULIC TURBINES AND THEIR PERFORMANCE

23	Introduction Classification of hydraulic turbines	1	T1, T2 & R1	*1.http://nptel.iit m.ac.in/courses*

24	Impulse turbine: Construction, Working principle, Work done & Efficiency of Pelton wheel	1	T1, T2 & R1	/105101082/;http://www.youtube.com/watch?v=wvxUZF4lvGw&feature=player_detailpage 2.http://nptel.iitm.ac.in/courses/105101082/ http://www.mech.uq.edu.au/courses/mech7350/lecture-notes-inpdf/mech7350-10-hydraulic-turbines.pdf
25	Reaction turbines: Working proportions, Work done & Efficiency of Francis turbine Working proportions, Work done & Efficiency of Kaplan turbine	2	T1, T2 & R1	
26	Draft tube theory - functions and efficiency	1	T1, T2 & R1	
27	Performance Of Hydraulic Turbines Geometric similarities Specific speed Unit quantities	1	T1, T2 & R1	
28	Performance characteristics of hydraulic turbines i) Constant head characteristic curves ii) Constant speed characteristics curves iii) Constant efficiency curves	1	T1, T2 & R1	
29	Governing of hydraulic turbines Selection of type of turbine	1	T1, T2 & R1	
30	Water hammer Surge tank & types of surge tank i) Simple surge tank ii) Inclined surge tank iii) Expansion chamber surge tank iv) Restricted orifice	1	T1, T2 & R1	
Total periods required:		**9**		

UNIT – V: PUMPS AND HYDROELECTRIC POWER STATIONS

31	Classification of pumps, Working principle, Work done, head losses and efficiencies of Single stage Centrifugal pump	1	T1, R1, & R1	1.http://nptel.iitm.ac.in/courses/105101082/;http://www.youtube.com/watch?v=FENCiAEfaA & feature=player_detailpage 2.http://nptel.iitm.ac.in/courses/105101082/ ; http://ga.water.usgs.gov/edu/hyhowworks.html
32	Multistage centrifugal pumps: Pumps in series Pumps in parallel	1	T1, R1, & R1	
33	Characteristics of Centrifugal pump Specific speed	1	T1, R1, & R1	
34	Introduction to reciprocating pumps Classification of reciprocating pumps Main components and working of single acting and double acting reciprocating pumps	1	T1, T2 & R1	
35	Discharge, workdone, power, Coefficient of discharge and slip	1	T1, T2 & R1	
36	Indicator diagrams of reciprocating pumps	1	T1, T2 & R1	
37	Hydroelectric power station: Elements of hydroelectric power station Types, heads and efficiencies	1	T1, T2 & R1	

38	Concept of pumped storage plants and storage requirements	1	T1, T2 & R1	
	Total periods required:	**8**		
	Grand total periods required:	**45**		

Text Books:

T1: R.K. Rajput, *Fluid Mechanics and Hydraulic Machines*, S.Chand,4thEdition, 2008.

T2:Modi and Seth, *Fluid Mechanics and Hydraulic Machinery*, Standard book house,17thEdition,2011.

Reference Books:

R1: R.K. Bansal, *Fluid Mechanics and Hydraulic Machinery*,Laxmi publications, 9th Edition 2005.

R2: D.S. Kumar, Fluid *Mechanics and Fluid Power Engineering*, Kotaria& Sons, 7thEdition 2009.