 <p>NAGARJUNA COLLEGE OF ENGINEERING & TECHNOLOGY</p>	<p>NBA Accredited *</p> <p>NACC Accredited with “A” grade (An ISO 9001 – 2008 Certified Institution)</p> <p>Affiliated to Visvesvaraya Technological University (VTU)</p> <p>Recognized by Govt. of Karnataka & Approved by A.I.C.T.E. New Delhi</p>
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Handout

Course No. : 19CVT33	Dept.: CIVIL
Course Title : Fluid Mechanics and Machinery	Semester: 3 rd
Instructor-in-charge : Mrs.Vidyashree.M	Academic Year: 2020-21
Lab. Instructor : Mr.Gopinath	

Subject Description

Fluid Mechanics is an inter-disciplinary course covering the basic principles and its applications in Civil Engineering, Mechanical Engineering and Chemical Engineering. The students will have new problem solving approaches like control volume concept and streamline patterns which are now a days required to solve the real-life complex problems. The visualization of the fluid-flow problems will be demonstrated to enhance student's interest on the subject.

Text Books:


1. R.K. Bansal, “A Text book of Fluid Mechanics and Hydraulic Machines”, Laxmi Publications, New Delhi
2. P.N. Modi & S.M. Seth, “Hydraulics and Fluid Mechanics”, Standard Book House
3. Madan Mohan Das, “Fluid Mechanics and Turbo Machines”, PHI Learning Pvt. Ltd. 2011

Reference Books:

1. K Subramanya, “Fluid Mechanics and Hydraulic Machines”, Tata McGraw Hill Publishing Co. Ltd
2. K Subramanya, “Fluid Mechanics and Hydraulic Machines-problems and solutions”, Tata McGraw Hill Publishing Co. Ltd
3. Victor L Streeter, Benjamin Wylie E and Keith W Bedford, “Fluid Mechanics”, 5 Tata McGraw Hill Publishing Co Ltd., New Delhi, 2008(Ed)


PREREQUISITES

1 Concepts of Engineering mechanics	Self-study/ Online/	1) N.P. Bali and Dr. Manish Goyal: “A Text Book of Engineering Mathematics”,	Remarks
2 Basic Civil Engineering		2) Elements of Civil Engineering and Engineering Mechanics by M. N. Shesha Prakash and Ganesh Mogaveer	
3 Integral Calculus <i>A good understanding of the above topics is essential</i>			

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LECTURE PLAN

Topic	Topic Details	Number of Lectures	Cumulative lecture hrs.	Unit/ Chapter Reference
Overview	Introduction	1	1	
Module 1	Introduction to fluids, Systems of units. Properties of fluid	1	2	T1-Page No- 1-34
Fluids & Their Properties	Fluid as a continuum	1	3	
	Newton’s law of viscosity (theory & problems)	1	4	
	Capillary rise in a vertical tube and between two plane surfaces (theory & problems)	1	5	
	Vapor pressure of liquid, surface tension, pressure inside a water droplet, a soap bubble and liquid jet. Numerical problems	1	6	
Fluid Pressure and Its Measurements	Definition of pressure, Pressure at a point, Variation of pressure with depth, Numerical problems	1	7	T1-Page No- 35-68
	Measurement of pressure using simple manometers, problems	1	8	
	Measurement of pressure using differential manometers & inclined manometers, problems	1	9	
Revision		1	10	
Module 2	Introduction, Definitions Total pressure and Centre of pressure , equations for hydrostatic force depth of centre of pressure for Vertical plane surfaces	1	11	T1-Page No-69-130
Hydrostatic Pressure on Surfaces	equations for hydrostatic force depth of centre of pressure for inclined submerged plane surfaces	1	12	
	Problems on vertical & inclined submerged plane surfaces	1	13	
	Practical applications of Total pressure and centre of pressure	1	14	

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Kinematics and Dynamics of Fluid Flow	Introductions, methods of describing fluid motion, types of fluid flow, streamline, path line	1	15	T1-Page No- 163-173, 259-261
	Three dimensional continuity equations in Cartesian Coordinates derivation	1	16	
	Numerical problems	1	17	
	Bernoulli’s equation using Euler’s equation of motion with assumptions and limitations, problems	1	18	
Revision		1	19	
Assignment	Online Quiz	1	20	
Module 3	Major loss & Minor loss, Darcy - Weisbach Equation	1	21	T1-Page No- 465-491, 502-509
Flow through pipes, Head losses	Hydraulic Gradient line, Total Energy Line, problems	1	22	
		Series and Parallel Network of pipes, problems	1	23
Orifice and mouth piece	Hydraulic coefficients,	1	24	T1-Page No- 317-321
	Concept of Orifice and Mouthpiece	1	25	
Notches and Weirs	Definition of Notch and Weir, Flow through V-notch, problems	1	26	T1-Page No- 355-365
	Flow through Rectangular weir, Cippoletti weir, problems	1	27	
	Corrections for Velocity of Approach, Numerical Problems	1	28	
	Corrections for End Contractions, Numerical Problems	1	29	
Revision		1	30	
Module 4	Velocity using Chezy’s and Manning’s equations	1	31	T1-Page No- 737-784
Open Channels Flow	Problems on Chezy’s and Manning’s equations	1	32	
		Hydraulic Efficient Channels	1	
	Rectangular and Trapezoidal channel, problems	1	34	
	Specific Energy, Critical Depth, Froude’s Number	1	35	

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	Specific Energy Diagram, Subcritical and Supercritical flows	1	36	
	Alternative Depths, Hydraulic Jump, Numerical Problems	1	37	
	Problems on Specific Energy	1	38	
Revision		1	39	
Assignment	Online Quiz	1	40	
Module 5	Impact of jet on vanes, Force exerted by the jet on a straight vane, Numerical Problems	1	41	T1-Page No- 803-837
Impact of Jet on Vanes:	Force exerted by the jet on a curved vane (Stationary & Moving), problems	1	42	
	Velocity triangles, Numerical Problems	1	43	
Pumps	Centrifugal and reciprocating pumps working principle and applications	1	44	T1-Page No-945-947, 993-995
Pelton wheel	Components and working principle. Maximum power	1	45	T1-Page No-857-874
	Efficiency, working proportions-problems	1	46	
Francis Turbines	Components and working principle	1	47	T1-Page No-895-896, 915-917
	Draft Tube, Types, Efficiency of Draft tube and problems	1	48	
Revision		1	49	
Future scope of learning	Irrigation and Hydraulic structures	1	50	

Evaluation Scheme:

Component	Duration	Weightage	Date (Time)
CIE 1	90 min	20%	29/09/20
CIE 2	90 min	20%	07/11/20
AIT 1	2 days	5%	25/09/20
AIT 2	2 days	5%	04/11/20

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Make up CIE	90 min	20%	26/11/20
SEE	180 min	50%	11/12/20
Make up SEE	180 min	50%	
Total		100%	

Course-in-charge
Mrs.Vidyashree.M