 <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>
---	--

General Handout for all courses appended to the time table

Course No. :	Dept.: Civil Engineering
Course Title : Fluid Mechanics (IC)	Semester: 5
Instructor-in-charge : Dr. Venkatesh Babu D L	Academic Year: 2020-21
Lab. Instructor : Mr. Gopinath	

Subject Description (100 words)

This course includes the concept of fundamental behavior **of fluids**, properties of fluid, hydrostatic pressure on surfaces, kinematics of fluid flow. Also this includes head losses in a pipe flow, flow through an open channel, finding a force exerted by jet on vanes and design of hydraulic structures

Text Books:


- 1) P.N. Modi & S.M. Seth, “Hydraulics and Fluid Mechanics”, Standard Book House
- 2) R.K. Bansal: “A Text book of Fluid Mechanics and Hydraulic Machines”, 9th Edition, 2014, Laxmi Publications, New Delhi, ISBN: 978-81-318-0815-3.
- 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

PREREQUISITES


1 Engineering Physics 2 Engineering Mathematics 3 Engineering Mechanics <i>A good understanding of the above topics is essential</i>	Self study/ Online/ Outsourced	Referral Document	Remarks
---	--------------------------------------	----------------------	---------

 <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>
---	--

LECTURE PLAN


Topic	Topic Details	Number of Lectures	Cumulative lecture hrs.	Unit/ Chapter Reference
Overview				
Unit 1	Fluids & Their Properties: Introduction to fluids, Systems of units. Properties of fluid; Mass density, Specific weight, Specific gravity, Viscosity, Cohesion, Adhesion, Surface tension & Capillarity. Fluid as a continuum, Newton’s law of viscosity (theory & problems).	02	08	T2 Pg No. 1 to 34
	Capillary rise in a vertical tube and between two plane surfaces (theory & problems). Vapor pressure of liquid,	02		
	pressure inside a water droplet, pressure inside a soap bubble and liquid jet. Numerical problems	01		
	Fluid Pressure and Its Measurements: Definition of pressure, Pressure at a point, Pascal’s law,	01		T2 Pg No. 35 to 65
	Variation of pressure with depth. Measurement of pressure using simple manometer	01		
	differential & inclined manometers (theory & problems).	01		
Revision				
Unit 2	Hydrostatic Pressure on Surfaces: Introduction, Definitions Total pressure and Centre of pressure	01	08	T2 Pg No. 69 to 107
	equations for hydrostatic force and depth of centre of pressure for Vertical and inclined submerged plane surfaces-Problems. Practical applications of Total pressure and centre of pressure.	02		

*CV, ME, ECE & ISE departments were accredited by NBA for 3 years

 <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>
---	--

	Kinematics and Dynamics of Fluid Flow: Introductions, methods of describing fluid motion,	01		T2 Pg No. 163 to 170
	types of fluid flow, streamline, path line.	01		
	Three dimensional continuity equations in Cartesian Coordinates (derivation and problems)	01		
	Bernoulli’s equation using Euler’s equation of motion with assumptions and limitations (Problems).	02		T2 Pg No. 259 to 286
Revision				
Assignment				
Unit 3	Flow through pipes: Head losses - Major loss & Minor loss, Darcy - Weisbach Equation,	01	08	T2 Pg No. 465 to 491
	Hydraulic Gradient line, Total Energy Line, Series and Parallel Network of pipes, Numerical Problems.	01		
	Orifice and mouth piece: Hydraulic coefficients, Concept of Orifice and Mouthpiece (No Numerical Problems).	02		
	Notches and Weirs: Definition of Notch and Weir, Flow through V-notch, Rectangular weir, Cippoletti weir, Corrections for Velocity of Approach,	02		
	Cippoletti weir, Corrections for Velocity of Approach,	01		
	End Contractions, Numerical Problems.	01		
Revision				
PBL				
Unit 4	Open Channels Flow: Calculation of Velocity using	02		T2 Pg No.

*CV, ME, ECE & ISE departments were accredited by NBA for 3 years


 <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>
---	--

	Chezy’s and Manning’s equations,			737 to 787
	Hydraulic Efficient Channels: Rectangular and Trapezoidal channel,	02		
	Specific Energy, Numerical Problems.	01		
	Critical Depth, Froude’s Number,	01		
	Specific Energy Diagram, Subcritical and Supercritical flows,	01		
	Alternative Depths, Hydraulic Jump, Numerical Problems.	01		
Revision				
Assignment				
Unit 5	Impact of Jet on Vanes: Impact of jet on vanes,	01	08	T2 Pg No. 803 to 840
	Force exerted by the jet on a straight & curved vane (Stationary & Moving)	02		
	Velocity triangles, Numerical Problems	02		
	Pelton wheel: Components and working principle. Maximum power, Efficiency, working proportions- problems.	01		T2 Pg No. 857 to 916
	Francis Turbines: Components and working principle	01		
	Draft Tube: Types, Efficiency of Draft tube and problems.	01		
Revision				
Future scope of learning				

Evaluation Scheme:

Component	Duration	Weightage	Date (Time)
CIE 1	60 min	10%	28/09/2020
CIE 2	60 min	10%	06/11/2020
AAT 1	2 days	2.5%	23/09/2020
AAT 2	2 days	2.5%	02/11/2020

*CV, ME, ECE & ISE departments were accredited by NBA for 3 years

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

Make up CIE	60 min	10%	25/11/2020
Lab + Practical + Record		25%	24/11/2020
SEE	180 min	50%	11/12/2020
Make up SEE	180 min	50%	08/01/2020
Total		100%	

Course-in-charge

**CV, ME, ECE & ISE departments were accredited by NBA for 3 years*