23CE3552: FLUID MECHANICS&HYDRAULIC MACHINESLAB
(SYLLABUS)

Course Code	23CE3552	Year	III	Semester	I
Course Category	Professional Core	Branch	CIVIL	Course Type	Laboratory
Credits	1.5	L-T-P	0-0-3	Prerequisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks:	100

Course Outcomes:

Course will enable the student to:

CO	Statement	Blooms level
CO 1	**Apply** Bernoulli's theorem to verify energy conservation in fluid flow.	**L3**
CO 2	**Analyze** flow measuring devices such as Venturi and orifice meters.	**L4**
CO 3	**Analyze** discharge coefficients using orifices and mouthpieces under varying head conditions.	**L4**
CO 4	**Analyze and interpret** flow over notches to determine discharge characteristics	**L4**
CO5	**Evaluate** energy losses in pipes due to friction, sudden changes in section, and bends.	**L5**

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3		2					3			3	2
CO2	3	3		2					3			3	2
CO3	3	3		2					3			3	3
CO4	3	3		2					3			3	2
CO5	3	3		2					3			3	2
Avg	3	3		2					3			3	2

COURSE CONTENT		
Exp No-1	Verification of Bernoulli's equation	**CO1**
Exp No-2	Calibration of Venturi meter	**CO2**
Exp No-3	Calibration of orifice meter	
Exp No-4	Determination of coefficient of discharge of a small orifice by constant head method	**CO3**
Exp No-5	Determination of coefficient of discharge of an external cylindrical mouthpiece by variable head method	
Exp No-6	Calibration of a contracted rectangular notch	**CO4**
Exp No-7	Calibration of a triangular notch	
Exp No-8	Determination of friction factor of the pipe material	**CO5**
Exp No-9	Determination of coefficient of dead loss due to a sudden expansion/contraction in a pipeline	
Exp No-10	Determination of head loss coefficient due to a bend in pipeline	

LEARNING RESOURSCES	
Text Books	**Laboratory Manuals** 1. Laboratory Manuals available in FM Laboratory 2. Sarbjit Singh, Experiments in Fluid Mechanics, Prentice Hall of India Pvt. Ltd, Learning Private Limited, Delhi, 2012. 3. V.P. Gupta J. Chadra and K.S. Gupta, Laboratory Manual of Fluid Mechanics and Machines, CBS Publishers and Distributors, New Delhi,2006.
Reference Books	1. To determine the coefficient of discharge of Venturi-meter and Orifice-meter 2. (IS 14615 (Part 1) : 1999 (2004), IS0 5167-1 : 1991 – Measurement of Fluid Flow by Means of Pressure Differential Devices, Part 1: Orifice Plates, Nozzles and Venturi Tubes Inserted in Circular cross-section conduits running full) 3. To determine the coefficient of discharge of mouthpiece and small orifice by constant head and falling head methods. 4 (IS 14615 (Part 1): 1999 (2004), IS0 5167-1: 1991 – Measurement of Fluid Flow by Means of Pressure Differential Devices, Part 1: Orifice Plates, Nozzles and Venturi Tubes Inserted in Circular cross-section conduits running full) 5. To determine the coefficient of discharge of V-notch (triangular notch) & rectangular notch.(IS 9108 : 1979 (2003) – Liquid Flow Measurement in Open Channels using Thin Plate Weirs) 6. (IS 13083: 1991(2003), IS0 4377: 1990- Liquid Flow Measurement in Open Channels - Flat-V Weirs) 7. To compute the friction factor using Darcy-Weisbach Equation for pipes of different diameters. 8. (IS 2595 (Part I): 1965 (Reaffirmed 2003) – Head loss in Straight Pipes due to frictional resistance. 9. To study the performance characteristics of Pelton wheel turbine 10. (IS 12800 (Part 3) : 1991 (2003) - Guidelines for Selection of Hydraulic Turbine, Preliminary Dimensioning and Layout of Surface Hydroelectric Powerhouses, Part 3 - Small, Mini And Micro Hydroelectric Power Houses) 11. To study the performance characteristics of the Francis turbine 12. (IS 12800 (Part 3) : 1991 (2003) - Guidelines for Selection of Hydraulic Turbine, Preliminary Dimensioning and Layout of Surface Hydroelectric Powerhouses, Part 3 - Small, Mini And Micro Hydroelectric Power Houses) 13. To study the working principles of a centrifugal pump 14. (IS 9137: 1978 (1993) – Code for Acceptance Tests for Centrifugal, Mixed Flow and Axial Pumps - Class C) 15. ISO 9905: 1994 - Technical specifications for centrifugal pumps —Class I 16. Other codes: IS 9118: 1979 (2001) – Method for Measurement of Pressure by means of Manometers
e-Resources& other digital material	1. http://fm-nitk.vlabs.ac.in/ 2. https://nptel.ac.in/courses/112/105/112105171/