

INSTITUTE	FACULTY OF TECHNOLOGY
PROGRAM	BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)
SEMESTER	6
COURSE TITLE	OPEN CHANNEL FLOW
COURSE CODE	01CI0613
COURSE CREDITS	3

Objective:

- 1 To analyze the flow in open channels.
- 2 To design optimum cross section for various types of channels.
- 3 To compute Uniform flow
- 4 To compute hydraulic jump formation and loss of energy

Course Outcomes: After completion of this course, student will be able to:

- 1 Understand spatially varied flow
- 2 Compute energy loss due formation of hydraulic Jump
- 3 Design optimal channel sections for the uniform flow condition.
- 4 Analyze the water surface profile for the non-uniform flow condition

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction Introduction channel, Types of channels, classification of flow, velocity distribution, one-dimensional method of flow analysis, Pressure distribution, equation of continuity, energy equation, Energy depth relationships, specific energy, critical depth, section factor, computation	8
2	Uniform Flow Introduction Steady uniform flow, Chezy equation, Darcy-Weisbach friction factors, Manning formula, Velocity distribution-shear stress distribution,, Optimum shape of the cross-section, Energy equation-specific energy-specific energy diagram discharge diagram Application of specific energy and discharge diagrams	10

Contents : Unit	Topics	Contact Hours
3	Non-Uniform Flow Introduction, Non-Uniform steady flow-equations for gradually varied flow- classification of flow profile, various water surface profiles (flow profiles), Analysis of flow profile., Introduction, Non-Uniform steady flow-equations for gradually varied flow- classification of flow profile, various water surface profiles (flow profiles), Analysis of flow profile,	10
4	Rapidly Varied flow Concept of a hydraulic jump, classification of a hydraulic jump, characteristics of jumps, characteristics of jump in rectangular channel, and non-rectangular channel, Location of hydraulic jump, use of jump as an energy dissipator	10
5	Spatially varied Flow Introduction, SVF with increasing discharge, SVF with decreasing discharge, side weir, Bottom racks	4
Total Hours		42

Textbook :

- 1 Fluid Mechanics and Hydraulic Machines , R. K. Rajput, S. Chand Publication, 2014
- 2 Fluid Mechanics , A.K. Jain, Khanna Publishers, New Delhi, 2012
- 3 Fluid Mechanics & Hydraulic Machines, R.K. Bansal, Laxmi Publication, 2012
- 4 Theory and Applications of Fluid Mechanics , K Subramanya, McGraw Hill Publication, 2017
- 5 Hydraulics and Fluid Mechanics, P.N. Modi and S.M. Seth, Standard Book House, New Delhi, 2018
- 6 Open channel Hydraulics, Ven Te, Chow, McGraw Hill Book Company, INC, New York., 2014

References:

- 1 Flow in open channels , Flow in open channels , K. Subramanya, Tata Mcgraw-Hill Publishing Company Limited, New Delhi., 2013

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	20.00	45.00	10.00	10.00	10.00

Instructional Method:

- 1 At the start of the course, the course delivery pattern, and prerequisite of the subject will be discussed.
- 2 Lectures will be taken in the classroom with the use of multi-media presentations, and whiteboard– a mix of both.
- 3 Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
- 4 A minimum of two internal exams will be conducted an average of two will be considered as a part of a 15% overall evaluation
- 5 Assignments/tutorials based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular intervals. It carries a weightage of 5%.
- 6 The assignments/tutorials/technical visits are planned in such a way that they cover the practical aspects of the course contents.

Supplementary Resources:

- 1 <https://archive.nptel.ac.in/courses/105/103/105103021>
- 2 [https://bawar.net/data0/books/5ae78e477a944/pdf/\[K_Subramanya\]_hydraulic\(.pdf](https://bawar.net/data0/books/5ae78e477a944/pdf/[K_Subramanya]_hydraulic(.pdf)