

Year & Sem: E2S1	Course Code: CE2102	Course Name: Hydraulics of Engineering	No. of Credits: 4	L	T&PS	P
				2	2	0

UNIT-I:Free Surface Flows

-Introduction, Channels and their Geometric properties, Pipe flow and free surface flow, continuity equation, energy in free surface flow. Velocity measurement and distribution, discharge measurement by velocity-area method. Continuity and Momentum equation

UNIT-II:Uniform Flow

Resistance flow formula, Velocity distribution, Equivalent roughness coefficient, Velocity coefficients, Uniform flow in rigid boundary channel, Uniform flow in mobile boundary channel, normal and critical slopes

Energy and Momentum Principle - Concept of Specific Energy, Critical Depth, Alternate depth, Specific Force, Sequent depth.

UNIT-III:Non-Uniform Flow

Governing equation of GVF, Classification of Gradually Varied Flow, Computation of GVF profile, standard step method, Rapidly Varied Flow, hydraulic Jump, Flow in Channel Transition

UNIT-IV:Unsteady Flow

- Wave and their classification, Surges, Characteristic equation, dam-break analysis

UNIT-V:Canal Design

– Design of a lined canal, design of best economic channel section, Design of unlined canal, Kennedy's regime theory and Lacey's regime theory.

UNIT-VI:Hydraulic machines

Fundamentals of hydraulic turbine theory; Turbine performance characteristics and selection of turbines; Design of radial flow and axial flow turbines and Pelton turbines; Fundamentals of Rotodynamic pumps; Centrifugal and axial flow pumps; special duty pumps; cavitation in hydraulic machines

References/Text Books:

1. V.T. Chow, Open Channel Hydraulics, McGraw Hill, 1975
2. K.G. Rangaraju, flow in Open Channels, Tata McGraw Hill Publication Co. Ltd., New Delhi, 1993
3. K.Subramanya, Flow in Open Channels, Tata McGraw Hill Publication co. Ltd. New Delhi, 1992
4. R.H. French, Open Channel Hydraulics, McGraw Hill Book Co., New York 1986
5. S.K. Garg, Irrigation Engineering and Hydraulic Structures, Khanna Publishers, 1992
6. P.N. Modi and S.M. Seth, *Hydraulics and Fluid Mechanics*, Standard Book House, 1998

Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations.

Video Lectures (Web Links):

1. <http://nptel.ac.in/courses/105103096/>