Discipline: **CIVIL**	Semester: 4[TH]	Name of the Teaching Faculty: **Deepsikha Panigrahi**
Subject: **Hydraulics & Irrigation Engineering**	No. Of Days/per week class allotted: **3**	Semester: From Date: 22-12-2025 To Date:18-04-2026 No. Of Weeks: 15
Week	**Class**	**Topics to be covered**
1st	1	**1. Pressure measurement and Hydrostatic pressure.** • Technical terms used in Hydraulics –fluid, fluid mechanics, hydraulics, hydrostatics and hydrodynamics - ideal and real fluid, application of hydraulics. • Physical properties of fluid
	2	Various types of pressure and its measurement
	3	Hydrostatic pressure, variation of pressure with diagram. Determination of total pressure and centre of pressure.
2nd	1	Numerical Problems.
	2	**2. Fluid Flow Parameters** Types of flow and discharge and its units.
	3	Energy of flowing liquid, Bernoulli's equation, statement and assumption
3rd	1	Numerical Problems.
	2	**3. Flow through pipes** Major head loss in pipe: Frictional loss and its computation by Darcy's Weisbach equation
	3	Minor losses in pipe: loss at entrance, exit
4th	1	Sudden contraction, sudden enlargement and fittings in pipe.
	2	Flow through pipes in series, pipes in parallel and Dupuit's equation for equivalent pipe.
	3	Numerical Problems
5th	1	Hydraulic gradient line and total energy line.
	2	Discharge measuring device for pipe flow: Venturi meter - construction and working.
	3	Discharge measurement-using Orifice, Hydraulic Coefficients of Orifice.
6th	1	Numerical Problems
	2	**4. Flow through Open Channel.** Geometrical properties of channel section: Wetted area, wetted perimeter, hydraulic radius for rectangular and trapezoidal channel section.
	3	• Determination of discharge by Chezy's equation and Manning's equation.

7th	1	• Conditions for most economical rectangular and trapezoidal channel section.
	2	• Discharge measuring devices: Triangular and rectangular Notches.
	3	• Velocity measurement devices: current meter, floats and Pitot's tube.
8th	1	• Specific energy diagram, Froudes' Number
	2	**5. Hydraulic Pumps.** • Concept of pump, Types of pump - centrifugal, reciprocating, submersible.
	3	Centrifugal pump: components and working
9th	1	Reciprocating pump: single acting and double acting, components and working.
	2	Suction head, delivery head, static head, Manometric head
	3	• Power of centrifugal pump. • Selection and choice of pump.
10th	1	**6. Introduction to Hydrology** • Hydrology: Definition and Hydrological cycle • Rain Gauge: Symons rain gauge, automatic rain gauge.
	2	• Methods of calculating average rainfall: Arithmetic mean, Isohyetal, and Theissen polygon method.
	3	• Runoff, Factors affecting Run off, Computation of run–off.
11th	1	• Maximum Flood Discharge measurement: Rational and empirical methods, Simple numerical problems.
	2	• Yield and Dependable yield of a catchment, determination of dependable yield.
	3	7. **Crop water requirement and Reservoir Planning** • Irrigation and its classification. • Crop Water requirement: Cropping seasons, Crop period, base period, Duty, Delta, CCA, GCA, intensity of irrigation
12th	1	Factors affecting duty, Problems on water requirement and capacity of canal. • Methods of application of irrigation water and its assessment.
	2	• Area capacity curve. • Silting of reservoir, Rate of silting, factors affecting silting and control measures.
	3	• Control levels in reservoir, Simple numerical problems on Fixing Control levels.
13th	1	**8. Dams and Spillways** • Dams and its classification: Earthen dams and Gravity dams (masonry and concrete).
	2	• Earthen Dams – Components with function, typical cross section, seepage through embankment and foundation and its control.
	3	• Methods of construction of earthen dam, types of failure of earthen dam and preventive measures.

14th	1	• Gravity Dams – Forces acting on dam, Theoretical and practical profile, typical cross section, drainage gallery, joints in gravity dam, concept of high dam and low dam.
	2	• Spillways-Definition, function, location, types and components, Energy dissipaters.
	3	9. **Diversion Head Works & Canals** • Weirs – components, parts, types, K.T. weir – components and construction • Diversion head works – Layout, components and their function.
15th	1	• Barrages – components and their functions. Difference between weir and Barrage. • Canals – Classification according to alignment and position in the canal network, Cross section of canal in embankment and cutting, partial embankment and cutting, balancing depth, Canal lining - Purpose, material used and its properties, advantages.
	2	• Cross Drainage works- Aqueduct, siphon aqueduct, super passage, level crossing. • Canal regulators- Head regulator, Cross regulator, Escape, Falls and Outlets
	3	**Revision**

Deepsikha Panigrahi
22.12.2025