ACADEMIC SESSION: SUMMER-2026		
Discipline : Civil Engg.	**Semester: 4th Semester**	**Name of the Teaching Faculty : Sri Sourav Kumar Behera, Lect. Stage-II (Civil)**
Subject:Hydraulics & Irrigation Engg.	No. of Days / Week class allotted: 3	Semester Duration: 22/12/2025 to 18/04/2026 No. of Weeks : 18
UNIT	**Class day (Hours)**	**Theory/Practical Topics:**
1st Pressure measurement and Hydrostatic pressure	**1**	i. Technical terms used in Hydraulics –fluid, fluid mechanics, hydraulics, hydrostatics and hydrodynamics - ideal and real fluid, application of hydraulics. ii. Physical properties of fluid – density-specific volume, specific gravity, surface tension, capillarity, viscosity-Newton's law of viscosity.
	2	iii. Various types of pressure – Atmospheric Pressure, Gauge Pressure, Absolute Pressure, Vacuum Pressure. Concept of Pressure head and its unit, Pascal's law of fluid pressure and its uses. iv. Measurement of differential Pressure by different methods. v. Variation of pressure with depth, Pressure diagram, hydrostatic pressure and center of pressure on immersed surfaces and on tank walls. vi. Determination of total pressure and center of pressure on sides and bottom of water tanks, sides and bottom of tanks containing two liquids, vertical surface in contact with liquid on either side
2nd Fluid Flow Parameters	**3**	i. Types of flow – Gravity and pressure flow, Laminar, Turbulent, Uniform, Non-uniform, Steady, Unsteady flow. Reynolds number. Ii. Discharge and its unit, continuity equation of flow.
	4	iii. Energy of flowing liquid: potential, kinetic and pressure energy. Iv. Bernoulli's theorem : statement, assumptions, equation.
3rd Flow through pipes	**5**	Frictional loss and its computation by Darcy's Weisbach equation
	6	Minor losses in pipe: loss at entrance, exit, sudden contraction, sudden enlargement andfittings
	7	Flow through pipes in series, pipes in parallel
	8	Dupuit's equation for equivalent pipe
	9	Hydraulic gradient line and total energy line
	10	Discharge measuring device for pipe flow: Venturi meter - construction and working

	11	Discharge measurement-using Orifice
	12	Hydraulic Coefficients of Orifice
4th Flow through Open Channel	13	Geometrical properties of channel section: Wetted area, wetted perimeter
	14	hydraulic radius for rectangular and trapezoidal channel section
	15	Determination of discharge by Chezy's equation and Manning's equation
	16	Conditions for most economical rectangular and trapezoidal channel section
	17	Discharge measuring devices: Triangular and rectangular Notches
	18	Velocity measurement devices: current meter, floats and Pitot's tube
	19	Specific energy diagram, Froudes' Number
5th Hydraulic Pumps	20	Concept of pump, Types of pump - centrifugal, reciprocating, submersible
	21	Centrifugal pump: components and working
	22	Reciprocating pump: single acting and double acting, components and working
	23	Suction head, delivery head, static head, Manometric head
	24	Power of centrifugal pump, Selection and choice of pump
6th Introduction to Hydrology	25	Hydrology: Definition and Hydrological cycle, Rain Gauge: Symons rain gauge, automatic rain gauge
	26	Methods of calculating average rainfall: Arithmetic mean, Isohyetal, and Theissen polygon method
	27	Runoff, Factors affecting Run off, Computation of run–off
	28	Maximum Flood Discharge measurement: Rational and empirical methods, Simple numerical problems
	29	Yield and Dependable yield of a catchment, determination of dependable yield
7th Crop water requirement and Reservoir Planning	30	Irrigation and its classification, Crop Water requirement: Cropping seasons, Crop period, base period, Duty, Delta, CCA, GCA
	31	intensity of irrigation, factors affecting duty, Problems on water requirement and capacity of canal
	32	Methods of application of irrigation water and its assessment, Area capacity curve
	33	Silting of reservoir, Rate of silting, factors affecting silting and control measures

	34	Control levels in reservoir, Simple numerical problems on Fixing Control levels
8th Dams and Spillways	35	Dams and its classification: Earthen dams and Gravity dams (masonry and concrete)
	36	Earthen Dams – Components with function, typical cross section, seepage through embankment and foundation and its control
	37	Methods of construction of earthen dam, types of failure of earthen dam and preventive measures
	38	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
	39	Spillways-Definition, function, location, types and components, Energy dissipaters
9th Diversion Head Works & Canals	40	Weirs – components, parts, types, K.T. weir – components and construction
	41	Diversion head works – Layout, components and their function
	42	Barrages – components and their functions. Difference between weir and Barrage
	43	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
	44	Cross Drainage works- Aqueduct, siphon aqueduct, super passage, level crossing
	45	Canal regulators- Head regulator, Cross regulator, Escape, Falls and Outlets

Signature of Faculty

Signature of HoD Civil