

## LESSON PLAN FOR HYDRAULIC AND IRRIGATION ENGINEERING

Discipline Civil	Semester: 4 <sup>th</sup>	Name of teaching faculty: <i>Sourav Kumar Behera</i>
Subject: <u>Hydraulic &amp; Irrigation Engg.</u>	Nos of days per week class allotted: 5	Semester from date: 10.03.22 to date: 10.06.22
<u>Week</u>	<u>Class day</u>	<u>Theory topics</u>
<u>March 2<sup>ND</sup> Week</u>	1 <sup>ST</sup>	<b>HYDROSTATICS:</b> Introduction
	2 <sup>ND</sup>	<b>Properties of fluid:</b> density, specific gravity, surface tension,
	3 <sup>RD</sup>	capillarity, viscosity and their uses
	4 <sup>th</sup>	<b>Pressure and its measurements:</b> intensity of pressure, atmospheric pressure
	5 <sup>th</sup>	gauge pressure
<u>March 3<sup>rd</sup> Week</u>	1 <sup>ST</sup>	, absolute pressure and vacuum
	2	pressure relationship between atmospheric pressure, absolute pressure and gauge pressure
	3	pressure head; pressure gauges
	4	<b>Pressure exerted on an immersed surface:</b> Total pressure, resultant pressure
	5	pressure head; pressure gauges expression for total pressure exerted on horizontal & vertical surface
<u>March 4<sup>th</sup> week</u>	1	Problems
	2	Problems
<u>April 1<sup>st</sup> week</u>	1 <sup>ST</sup>	<b>KINEMATICS OF FLUID FLOW</b> Basic equation of fluid flow and their application: Rate of discharge
	2 <sup>ND</sup>	equation of continuity of liquid flow,
<u>April</u>	1 <sup>ST</sup>	total energy of a liquid in motion- potential,

<u>2<sup>ND</sup></u> <u>week</u>		kinetic & pressure
	2 <sup>ND</sup>	Bernoulli's theorem and its limitations
	3 <sup>RD</sup>	Practical applications of Bernoulli's equation
	4 <sup>TH</sup>	Flow over Notches and Weirs Notches, Weirs
	5 <sup>TH</sup>	types of notches and weirs
<u>April 3rd</u> <u>week</u>	1 <sup>ST</sup>	Discharge through different types of notches and weirs
	2 <sup>ND</sup>	their application
	3 <sup>RD</sup>	Types of flow through the pipes uniform and non uniform; laminar and turbulent; steady and unsteady
	4 <sup>TH</sup>	Reynold's number and its application
	5 <sup>TH</sup>	Losses of head of a liquid flowing through pipes Different types of major and minor losses.
<u>April 4th</u> <u>week</u>	1 <sup>ST</sup>	Simple numerical problems on losses due to friction using Darcy's equation
	2 <sup>ND</sup>	Total energy lines & hydraulic gradient lines (Concept Only).
	3 <sup>RD</sup>	Flow through the Open Channels Types of channel sections-rectangular, trapezoidal and circular
<u>May</u> <u>1st week</u>	1 <sup>ST</sup>	discharge formulae- Chezy's and Manning's equation
	2 <sup>ND</sup>	Best economical section
	3 <sup>RD</sup>	Problems
<u>May</u> <u>2nd week</u>	1 <sup>ST</sup>	<b>PUMPS</b> Type of pumps
	2 <sup>nd</sup>	Centrifugal pump: basic principles, operation, discharge
	3 <sup>rd</sup>	horse power & efficiency.
	4 <sup>th</sup>	Reciprocating pumps: types, operation, discharge
	5 <sup>th</sup>	horse power & efficiency
<u>May</u> <u>3rd week</u>	1 <sup>st</sup>	<b>Hydrology</b> Hydrology Cycle

	2 <sup>nd</sup>	Rainfall: types, intensity, hyetograph Estimation of rainfall, rain gauges, Its types
	3 <sup>rd</sup>	Concept of catchment area, types, run-off, estimation of flood discharge by Dicken's and Ryve's formulae <b>Water Requirement of Crops</b> Definition of irrigation, necessity, benefits of irrigation, types of irrigation Crop season
	4 <sup>th</sup>	Duty, Delta and base period their relationship, overlap allowance, kharif and rabi crops Gross command area, culturable command area, Intensity of Irrigation, irrigable area, time factor, crop ratio
	5 <sup>th</sup>	<b>FLOW IRRIGATION</b> Canal irrigation, types of canals, loss of water in canals Perennial irrigation
<u>May</u> <u>4<sup>th</sup> week</u>	1 <sup>st</sup>	Different components of irrigation canals and their Functions Sketches of different canal cross-sections
	2 <sup>nd</sup>	Classification of canals according to their alignment, Various types of canal lining – Advantages and disadvantages Problems
	3 <sup>rd</sup>	<b>WATER LOGGING AND DRAINAGE</b> Causes and effects of water logging detection, prevention and remedies
	4 <sup>th</sup>	<b>DIVERSION HEAD WORKS AND REGULATORY STRUCTURES</b> Necessity of diversion head works, weirs and barrages
	5 <sup>th</sup>	objectives of diversion head works, weirs and barrages General layout of barrage
<u>June</u> <u>1<sup>st</sup> week</u>	1 <sup>st</sup>	functions of different parts of barrage Siltation and scouring
	2 <sup>nd</sup>	Functions of regulatory structures <b>CROSS DRAINAGE WORKS</b> Functions and necessity of Cross drainage works
	3 <sup>rd</sup>	aqueduct, siphon

		super-passage, level crossing Concept of each with help of neat sketch
	4 <sup>th</sup>	<b>DAMS</b> Necessity of storage reservoirs types of dams Earthen dams: types, description
	5 <sup>th</sup>	causes of failure and protection measures
<u>June</u> <u>2<sup>nd</sup> week</u>	1 <sup>st</sup>	Gravity dam- types, description,
	2 <sup>nd</sup>	Causes of failure and protection measures
	3 <sup>rd</sup>	Spillways- Types (With Sketch) and necessity