

# Kurigram Polytechnics Institute, Kurigram

## Semester plan

Course name : **6445 HYDRAULICS**

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No. of week	No. of Class	General Objective	Remarks
1	1	1.1 Define fluid, liquid and gases. 1.2 Differentiate fluid, liquid and gases. 1.3 Define hydraulics.	
	2	1.4 Define density, specific weight, surface tension, capillarity and viscosity of liquid.	
	3	2.1 State the meaning of intensity of pressure. 2.2 State the meaning of pressure head and static head of liquid.	
2	1	2.3 Define free surface of liquid, atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. 2.4 Compute the intensity of pressure and total pressure at the base / side wall of a tank full of water.	
	2	2.5 Identify hydraulic ram and plunger. 2.6 Explain the working principle of a hydraulic ram. 2.7 Calculate the weight lifting capacity of ram.	
	3	3.1 Define piezometer, manometer, differential manometer and inverted differential manometer 3.2 Outline the specific uses and limitations of each of the fluid pressure measuring devices in 3.1.	
3	1	3.3 Compute liquid pressure using piezometer. 3.4 Compute liquid pressure using simple manometer.	
	2	3.5 Compute difference of fluid pressure between two sections of a pipe line using differential manometer. 3.6 Compute difference of fluid pressure between two sections of a pipe line using inverted differential manometer.	
	3	4.1 Explain the meaning of total pressure and center of pressure on an immersed plane surface. 4.2 Express the deduction of formula for computing total pressure on a vertically immersed plane surface.	
4	1	4.3 Express the deduction of formula for computing center of pressure on a vertically immersed plane surface 4.4 Compute total pressure on a vertically immersed plane surface.	
	2	4.5 Compute center of pressure of liquid on a vertically immersed plane surface	
	3	5.1 Define buoyancy and center of buoyancy. 5.2 State the meaning of metacentre and metacentric height.	
5	1	5.3 Mention the conditions of equilibrium of a floating body. 5.4 Compute the metacentric height using experimental formula	
	2	6.1 Define various types of flow such as: laminar flow, turbulent flow, steady flow, unsteady flow, uniform flow, non-uniform flow, incompressible flow, rotational flow, irrotational flow, continuous flow.	
	3	6.2 Explain the term discharge.	

		6.3 State the equation of continuity of liquid flow.	
6	1	6.4 Explain datum head, velocity head, pressure head and total head of a liquid.	
	2	7.1 State the Bernoulli's theorem. 7.2 Prove the Bernoulli's theorem.	
	3	7.3 Describe construction of venturimeter and pitot tube. 7.4 Compute the discharge in a given pipe line by using venturimeter.	
7	1	7.5 Compute velocity and discharge in a section of a flowing liquid by using a pitot tube.	
	2	8.1 Define the terms: orifice, jet of water and venacontracta. 8.2 State the meaning of coefficient of contraction (Cc), coefficient of velocity (Cv), coefficient of discharge (Cd).	
	3	8.3 State the relation between Cc, Cv and Cd. 8.4 Calculate the time of emptying a rectangular tank and hemispherical vessel through orifice.	
8	1	8.5 Define the term mouthpiece. 8.6 Explain the functions of a mouthpiece.	
	2	8.7 Distinguish between external and internal mouthpieces.	
	3	Class test	
9	1	9.1 Explain the meaning of fluid friction 9.2 Define different types of losses of head of flowing liquid such as: a) Loss of head due to friction. b) Loss of head due to bend and elbows. c) Loss of head due to sudden enlargement. d) Loss of head due to sudden contraction. e) Loss of head at entrance to pipe. f) Loss of head due to obstruction.	
	2	9.3 Write down the formulae for different types of losses of head. 9.4 Calculate loss of head due to friction.	
	3	10.1 State the meaning of critical velocity of liquid. 10.2 State the meaning of the friction in pipes of flowing liquid, hydraulic gradient and hydraulic mean depth.	
10	1	10.3 State the Chezy's formula for loss of head due to friction in pipes. 10.4 State the Darcy's formula for loss of head due to friction in pipes.	
	2	10.5 Calculate the loss of head due to friction in pipes using Chezy's formula.	
	3	10.6 Calculate the loss of head due to friction in pipes using Dracy's formula	
11	1	11.1 Define notch. 11.2 Identify different types of notches with sketches such as: rectangular notch, V-notch and trapezoidal notch. 11.3 Outline the advantages of triangular notch over rectangular not	
	2	11.4 State the formulae for measuring discharges through rectangular notch, V-notch and trapezoidal notch.	

		11.5 Calculate the discharges through rectangular notch using discharge formulae.	
	3	11.6 Calculate the discharges through triangular notch using discharge formulae. 11.7 Calculate the discharges through trapezoidal notch using discharge formulae.	
12	1	12.1 Define the term weir. 12.2 Outline the differences between weirs and notches. 12.3 State Francis' formula for discharge through a rectangular weir. 12.4 State Bazin's formula for discharge through a rectangular weir.	
	2	12.5 Calculate the discharges through rectangular weir using Francis' formula.	
	3	12.6 Calculate the discharges through rectangular weir using Bazin's formula.	
13 14 15 16		<b>Class test ,Quiz test, Extra class Solve problems of board question., and Semester Final Examination.</b>	