Uka Tarsadia University (Diwaliba Polytechnic)
Diploma in Environmental Engineering
Assignment (Fundamentals of Hydraulics-CV1007)

Unit-1 Introduction, Pressure and pressure measurement

1. Elaborate the difference between laminar and turbulent flow.
2. Explain about the process of Bernoulli's equation with the help of assumption.
3. Write a short note on types of flow in pipe.
4. A fluid having kinematic viscosity 21.4 stoke is flowing through a pipe having 30cm diameter. If discharge through pipe is 15 lit/s, decide the type of flow.
5. Write down the equation of Reynold number and classify the flow based on reynold number.
6. Draw the sketch of venturi meter showing all its parts.
7. The Diameter of a Pipe at the section 1 and section 2 are 8 cm and 10 cm. Find the Discharge Through the Pipe If the velocity of Water Flowing Through the Pipe at section 1 is 8m/s. determine also the velocity at section 2.

Unit-2 Hydrostatics

1. For a static fluid, derive the relation between pressure and depth of fluid.
2. Write down the equation for moment of inertia of following shapes:

   1) Rectangle 2) Triangle 3) Circular 4) Semicircular 5) Trapezium.
3. State pascal's law and derive its equation.
4. A tank 1.5m x 1.5m x 1.5m size contains water to a depth of 0.5m. The upper remaining part is filled with oil of sp.gr. 0.8. Calculate total pressure on one side of tank
5. An isosceles triangle of base 2m and height 3m is immersed vertically in water such that its base is parallel to and at a depth of 3m from free surface of water. Calculate total pressure and centre of pressure
6. Derive an equation for total pressure on an inclined immersed surface in a liquid.
7. Derive equation of total pressure on a vertically immersed surface.
8. A rectangular plate 4mx3m hung in water vertically such that one of its diagonal remains parallel to free surface of water and at depth of 3m. Estimate difference between centre of pressure and centroid of plane.

Unit-3 Hydro kinematics and Hydrodynamics

1. Enlist the important forms of energy of a liquid in motion and define potential energy.
2. Explain types of fluid.
3. Write a short note on simple U-Tube Manometer.
4. Write a short note on types of pressure.
5. Enlist pressure measuring equipment and explain piezometer.
6. A U-tube differential manometer connects two points 'A' and 'B'. Pipe A contains an oil of specific gravity 1.6 under a pressure of 120 kPa. The pipe B contains an oil of specific gravity 0.8 under a pressure of 200 kPa. The pipe A lies 2.5 m above the pipe B. Find the difference of pressure measured by mercury filled in U-tube. The level of mercury in left limb is at the level of pipe B.
7. A simple manometer containing mercury is used to measure pressure of water flowing in a pipe. Mercury level in open tube is 50 mm higher than that of left limb. If height in left limb is 40 mm, determine the pressure in terms of the head of water in pipe.
8. A differential manometer connected at the two points A and B at the same level in a pipe containing an oil of specific gravity 0.8, shows a difference in mercury levels as 100 mm. Determine the difference in pressures at the two points.

Unit-4 Hydraulic coefficient, notches and weirs

1. Explain Cippoletti weir.
2. Define orifice and state uses of orifice.
3. Give classification of orifice.
4. Explain vena contracta.
5. Obtain the relation between Cc, Cv and Cd.
6. A 45 mm diameter orifice is Discharging water under a head of 12m. Calculate the actual discharge in lit/sec and actual velocity of the jet. Take Cd=0.5 and Cv=0.9.
7. Water flows over a rectangular notch 1 m wide at a depth of 15 cm and afterwards passes through a triangular right-angled notch. Taking Cd for the rectangular notch as 0.62, find Cd for triangular notch if the depth of water over the triangular notch is 0.35 m.
8. Write the advantages of a V-notch over a rectangular notch.
9. An 80 mm diameter orifice is discharging water under a head of 8 m. Calculate the actual discharge in liter/second and actual velocity of the jet in meter/second at vena contracta, if Cd=0.62 and Cv=0.9.
10. Water is flowing through a rectangular notch having base width 500mm and head over it is 160 mm. Find discharge of notch if Cd=0.6.

Unit-5 Flow through pipes

1. Derive Darcy 's equation for a loss of head in pipe.
2. Write down characteristics of flow through pipes.
3. Write down various head losses in flow through pipes. Explain any one with equation.
4. Explain H.G.L and T.E.L.
5. Explain Reynold's experiment.
6. Water is flowing through a pipe 1200m long and 0.9m diameter with a velocity of 1m/sec. find Head Loss due to friction by Using: a) Darcy Equation with f=0.004 b) Chezy's Equation with c=50.
7. A pipe line is 8 km long and having 16 cm diameter connect two reservoirs "A" and "B". The rate of discharge in the pipe is 28 lit/sec. Find out the difference in reservoir level if friction factor f=0.0009.
8. Water is flowing through a pipe of 80 cm diameter and 1400 m long with a velocity of 4 m/sec. Find head loss due to friction, if f=0.006.

Unit-6 Flow through open channel

1. Derive equation for hydraulic mean depth for rectangular and trapezoidal channel.
2. State the difference between flow through pipe and flow through channel.
3. Explain Hydraulic jump.
4. Define Froude number and enlist types of flow based on Froude number.
5. Enlist classification of open channels and state the difference between natural and artificial channels.
6. Enlist different formula for computing uniform flow and explain any two with equation.
7. Explain specific energy diagram.
8. Enlist various types of velocity measurement methods. Explain any one method used in field.
9. A rectangular channel 6 m wide and 2 m deep has a longitudinal slope 1 in 900. Determine the discharge through channel if Chezy's constant C=60.
10. A cement lined rectangular channel 7 m wide carries water at the rate of 20 m^3/sec. Calculate the critical depth and critical velocity.