

31062 – Hydraulics

UNIT 1

PART – A (2 MARK)

1. Define Viscosity.
2. Define Cohesion.
3. Define capillarity.
4. What is meant by pressure head of liquid?
5. Define Pressure head of liquid.
6. Define vacuum pressure.
7. Define density.
8. Define Specific volume.

PART – B (3 MARK)

1. What are the types of pressure?
2. Define Gauge pressure.
3. Define center of pressure.
4. What are the types of Manometer?
5. Explain density, cohesion and adhesion.
6. What is meant by pressure head of liquid?
7. Define total pressure.

PART – C (10 MARK)

1. Calculate the pressure due to column of 0.2m of (a) water (b) an oil of specific gravity 0.9 and (c) mercury
2. The left leg of a U- tube manometer is connected to a pipe line conveying water, the level of mercury in the left leg being 600mm below the centre of pipe line and the right leg is open to atmosphere. Find the pressure in the pipe if the difference in level of mercury between the two limbs is 300mm.
3. Find the total pressure and the depth of center of pressure on a rectangular plate 0.6m x 1m placed with its shorter edge horizontal and longer edge inclined 60° to the vertical. The top edge is at a depth of 3m below free surface of water.
4. The diameter of a pipe tapers from 200mm at a section 3m above the datum to 50mm at a section 1m above the datum is $5000\text{N}/\text{mm}^2$. If the velocity of flow at the second section is 2.4m/s. determine the pressure at the section.
5. The weight of 6.6m of oil is 56,700N. Calculate (a) Specific weight (b)Density and (c) Specific volume.
6. Explain the barometer and piezometer
7. The U-tube containing mercury has its two limbs connected to two pressure points in a pipe line carrying oil of relative density 0.80. If the deflection of mercury is 60mm, find the differential pressure in terms of meters of oil and meters of water.

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8. What is the absolute pressure in KN/m^2 when the vacuum pressure at a Point is (a) 300mm of mercury and (b) 3m of water?
9. Calculate the Specific weight , density and specific gravity of liquid having a volume of 3 m^3 and weighing is 30kN.
10. An inverted differential manometer containing oil of specific gravity 0.9 is connected to find the difference of pressure at two points of a pipe containing water, if the manometer reading is 0.4m find the difference of pressure.
11. A circular plate 2.5m diameter is immersed in water, its greatest and least depth below free surface being 2m and 1m respectively. Find the Total pressure and position of center of pressure.

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UNIT 2

PART – A (2 MARKS)

1. What is meant by rate of flow?
2. Define uniform flow and non-uniform flow.
3. Define mouthpiece.
4. Define steady and unsteady flow.
5. Define orifice and mouthpiece.
6. What are the types of Flow?
7. Define Kinetic energy.
8. Define orifice.

PART – B (3 MARKS)

1. What are the types of orifice?
2. What is meant by co efficient of discharge?
3. Write the equation for continuity.
4. Explain Bernoulli's theorem
5. Explain the classification of orifice.
6. What are the types of Mouthpiece?
7. What are the types of hydraulic co efficient?

PART – C (10 MARK)

1. Find the discharge through the venture meter 300mmx100mm, if the differential manometer shows a mercury deflection of 400mm. Take the coefficient of discharge as 0.96
2. An internal mouthpiece of 100mm diameter is discharging water under a head of 3m. Find the discharge in l/min through the mouthpiece, where i) the mouth piece is running full ii) the mouthpiece is running free.
3. The discharge through a vertical water pipe 200mm diameter at top and 400mm diameter at bottom is 85 lps. If the length of the pipe is 1.5m find (a) Velocity at top (b) Velocity at bottom and (c) The pressure difference.
4. A large tank has a circular sharp edged orifice of 30mm diameter at a vertical depth of 0.8m below constant water level. The jet diameter at vena contracts is found to be 25mm. The water is collected in a tank having dimensions 1.5m X 0.8m X 0.8m. The time required to fill the tank is 450 sec. Calculate (i) Co-efficient of contraction (ii) Co-efficient of discharge and (iii) Co-efficient of velocity.
5. A venture meter has a diameter of 1.2m of pipe and 0.6m at the throat, with water flow through it. The differential mercury manometer gives the reading of 0.51mm. Find the discharge and velocity flow at throat. Take $C_d=0.98$.
6. A rectangular orifice 1.25mx1m has water surface on either side 2m and 0.6m respectively above the lower edge of opening. Estimate the discharge if $C_d=0.62$.

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UNIT 3

PART – A (2 MARKS)

1. Define crest or sill
2. Define notch.
3. What are the types of Weir?
4. Give the formula for end contraction of weir?
5. Give the Francis formula?
6. What do you mean by suppressed weir?
7. What is spill way?
8. Why we are provide the spill way at dam?

PART – B (3 MARKS)

1. Explain the types of weir.
2. Comparison between triangular and rectangular notch.
3. Explain hydraulic coefficient.
4. Explain nappy and crest.
5. Derive the basins formula
6. Briefly explain the classification of weir?
7. Explain about cippoletti weir?
8. What do you mean by velocity of approach?

PART – C (10 MARKS)

1. Derive the discharge of Trapezoidal notch.
2. A rectangular weir, 9m long is divided into 3 equal bays by two vertical posts, each 0.3m thick. Find the discharge when the head is 0.55m by using Bazin's formula.
3. A narrow crested weir, 1m long is discharging under a head of 0.4m. Find the discharge over the weir, if $C_d = 0.623$.
4. a) Derive the discharge of rectangular notch.
5. The head of water over a rectangular notch is 500mm. The discharge is 150lps. Find the length of notch When $C_d = 0.6$
6. Derive the discharge over the triangular notch.
7. The head of water over a rectangular notch is 800mm. The discharge is 300liter/sec. Find the length of the notch when $C_d=0.6$.
8. Find the discharge over a rectangular weir of length 100m. The head of water over the weir is 1.5m. The velocity of approach is given as 0.5m/s Take $C_d=0.6$.

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UNIT 4

PART - A (2 MARKS)

1. Draw the cross section of channel.
2. Define wetted perimeter.
3. Give the chezy's formula
4. What is specific energy?
5. Define critical depth
6. What is ventury flume?
7. Define uniform flow
8. Why we give the lining of canal?

PART - B (3 MARKS)

1. Explain the types of canal lining.
2. Write the advantages of lining of canal.
3. Explain the channel losses
4. Give the chezy, bazin and mannings formula
5. Give the value of one mannings
6. Explain the soil cement lining with sketch
7. What is sluice gate? Why it provided?

PART - C (10 MARKS)

1. An economical rectangular channel discharges 20 cumecs with a velocity of 1.80m/sec. Taking Chezy's constant as 60, find (a) Depth of flow (b) Bed width and (c) Bed fall.
2. An economical trapezoidal channel has a bed width of 4m and side slopes of 1:1. It has a bed fall of 1 in 1500. Taking C as 60, find the discharge.
3. Explain the methods of measurements of velocity in channel.
4. Find the slope of the bed of a rectangular channel of width 5m when depth is 2m and the rate of flow is given as $20\text{m}^3/\text{sec}$. Take $C=50$.
5. A Rectangular Channel carries water at the rate of 500l/s when bed slope is 1 in 2000. Find the most economical dimension of the channel if $c=50$.
6. An Economical trapezoidal channel has a bed width of 4m and sides slope of 1:1. It has a bed fall 1in 1600. Take c as 60, find the discharge.
7. A Channel of 6m wide is discharging 20cumecs of water. Determine the depth of water when the specific capacity of flowing water is minimum and find the critical velocity.

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UNIT 5

PART - A (2 MARKS)

1. Define ground water.
2. What is aquifers?
3. Define confined aquifers
4. What is shallow well?
5. What is centrifugal pump?
6. What is reciprocating pump?
7. Define efficiency of pump?
8. What is the function of strainer?

PART - B (3 MARKS)

1. Explain aquifers.
2. Differentiate the confined and unconfined aquifers?
3. Explain the types of well?
4. List the types of centrifugal pump?
5. List the types of reciprocating pump?
6. Derive the expression for efficiency for single acting reciprocating pump?
7. Write the advantages of rain water harvesting?
8. Explain the yield of well

PART - C (10 MARKS)

1. Explain the Methods of rainwater harvesting.
2. Explain with neat sketch, the working of a single acting reciprocating pump.
3. Explain the types of tube well.
4. Explain with neat sketch, the working of a double acting reciprocating pump.
5. Explain the specific capacity of well.
6. Briefly explain the sanitary protection.
7. Briefly explain the construction and working of centrifugal pump.
8. Briefly explain the hand and jet pump.
9. Derive the expression for discharge and efficiency of centrifugal pump and their types.