



10CV35

- 4 a. With new sketches, define and distinguish between streamline, path line and streak line. (06 Marks)
- b. Derive with usual notation three dimensional continuity equation in Cartesian co-ordinates. (08 Marks)
- c. The velocity components of a two dimensional incompressible flow are $u = x - 4y$ and $v = -y - 4x$. The flow is continuous. Find the velocity potential function and stream function. (06 Marks)

PART – B

- 5 a. State the assumptions made in the Bernoulli's equation. Derive the Bernoulli's equation from Euler's equation with usual form. (08 Marks)
- b. What is kinetic energy correction factor, derive the expression for kinetic energy correction factor. How is it incorporated in Bernoulli's equation. (06 Marks)
- c. A 400 m long pipe tapers from 1.20 m diameter at high end and 0.60 m diameter at the low end, the slope of the pipe being 1 in 100. The pipe conveys a discharge of 1025 cum/s. If the pressure at high end is 75 KPa, find the pressure at the low end, ignore losses. (06 Marks)
- 6 a. Derive expression for pressure rise due to instantaneous closure of valve for rigid and elastic pipes. (10 Marks)
- b. A pipe line 2.50 km long 180 mm diameter conveys a discharge of 0.015 m³/s. From high level tank to a low level tank. If it is planned to increase the discharge to the low level tank by 30% by attaching an additional pipe in parallel to the latter half length of the pipe, find the diameter of this pipe. Take $f = 0.0075$. (10 Marks)
- 7 a. How Floats and Currents meter are used to find the velocity in stream? Explain. (08 Marks)
- b. A Pitot tube records a reading of 7.85 kPa as the stagnation pressure, when it is held at the centre of a pipe of 250 mm diameter conveying water. The static pressure in the pipe is 40 mm of mercury (vacuum). Calculate the discharge in the pipe assuming that the mean velocity of flow is 0.8 times the velocity at the centre. Take co-efficient of Pitot tube as 0.98. (06 Marks)
- c. Following velocities are recorded in a stream with a current meter,
- | | | | | | |
|---------------------|---|-----|-----|-----|-----|
| Depth above bed (m) | 0 | 1 | 2 | 3 | 4 |
| Velocity (m/s) | 0 | 0.5 | 0.7 | 0.8 | 0.8 |
- Find the discharge per unit width of stream near the point of measurement depth of flow at the point was 5 m. Use both single point and double point of assessment of discharge. (06 Marks)
- 8 a. Prove that discharge equation over Cipolletti notch is same as the equation of discharge over a suppressed rectangular notch. (08 Marks)
- b. What are the advantages of triangular notch over rectangular notch? (04 Marks)
- c. Find the Venturi head for a venturimeter which has its axis vertical. The inlet and throat diameters are 150 mm and 75 mm respectively. The throat is 225 mm above the inlet and petrol of sp. gravity 0.78 flows up through the meter at a rate of 0.029 m³/s. Take $K = 0.96$. Also, find the pressure difference between inlet and the throat. (08 Marks)

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