3.2 - Bernoulli's Principle

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- (1999) The velocity at a certain point in a flow pipe is 1.0 ms^{-1} and the gauge pressure there is 3×10^5 N/m^2 . The cross-sectional area at a point 10 m above the first is half that at the first point. If the flowing fluid is pure water, calculate the gauge pressure at the second point.
- (2000) Write down the Bernoulli's equations for fluid flow in a pipe and indicate the term which will disappear when the flow of fluid is stopped.
- (2000) Water flows into a tank of large cross-section area at a rate of 10^{-4} m^3/s but flows out from a hole of area $1cm^2$ which has been punched through the base. How high does the water rise in the tank?
- (2007) Under what conditions is the Bernoullis equation applicable?
- (2007) Discuss two (2) applications of the Bernoullis equation.
- (2013) A submarine model is situated in a part of a tube with diameter 5.1 cm where water moves at 2.4 m/s. Determine the:
  - velocity of flow in the water supply pipe of diameter 25.4 cm.
  - pressure difference between the narrow and the wide tube.
- (2015) Write down the Bernoullis equation for fluid flow in a pipe and indicate the term which will disappear when the fluid is stopped.
- (2015) Basing on the applications of Bernoullis principle, briefly explain why two ships which are moving parallel and close to each other experience an attractive force.
- (2015) Water is flowing through a horizontal pipe having different cross-sections at two points A and B . The diameters of the ippe at A and B are 0.6 m and 0.2 m respectively. The pressure difference between points A and B is 1 m column of water. Calculate the volume of water flowing per second.
- (2016) Distinguish between static pressure, dynamic pressure and total pressure when applied to streamline or laminar fluid flow and write down expression at a point in the fluid in terms of the fluid velocity v, the fluid density ρ , pressure P and the height h , of the point with respect to a datum.
- (2016) The static pressure in a horizontal pipeline is 4.3×10^4 Pa, the total pressure is 4.7×10^4 Pa and the area of cross-section is 20 cm^2 . The fluid may be considered to be incompressible and non-viscous and has a density of 1000 kg/m^3 . Calculate the flow velocity and the volume flow rate in the pipeline.

- (2016) Briefly explain the carburetor of a car as applied to Bernoullis theorem.
- (2016) Three capillaries of the same length but with internal radii $3R$, $4R$, and $5R$ are connected in series and a liquid flows through them under streamline conditions. If the pressure across the third capillary is 8.1 mm of liquid, find the pressure across the first capillary.
- (2017) State Bernoulli's theorem for the horizontal flow.
- (2017) On which principle does the Bernoulli's theorem based.
- (2017) A pipe is running full of water. At a certain point A , it tapers from 30 cm diameter to 10 cm diameter at B , the pressure difference between point A and B is 100 cm of water column. Find the rate of flow of water through the pipe.
- (2017) Two capillaries of the same length and radii in the ratio of 1:2 are connected in series and the liquid flow through the system under stream line conditions. If the pressure across the two extreme ends of the combination is 1 m of water, what is the pressure difference across the first capillary?
- (2018) Given the Bernoullis equation: $p + \rho gh + \rho v^2 =$ constant where all the symbols carry their usual meaning.
  - What quantity does each expression on the left hand side of the equation represent?
  - Mention any three conditions which make the equation to be valid.
- (2018) Water is supplied to a house at ground level through a pipe of inner diameter 1.5 cm at an absolute pressure of 6.5×10^5 Pa and velocity of 5 m/s. The pipe line leading to the second floor bath room 8 m above has an inner diameter of 0.75 cm. Find the flow velocity and pressure at the pipe outlet in the second floor bathroom.
- (2018) A horizontal pipeline increases uniformly from 0.080 m diameter to 0.160 m diameter in the direction of flow of water. When 96 litres of water is flowing per second, a pressure gauge at the 0.080 m diameter section reads 3.5×10^5 Pa. What should be the reading of the gauge at the 0.160 m diameter section neglecting any loss?
- (2019) A horizontal pipe of cross - sectional area 10 cm^2 has one section of cross sectional area 5 cm^2 . If water flows through the pipe, and the pressure difference between the two sections is 300 Pa, how many cubic meters of water will flow out of the pipe in 1 minute?