

Numerical PROBLEMS N°5

1/ Consider water at 25 °C being siphoned from a large tank through a constant-diameter hose as shown in Fig.5–01. The free surface in the container, point (1), the end of the siphon, point (2) and the maximum elevation point (3). Using Bernoulli's equation (negligible friction), demonstrate that:

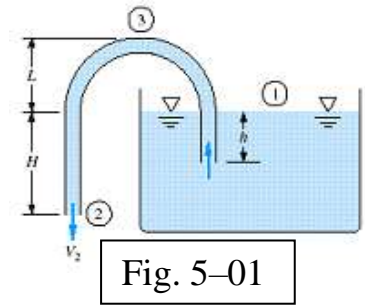


Fig. 5–01

- a- the speed v_2 , at the exit, depends only on g and H .
- b- the minimum pressure (absolute vacuum) is at point 3 and depends on the distance $L+H$.
- d- Determine the maximum height of the hill, $L+H$, over which the water can be siphoned without cavitation occurring.

2/ Kerosene flows through the Venturi meter shown in Fig.5–02 with flowrates between 0.005 and 0.050 m³/s.

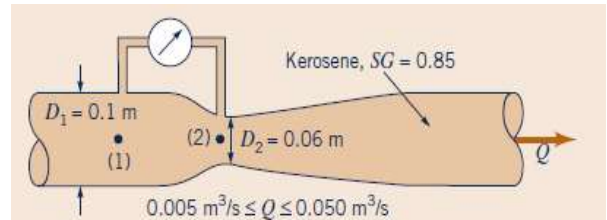


Fig. 5–02

- Determine the range in pressure difference, needed to measure these flowrates. $p_1 - p_2$.

3/ As shown in Fig. 5–03 (water tower and its distribution system).

- The main pipeline has a diameter D , the diameters distribution pipes n°1 and n°2 are d_1 and d_2 respectively. Both outlets are at atmospheric pressure.
- Determine the different flow rates and the pressure at point 3.

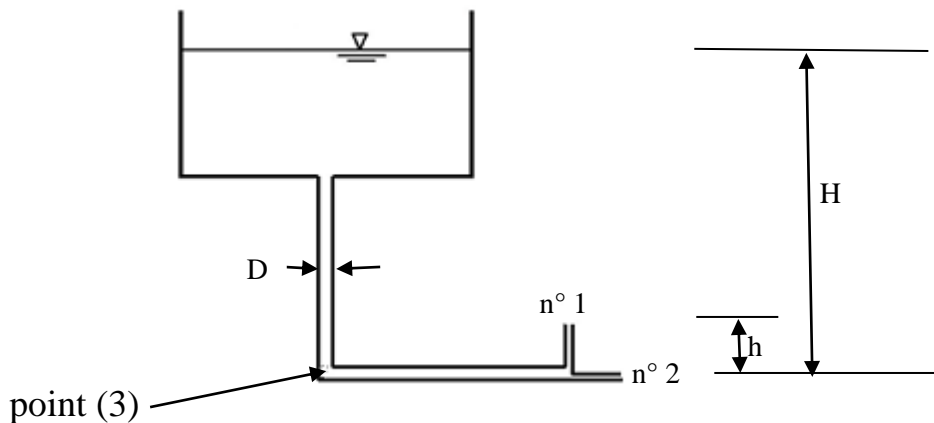
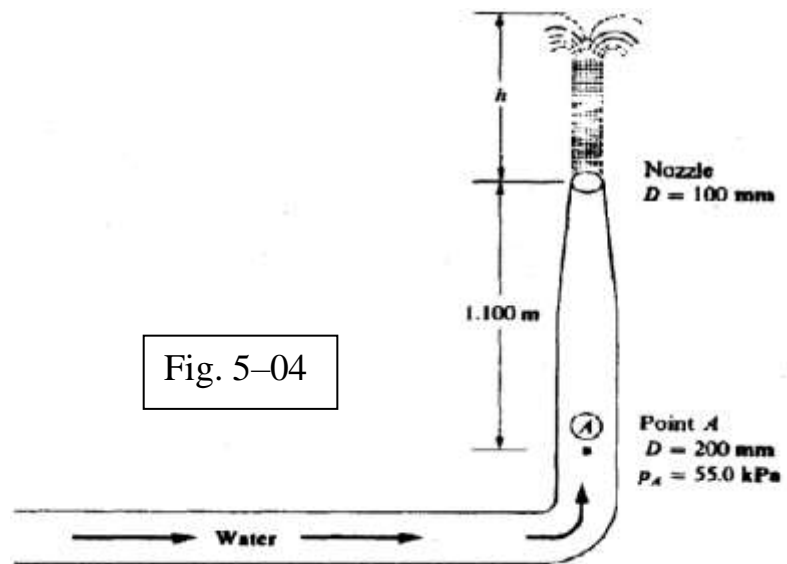


Fig. 5–03

4/ For the water shooting out of the pipe and nozzle under the conditions shown in fig 5-04, find the height above the nozzle to which the water jet will shoot (distance h). assume negligible head loss.



MCQ (Multiple Choice Questions)

1/ Which forces are neglected to obtain Euler's equation of motion from Newton's second law of motion?

- a) Viscous force, Turbulence force, Compressible force
- b) Gravity force, Turbulence force, Compressible force
- c) Body force, Gravity force, Turbulence force
- d) Viscous force, Turbulence force, Body force

2/ In order to apply Bernoulli's equation across two sections, we have to obtain it from Euler's equation. What is the operation that needs to be carried out in order to obtain it from Euler's equation?

- a) Partial Differentiation
- b) Differentiation
- c) Integration
- d) None of the mentioned

3/ According to statement of Bernoulli's theorem if Kinetic or Potential Energy is changing then overall energy changes and hence energy is not constant at all the places.

- a) True
- b) False