

## Assignment 2

(Due: 10 October, 2017 by 17:00)

- Q1.** In the system illustrated in Figure 1, a pump is installed in pipe *BC* to provide a flow of 40 L/s to reservoir *C*. Neglecting the velocity head at the junction and the local losses in the pipes, calculate the total head to be generated by pump and the input power assuming an overall efficiency of 60 percent. Also determine the flow rates in pipes *AB* and *BD*. Assume  $\nu = 1 \times 10^{-6} \text{ m}^2/\text{s}$ .

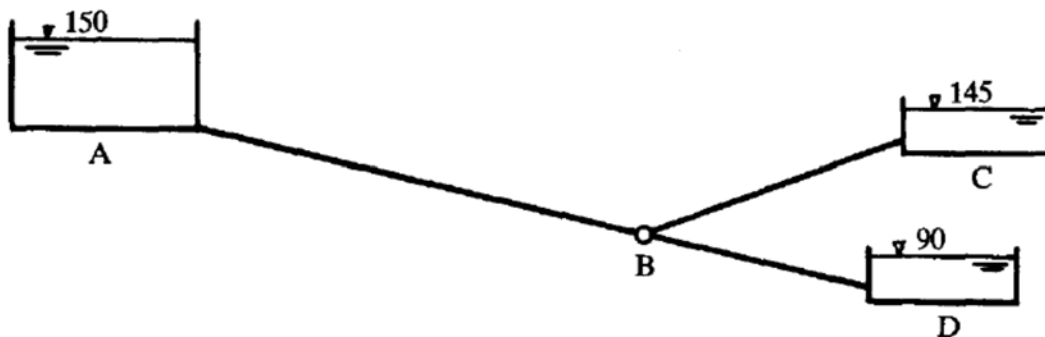


Figure 1

Pipe	AB	BC	BD
Roughness (mm)	0.06	0.06	0.06
Length (m)	10000	4000	5000
Diameter (mm)	400	250	250

**Q2.** Determine the flow rate in the pipes (initial estimated flow rates are provided) and the pressure head elevations at the junctions of the closed-loop pipe network illustrated in Figure 2, neglecting local losses. Water enters the system at junction A from a storage tank (surface elevation of 60.0 m). All pipes have the same roughness size ( $k_s = 0.03$  mm) with lengths and diameters provided in the table below. The outflows at the junctions are shown in L/s. Assume  $\nu = 1.13 \times 10^{-6}$  m<sup>2</sup>/s.

Hint: the solution is iterative. Continue iterations until  $\Sigma h_f < 0.01$  m for each loop.

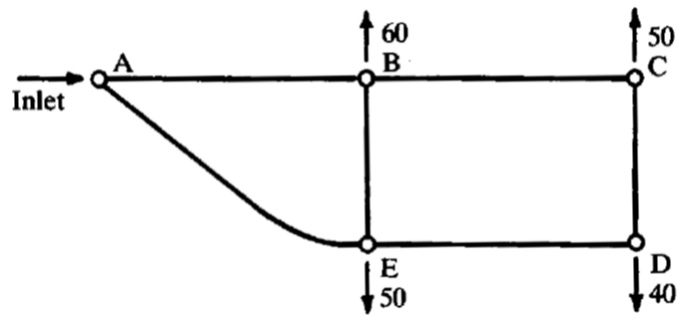


Figure 2

Pipe	AB	BC	CD	DE	EA	BE
Flow (L/s)	120	55	5	35	80	5
Length (m)	500	600	200	600	600	200
Diameter (mm)	200	150	100	150	200	100