



UNIVERSITY OF RUHUNA

Faculty of Engineering

Mid-Semester 8 Examination in Engineering: October 2015

Module Number: ME8324

Module Name: Industrial Fluid Dynamics

[Two Hours]

[Answer all questions, each question carries five marks]

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- Q1 a) "Even though the K-Factor method is the simplest technique to estimate local losses, it is not very accurate." Explain the above statement giving valid reasons. [2 Marks]
- b) Why is the energy losses in curved conduits much larger than those of straight conduits of the same length? [1.5 Marks]
- c) What are the advantages of Equivalent Length Method used for estimating local losses in pipe networks? [1.5 Marks]
- Q2 a) Explain briefly Hardy Cross method used for analyzing complex pipe networks. [1 Mark]
- b) For a micro irrigation system, a pipe network is designed to operate sprinklers as shown in Figure Q2. The head loss in each pipe can be estimated as KQ^n . The value of n is assumed to be a constant and taken as 2.0 from Darcy-Weisback formula. The coefficient K for each pipe is indicated in Figure Q2. Determine the distribution of flow in the pipe network. [2 Marks]
- Q3 a) "Homogeneous Flow Model is most suitable to predict two-phase frictional pressure drop in bubbly flow regime." Explain the above statement considering characteristics of different two-phase flow regimes. [2 Marks]
- b) What are the advantages of using centrifugal pumps in irrigation and flood control systems?

- c) What are the precautions that should be taken before starting a centrifugal pump for the first time?

[1.5 Marks]

Q4

A centrifugal pump is connected to a constant speed electric motor and operated at 1500 rpm. The outlet vane angle of the impeller blades is 45° and velocity of flow at outlet is 2.5 m/s. The discharge through the pump is 200 liters/s when the pump is working against a head of 20 m. If the manometric efficiency of the pump is 80%, determine,

- The diameter of the impeller,
- The width of the impeller at outlet.

[5 Marks]

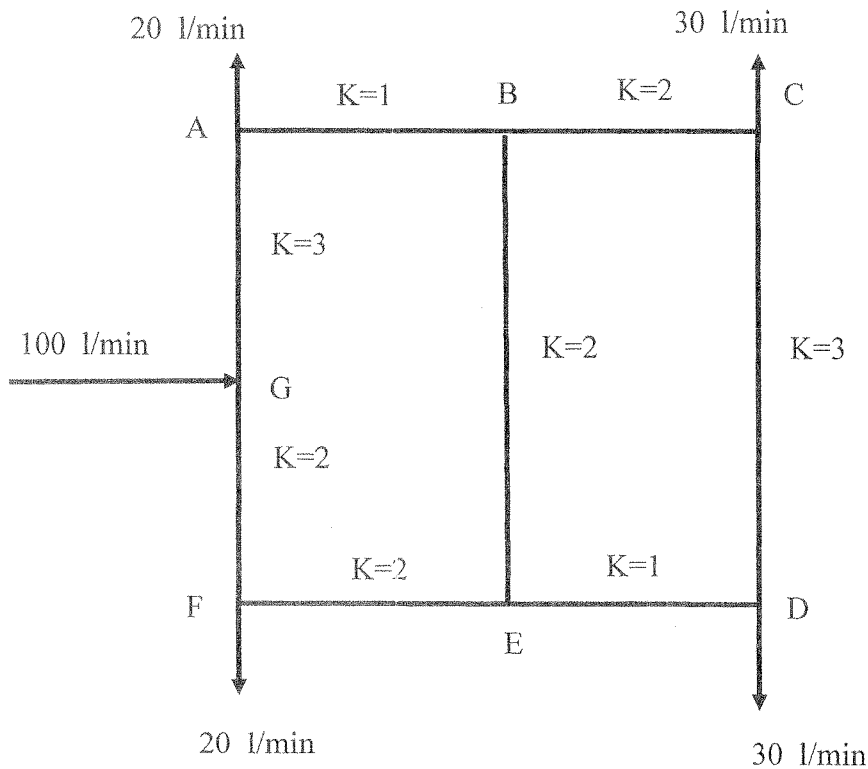


Figure Q2.