



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

INSTITUTE OF OPEN LEARNING (IOL)

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN WATER
AND ENVIRONMENTAL ENGINEERING

SET 312: FLUID MECHANICS III

DATE: Tuesday, 5th July, 2011

TIME: 2.00 p.m. – 4.00 p.m.

INSTRUCTIONS:

Answer question **ONE** and any other **TWO** questions.

QUESTION 1

Name and discuss the distinction between the two types of flow that occur in pipes and other closed conduits. What criterion is used to differentiate the two.

QUESTION 2

Determine

- a) The shear stress at the wall of a 305mm diameter pipe when water flowing causes a measured lost head of 15m in 300m of pipe length.
- b) The shear stress 51mm from the centre line of the pipe
- c) The shear velocity
- d) The average velocity for an f value of 0.050

QUESTION 3

A compound piping system consists of 1830m of 508mm, 1220m of 406mm, and 610m of 305mm new cast iron pipe. Convert the system to

- a) An equivalent length of 406mm pipe

b) An equivalent size pipe 3660m long

QUESTION 4

A pilot tube having a coefficient of 0.98 is used to measure the velocity of water at the centre of a pipe. The stagnation pressure head is 5.67m and the static pressure head in the pipe is 4.72m. What is the velocity.

QUESTION 5

Water flows through a 100mm pipe at the rate of $0.027\text{m}^3/\text{s}$ and then through a nozzle attached to the end of the pipe. The nozzle tip is 50 mm in diameter and the coefficient of velocity and contraction for the nozzle are 0.950 and 0.930 respectively. What pressure head must be maintained at the base of the nozzle if atmospheric pressure surrounds the jet?