



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

BCECD 208: FLUID MECHANICS I

Date: 20/4/2016

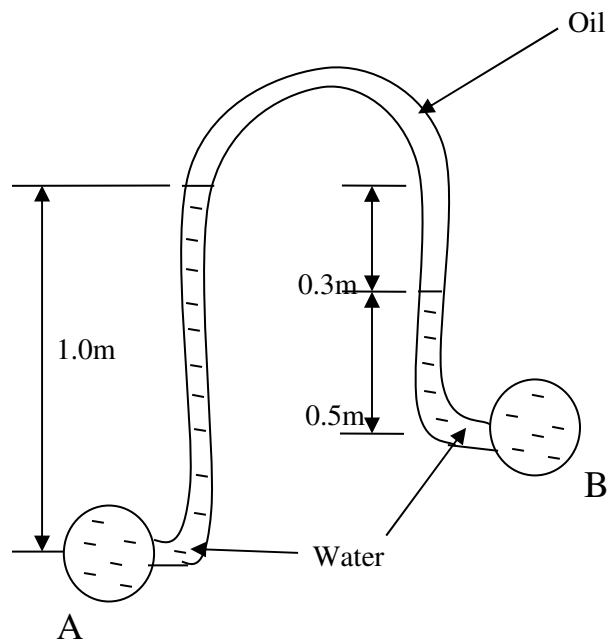
Time: 8:30 – 10:30 AM

Instructions:

- This paper comprises of **five** questions
- Question **one** is **compulsory** and carry 30 marks
- Answer any **other two** questions

- 1 a) State Bernoulli's theorem (2 marks)
- b) Differentiate between each of the following types of flow
- i. Uniform and non-uniform flow
 - ii. Steady and unsteady flow (6 marks)
- c) State and proof Pascal's law (7 marks)
- d) Define the following terms
- i. Mass density
 - ii. Specific gravity
 - iii. Viscosity
 - iv. Weight density
 - v. Capillarity (10 marks)
- e) Calculate the specific weight, mass density and specific gravity of one litre of a liquid which weighs 7N. (5 marks)

- 2
- Derive an expression for theoretical discharge through a horizontal venturimeter.
 - Show how it can be modified to obtain actual discharge. (8 marks)
 - The figure below shows an inverted U-tube manometer connected to two pipes A and B which convey water. The fluid in the manometer is oil of specific gravity 0.8. Determine the pressure difference between pipes A and B.



(12 marks)

- 3
- A cold storage cistern is filled 3m above a 50mm diameter gate valve. Calculate
 - the intensity of pressure on the gate valve
 - the total pressure on the gate valve
 (10 marks)
 - A liquid flows in a horizontal pipeline and gradually converges from diameter of 200mm at a position A to a diameter of 150mm at position B. if the velocity is 2m/s and the pressure head at A is 15m, calculate the velocity and pressure head at B. (10 marks)
- 4
- A vertical dock gate is 5m and has water at a depth of 7.5m on one side and to a depth of 3m on the other side.

- a) Find the resultant horizontal force on the dock gate and the position of its line of action
- b) Sketch the pressure distribution diagram for this case
- c) To what position does the resultant force tend to as the depth of water on the lower side rises to 7.5? (20 marks)
- 5 a) Using elaborate sketches explain the working principle of the following velocity measuring devices
- Pitot tube
 - Pitot static tube (8 marks)
- b) A 2m x 2m tank with vertical sides contains oil of density 900kg/m^3 to a depth of 0.8m floating on 1.2m depth of water.
- Calculate the total thrust and its location on one side of the tank.
 - Sketch the pressure diagram to represent this case (12 marks)