



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL
ENGINEERING

BCECD 308: FLUID MECHANICS II

DATE: 6/6/2017

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

- Differentiate between the following terms as used in discharge measurement
 - Co-efficient of velocity
 - Co-efficient of contraction
 - Co-efficient of discharge (10 marks)
 - Using elaborate sketches tabulate all the major and minor head losses that occur in a pipe network conveying a particular fluid from one reservoir to another. (20 marks)
- A pipe 1800m long having a diameter of 200 mm connects two reservoirs and forms a siphon as it crosses a ridge whose summit is 7.5 m above the upper reservoir. The surface of water in the lower reservoir is 30 m below the upper reservoir. The length of pipe from the upper reservoir to the summit ridge is 300 m. given $f = 0.008$, find;-
 - The minimum depth of the pipe below the summit of the ridge in order that pressure at the apex does not fall 7.5 m below the atmosphere.
 - The discharge to the lower reservoir in liters/s (20 marks)

3. Two reservoirs are connected by a pipeline which is 150 mm in diameter for the first 6 m and 225 mm for the remaining 15 m. the water surface in the upper reservoir is 6 m above that which is lower. If the friction coefficient for both pipes is 0.001;-
- i) Tabulate the losses of head which occur
 - ii) Calculate the rate of flow in m^3/s
 - iii) Sketch the hydraulic gradient line (H.G.L) and the total energy line (T.E.L)
- (20 marks)
4. a) Define the following terms
- i) Hydraulic grade line
 - ii) Total energy line
 - iii) Datum line
 - iv) Air lock
- (8 marks)
- b) A closed vessel contains water up to a height of 1.5 m and over the water surface there is air of 7.848 N/m^2 above the atmospheric pressure. At the bottom of the vessel there is an orifice of diameter 100 mm. Find the rate of flow of water from the orifice given that $C_d = 0.6$
- (12 marks)
5. Using relevant sketches, explain the difference between each of the following types of orifices
- i) Small orifice
 - ii) Large orifice
 - iii) Fully drowned submerged orifice
 - iv) Partially submerged orifice
- (20 marks)