



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

DIPLOMA IN CIVIL ENGINEERING

BCE CD 308 FLUID MECHANICS II

DATE: 19/01/2021

TIME: 2.00-4.00 PM

INSTRUCTIONS

QUESTION ONE IS COMPULSORY AND CARRIES 30 MARKS ANSWER ANY OTHER TWO QUESTIONS

1.
 - a) with the aid of a diagram, derive the expression of coefficient of velocity for a flowing fluid jet through an orifice (20 marks)
 - b) In a laboratory, 53.5 litres of water per second is collected through a small orifice of 100mm deep and 250mm wide under a constant head of 600mm. Determine the value of coefficient of discharge (10 marks)
2.
 - a) Explain the term vena contrata as applied to flow of water through a sharp –edged orifice (2 marks)
 - b) Find the discharge through a drowned orifice width 3m, if the difference of water levels on both sides of the orifice is 0.5m. The heights of water levels from the top and bottom of the orifice are 2.5m and 2.7m respectively. Take coefficient of discharge for the orifice as 0.6 (18 marks)
3.
 - a) water discharge at the rate of 98.2 litres/second through a 120mm diameter vertical sharp edged orifice under a constant head of 10m. A point on the jet measured from the vena-contrata, has co-ordinates of 4.5m horizontal and 0.54m vertical. Determine the values of C_c , C_d and C_v of the orifice. (10 marks)

- b) A large rectangular orifice of 2m wide and 1.2m deep is discharging water from a vessel. Determine the discharge through the orifice, if the water level in the tank is 0.6m above the top edge of the orifice. Take $C_d=0.6$. (10 marks)
4. a) A drowned orifice 1.5m wide and 0.5m deep is provided in one side of a tank. Determine the discharge in litres/second through the orifice if the difference of water levels on both sides of the orifice is 4m. Take $C_d=0.64$ (10 marks)
- b) A circular water tank of 4m diameter contains 5m deep water. An orifice of 400mm diameter is provided at its bottom. Determine the time taken for the water level to fall from 5m to 2m. Take $C_d=0.6$ (10 marks)
5. a) A cistern of cross-sectional area of 1 square metre contains water 4m deep. An orifice of 60mm diameter is provided at its bottom. Determine the fall of water level after 2 minutes. Take $C_d=0.6$. (10 marks)
- b) Derive an expression of discharge through a partially drowned orifice. (10 marks)