MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN CIVIL ENGINEERING

BCECD 315: HYDRAULICS

DATE: 9/12/2021 **TIME: 8.30-10.30 AM**

Instructions:

- *This paper consists of **Five** questions.*
- *Answer question **ONE** and any other **TWO** questions*
- *Maximum marks for each part of the question are as shown.*

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Define the term open channel and state two types of open channels. (2 marks)

b) Distinguish between the following types of flow in open channels:

i Steady flow and unsteady flow.

ii Uniform flow and varied flow (8 marks)

c) Explain three parameters used to measure the efficiency of a turbine. (6 marks)

d) Sketch and label a vertical section through a typical centrifugal pump. (6 marks)

e) Determine the most economical section of a rectangular channel carrying water at a rate of $0.5m^3/s$, the deb slope of the channel being 1 in 2000. Take Chezy's constant C as 50. (8 marks)

QUESTION TWO (20 MARKS)

a) Distinguish between subcritical flow, critical flow and supercritical flow. (6 marks)

b) Determine the discharge through a trapezoidal channel of bed width 2m and side slope 1 horizontal to 3 vertical. The depth of flow of water is 1.2m and the value of Chezy's constant, C is 50. The slope of the bed is 1 in 2000. (14 marks)

QUESTION THREE (20 MARKS)

a) State four causes of non-uniform flow in open channels. (6 marks)

b) Determine the discharge of water through the channel shown in figure 1. Take Chezy's constant as 60 and slope of bed as 1 in 2000. (14 marks)

QUESTION FOUR (20 MARKS)

a) Describe four parts of a centrifugal pump. (6 marks)

b) Determine the most economical section of a trapezoidal section carrying water at the rate of $0.5m^3/s$ given that the channel has side slopes of 3 horizontal to 4 vertical and the slope of its bed is 1 in 1500. Take Chezy's constant as 60. (14 marks)

QUESTION FIVE (20 MARKS)

a) Distinguish between laminar flow and turbulent flow. (4 marks)

b) Distinguish between turbines and pumps. (4 marks)

c) A triangular gutter whose sides include an angle of 60^0, conveys water at a uniform depth of 200mm. if the discharge is $0.04m^3/s$, determine the gradient of the trough. Take Chezy's constant as 52. (12 marks)