



MACHAKOS UNIVERSITY

University Examination 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN CIVIL ENGINEERING

BCECD 315: HYDRAULICS

DATE: 8/5/2019

TIME: 8:30 – 10:30 AM

Instructions to candidates

INSTRUCTIONS

- i) Question one is compulsory and carries 30mks
- ii) Answer Any other Two questions

1.
 - a) Give five comparisons between centrifugal and reciprocating pumps. (10 marks)
 - b) For uniform flow through open channels, derive an expression that show that $Q = A C \sqrt{m i}$ (10 marks)
 - c) With the aid of a diagram, describe the following turbines
 - i) Reaction turbine
 - ii) Pelton wheel turbine (10 marks)
2.
 - a) Give five differences between impulse turbine and reaction turbine (10 marks)
 - b) Water is flowing at a rate of $16.5 \text{ m}^3/\text{s}$ in a earthen trapezoidal channel with bed of width 9m, water depth 1.2m and side slope 1:2. Calculate the bed slope, if the value of C in the Chezy's formula be 49.5. (10 marks)
3.
 - a) A rectangular channel has a cross section of 8 m^2 . Find its size and discharging through the most economical section, if the bed slope is 1 in 1000. Take $C=55$ (15 marks)
 - b) With the aid of a diagram, describe the reciprocating pump (5 marks)
4.
 - a) With the aid of a diagram, describe the following reaction turbine types
 - i) Inward flow reaction turbine
 - ii) Outward flow reaction turbine (6 marks)

- b) A channel has two sides vertical and semi-circular bottom of 2 metres diameter. Calculate the discharge of water through the channel, the depth of flow is 2 metres. Take $C=70$, and slope of bed as 1 in 100. (10 marks)
- c) Give two advantages of air lift pump (4 marks)
5. a) With the aid of a diagram, describe the working of hydraulic ram and define its efficiency (16 marks)
- b) Give the main components of a pelton wheel turbine (4 marks)