



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL
ENGINEERING

BCECD 315 HYDRAULICS

DATE: 18/12/2017

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

1.
 - a) With the aid of a sketch, describe the following types of turbines
 - i. Pelton wheel nozzle turbine
 - ii. Pelton wheel runner and buckets turbine
 - iii. Pelton wheel breaking jet turbine (12 marks)
 - b) With an aid of a diagram, describe a reciprocating pump (8 marks)
 - c) Water is flowing at a rate of $16.5\text{m}^3/\text{s}$ in an earthen trapezoidal channel with bed width of 9 metres, water depth 1.2metres and side slope 1:2. Calculate the bed slope, if the value of C in the Chezy's formula be 49.5 (6 marks)
 - d) State the difference between an impulse turbine and a reaction turbine (4 marks)
2.
 - a) Give five comparison of impulse turbine and reaction turbine (10 marks)
 - b) A trapezoidal channel having side slopes of 1:1 and a bed slope of 1 in 1200 is required to carry a discharge of $180\text{m}^3/\text{min}$. Find the dimensions of the channel for minimum cross-section.
Take Chezy's constant as 50.
3.
 - a) Explain the term open channel
 - b) Discuss the various types of open channels (6 marks)

- c) A trapezoidal channel has side slope 2 vertical to 3 horizontal. It is discharging water at a rate of $20\text{m}^3/\text{s}$ with a bed slope 1 in 2,000. Design the channel for its best form. Use Manning's formula, take $N=0.01$
4. a) Design a most economical earthen channel with the velocity of flow as 1m/s , and to discharge $3\text{m}^3/\text{s}$ having a slope 1 in 2. Take $C=55$
- b) Describe with sketches, the working of an impulse, turbine (10 marks)
5. a) Give five comparison of centrifugal pump and reciprocating pump (10 marks)
- b) Water at the rate of $0.4\text{m}^3/\text{s}$ flows through a 1m diameter vitrified sewer, when the sewer pipe is half full.
- Find the slope of the water, if Manning's N is 0.013 (10 marks)