



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT BUILDING AND CIVIL ENGINEERING

**UNIVERSITY EXAMINATION FOR:**

**BSC IN CIVIL ENGINEERING**

**ECE 2312: HYDRAULICS II**

**END OF SEMESTER EXAMINATION**

**SERIES: APRIL 2016**

**TIME: 2 HOURS**

**DATE: 11 May 2016**

## Instructions to Candidates

You should have the following for this examination

*-Answer Booklet, Drawing Instruments, Scientific calculator, examination pass and student ID*

This paper consists of five questions. Attempt question ONE (Compulsory) and any other TWO questions.

- Qs.1.(a) Define the following terms:
- (i) Cavitation **(4marks)**
  - (ii) Hydraulic efficiency **(2marks)**
  - (iii) Mechanical efficiency **(2marks)**
- (b) Describe the two types of turbines commonly in use. **(2marks)**
- (c) Outline three assumptions made in developing the linear wave theory **(8 marks)**
- (d) A pelton wheel is supplied water under a head of 200m through a 100mm diameter pipe. If the quantity of water supplied to the wheel is  $1.25\text{m}^3/\text{s}$ . Calculate the number of jets.  
Assume  $C_v = 0.97$  **(12 marks)**
- Qs.2 A Pelton wheel is to be designed for the following specifications:
- Power (brake or shaft): 9560kW  
Head: 350metres

Speed: 750r.p.m  
Overall efficiency: 85%  
Jet diameter not to exceed 1/6 of the wheel diameter  
Calculate the following:

- (i) The wheel diameter **(8marks)**
- (ii) Diameter of the jet, and **(8marks)**
- (iii) The number of jets required.  
*Take  $C_v=0.985$ , speed ratio= $0.45$  **(4marks)***

- Qs.3 (a) Describe how the minimum value of a cavitation parameter can be determined experimentally for a given machine or model turbine **(6 marks)**
- (b) Define the overall efficiency  $e$  of a reaction turbine and explain the terms **(6 marks)**
- (c) Derive the formula for the greatest hydraulic efficiency for a given turbine **(8 marks)**

- Qs.4 (a) Describe “managed retreat” in generic strategies for coastal defense or general coastal management strategies **(8 marks)**
- (b) Enumerate two examples of event warning systems in coastal management and how they are they used for. **(3 marks)**

(c) A pelton wheel develops 1750kW under a head of 100m while running at 200r.p.m and discharging 2500litres of water per second. Calculate

- i. The unit power **(3 marks)**
- ii. The unit speed **(3 marks)**
- iii. Unit discharges of the wheel **(3 marks)**

- Qs.5 (a) Outline three factors that influence the formation of wind waves **(3 marks)**
- (b) What are waves characterized by **(4 marks)**
- (c) Describe the current challenges in coastal management **(13 marks)**