TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
(BSCE Y3 S2)

ECE 2312: HDYROLOGY II

END OF SEMESTER EXAMINATION
SERIES: APRIL 2014
TIME ALLOWED: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer booklet*

This paper consists of **FIVE** questions.
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
All questions carry equal marks
Maximum marks for each part of a question are as shown
This paper consists of **TWO** printed pages

Question One (COMPULSORY)

a) Describe the TWO types of turbines commonly used and indicate what action both turbines would depend on. **(5 marks)**

b) Define the terms:
(i) Static head **(1 mark)**
(ii) Manometric head **(1 mark)**
(iii) Total, gross or effective head **(1 mark)**

c) A centrifugal pump is to discharge 0.118m3/s at a speed of 1450r.p.m against a head of 25m. The impeller diameter is 250mm, its width at a outlet is 50mm and manometer efficiency is 75%.

Calculate the vane angle at the outer peripheral of the impeller. **(2 marks)**

d) Write down the overall efficiency of a reaction turbine and explain the terms used. **(9 marks)**

Question Two

a) Calculate the specific speed of centrifugal pump, delivering 750 litres/s of water against a head of 15m at 725 r.p.m **(5 marks)**

b) A turbine is to operate under a head of 25m at 200rpm. The discharge is 9m3s. If the overall efficiency is 90%, calculate:

(i) Power generator **(5 marks)**
(ii) Specific speed of the turbine **(5 marks)**
(iii) Determine the type of turbine **(5 marks)**

Question Three

a) Describe in detail two hard stabilization techniques in the preservation of natural remedies for beach erosion

b) Describe the THREE different types of wind waves that develop over time.

c) Describe the FIVE factors that influence the formation of wind waves.

d) The phase speed of the surface wave (also called the celerity) is well approximated by a formula show it and name the terms.

Question Four

A jet of water 100mm in diameter, moving with a velocity of 25m/s in the direction of the vaves, enters the valves moving with a velocity of 12.5m/s. If the jet leaves the vaves at an angle of 60o with the direction of motion of the vaves, calculate:

i) Force on the vaves in the direction of their motion **(12 marks)**
ii) Work done per second **(8 marks)**

Question Five

a) A reaction turbine is working under a head of arm and average discharge of 11200l/s for generator speed of 200rpm. Calculate the specific speed. **(8 marks)**
Assume overall efficiency of the turbine = 92%

b) A turbine develops 10000KW under a head of 25m at 135rpm. Calculate:

(i) The specific speed
(ii) What would be its normal speed and **(5 marks)**
(iii) Output under a head of 20m **(7 marks)**