TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING (HDBC 12S)

EBC 3205: HYDRAULICS

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2013
TIME ALLOWED: 2 HOURS

Instructions to Candidates:
You should have the following for this examination

- *Answer Booklet*
- *Calculator*

This paper consists of **FIVE** questions. Answer any **THREE** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

a) Define the following types of flow:
   (i) Steady
   (ii) Unsteady
   (iii) Laminar
   (iv) Turbulent
   (v) Uniform **(10 marks)**

b) A channel 0.9 wide has vertical sides and the bottom is V shaped, the angle of the V being 120^o. The depth of water flowing along the channel measured from the bottom of the V is 0.6m, and chezy's C -= 55. If the bed slope of the channel is 1:1200, determine the flow: **(10 marks)**

Question Two

a) An open channel of trapezoidal cross-section has a bottom width of 6m, side slopes 2 horizontal to 1 vertical and bed slope of 1:1000. The depth of flow is 2.4m and mannings n = 0.025.
Determine the:
   (i) Mean velocity
   (ii) Discharge
   (iii) Corresponding value of Chezy's C **(14 marks)**

b) A circular culvert is 1.8m diameter. Determine the depth of flow for:
   (i) Maximum discharge
   (ii) Maximum velocity **(6 marks)**

Question Three

a) A trapezoidal channel is to be designed to convey 280,000 litres per minute of water. The side slopes at 45^o and the bed slope is 1:1600. Chezy's C = 50. Design the channel **(10marks)**

b) A 0.9m diameter circular stone water sewer has a bed slope of 1:1200. Chezy's C = 55. Determine:
   (i) Maximum discharge
   (ii) Discharge when flowing full **(10 marks)**

Question Four

The depth of flow is 1.2m in a 12m wide rectangular channel when water is flowing at a rate of 14m3/s. Determine:

   (i) Whether the flow is subcritical or supercritical.
   (ii) The slope required to produce uniform flow for this depth if manning's n = 0.017.
   (iii) The specific energy **(20 marks)**

Question Five

a) Explain the importance of the following in open channel design:

(i) Free board
(ii) Maximum allowable velocity
(iii) Minimum allowable velocity **(9 marks)**

b) Explain the major factors considered in choosing the following in open channel design:
(i) Bed slope
(ii) Side slope **(6 marks)**

c) State:
(i) TWO uses of broad crested weirs
(ii) ONE use of a venturi flume
(iii) ONE use of a hydraulic jump
(iv) ONE reason why it is not worthwhile designing an economical circular open channel **(5 marks)**