MURANG'A UNIVERSITY COLLEGE

(A constituent college of Jomo Kenyatta University of Agriculture and Technology)

SCHOOL OF ENGINEERING

DEPARTMENT OF BUILDING AND CIVIL

MAIN EXAMINATION

UNIT TITLE: HYDRAULICS III

CLASS; BC/C /014D MAY

UNIT CODE: SEB 1231

DATE: 19ᵀᴴ APRIL 2016   TIME   2HRS

Instructions:-
- Question ONE is compulsory Attempt any other TWO questions.
- Marks for each question are allocated at the end of each.

QUESTION ONE 30 MARKS

a) Define the terms Natural and prismatic channels   [**2 Marks**]

b) Derive the expression for a discharge through V- Notch   [**6 marks**]

c) A 60o v-notch is used to measure the flow through a channel. The depth of flow in the notch is 0 .8m If Cd is 0.6, compute the flow rate.   [**6marks**]

d) Derive an expression for discharge measurement through a cipolletti weir   [**8mrks**]

e) A Cipolletti weir has the following hydraulic particulars
        Base width = 2.8 m
        Flow head   = 0.9 m
        Cd   =0.62
        Area upstream = 2.5 m2
    Compute the flow rate considering end contraction and velocity of approach   [**8 marks**]

QUESTION TWO 20 MARKS
a) A broad crested weir has the following data
     Crest length == 4.0 m
     Height of sill above bottom = 1.6m
     Flow head   0.78 m

Cd   =   0.85
Cv= 1.2

Assuming the critical flow conditions to occur on the crest, compute the following

i   Discharge in channel
ii   The critical depth

iii   Critical velocity, in a stream   **[14 Marks]**

b)   Draw a neat sketch of a current meter and explain how it is calibrated   **[6 marks]**

QUESTION THREE   20 MARKS

Outline 4 methods of measuring average velocity   **[8 marks]**

 Derive the expression for an economical Trapezoidal section.   **[12 Marks]**

QUESTION   FOUR   20 MARKS

a.   Outline the working principles of a Centrifugal   **[4 marks]**
b.   A rectangular channel has a cross section of 8 m^2 Find its dimensions and discharge through the most economical section if bed slope is 1: 1000.   [**8 marks]**

c.   A Rectangular channel 6.0m wide discharges 1440litres per sec of water into a 6.0mapron, with no slope, and a mean velocity of 6.0m/s.

 i Compute the height of the jump

 ii How much energy absorbed in the jump ?   **[8 marks]**

QUESTION FIVE   20 MARKS

a.   With a neat sketch, outline the working principles of Pelton wheel Turbine.   **[5 marks]**

b.   A Trapezoidal channel has side slope 2 vertical to 3 horizontal. It is discharging water at a rate of 2o m3/s with bed slope of 1: 2000. Design the Channel for its best form. Take n= 0.01
                                                                                   [15marks]