MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2018/2019 ACADEMIC YEAR

SECONDYEAR **SECOND**SEMESTER EXAMINATION FOR, DIPLOMA IN CIVIL ENGINEERING
SEB1221: HYDRAULICSII

DURATION: 2 HOURS

DATE: 19/12/2018

TIME: 9.00 - 11.00 A.M

Instructions to candidates:

1. Answer **question One** and **Any Other Two** questions.

2. Mobile phones are not allowed in the examination room.

3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Differentiate between narrow crested weir and broad crested weir. **(2Marks)**

b) Water flows over a rectangular notch of meter length and over a depth of 150mm. The same quantity of water passes through a rectangular right-angled notch. Determine the depth of two water through the notch. Take the coefficient of discharge for the rectangular and triangular notch as 0.62 and 0.59 respectively. **(8Marks)**

c) An orifice in the size of a large tank is rectangular in shape, 1.2m broad and 0.6 deep. If water level on one side of orifice is 2.4m above the top edge and the water level on the side of the orifice is 0.3m below the top edge of the orifice. Taking $C_d=0.62$, determine the discharge in litre per second. **(9Marks)**

d) A 300mmx150mm venturimeter is provided in vertical pipeline carrying oil of specific gravity 0.9, the flow being upwards. The difference in elevation of throat section and entrance section of the venturimeter is 300mm. The difference U-tube mercury manometer shows a gauge deflection of 250mm. Calculate;

   i. Discharge of the oil.

   ii. Pressure difference between the entrance and throat section.

      Take the coefficient of meter as 0.98 and the specific gravity of the mercury as 13.6 **(11Marks)**

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a) Water flows through a pipe AB of diameter $d_1=50$mm, which is in series with pipe BC of diameter $d_2=75$mm in which the mean velocity $V_2=2$m/s at C the pipe forks and one branch CD is of diameter d_3 such that the mean velocity V_3 is 1.5m/s the branch. The other branch CE is of diameter $d_4=30$mm and conditions are such that the discharge Q_2 from BC divides so that $Q_4= \frac{1}{2} Q_3$ (host Qs).Calculate the values of $Q_1, V_1, Q_2, Q_3, d_3, Q_4$ and V_4.
(7Marks)

b) Calculate the rate of flow for the following cases, assuming Mean Velocity of 3m/s. **(10Marks)**
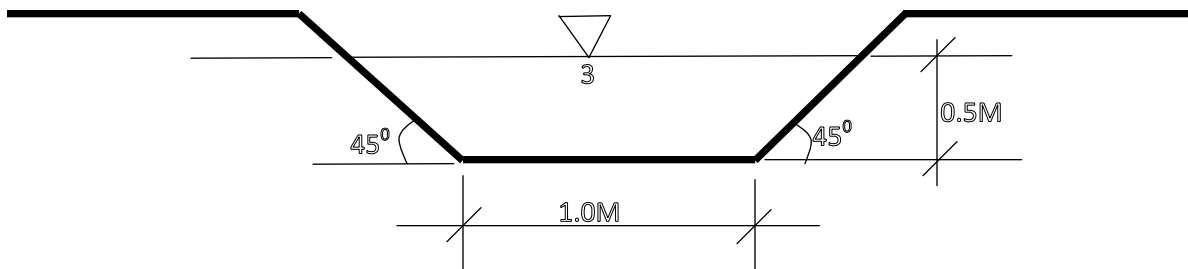
c) State three energies of a liquid in motion which are important from the hydraulic point of view. **(3Marks)**

QUESTION THREE (20 MARKS)

a) A tank has two identical orifices in one of its vertical sides. The upper orifice is 2m below the water surface and the lower one is 4m below the water surface. Determine the point at which two jets through the orifice will intersect, if the coefficient of velocity is 0.98 for both the orifices. **(10Marks)**

b) A cylindrical tank 1.2 diameter is fitted with a 30mm diameter orifice (C_d=0.65) Calculate;
   i. The time it will take to bring the water level from initial 2m above the orifice to final 1m above the orifice.
   ii. The time it will take to empty the tank completely. **(10Marks)**

QUESTION FOUR (20 MARKS)

a) Determine the quantity of water flowing in litre/second through venturimeter of size 150x50mm when the differential manometer connected between the inlet and the throat of venturimeter given 60mm of mercury reading. Coefficient of venturimeter may be taken as 0.98. **(7Marks)**

b) An orifice meter consist of a 100mm diameter orifice in a 250mm diameter pipe and has a coefficient of discharge of 0.65 the pipes convey oil of specific gravity 0.9 and the pressure difference between the two sides of orifice plate is measured by a mercury manometer, the leads to the gauge being filled with oil, if the difference in mercury level in the gauge is 760mm. Calculate the rate of flow of oil in the pipeline. **(7Marks)**

c) Derive an equation to measure the quantity of water flowing a venturimeter. **(6Marks)**