SIR ARTHUR LEWIS COMMUNITY COLLEGE
Division of Technical Education and Management Studies

EXAMINATION SESSION	:	May 2015 Examination
TUTOR(S)	:	I. Lambert
PROGRAMME TITLE	:	Mechanical Engineering
PROGRSMME CODE(S)	:	3ME-MEC-AD
COURSE TITLE	:	Applied Mechanics II
COURSE CODE	:	EGT 110
CLASS (ES)	:	MECH Year Two (2)
DATE	:	Friday 15th May, 2015
COMMENCEMENT TIME	:	9:00 AM
DURATION	:	2 1/2 Hrs
INVIGILATOR (S)	:	E. Lewis, M. Sifflet
ROOM (S)	:	CEHI-1E-03

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INSTRUCTIONS

This examination paper consists of six (6) questions. You are required to answer *any four (4)* questions.
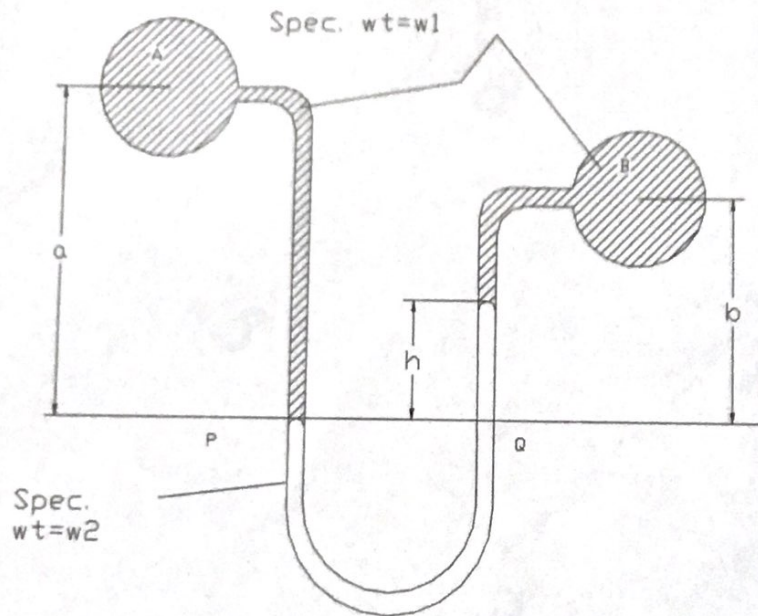
All questions are worth twenty (20) marks.

➢ Students are advised to use a pen to write this examination.

➢ Write your ID Number on *each* answer sheet.

➢ All cell phones must be turned off during the examination.

➢ <u>Note:</u> **Bags, books as well as writing paper not given by the invigilator should be deposited at the front of the examination room or as otherwise indicated.**

➢ Students must sign **IN** and **OUT** on the examination class list.

1. The water in a tank is 1.8m deep from the center of the orifice and over the surface is air at $100kN/m^2$ above atmospheric. Find the rate of flow in m^3/s from an orifice of 50mm diameter in the bottom of the tank, given that C_d=0.6. (20marks)

2. A closed tank partially filled with water discharges through an orifice of 12.5 mm diameter and has a coefficient of discharge of 0.7.If air is pumped into the upper part of the tank, determined the pressure required to produce a discharge of 36dm3/min when the water surface is 0.9m above the outlet. (20marks)

3. A horizontal venturi meter measures the flow of oil of specific gravity 0.9 in a 75mm diameter pipe line. If the difference of pressure between the full bore and throat tapings is 34.5 kN/m^2 and the area ratio m is 4, calculate the rate of flow, assuming a coefficient of discharge of 0.97. (20marks)

4. A 3m high, 12m wide rectangular gate is hinged at the top edge at A and is restrained by a fixed ridge at B as shown in the diagram.
   (a) Determine the hydrostatic force exerted by 5m high of water. (8marks)
   (b) Determine the location of the pressure center (6marks)
   (c) Determine the reaction on the fixed ridge at B. (6marks)
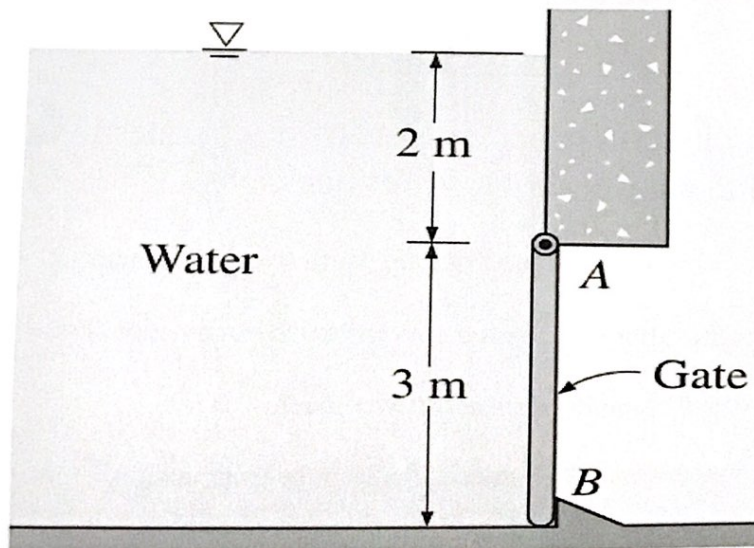
5. A piston of 46mm diameter slides concentrically in a fixed cylinder of 50mm diameter .The cylinder is filled with water and when the piston moves into the cylinder flows through the annular gap surrounding the piston .If the velocity of the piston is 75mm/s relative to cylinder, what is the velocity of the flow of through the gap. (20marks)

6. A U-tube manometer of Fig Q4 measures the pressure difference between two points A and B in a liquid of specific weight w_1. The U- tube manometer contains mercury of specific weight w_2. if a=1.47m b= 0.69m and h=0.47m, and the liquid at A and B is water (w_1=9.81X10^{3}N/m^3) and the specific gravity of mercury is 13.6(so that w_2=13.6w_1). Calculate the difference in pressure. (20marks)

Spec. wt=w1

Spec. wt=w2

a

b

h

P

Q

End of Examination