MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR SECOND TERM FOR

DIPLOMA IN CIVIL ENGINEERING

WATER SUPPLY

DATE: **TIME:**

INSTRUCTIONS TO CANDIDATES

ANSWER ALL QUESTIONS

1. a) Define the following terms

   i) Total pressure
   ii) Centre of pressure
   iii) Archimedes principle
   iv) Buoyancy
   v) Centre ofbuoyancy (10 marks)

   b) A rectangular plate 2M wide and 4M deep is immersed in water in such a a way that its plane makes an angle of 25º with the water surface as shown **in Figure** Determine:

   i) Total pressure of on one side of the plate
   ii) The position of Centre of gravity (10 marks)

2. a) A tank 3mx 4m contains 1.2m deep oil of specific gravity of 0.8.Determine;

   i) Intensity of pressure at the base of the tank
   ii) Total pressure on the base of the tank (8 marks)

   b) Give two applications of hydrostatics (2 marks)

   c) A square plate ABCD 5M X5 M hangs in from one of its corner as shown in **figure 2.**

Determine;

i) The total pressure
ii) The position of Centre of gravity (10 marks)

3. a) Define the following terms

i) Path lines
ii) Streamlines
iii) Streaklines (6 marks)

b) Define the following types of flow

i) Streamline flow
ii) Turbulent flow
iii) Steady flow
iv) Unsteady flow
v) Compressive flow
vi) Rotational flow
vii) Irrotational flow (14 marks)

4. a) State difference between uniform flow and non-uniform flow (2 marks)

b) Describe the three conditions for a body to be in stable equilibrium

(9 marks)

c) A square plate of 1m side is immersed vertically with its Centre is 4m below the water surface. Determine;

i) Total pressure

ii) Centre of Centre (9 marks)

5. a) A gate 3m wide and 2m deep is fitted in a wall having a slope of 60^{o}constructed a cross a channel. Determine;

i) Total pressure
ii) Position of the gate when the channel is full of water (10 marks)

b) Derive an expression to show that Centre of pressure equals to;

$h=IG+AX^{-2}/AX$ (10 marks)