



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN

MECHANICAL ENGINEERING

MED-PR 118: FLUID MECHANICS I

DATE: 5/6/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

1.
 - a) Define the following terms
 - i. Mass density
 - ii. Weight density
 - iii. Specific gravity (3 marks)
 - b) The internal diameter of a cylindrical tank is 280 mm. it contains 7.7 liters of oil of relative density 0.8. taking the density of water as 100 kg/m^3 , determine the mass of the oil. (8 marks)
 - c) State the Pascal's law (2 marks)
 - d) The right limb of a sample U-tube monometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of specific gravity 0.9 is flowing. The center of the pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20 cm. (6 marks)

- e) A hydraulic press has a ram of 20cm diameter and a plunger of 3 cm diameter. It is used for lifting a weight of 30 kN. Find the force required at the plunger.
(11 marks)
2. a) Define buoyancy (2 marks)
- b) Find the volume of the water displaced and position of centre of buoyancy for a wooden block of width 2.5 m and of depth 1.5 m, when it floats horizontally in water. The density of wooden block is 650 kg/m^3 and its length 6.0 m. (18 marks)
3. At a section A in a horizontal pipe running full of oil, the diameter of the pipe is 600 mm and the velocity of flow is 1 m/s. calculate the velocity of the oil at another section B where the diameter of the pipe is 450 mm. what is the rate of flow in liters per minute.
(20 marks)
4. A rectangular plane surface is 2m wide and 3m deep. It lies in vertical plane in water. Determine the total pressure and position of center of pressure on the plane surface when its upper edge is horizontal and ;-
- i. coincides with water surface
- ii. 2.5m below the free water surface (20 marks)
5. Show that the intensity of pressure at a point in a fluid at rest is the same in all directions
(20 marks)