EL-MANSOURA UNIVERSITY
FACULTY OF ENGINEERING
IRRIGATION & HYDRAULICS ENG. DEPT.
FINAL TERM EXAM

2ND YEAR CIVIL
HYDRAULICS (1)
2008-2009
Time : 3hr

Answer the following questions:

Q(1): Choose the correct answer :

1. If 5.6m^3 of oil weighs 46 800 N, what is the mass density in kg/m^3?
a) 1.2 X 10-4 b) 852.0 c) 8357.1 d) 8.52 e) 8.36 **[2 Marks]**

2. A fluid has absolute viscosity, μ, of 0.048 Pa s. If at point A, 75mm from the wall the velocity is measured as 1.125 m/s, calculate the intensity of shear stress at point B 50mm from the wall in N/m2. Assume a linear (straight line) velocity distribution from the wall.
a) 15 b) 0.048 c) 0.72 d) 0.0032 e) 0.032 **[2 Marks]**

3. What depth of oil (in m), relative density 0.75, will give a gauge pressure of 275000 Pa
a) 37.38 b) 367 c) 0.027 d) 20.2 X 104 e) 28.03 **[2 Marks]**

4. Express the pressure head of 15m of water in metres of oil of relative density 0.75
a) 110.36 b) 11.25 c) 11 250 d) 15.0 e) 20.0 **[2 Marks]**

5. Determine the absolute pressure in Pa at a depth of 6m below the free surface of a tank of water when a barometer reads 760mm mercury (relative density 13.60)
a) 101172 b) 58860 c) 160 032 d) 82.42 e) 160.032 **[2 Marks]**

Q(2):

a) In **Fig.(1)** ,Calculate level **(h)** of the oil in the right hand tube. Both tubes are open to the atmosphere. **[5Marks]**

b) The vertical plate shown in **Fig.(2)** is submerged in Vinegar (s.g = 0.80). Find the magnitude of the hydrostatic force on one side (KN) and the depth to the center of pressure. **[5 Marks]**

c) Find horizontal and vertical forces per foot of width on the Tainter gate shown in **Fig.(3)** . **[5Marks]**

Q(3):

a) A solid cylindrical 36 cm long, 8 cm diameter has its base 1 cm thick and of specific gravity 7 . The remainig part of the cylinder is of specific gravity 0.50 .Determine, if it can float vertically in water. **[5Marks]**

b) The stream function and velocity potential for a flow are given by $\Psi = 2xy$, $\Phi = (x^2 - y^2)$. Show that the conditions of continuity and irrotational flow are satisfied . **[5Marks]**

c) Given the velocity field V(x,y,z,t) =10 x^2 i -20 yx j + 100 t k , determine the velocity, local and convective accelerations of a particle at position x =1m, y = 2m, z = 5m, and t = 0.1sec . **[5Marks]**

Q(4):

a) Starting with the Bernoulli and Continuity equations , derive the following expression that can be used to measure flow rate width a Venturimeter when the pressure difference is measured using a manometer. **[10Marks]**

P.T.O ⇨

i- The Honour for program "as an Invention" is divided by the ratio 7:3 between A& B, respectively

Yes ☐ No ☐

ii- The Honour for program writing "as an Invention" is divided by the ratio 1:1 between A& B, respectively

Yes ☐ No ☐

iii- The Honour for tool design "as an Invention" is divided by the ratio 3:7 between A& B, respectively

. Yes ☐ No ☐

iv- The Honour for tool design "as an Invention" is divided by the ratio 1:1 between A& B respectively,

. Yes ☐ No ☐

GOOD LUCK
