Kafr El-Sheikh University	Second year
Faculty of Engineering	Fluid Mechanics
Civil Engineering Dept.	Final term exam.
Date: January, 2016	Time : 3 hour

Answer all the following five questions.
Any other required data may be reasonably assumed.

الامتحان مكون من صفحتين

Question No. (1) [20%]

Calculate the value and point of application of the **horizontal** and **vertical** components of the hydrostatic force acting on the inclined surface **AB** shown in Fig. (1)

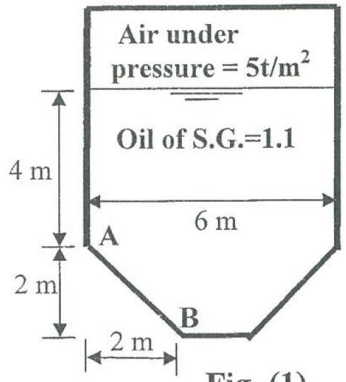

Fig. (1)

Question No. (2) [20%]

A **closed** vertical cylindrical tank of diameter 6m and height 5m is filled of water to a depth of 3m, calculate the pressure at the **center** and **edge** of the tank **bottom** when the tank is rotated about its vertical axis with angular velocity (ω) = 3.5 rad/sec. Also, calculate the exposed area of the tank bottom.

Question No. (3) [20%]

a) An orifice is placed at a side of a tank as shown in Fig. (2). Calculate the velocity coefficient (c_v) of the orifice.

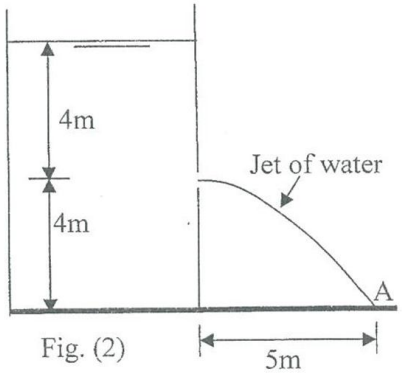

Fig. (2)

b) A **square** orifice of 2 m side is discharging water between two tanks where water level of the higher tank is **4 m** above the centerline level of the orifice, while the water level of the lower tank is the centerline level of the orifice. Calculate the discharge passing through the orifice, C_d=0.6 **[10%]**

باقي الأسئلة في الخلف

Question No. (4) [15%]

A vertical **cylindrical** tank of diameter = 4m and height of 10m is filled with water to a depth of 9m. If the tank has **two identical** orifices at **a side** of the tank where the **upper** and the **lower** orifices are located at distances of **6m** and **3m**, respectively, form the tank base, calculate the time required to **reduce** the water depth in the tank **by** 2m, orifice diameter = 8cm, $c_d = 0.62$

Question No. (5) [25%]

a)A pipeline of diameter 1 m and length of 5000 m is conveying water from a tank and discharging **freely** at a level below the water level in the tank by 10m, it is required to calculate the discharge passing through the pipeline. If a **leakage** of took place at a distance **1500** m from the **tank**, where the **leakage discharge** is **0.5** m^3/sec. Calculate the **percentage change** in discharge a the **end of the pipeline**,λ=0.025. **[15%]**

b) A pipeline of diameter 0.5m, length of 300m, $\lambda = 0.02$, connects between tank (A) and tank (B), Fig. (3), calculate the **power** of a pump required to **lift** a discharge of 4 m^3/sec from the tank **(B) to the tank (A)**

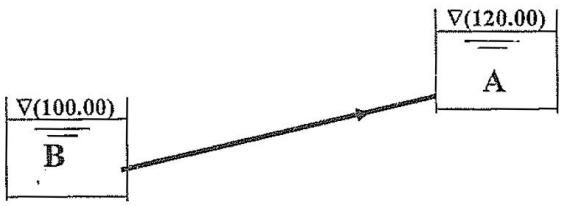

Fig. (3)

GOOD LUCK