


ثانية من ١٤٢١
٢ منى
عليه صلح

Kafr El-Sheikh University Faculty of Engineering Civil Engineering Dept. Date: January, 2017 Examiner Associ. Prof. Moustafa El-Enany		72 Second year Fluid Mechanics (CES2109) Final term exam. Time : 3 hour Full Mark: 75 marks
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Answer all the following five questions.

Any other required data may be reasonably assumed.

الامتحان مكون من صفتين

Question No. (1) [13 marks]

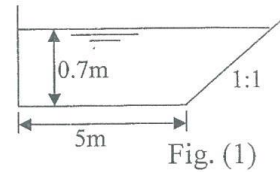
A pipeline carrying water has to be laid below the water surface of a lake. The pipe is 300 mm in internal diameter, its walls are 12.5 mm thickness and its weight is 150 N per meter length. Show if buoyancy effect will create problems in the case when the pipe is full and the case when the pipe is empty. If the pipeline is to be anchored to the lake bed by bolts, what is the tension force in bolts per meter length of the pipe?.

Question No. (2) [13 marks]

An **open** vertical cylindrical tank of diameter 4m and height 6m is filled of water to a depth of 4m, calculate the **pressure** at the **center** and **edge** of the tank **bottom**, also calculate the **exposed area** of the tank bottom when the tank is **rotated** about its vertical axis with angular velocity(ω), where ω has one of the following two values: (a) $\omega = 3$ rad/sec. (b) $\omega = 5$ rad/sec

Question No. (3) [14 marks]

a) calculate the discharge passing over a trapezoidal weir shown in Fig. (1), $c_d = 0.62$.

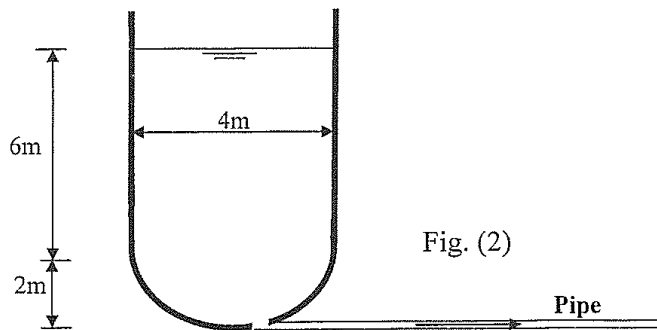


b) A **square** orifice of 1 m side is discharging water between **two** tanks where water level of the **higher** tank is 6m above the **centerline** level of the orifice, while the water level of the **lower** tank is 3m above the **centerline** level of the orifice. Calculate the discharge passing through the orifice, $C_d=0.6$ [7 marks]

باقي الاسئلة في الخلف

Question No. (4) [17 marks]

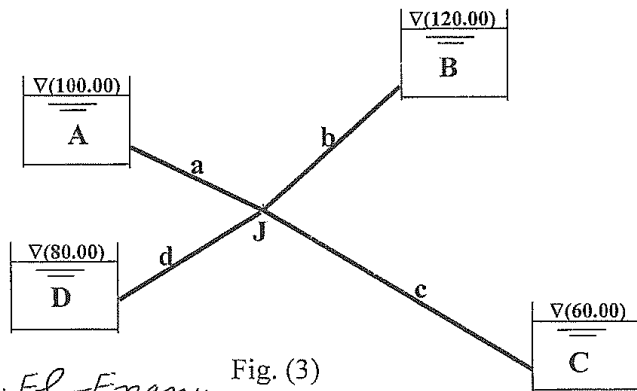
A tank has an **upper cylindrical part** of 4 m diameter with a **hemispherical base**, Fig. (2). The tank is partially filled with water as shown in Fig.(2). Determine the time taken to **empty** the tank through a **pipe** of diameter 0.25m, length of 200m, $\lambda = 0.02$, Fig. (2), where the pipe is connected to the tank bottom



Question No. (5) [18 marks]

Four pipes connect four tanks where the pipes meet at point J as shown in Fig. (3). It is required to calculate the **discharge** passing in the four pipes (a, b, c and d) where the pipes have the following data:

$L_a = 4000 \text{ m}, D_a = 0.5 \text{ m}, \lambda_a = 0.02$, $L_b = 5000 \text{ m}, D_b = 0.4 \text{ m}, \lambda_b = 0.016$
 $L_c = 7000 \text{ m}, D_c = 0.35 \text{ m}, \lambda_c = 0.025$, $L_d = 3000 \text{ m}, D_d = 0.3 \text{ m}, \lambda_d = 0.022$



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GOOD LUCK