

Kafr El-Sheikh University
 Faculty of Engineering
 Civil Engineering Dept.
 Date: January, 2017
 Examiner Associ. Prof. Moustafa El-Enany



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Second year
 Fluid Mechanics (CES2109)
 Final term exam.
 Time : 3 hour
 Full Mark: 75 marks

Answer all the following five questions.

Any other required data may be reasonably assumed.

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Question No. (1) [13 marks]

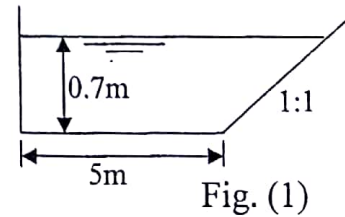
A pipeline carrying water has to be laid below the water surface of a lake. The pipe is 300 mm in internal diameter, its walls are 12.5 mm thickness and its weight is 150 N per meter length. Show if buoyancy effect will create problems in the case when the pipe is full and the case when the pipe is empty. 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), $c_d = 0.62$.

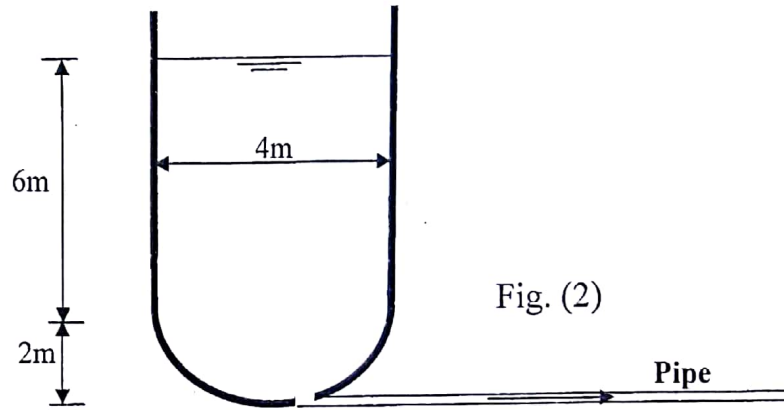


b) A square orifice of 1 m side is discharging water between two tanks where water level of the higher tank is 6m above the centerline level of the orifice, while the water level of the lower tank is 3m above the centerline level of the orifice. Calculate the discharge passing through the orifice, $C_d=0.6$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

باقى الاسئلة فى 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

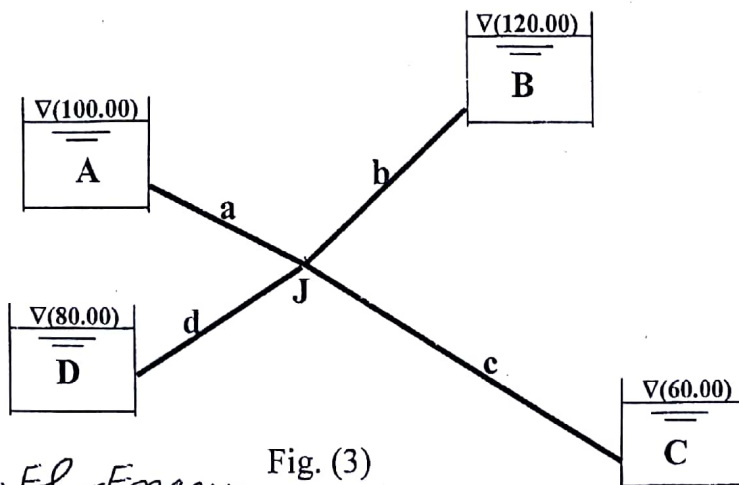


Question No. (5) [18 marks]

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:

$$L_a = 4000 \text{ m}, D_a = 0.5 \text{ m}, \lambda_a = 0.02 \quad , \quad L_b = 5000 \text{ m}, D_b = 0.4 \text{ m}, \lambda_b = 0.016$$

$$L_c = 7000 \text{ m}, D_c = 0.35 \text{ m}, \lambda_c = 0.025 \quad , \quad L_d = 3000 \text{ m}, D_d = 0.3 \text{ m}, \lambda_d = 0.022$$



M. El-Erany

GOOD LUCK