

## **College of Engineering & Technology**

<u>R. N.:</u>

Department: Mechanical Engineering Ma Lecturer: Dr. Rola Afify Tin Course Code: ME362 Da

Marks: 20 Time: 4:00 – 5:00 Date: 6/5/2015

## Name:

## Answer the following questions: Question one (10 marks)

A) A 5 m high and 5 m wide rectangular plate blocks the end of a 4 m deep freshwater channel as shown in Figure. The plate is hinged about a horizontal axis along its upper edge through a point A and is restrained from opening by a fixed ridge at point B. Determine the force exerted on the plate by the ridge.

B) If the resultant pressure force on the circular gate shown in Figure is inclined  $50^{\circ}$  to the horizontal. Calculate the height of water in the tank 'h' and the magnitude of the resultant pressure force on the gate. Given that gate width = 0.5 m.



1/2

## **Question two (10 marks)**

A) Compare between Rotational and Irrotational flows.

B) Water is flowing in the conduit shown in figure. If the flow rate Q is 8 lit/s and the diameters  $d_1$ ,  $d_2$  and  $d_3$  at sections 1, 2 and 3 are 50, 60 and 100 mm respectively, find the flow velocities  $v_1$ ,  $v_2$  and  $v_3$ . If the pressure P<sub>1</sub> at section 1 is 24.5 kPa, what is the pressure P<sub>3</sub> at sections 3?



C) What diameter orifice hole, *d*, is needed if under ideal conditions the flowrate through the orifice meter is to be 0.4 m<sup>3</sup>/sec of water with  $P_1$ -  $P_2$  = 2.37 kPa. The contraction coefficient is assumed to be 0.63.

