Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016

COURSE NAME	:	HYDRAULICS
COURSE CODE	:	DAC 21003
PROGRAMME	:	2 DAA
EXAMINATION DATE	:	DECEMBER 2015 / JANUARY 2016
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FIVE (5)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 (a) Define **two (2)** differences between hydrostatic pressure and atmospheric pressure.

(4 marks)

(b) Explain about Pascal's principle.

(4 marks)

(c) Determine the pressure (in N/m^2) at 40 m depth below water surface inside a reservoir.

(3 marks)

(d) Refer **Figure Q1(d)**, determine absolute pressure of four different fluid inside a glass container. (P_{atm} = 102 kPa)

(9 marks)

Q2 (a) Describe about centre of pressure.

(4 marks)

(b) Sketch the hydrostatic force on horizontal submerged plane surface.

(4 marks)

(c) Refer **Figure Q2(c)**, 10 m width rectangular gate that leans against the floor with an angle 45°. Analyze the minimum force required to open the water gate.

(12 marks)

Q3 (a) Sketch the types of water flow as below:

(i) Steady flow

(2 marks)

(ii) Uniform flow

(1 mark)

(iii) Non uniform flow

(1 mark)

(b) Identify **two (2)** differences between gradually varied flow and rapidly varied flow.

(4 marks)

(c) Determine the velocity from 9 mm nozzle attached to the 36 mm diameter pipe has a velocity of 1.5 m/s.

(4 marks)

(d) A 450 mm diameter pipe has velocity of Tetrachloride Carbon (density = 1500 kg/m^3) which is 2.4 m/s. Calculate the discharge in diffeerent unit as below:

(i) kg/hour

(2 marks)

(ii) ml/min

(2 marks)

(iii) m^3/s

(2 marks)

(iv) Gallon/day

(2 marks)

Q4 (a) Describe about flow, kinetic, potential and total energy in fluid flow.

(4 marks)

(b) Identify **four (4)** principles of Bernoulli's equation.

(4 marks)

(c) Refer **Figure Q4(c),** the specific weight of air is 12.7 N/m^3 and Benzene in the manometer has specific gravity = 0.88. Determine the flow rate in the venturi meter by neglecting losses. (Diameter pipe 1 = 200 mm and diameter pipe 2 = 100 mm)

(12 marks)

Q5 (a) Define **two (2)** differences between laminar and turbulent flow.

(4 marks)

(b) Explain about friction in pipe.

(4 marks)

(c) Analyze the head loss of a raw oil (specific gravity = 856 kg/m^3, viscosity = 7.2 X 10^{-3} Ns/m^2) due to friction which flowing through a 135 m long pipe. The velocity is 3 m/s and pipe radius is 225 mm.

(6 marks)

(d) Measure total discharge of parallel pipe system which length of pipe A is 20 m with discharge in pipe 2 is 2 m^3/s and length of pipe B is 5 m. Both pipe has a same diameter with friction factor is 0.01. Minor losses are neglected.

(6 marks)

Q6 (a) Compare the characteristics between supressed crested weir and contracted crested weir.

(4 marks)

(b) Sketch **two (2)** artificial channels.

(2 marks)

(c) Explain about pump as a hydraulic machine.

(2 marks)

(d) Analyze the head in centimeters for the discharge over a triangular notch weir is to be 127.5 l/s. If V- notch is having angle of 40°. Take coefficient of discharge as 0.65.

(4 marks)

(e) Refer **Figure Q6(e)**, determine the hydraulic radius.

(4 marks)

(f) A centrifugal pump is needed to supply 69 m^3/s of water for a city. This operation will utilise a net head (H) of 60 m with a specific speed N of 1,350 rpm. Given that the inflow power is 15 MW, calculate as below:

(i) Outflow power, P_d

(2 marks)

(ii) Overall efficiency, η_o

(2 marks)

- END OF QUESTIONS-

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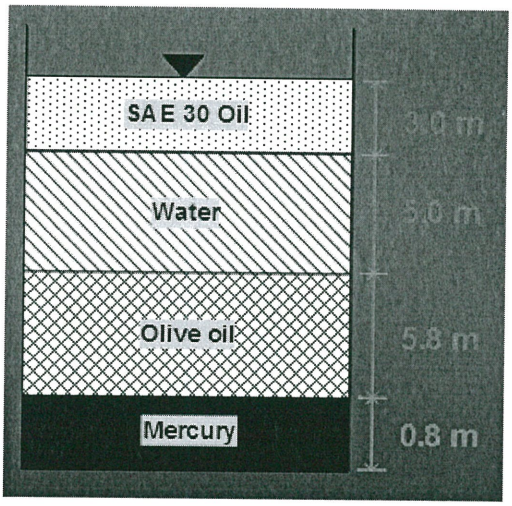

FIGURE Q1(d)

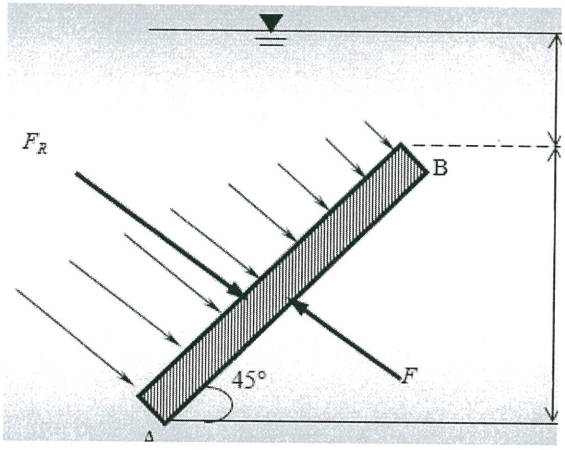

FIGURE Q2(c)

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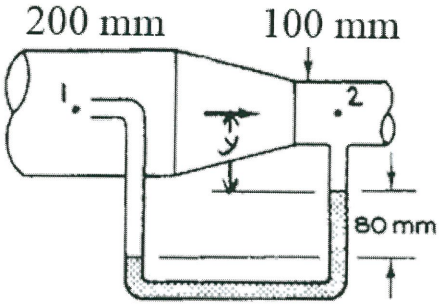

FIGURE Q4(c)

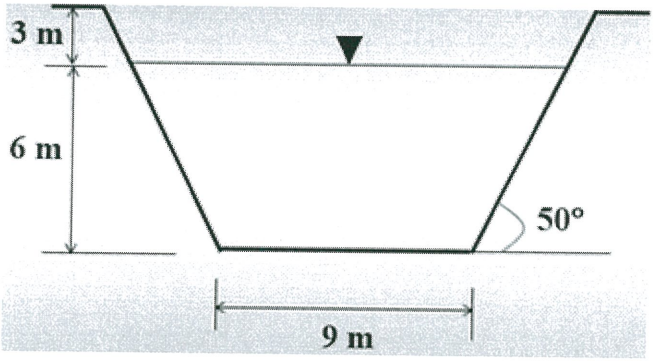

FIGURE Q6(e)