UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER III
SESSION 2018/2019

COURSE NAME	:	HYDRAULICS
COURSE CODE	:	DAC 21003
PROGRAMME CODE	:	DAA
EXAMINATION DATE	:	AUGUST 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FIVE (5)** QUESTIONS ONLY

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

Q1 (a) List **four (4)** properties of ideal fluid.

(4 marks)

(b) Compare **two (2)** differences between vapor phase and liquid phase.

(4 marks)

(c) Benzene has a mass of 3000 kg and volume of 3.5 m³. Determine as below:

(i) Weight (kN).

(2 marks)

(ii) Density (kg/m³).

(2 marks)

(iii) Specific weight (kN/m³).

(2 marks)

(iv) Relative density.

(2 marks)

(v) Specific gravity.

(2 marks)

(vi) Specific volume (m³/kg).

(2 marks)

Q2 (a) Describe **four (4)** examples of failure due to error in designing water structure.

(4 marks)

(b) Compare **two (2)** differences between gravity force and floating force.

(4 marks)

(c) Referring to **Figure Q2(c)**, value of P_1 is 25 kN and Θ is 30°. Calculate the value of P_Θ.

(6 marks)

(d)   A ship has displaced water of 175 m³. Determine as below:

  (i) Weight of the ship (kN).

  (2 marks)

  (ii) Volume of seawater (m³) will be displaced by the ship (ρ_{sw} = 1030 kg/m³).

  (2 marks)

  (iii)Volume of water (liter) has displaced by the ship.

  (2 marks)

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

  (i) Uniform flow.

  (1 mark)

  (ii) Non-uniform flow.

  (1 mark)

  (iii)Gradually varied flow.

  (1 mark)

  (iv)Rapidly varied flow.

  (1 mark)

  (b) Describe the venturi meter which consisting two conical parts.

  (4 marks)

  (c) Water flows at the rate of 0.07 m³/s through a 35 cm diameter orifice used in a 600 mm pipe diameter. Calculate the difference in pressure head between the upstream section and the vena contracta section. (C_c = 0.65 and C_v = 1.0).

  (12 marks)

Q4 (a) Describe the type of flow as below:

  (i) Turbulent flow.

  (2 marks)

  (ii) Laminar flow.

  (2 marks)

  (iii)Rapidly varied flow.

  (2 marks)

  (iv)Gradually varied flow.

  (2 marks)

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(b)   A fluid is flowing through a pipe line at a velocity of 95×10^3 mm/s and has a radius of 1.55 cm. ($\gamma_{fluid} = 8.5$ kN/m^3 and $\mu = 0.095$ kg/ms). Determine the value of N_R.

(6 marks)

(c)   Diameter of a pipe at point A changes gradually from 225 mm at 700 cm datum level to 115 mm at 350 cm datum level at point B. Determine as below:

(i)   Velocity (m/s) at point B if velocity at point A is 4.5 m/s.

(2 marks)

(ii)   Pressure (kN/m^2) at point B if pressure at point A is 125 kN/m^2 by ignoring losses.

(4 marks)

Q5   (a)   Define the energy losses from a flow in pipe system.

(4 marks)

(b)   Explain the friction in pipe due to the effect of the fluid's viscosity.

(4 marks)

(c)   A raw oil flows with 0.35 m/s of velocity through a 150 m long pipe and 30 mm pipe radius. Calculate as below:

(i)   Reynolds Number, R_e (kinematic viscosity $= 8.4 \times 10^{-6}$ m^2/s).

(3 marks)

(ii)   Head loss (m) due to friction, h_f.

(3 marks)

(d)   Referring to **Table 1**, calculate as below:

(i)   Relative roughness.

(2 marks)

(ii)   Velocity of flow (m/s).

(2 marks)

(iii)   Reynolds Number, R_e.

(2 marks)

Q6 (a) Write the flood control in altering river conditions.

(8 marks)

(b) Determine the head (cm) for the discharge over a triangular notch weir is to be 127 l/s. If V- notch is having angle of 45° and coefficient of discharge is 0.69.

(6 marks)

(c) A rectangular river channel 2.5 m wide carries water at a depth of 0.3 m. The slope of the channel is 1 in 200. The channel has a poor alignment and the bed is covered with stones which n values is 0.05. Calculate discharge (m^3/s) of the channel by using Manning's equation.

(6 marks)

Q7 (a) Compare **four (4)** differences between before hydraulic jump and after hydraulic jump.

(8 marks)

(b) A rectangular river channel 2.3 m wide carries water at a depth of 0.3 m. The slope of the channel is 1 in 200. The channel has a poor alignment and the bed is covered with stones which n values is 0.04. Determine as below:

(i) Discharge (m^3/s) of the channel by using Manning's equation.

(4 marks)

(ii) Difference percentage between $n = 0.04$ and $n = 0.08$ in the flows.

(4 marks)

(c) The spans of a rectangular channel 3.50 m in width. The difference in elevation between the weir crest and the upstream water surface is 0.35 m and the weir itself is 0.70 m high. Determine the rate of flow (L/s) in this channel with weir coefficient is 1.9.

(4 marks)

- END OF QUESTIONS –

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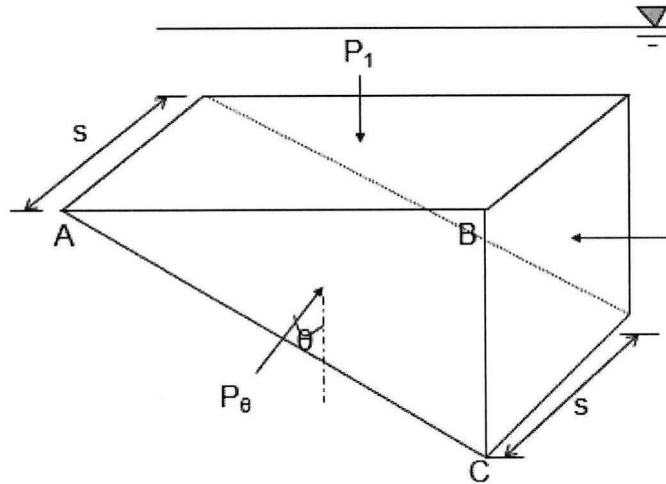
Figure Q2(c)

Table 1

Item	Value
Length of pipe	190 m
Diameter of pipe	0.13 m
Cast iron roughness	0.27 mm
Friction factor	0.03
Kinematic viscosity of oil	1.3×10^{-5} m^2/s
Head loss	5.7 m