FINAL
ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session : **April 2022**

Programme : Diploma In Mechanical Engineering (DMEN)

Course : EGR2178: Fluid Mechanics 1

Date of Examination : 04 August 2022 (Thurrsday)

Time : 12.00pm - 02.30pm Reading Time : Nil

Duration : 02 hours 30 minutes

Note: 30 minutes is added into the duration of the examination to factor in any connectivity matters and for you to scan and upload your scripts

Special Instructions :

This paper consists of **Four (4)** questions. Answer all questions.

Material permitted :

Non-Programmable Scientific Calculator

Materials provided :

Nil

:

Examiner(s) Mohamad Faiz Osrin

Chief Moderator : Iylia Elena Abdul Jamil

This paper consists of 6 printed pages, including the cover page

DIPLOMA IN MECHANICAL ENGINEERING PROGRAMME (DMEN)
EGR2178: FLUID MECHANICS 1
FINAL ALTERNATIVE ASSESSMENT: APRIL 2022 SESSION

Instructions: This paper consists of **FOUR (4)** questions. Answer all **FOUR (4)** questions. All questions carry equal marks.

Question 1

(a) The Figure Q1(a) shows a pitot static probe connected with a U-shape manometer. The manometer contains mercury with density, ρ_{Hg} = 13 550 kg/m^3. Determine the velocity of water through the pipe.

(12 marks)

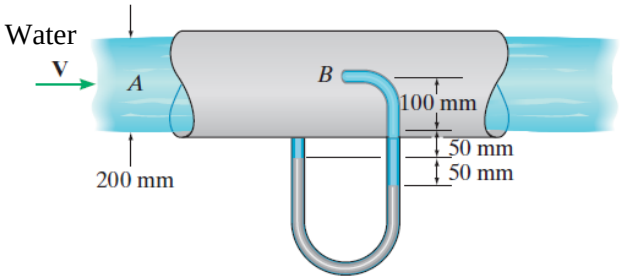

Figure Q1(a)

(b) Air in a circular pipe connected with manometer as shown in Figure Q1(b). The density of air, ρ = 1.23 kg/m^{3}and the manometer contains mercury with density, ρ_{Hg} = 13 550 kg/m^3. Determine the volumetric flow of air through the circular pipe.

(13 marks)

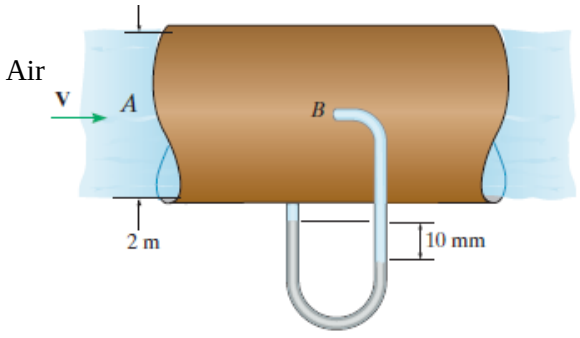

Figure Q1(b)

Question 2

(a) Determine the dimensionless parameter of the following terms.

(i) Qp/L,

(3 marks)

(ii) $\rho V^2/\mu$,

(3 marks)

(iii) E_V/ρ,

(3 marks)

(iv) γQL.

(3 marks)

(b) The velocity, V of the stream flowing from the side of the tank shown in Figure Q2(b) is depends on the liquid's density ρ, the depth h, and the acceleration of gravity g. Determine the relation between V and these parameters.

(13 marks)

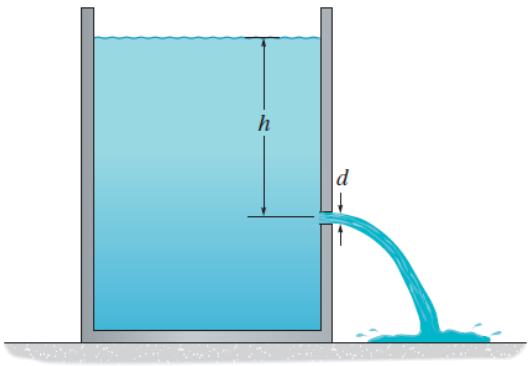

Figure Q2(b)

Question 3

(a) Water flows through a pipe with diameter, d shown in Figure Q3(a). The density of water, ρ is 998 kg/m^3.The flowrate, Q of water along the pipe is 0.002 m^3/s. Determine the pressure drop that occurs in the pipe.

(12 marks)

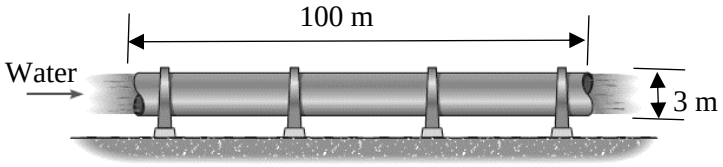

Figure Q3(a)

(b) Water at 20°C flows upwards through the 50 mm diameter cast iron pipe at mass flow rate, $\dot{m}$ = 5.88 kg/s as shown in Figure Q3(b). Determine

(i) the major head loss that occurs over the 8 m long vertical segment,

(7 marks)

(ii) the pressure at section A?

(6 marks)

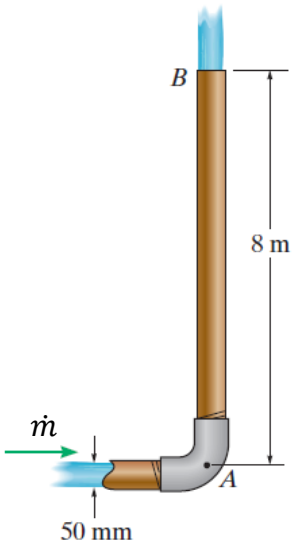

Figure Q3(b)

Question 4

(a) Water flows over the top surface of the plate as shown in Figure Q4(a). The freestream velocity, U is 0.1 m/s and kinematic viscosity, v is 1.004 x 10^{-6} m^2/s. Determine

(i) the boundary layer thickness,

(4 marks)

(ii) the displacement thickness,

(4 marks)

(iii) the momentum thickness at the back end of the plate?

(4 marks)

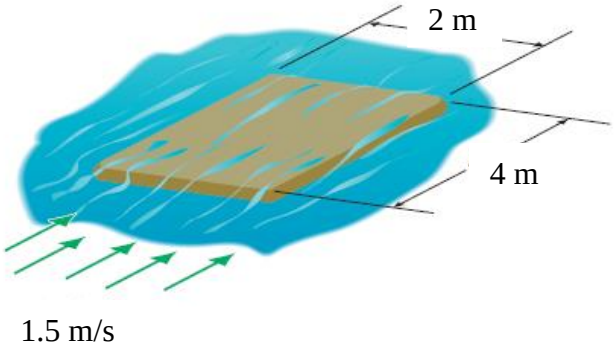

Figure Q4(a)

(b) Air at 20°C is blowing at 2 m/s as it passes over the flat surface shown in Figure Q4(b). The density of air, ρ_{air} = 1.202 kg/m^3. At a distance of x = 0.5 m from the leading edge. Determine

(i) the boundary layer thickness,

(4 marks)

(ii) the displacement thickness,

(4 marks)

(iii) the velocity of the flow at half the boundary thickness?

(5 marks)

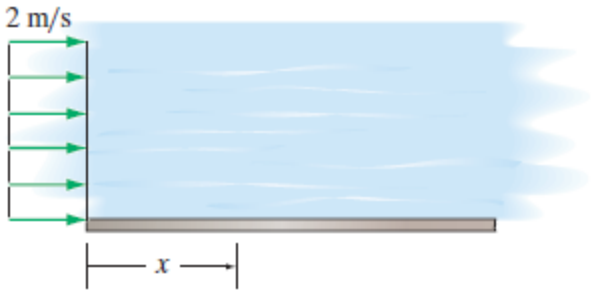

Figure Q4(b)

~THE END~

EGR2178 (F)/ April 2022 Session/ formatted