UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2017 SEMESTER

COURSE CODE	: LGB21403
COURSE NAME	: FLUID MECHANICS
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	: BACHELOR OF ENGINEERING TECHNOLOGY (HONS) IN NAVAL ARCHITECTURE & SHIPBUILDING
DATE	: 13/07/2017 THU
TIME	: 9.00 AM - 12.00 PM
DURATION	: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read CAREFULLY the instructions given in the question paper.
2. This question paper has information printed on both sides.
3. This question paper consists of TWO (2) sections; Section A and Section B. Answer ALL questions in Section A and THREE (3) questions from Section B.
4. Please write yours answers on the answer booklet provided.
5. Write your answers only in BLACK or BLUE ink.
6. Answer all questions in English.

THERE ARE 7 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

(a) Convert these values into SI unit.

i. Density = 400 g/cm^3

ii. Flow rate = 5400 ml/min

iii. Volume = 200 cm^3

(6 marks)

(b) Figure 1 shows a light crude oil fills three quarter of a cylindrical container with a diameter of 500 mm and a height of 2000 mm. If the weight of the liquid is 2600 N, determine the density and relative density of the liquid.

(10 marks)

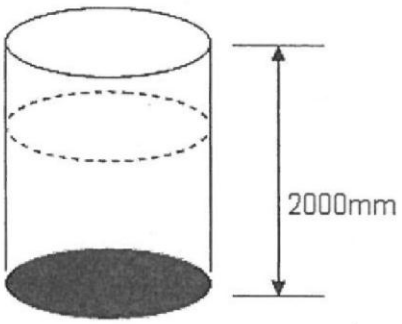

Figure 1

(c) Sea water of relative density 1.03 is at a depth of 5.0 m above a rectangular steel plate of 200 mm x 400 mm side. Determine the force on the plate and, hence the pressure exerted by the sea water.

(4 marks)

Question 2

(a) State the theory of the Archimedes principle with the aid of an appropriate diagram.

(4 marks)

(b) Figure 2 shows pipe system branching out for three (3) sections. State the equation of the volume flow rate for section 1, section 3 and section 6.

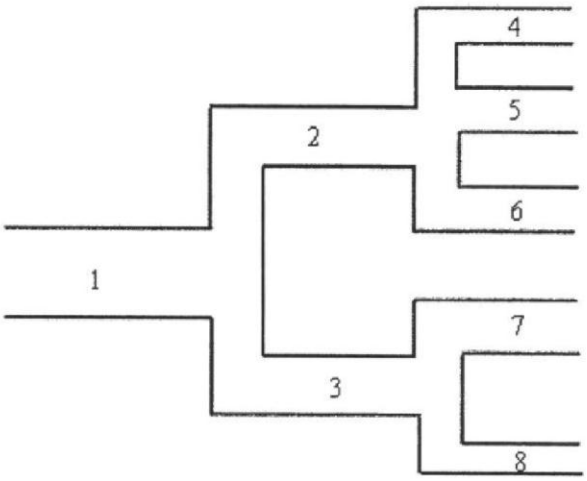

Figure 2

(6 marks)

(c) Water flows through a nozzle of 25 mm in diameter into a container of cubical shape of 2 m base length and height of 3 m. If the water fills two third of the container in 15 minutes and 20 seconds, determine:

i. the volume flow rate

ii. the mass flow rate

iii. the velocity of the fluid flow through the nozzle

(10 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer only THREE questions.
Please use the answer booklet provided.

Question 3

Figure 3 shows a bend in a horizontal pipeline reduces from 600 mm to 300 mm whilst being deflected through 60°. If the pressure at the larger section is 250 kPa and a water flow rate of 800 Liter/second, resolve the magnitude and the resultant force on the pipe.

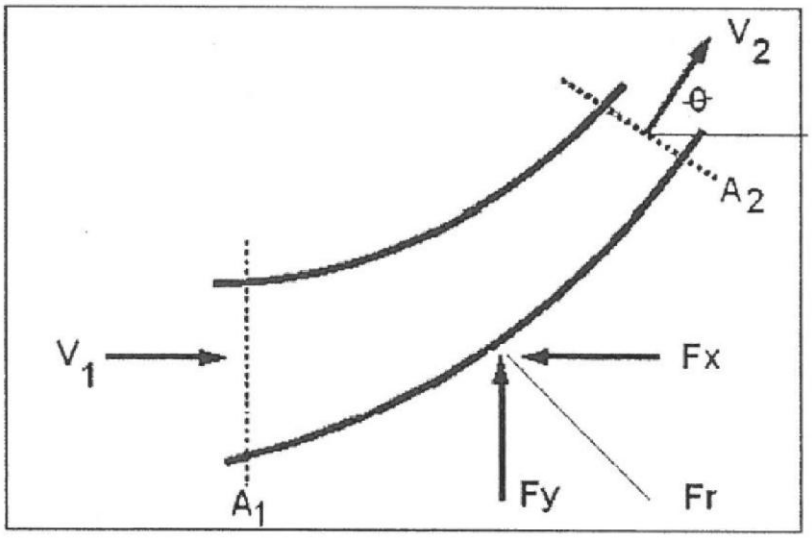

Figure 3

(20 marks)

Question 4

(a) Figure 4 shows the main pipe of diameter 400 mm has water flowing at 8 m/s. The pipe then branches into two with one branch has a diameter of 400 mm and water velocity of 5 m/s and the other branch has a diameter of 250 mm. Determine:

i. The volume flow rate in all three branches
ii. The mass flow rate in all three branches
iii. The velocity in the 250 mm diameter pipe.

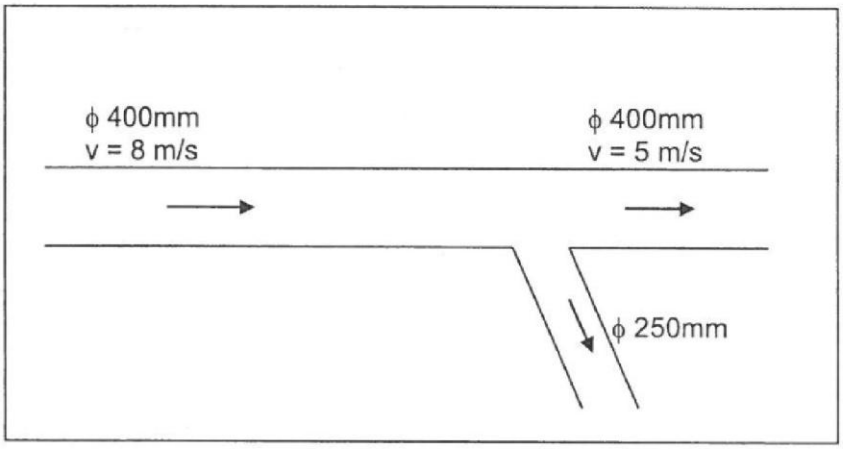

Figure 4

(12 marks)

(b) Explain the following terms:

i. Velocity head
ii. Pressure head
iii. Steady flow
iv. Non steady flow

(8 marks)

Question 5

(a) The pipe of diameter 100 mm shown in Figure 5 below has been connecting to a liquid tank. The valve is three quarterly open as to deliver flow rate of 20 dm^3/s. The pressure loss between point (1) and point (2) is equal 2.5 m head. Determine:

i. The total head at point (1)
ii. The velocity head at point (2)
iii. The pressure head at point (2)

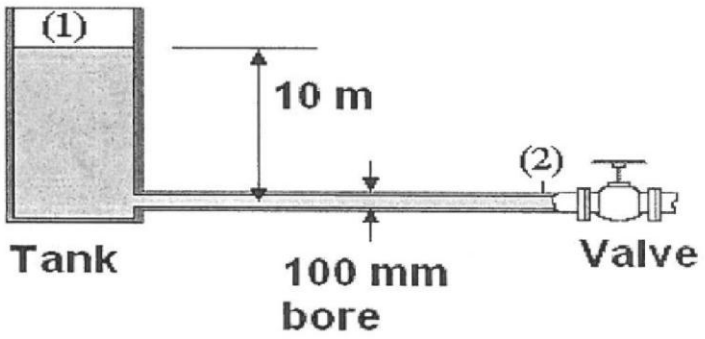

Figure 5

(14 marks)

(b) Explain the following terms:

i. Reynolds Number
ii. Transition Flow
iii. Laminar flow

(6 marks)

Question 6

Figure 6 shows water at 20 ° C flows through two commercial steel pipes joined in series. The flow velocity at point 1 is 0.5 m/s. Neglect the flow loss due to the pipe enlargement, determine the head loss in the pipe A and pipe B by using friction factor obtained from either Moody Diagram or calculated from Moody Formula. Solve the problem accordingly.

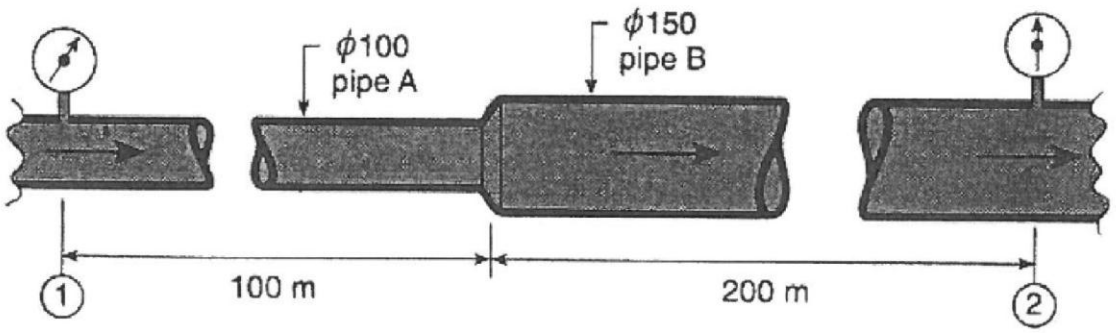

Figure 6

(20 marks)

END OF EXAMINATION PAPER