KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

POLITEKNIK MALAYSIA
KUCHING SARAWAK

DEPT. OF MECHANICAL ENGINEERING		
DJJ20273 / FLUID MECHANICS		
LECTURER NAME		
TYPE OF ASSESSMENT		
TOPIC		
DURATION		
DATE OF ASSESSMENT		
STUDENT'S INFORMATION	*NAME*	*REGISTRATION NO.*
TOTAL MARKS	*CLO3*	/*MARKS*

Nota :

i. *Bagi kursus seperti MPU22042 Bahasa Kebangsaan A dan lain-lain kursus yang diajar dalam Bahasa Melayu maka penggunaan bahasa pada muka hadapan lembaran kerja dan arahan/kandungan pada lembaran kerja adalah menggunakan Bahasa Melayu sepenuhnya.*

POLITEKNIK MALAYSIA
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DJJ20273 – FLUID MECHANICS

ASSESSMENT NO. 2 FLUID DYNAMICS

CLO NO.	CLO STATEMENT	PLO NO.	DK DP NA
CLO3	Organize appropriate experiments in groups according to the Standard Operating Procedures.	P4, PLO5	DK6: ENGINEERING PRACTICE DP1: DEPTH OF KNOWLEDGE DP2: RANGE OF CONFLICTING REQUIREMENT DP3: DEPTH OF ANALYSIS REQUIRED

A. OBJECTIVES

i. To compute Reynold's Number (R).

ii. To observe laminar, transitional and turbulent flow.

B. LEARNING OUTCOME

At the end of the lab session students should be able:

i. To define the types of flow.

ii. To investigate the Reynold's Number of fluid (water) and to describe the different characteristics of laminar, transition and turbulent flow.

C. TOPIC SUMMARY/ THEORY

Reynolds Number Calculation: Calculate the Reynolds number (Re) using the formula $Re = \frac{U\ x\ D}{V}$, where

R_e = Reynold's Number

U = Fluid velocity (m/s)

D = Diameter (15 mm)

V = Kinematic viscosity (0.89×10^{-6} m^2/s)

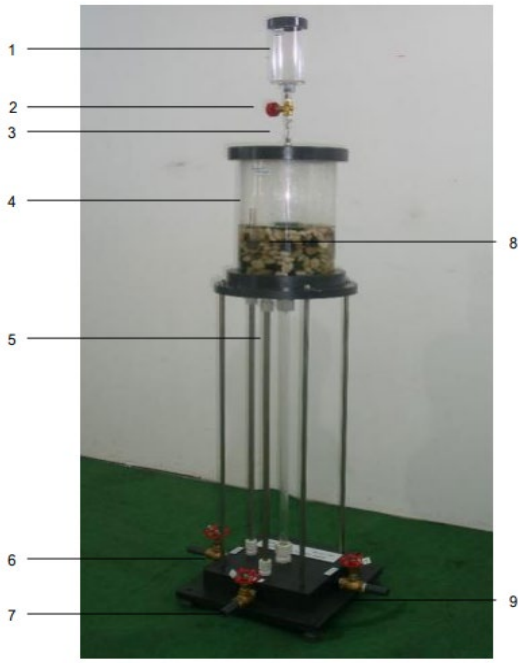
which helps predict flow behaviour in fluid dynamics.

Flow Regimes Observation: Identify and observe the three flow regimes:

- **Laminar Flow** (Re < 2000): Smooth and orderly fluid motion.
- **Transitional Flow** (2000 < Re < 4000): Mixed characteristics of laminar and turbulent flow.
- **Turbulent Flow** (Re > 4000): Chaotic and irregular fluid motion with eddies.

This approach allows for a comprehensive understanding of fluid flow dynamics in practical applications.

D. MATERIAL / TOOLS



1. Dye reservoir
2. Dye control valve, V4
3. Dye injector
4. Head tank
5. Observation tube
6. Overflow valve, V3
7. Water inlet valve, V1
8. Bell mouth
9. Water outlet valve, V2

E. GENERAL INSTRUCTION / SAFETY PROCEDURE

i. Wear suitable attire when in the lab.

ii. Wear safety goggles while handling the liquids.

iii. Always clean droplets or excessive liquid at the working area during and after experiments.

iv. Always obey the Lecturer/Lab Assistant instructions.

F. WORK INSTRUCTION / PROCEDURE

i. Lower the dye injector until it is seen in the glass tube.

ii. Open the inlet valve, V1 and allow the water to enter the stilling tank.

iii. Ensure the small overflow spillage through the overflow tube to maintain a constant level.

iv. Allow water to settle for a few minutes.

v. Let water flow through the visualizing tube.

vi. Slowly adjust the dye control valve, V4 until a slow flow with dye injection is achieved.

vii. Regulate the water inlet valve, V1 and outlet valve, V2 until a straight identifiable dye line is achieved. The flow will be laminar.

viii. Measure the flowrate at the outlet valve, V2 using volumetric method.

ix. Repeat the experiment using by regulating water inlet valve, V1 and outlet valve, V2 to produce transitional and turbulent flow.

G. RESULT

Laminar Flow

Volume (L)	Time (s)	Flow rate Q (L/s)	Flow rate Q (m^3/s)	Fluid Velocity, U (m/s)	Reynold's Number
0.3					
0.3					
0.3					

Transition Flow

Volume (L)	Time (s)	Flow rate Q (L/s)	Flow rate Q (m^3/s)	Fluid Velocity, U (m/s)	Reynold's Number
0.3					
0.3					
0.3					

Turbulent Flow

Volume (L)	Time (s)	Flow rate Q (L/s)	Flow rate Q (m^3/s)	Fluid Velocity, U (m/s)	Reynold's Number
0.3					
0.3					
0.3					

H. DISCUSSION

i. Show the calculation for every flow rate, fluid velocity and Reynold's number.

ii. Explain the behavior of each flow based on your observation.

I. REFERENCES

Douglas,J.F, J.M Gasiorek & J.A Swaffield (1996). Fluids Mechanics – (3rd Edition). Longman: Singapore Prasuhn, Alan L (1980). Fundamentals of Fluid Mechanics. Prentice-Hall: London

PREPARED BY: *(Course Lecturer)* *……* *( )* ***Date:***	***CHECKED BY:*** *(Course Coordinator/ Head of Programme)* *……* *( )* ***Date:***	***APPROVED BY:*** *(Head of Programme/ Head of Department)* *……* *( )* ***Date:***

Nota :

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