

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI**

JABATAN KEJURUTERAAN MEKANIKAL

PEPERIKSAAN AKHIR

SESI JUN 2015

DJJ2093 : FLUID MECHANICS

TARIKH : 02 NOVEMBER 2015

TEMPOH : 08.30 AM – 10.30 AM (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.
Soalan Struktur (4 Soalan). Jawab **SEMUA** soalan

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

INSTRUCTION:

This section consists of **FOUR (4)** questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan. Jawab SEMUA soalan.

QUESTION 1**SOALAN 1**CLO1
C1

- (a) State the difference between gauge pressure, atmospheric pressure and absolute pressure.

Nyatakan perbezaan di antara tekanan tolok, tekanan atmosfera dan tekanan mutlak.

[6marks]
[6 markah]

CLO1
C2

- (b) The height of a head for a gas taking from the gauge pressure is 68 mm water and the height of mercury caused by atmospheric is 750 mm mercury. What is the absolute pressure count in kN/m^2 .

Tinggi turus sejenis gas yang diambil dari sebuah tolok tekanan ialah 68 mm air, manakala tinggi turus raksa akibat tekanan atmosfera ialah 750 mm raksa. Berapakah nilai tekanan mutlak gas tersebut dalam unit kN/m^2 .

[9 marks]
[9 markah]

CLO1
C3

(c) The weight for 1 litre volume of fluid is 7.05 N. From the data, calculate:

Berat Isipadu 1 liter suatu bendalir adalah 7.05 N. Berdasarkan kepada data-data tersebut, hitungkan :

- i. Mass density
Ketumpatan jisim
- ii. Specific weight
Berat tentu
- iii. Specific gravity
Ketumpatan bandingan
- iv. Specific volume
Isipadu tentu

[10 marks]
[10 markah]

QUESTION 2
SOALAN 2

CLO1
C1

- (a) Explain the working principle of hydraulic jack with a diagram.

Jelaskan prinsip kerja bicu hidraulik berserta rajah.

[5 marks]
[5 markah]

- (b) A wooden cylinder as in Figure S2(b) has a diameter of 40 cm and 60 cm long. The same cylindrical wood has a density of 0.6 when floated in water. Determine;

Sebuah silinder kayu seperti Rajah S2(b) mempunyai diameter 40 cm dan panjang 60 cm. Silinder kayu tersebut mempunyai ketumpatan 0.6 apabila terapung di dalam air. Tentukan;

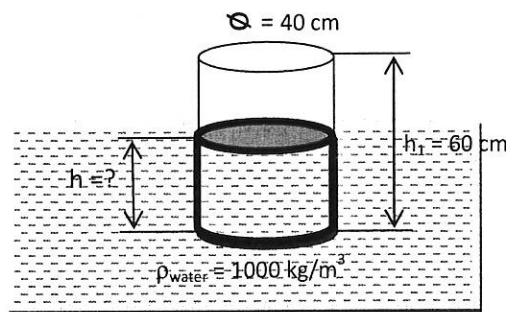


Figure S2 (b)
Rajah S2 (b)

CLO1
C2

- i) Buoyancy force
Daya Apungan

[8 marks]
[8 markah]

CLO1
C2

- ii) The height of the submerged in water (h)
Ketinggian ketenggelaman di dalam air (h)

[4 marks]
[4 markah]

CLO1
C3

- (d) Based on Figure S2 (c) below, the density of water (ρ_{water}) is 998 kg/m^3 , specific gravity of oil (S_{oil}) and mercury (S_{Hg}) is each 0.8 and 13.6. While reading the pressure head atmosphere (P_{atm}) was read at barometer is 763 mm mercury. Determine the absolute pressure P_A at the center of the unit kN/m^2 .

Berdasarkan Rajah S2 (c) di bawah, ketumpatan air (ρ_{water}) ialah 998 kg/m^3 , ketumpatan bandingan minyak (S_{oil}) dan raksa (S_{Hg}) masing-masing 0.8 dan 13.6. Sementara tekanan turus atmosfera (P_{atm}) dibaca pada barometer ialah 763 mm raksa. Tentukan nilai tekanan mutlak P_A pada pusat dalam unit kN/m^2 .

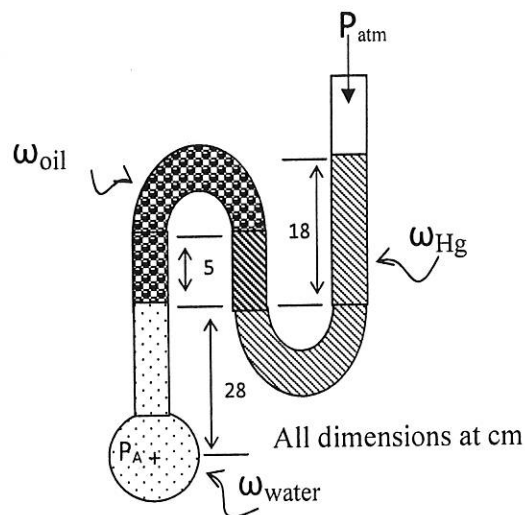


Figure S2(c)
Rajah S2(c)

[8 marks]
[8 markah]

QUESTION 3

SOALAN 3

CLO 1
C1

a) Define ;

Takrifkan ;

- i. Discharge
Kadaralir
- ii. Mass flowrate
Kadaralir jisim
- iii. Continuity equation
Persamaan keterusan

[6 marks]

[6markah]

CLO 1
C2

b) A venture tube tapers from 300 mm in diameter .The discharge coefficient is 0.98.

A differential mercury U-tube gauge is connected between pressures tapping at the entrance at throat. If the meter is used to measure the flow of water and the water fills the leads to the U-tube and is in contact with the mercury, calculate diameter at throat when the difference of level in the U-tube is 55 mm and actual discharge is $0.0825\text{m}^3/\text{s}$.

Satu meter venture mempunyai diameter masukan sebanyak 300mm. Pekalikadaralir adalah 0.98. Satu tiub kebezaan merkuri dihubungkan di antara masukan dan leher meterventure. Jika meter tersebut digunakan untuk mengukur kadar alir air, kirakan diameter bagi leher apabila perbezaan aras ketinggian raksa menunjukkan bacaan sebanyak 55mm dan nilai kadar alir sebenar adalah is $0.0825\text{m}^3/\text{s}$.

[10 marks]

[10 markah]

CLO 1
C3

- c) Oil flows in a 20mm pipe. The pipe is split into two whereby the first pipe is 10mm diameters with a velocity of 0.3m/s and the other pipe is 15mm diameter with a velocity of 0.6m/s. Calculate the flow rate for a 20mm pipe.

Minyak mengalir di dalam paip sepanjang 20 mm. Paip tersebut terbahagi kepada dua (2) paip, di mana paip yang pertama berdiameter 10 mm dengan halaju 0.3m/s dan satu lagi paip berdiameter 15 mm dengan halaju 0.6m/s. Kirakan kadar alir di dalam paip yang berdiameter 20mm tersebut.

[9 marks]

[9 markah]

SOALAN 4

CLO1
C1

- (a) Draw and label the velocity distribution diagram in a circular pipe system.

Lukis dan labelkan gambarajah pengagihan halaju di dalam sistem paip bulat.

[4 marks]

[4 markah]

CLO1
C2

- (b) A horizontal pipe carrying $0.06 \text{ m}^3/\text{s}$ of water increases suddenly from 8 cm to 15 cm diameter. Find

- (i) the head loss due to the sudden enlargement
(ii) the difference in pressure in kN/m^2 in the two pipes

Sebatang paip mendatar membawa $0.06 \text{ m}^3/\text{s}$ air meningkat secara mendadak daripada diameter 8 cm kepada 15 cm . Kira;

- (i) *kehilangan turus disebabkan oleh pembesaran mendadak.*
(ii) *perbezaan tekanan dalam kN/m^2 di antara kedua-dua paip tersebut.*

[10marks]

[10 markah]

CLO1
C3

- (c) Water from a large reservoir is discharged to the atmosphere through a 100 mm diameter pipe with 550 m length. The entry from the reservoir to the pipe is sharp and the outlet is 8 m below the surface level in the reservoir. Taking $f = 0.01$ in the Darcy formula, calculate the discharge.

Air daripada kolam yang besar disalurkan ke atmosfera melalui paip sepanjang 550 m dan bergaripusat 100mm . Salur masuk paip dari kolam adalah tajam dan salur keluar berada pada 8m di bawah permukaan air kolam. Dengan mengambil $f = 0.01$ dalam persamaan Darcy, kirakan kadar alir.

[11 marks]

[11 markah]

SOALAN TAMAT



LIST OF FORMULAS
DJJ2093 - FLUID MECHANICS

FLUID DYNAMICS

$$z_1 + \frac{P_1}{\omega} + \frac{v_1^2}{2g} = z_2 + \frac{P_2}{\omega} + \frac{v_2^2}{2g}$$

$$Q_{Actual} = C_d (Q_{Theory})$$

$$Q_{Theory} = A_1 \sqrt{\frac{2gH}{(m^2 - 1)}}$$

$$H = \frac{P_1 - P_2}{\omega_{sub}} + (z_1 - z_2) = x \left[\frac{\omega_{Hg}}{\omega_{sub}} - 1 \right]$$

ENERGY LOSSES IN PIPELINE

$$h_L = \frac{(v_1 - v_2)^2}{2g}$$

$$h_c = \left[\frac{1}{c_c} - 1 \right]^2 x \frac{v^2}{2g}$$

$$h_f = \frac{4fL v^2}{d 2g}$$

$$h_i = \frac{1}{2} \left[\frac{v^2}{2g} \right]$$

$$h_o = \frac{v^2}{2g}$$

FLUID STATIC

$$P = \rho gh$$

$$\omega = \rho g$$

$$v = \frac{1}{\rho}$$

