

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA**

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI JUN 2018

DCC5143: FLUID MECHANICS

TARIKH : 31 OKTOBER 2018

MASA : 11.15 PAGI - 1.15 TENGAHARI (2 JAM)

Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.

Bahagian A: Struktur (2 soalan)

Bahagian B: Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A : 50 MARKS

BAHAGIAN A : 50 MARKAH

INSTRUCTION:

This section consists of TWO (2) structured questions. Answer ALL questions.

ARAHAN :

Bahagian ini mengandungi DUA (2) soalan berstruktur. Jawab SEMUA soalan.

QUESTION 1

SOALAN 1

CLO1
C1

(a) Define the following terms :

Berikan definisi kepada istilah-istilah berikut :

i. Ideal fluid

Bendalir unggul

ii. Real fluid

Bendalir sebenar

[5 marks]

[5 markah]

CLO1
C2

(b) A specific gravity of certain liquid is 0.75. Calculate the specific weight of the liquid.

Graviti tentu suatu cecair adalah 0.75. Kirakan nilai berat tentu cecair tersebut.

[6 marks]

[6 markah]

CLO1
C3

- (c) **Figure A1(c)** shows a differential manometer. Pipe A and B contains oil of specific gravity 0.95. If the pressure at pipe A and B are 222.5 kN/m^2 and 165.0 kN/m^2 , calculate the value of h .

Rajah A1(c) menunjukkan satu manometer bezaan. Paip A dan B mengandungi minyak yang mempunyai graviti tentu 0.95. Jika tekanan pada paip A dan B adalah 222.5 kN/m^2 dan 165.0 kN/m^2 , kira nilai h .

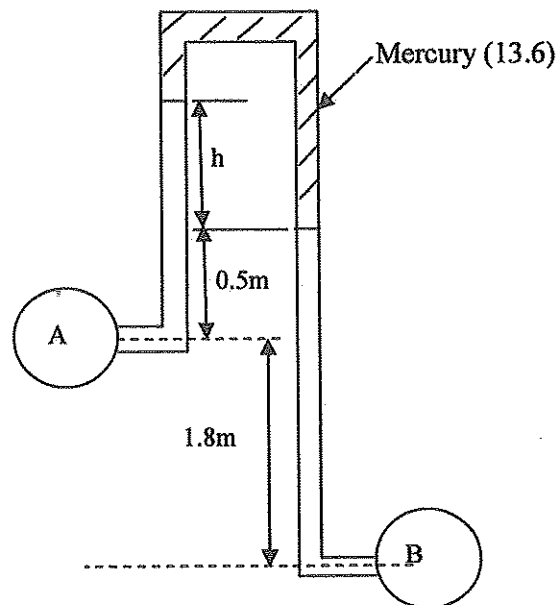


Figure A1(c) / Rajah A1(c)

[14 marks]

[14 markah]

QUESTION 2

SOALAN 2

CLO2
C1

- (a) Draw the pressure diagrams for following situations:

Lukiskan gambarajah taburan tekanan bagi keadaan berikut:

- i. Pressure due to liquids, over another, on one side as
- Figure A2 (ai)**
- .

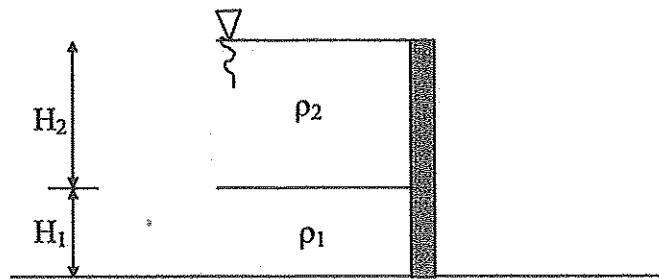
Tekanan oleh beberapa jenis cecair, sebelah sahaja seperti Rajah A2 (ai).

Figure A2 (ai) / Rajah A2 (ai)

- ii. Pressure due to liquids on both the sides as
- Figure A2 (aii)**
- .

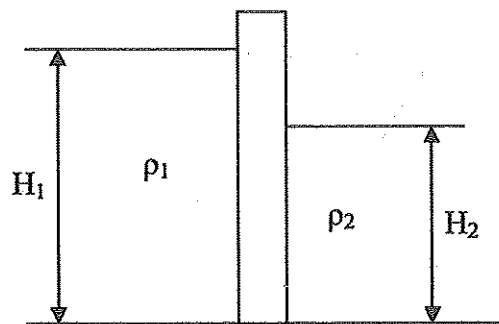
Tekanan oleh cecair di kedua-dua belah seperti Rajah A2 (aii).

Figure A2 (aii) / Rajah A2 (aii)

[4 marks]

[4 markah]

CLO2
C2

- (b) Calculate the resultant force and the angle of the force act on a curved AB as shown in Figure A2 (b). Take $L = 3\text{m}$.

Kira daya tindakan dan sudut bagi daya yang bertindak pada lengkung AB seperti ditunjukkan pada Rajah A2 (b). Ambil $L = 3\text{m}$.

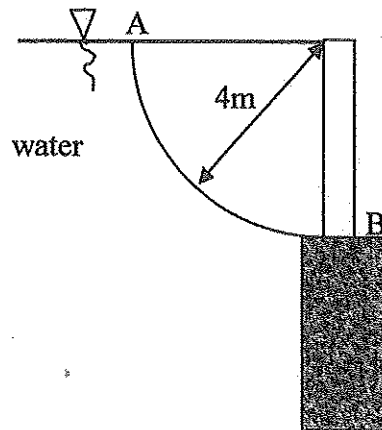


Figure A2 (b) / Rajah A2 (b)

[9 marks]

[9 markah]

CLO2
C3

- (c) A rectangular plate 3m wide and 5m deep is immersed in water such a way that its plane makes an angle of 30° as shown in Figure A2 (c). Calculate the total pressure and the position of the centre of pressure.

Satu plat segiempat berukuran 3m lebar dan 5m dalam ditenggelamkan dalam air pada sudut 30° seperti dalam Rajah A2 (c). Kira jumlah tekanan dan kedudukan pusat tekanan.

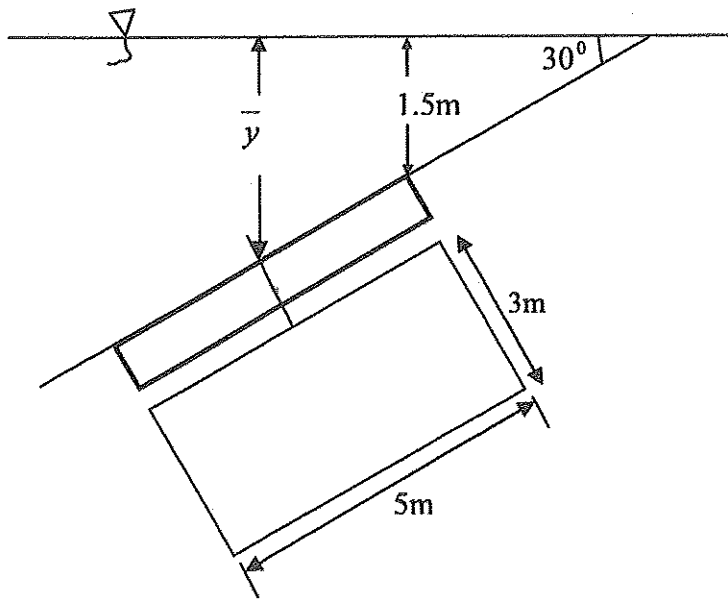


Figure A2 (c) / Rajah A2 (c)

[12 marks]

[12 markah]

SECTION B : 50 MARKS

BAHAGIAN B : 50 MARKAH

INSTRUCTION:

This section consists of FOUR (4) structured questions. Answer TWO (2) questions only.

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan berstruktur. Jawab DUA (2) soalan sahaja.

QUESTION 1

SOALAN 1

CLO2
C2

- (a) A block of wood with specific gravity of 0.80 floats in the water. The size of the block is 5m long, 3m wide and 2m height. Calculate the depth of immersed (d) of the wood.

Satu blok kayu mempunyai graviti tentu 0.80 terapung di dalam air. Saiz blok ialah 5m panjang, 3m lebar dan 2m tinggi. Kirakan kedalaman (d) bahagian kayu yang tenggelam.

[10 marks]

[10 markah]

CLO2
C3

- (b) A cylindrical buoy of 3m diameter and 4m long is weighing 150kN. Calculate the metacentric height of the buoy.

Satu bongkah silinder yang berdiameter 3m dan panjang 4m mempunyai berat 150kN. Kirakan ketinggian pusat meta bagi bongkah tersebut.

[15 marks]

[15 markah]

QUESTION 2

SOALAN 2

CLO2
C2

- (a) Two streams discharge into a pipe as shown in **Figure B2(a)**. The velocity of stream A and B are 12m/s and 18m/s respectively. Calculate the velocity and flow rate at pipe C.

Dua sungai mengalir ke dalam satu paip seperti dalam Rajah B2(a). Halaju pada sungai A dan B adalah 12m/s dan 18m/s. Kira halaju dan kadar alir pada paip C.

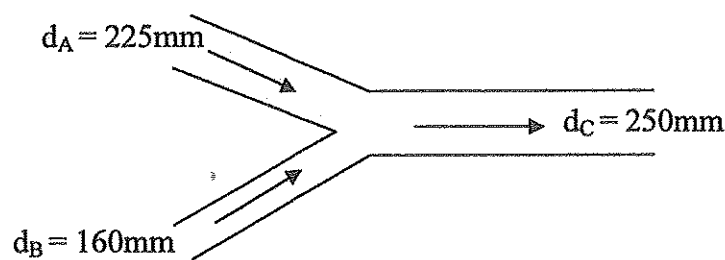


Figure B2(a) / Rajah B2(a)

[10 marks]

[10 markah]

CLO2
C3

- (b) A venturimeter installed horizontally has 200mm inlet diameter and 90mm throat diameter to measure the oil flow rate. The oil specific gravity is 0.85. Calculate the reading on the manometer if the flow rate of oil is 75liter/second.

Satu venturimeter dipasang secara mengufuk mempunyai 200mm diameter pada ruang masuk dan 90mm diameter pada leher untuk mengukur kadar alir minyak. Graviti tentu minyak adalah 0.85. Kirakan bacaan pada manometer jika kadar alir minyak adalah 75liter/saat.

[15 marks]

[15 markah]

QUESTION 3

SOALAN 3

CLO1
C2

- (a) Energy loss for fluid flowing within a pipe system can be divided into major and minor losses.

Kehilangan tenaga aliran bagi bendalir yang mengalir dalam paip terbahagi kepada kehilangan utama dan kehilangan sekunder.

- i. Identify major loss.
Kenalpasti kehilangan utama.
- ii. Identify minor loss.
Kenalpasti kehilangan sekunder.
- iii. Explain a situation where the minor loss is higher than the major loss.
Jelaskan satu situasi yang akan menyebabkan jumlah kehilangan tenaga sekunder bagi suatu bendalir yang mengalir dalam paip lebih besar berbanding kehilangan tenaga utama.

[10 marks]

[10 markah]

CLO1
C3

- (b) Water flows from tank A to tank B through two parallel pipes. The length and diameter for the first parallel pipe are 1500m and 2.0m respectively, while the length and diameter of second parallel pipe are 1500m and 1.5m. Calculate the rate of flow and velocity in each parallel pipe, if total flow in the main pipe is $5.0\text{m}^3/\text{s}$. The coefficients of friction for each parallel pipe are 0.008.

Air mengalir dari tangki A ke tangki B melalui dua batang paip yang selari. Panjang dan diameter bagi paip selari yang pertama masing-masing adalah 1500m dan 2.0m manakala paip selari yang kedua adalah 1500m dan 1.5m. Kirakan kadar alir dan halaju dalam setiap batang paip tersebut sekiranya jumlah aliran keseluruhan adalah $5.0\text{m}^3/\text{s}$. Pekali geseran bagi setiap batang paip tersebut adalah sama iaitu 0.008.

[15 marks]

[15 markah]

QUESTION 4

SOALAN 4

CLO2
C2

- (a) A jet oil ($s = 0.80$) of diameter 50mm moving with a velocity of 30m/s strikes a fixed plate at an angle of 30° as shown in Figure B4 (a). Calculate the force exerted by the jet on the plate :

Aliran minyak ($s = 0.80$) berdiameter 50mm bergerak dengan halaju 30m/s melanggar plat pada sudut 30° seperti Rajah B4 (a). Kirakan daya hentaman jet :

- i. When the plate is stationary
Bila plat tidak bergerak.
- ii. When the plate is moving at 5 m/s in direction of the jet.
Bila plat bergerak dengan halaju 5 m/s pada arah jet.

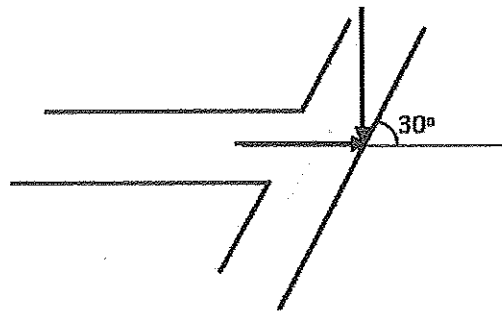


Figure B4 (a)./ Rajah B4 (a).

[10 marks]

[10 markah]

CLO2
C3

- (b) A 45° pipe junction discharge $0.455\text{m}^3/\text{s}$ flow of water. The water flows from 550mm diameter pipe to 330mm diameter pipe as shown in Figure B4 (b). The water pressure of the section pipe 1 and 2 is 145kPa and 135kPa. Assume the position of the pipe junction is on the horizontal axis, calculate the magnitude of the resultant force on the pipe bend.

Sebatang liku paip bersudut 45° mengalirkan air pada kadar $0.455\text{m}^3/\text{s}$. Aliran air adalah dari paip berdiameter 550mm ke paip berdiameter 330mm seperti Rajah B4 (b). Tekanan pada bahagian 1 dan 2 ialah 145kPa dan 135kPa. Anggapkan kedudukan liku paip pada paksi mendatar, kirakan magnitud daya paduan yang dikenakan oleh bendalir.

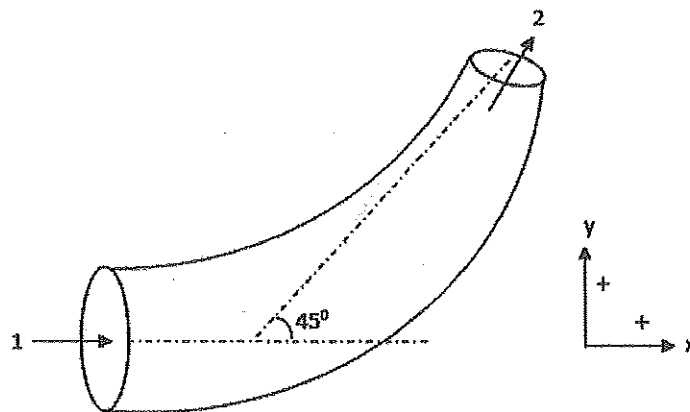


Figure B4 (b) / Rajah B4 (b)

[15 marks]

[15 markah]

SOALAN TAMAT

LIST OF FORMULAE DCC5143

- | | |
|--|---|
| 1. $P = \rho gh$ | 13. $GM = BM - BG$ |
| 2. $R = \rho g A \bar{y}$ | 14. $Q = A x v$ |
| 3. $\bar{h} = \frac{I_{xx}}{Ay} + \bar{y}$ | 15. $H = \frac{P}{\rho g} + \frac{v^2}{2g} + Z$ |
| 4. $\bar{h} = \frac{I_{xx} \sin^2 \theta}{Ay} + \bar{y}$ | 16. $Q = \frac{A_1 A_2}{\sqrt{(A_1^2 - A_2^2)}} \sqrt{2gH}$ |
| 5. $R = \sqrt{(R_x)^2 + (R_y)^2}$ | 17. $Q = A_1 \sqrt{\frac{2gH}{(m^2 - 1)}}$ |
| 6. $F_H = \rho g A \bar{y}$ | 18. $H = \frac{(\rho' - \rho)x}{\rho}$ |
| 7. $F_V = \rho g V$ | 19. $V_A = C_v \sqrt{2gh}$ |
| 8. $\tan \alpha = \frac{F_V}{F_H}$ | 20. $Q_A = C_d A \sqrt{2gh}$ |
| 9. $W = \rho_b g V_b$ | 21. $Q = \frac{2}{3} C_d b \sqrt{2g} [H_2^{3/2} - H_1^{3/2}]$ |
| 10. $F_B = \rho_f g V_d$ | 22. $h_f = \frac{f l Q^2}{3d^5}$ |
| 11. $BG = OG - OB$ | 23. $h_f = \frac{4.f.l.v^2}{2gd}$ |
| 12. $BM = I_{xx} / V_d$ | |