

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR
SESI DISEMBER 2014

DBS1012: ENGINEERING SCIENCE

TARIKH : 20 APRIL 2015
MASA : 8.30 AM - 10.30 AM (2 JAM)

Kertas ini mengandungi **EMPAT BELAS (14)** halaman bercetak.

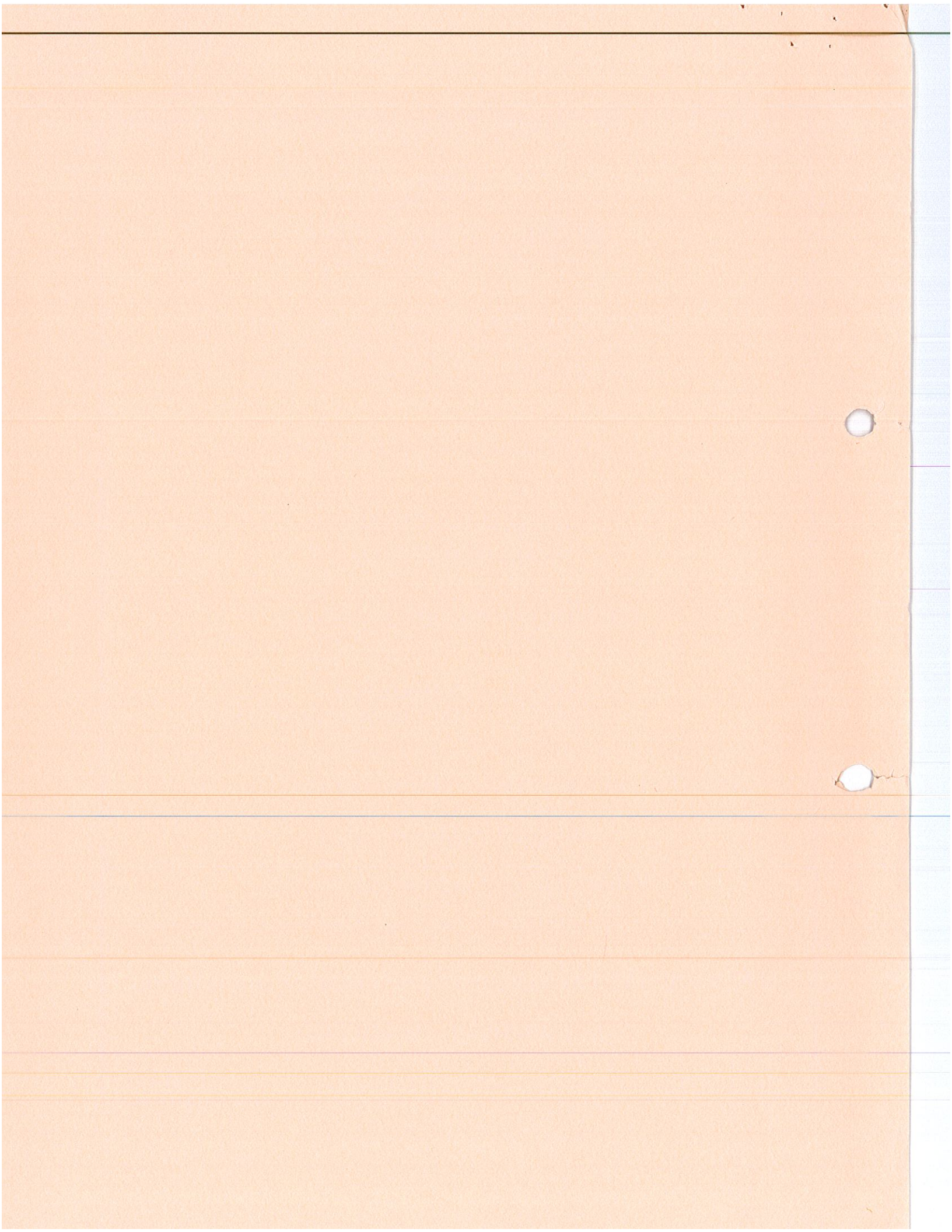
Bahagian A: Struktur (6 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT



SECTION A: 100 MARKS
BAHAGIAN A: 100 MARKAH

INSTRUCTION:

This section consists of **SIX (6)** structured questions. Answer **FOUR (4)** questions only.

ARAHAN:

Bahagian ini mengandungi ENAM (6) soalan berstruktur. Jawab EMPAT (4) soalan sahaja.

QUESTION 1

SOALAN 1

CLO1
C1

- (a) Define the terms below:
Berikan definisi bagi istilah berikut:

i. Base quantity [2 marks]

Kuantiti asas [2 markah]

ii. Derived quantity [2 marks]

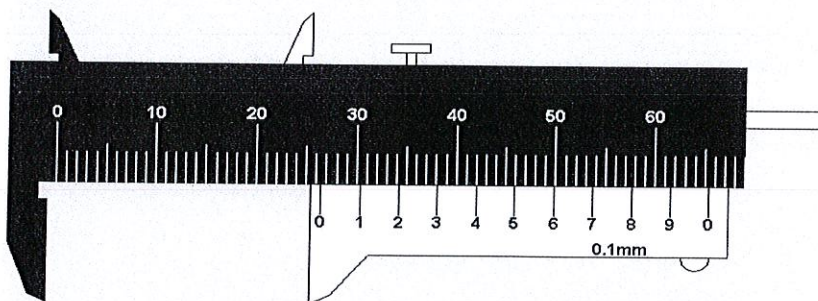
Kuantiti terbitan [2 markah]

CLO1
C2

- (b) Determine the reading of the following measurement tools by stating the scientific notation.

Nyatakan nilai bacaan bagi alat pengukuran berikut dan nyatakan dalam bentuk saintifik.

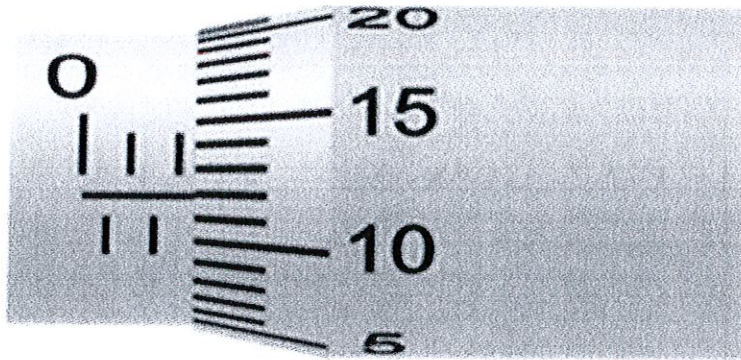
i.



[3 marks]

[3 markah]

ii.



[3 marks]

[3 markah]

CLO3
C3

(c) Convert the following units.

*Tukarkan unit-unit yang berikut .*i. 100.5 mm^3 into cm^3 .

[3 marks]

 100.5 mm^3 kepada cm^3 .

[3 markah]

ii. 20 m/s^2 into km/h^2 .

[3 marks]

 20 m/s^2 kepada km/h^2 .

[3 markah]

iii. 10 g/cm^3 into kg/m^3 .

[3 marks]

 10 g/cm^3 kepada kg/m^3 .

[3 markah]

iv. 20 Nm^{-2} to kNm^{-2}

[3 marks]

 20 Nm^{-2} kepada kNm^{-2}

[3 markah]

v. $100 \mu\text{m}$ to m

[3 marks]

 $100 \mu\text{m}$ kepada m

[3 markah]

QUESTION 2

SOALAN 2

CLO1
C1(a) Give the definition of the following terms with **ONE (1)** examples.*Berikan takrifan pergerakan seragam dengan **SATU (1)** contoh.*

i. Uniform motion [2 marks]

Pergerakan seragam [2 markah]

ii. Non-linear motion [2 marks]

*Pergerakan tidak seragam [2 markah]*CLO1
C2(b) State **THREE(3)** differences between speed and velocity.*Nyatakan **THREE(3)** perbezaan di antara laju dan halaju.*

[6 marks]

[6 markah]

CLO3
C3

(c) Halim is driving his car with velocity of 70 m/s. He steps on his brake to reduce the velocity of the car to 30 m/s after travelling 50 m. Calculate the deceleration and the time taken while the car decelerates.

Halim memandu keretanya dengan halaju 70 m/s. Dia menekan brek untuk mengurangkan halaju kereta kepada 30 m/s selepas perjalanan 50 m. Kira nyahpecutan dan masa yang diambil semasa kereta mengalami nyahpecutan.

[5 marks]

[5 markah]

CLO3
C3

- (d) A car starts from 30 m/s and accelerates at a constant acceleration of 4m/s^2 for 10 s. Then it travels at a constant velocity for 15 s. Then, the brakes are applied and the car stops in 9 s.

Sebuah kereta bermula dari 30 m/s dan memecut dengan pecutan seragam, 4m/s^2 selama 10 s. Kemudian ia bergerak pada halaju seragam selama 15 s. Brek kemudiannya ditekan dan kereta berhenti dalam masa 9 s.

- i. Calculate the maximum velocity attained by the car
Kirakan halaju maksimum yang dicapai oleh kereta

[2 marks]

[2 markah]

- ii. Sketch a velocity-time graph for the whole journey
Lakarkan graf halaju-masa untuk keseluruhan perjalanan

[4 marks]

[4 markah]

- iii. From the velocity-time graph, determine the total distance traveled
Daripada graf halaju-masa, tentukan jumlah jarak yang dilalui

[4 marks]

[4 markah]

QUESTION 3

SOALAN 3

CLO1
C1

- (a) State the definition and SI units of the terms below:
Nyatakan definisi dan unit SI bagi sebutan di bawah;

i. Force [2marks]
Daya [2 markah]

ii. Moment [2 marks]
Momen [2 markah]

CLO1
C2

- (b) i. An object with the mass of 50 kg is placed on a smooth floor and being pulled by a force of 80 N. Find the acceleration of the object.

Sebuah objek seberat 50 kg telah diletakkan di atas lantai dan ditarik dengan daya 80 N. Cari pecutan objek tersebut.

[2 marks]

[2 markah]

- ii. Calculate the net force acting on the x-axis and y-axis of an object in Figure 3(a). *Kira daya bersih yang bertindak pada paksi x dan paksi y bagi objek dalam Rajah 3(a).*

[4 marks]

[4 markah]

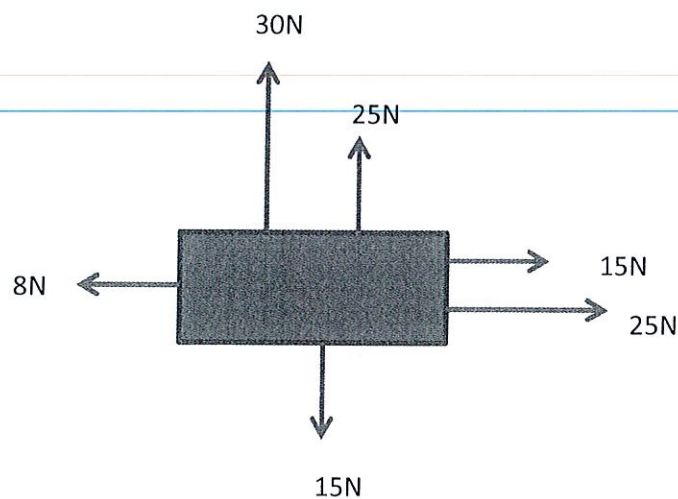


Figure 3(a)/Rajah 3(a)

CLO3
C3

- (c) i. Calculate the magnitude and angle of the resultant force for the Figure 3(b).

Kirakan magnitud dan sudut bagi daya paduan untuk Rajah 3(b).

[8 marks]

[8 markah]

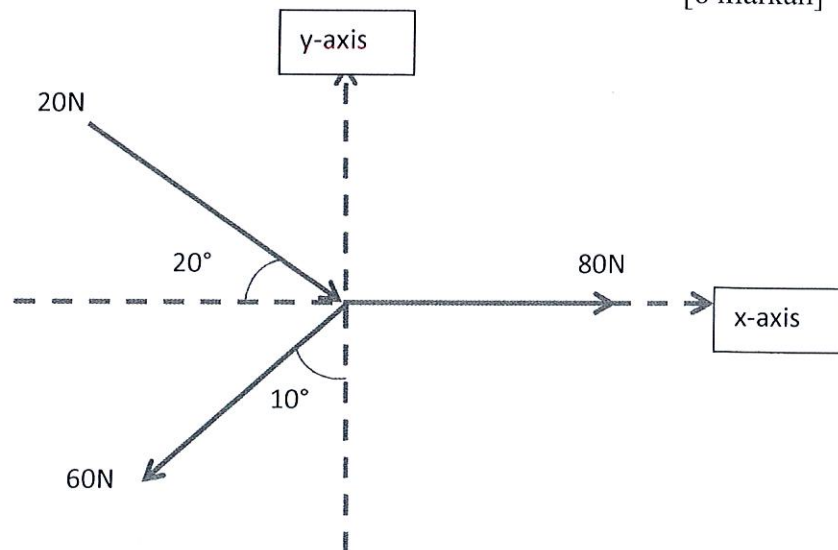


Figure 3(b)/Rajah 3(b)

- ii. Find the centre of gravity of the Figure 3(c) so that it is in equilibrium.

Cari pusat graviti bagi Rajah 3(c) supaya ia berada dalam keseimbangan.

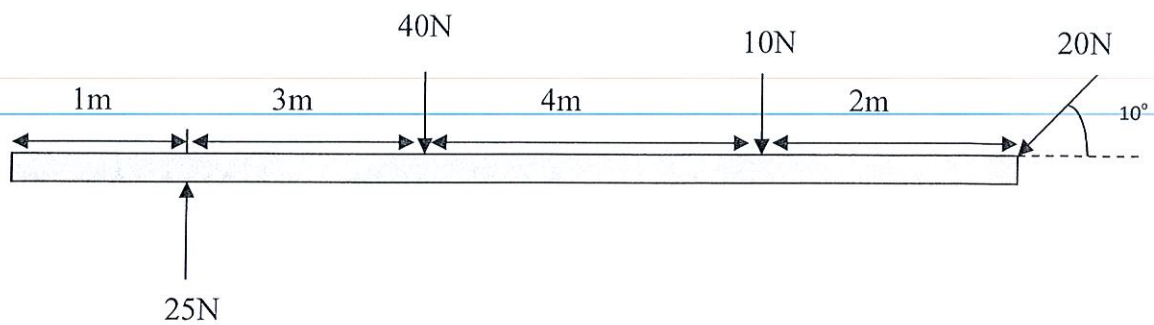


Figure 3(c)/Rajah 3 (c)

[7 marks]

[7 markah]

QUESTION 4
SOALAN 4CLO1
C1

(a) Define each of the following terms and state the SI unit.

Berikan takrifan setiap yang berikut dan nyatakan dalam unit SI.

i. Potential Energy.

[2 marks]

Tenaga Keupayaan.

[2 markah]

ii. Kinetic Energy.

[2 marks]

Tenaga Kinetik.

[2 markah]

CLO1
C2

(b) Ahmad lifts a 50 kg hiking bag onto his shoulders through a vertical distance of 1.65 m in 3 s. Calculate the work done and power produced by Ahmad.

Ahmad mengangkat 50 kg beg mendaki ke bahu melalui jarak menegak 1.65 m dalam masa 3 saat. Kirakan kerja dan kuasa yang dihasilkan oleh Ahmad.

[6 marks]

[6 markah]

CLO3
C3

(c) A durian with mass of 1.5 kg falls from a tree branch which is 5 m high from the ground. Calculate :

Sebiji durian dengan jisim 1.5 kg gugur dari dahan pokok yang berketinggian 5 m dari tanah. Kirakan:

i. Potential energy while the durian is still at the tree branch.

Tenaga keupayaan sewaktu durian tersebut masih berada di dahan pokok.

[3 marks]

[3 markah]

- ii. Potential Energy and Kinetic Energy when the durian falls 3 m from the tree.

Tenaga Kinetik dan Tenaga Keupayaan apabila durian tersebut gugur bebas sejauh 3 m.

[5 marks]

[5 markah]

- iii. Velocity of the durian just before touches the ground.

Halaju durian tersebut sebelum mencecah tanah.

[3 marks]

[3markah]

CLO3
C3

- (d) A water pump is running at an efficiency of 88.24% with power output of 7.5 kW to deliver clean water to Water Supply Tank. Calculate the power input of the water pump in watt.

Sebuah pam air berfungsi dengan kecekapan 88.24% telah menghasilkan kuasa output 7.5 kW untuk menghantar bekalan air bersih ke Tangki Bekalan Air. Kirakan kuasa input pam air tersebut dalam unit Watt.

[4 marks]

[4 markah]

QUESTION 5

SOALAN 5

CLO1
C1

- (a) State **TWO (2)** characteristics of solid and gas.
Nyatakan DUA (2) ciri-ciri pepejal dan gas.

[4 marks]

[4 markah]

CLO1
C2

- (b) A cube as in Figure 5 (a) has dimensions of 0.25 m with a mass of 890 g. Find the density of the cube.

Sebuah kiub seperti di Rajah 5(a) mempunyai dimensi 0.25 m dengan jisim sebanyak 890 g. Cari ketumpatan kiub tersebut.

[6 marks]

[6 markah]

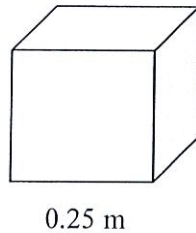


Figure 5(a) / Rajah 5(a)

CLO3
C3

- (c) Figure 5(b) shows a simple hydraulic system.

Rajah 5 (b) menunjukkan sistem hidraulik mudah.

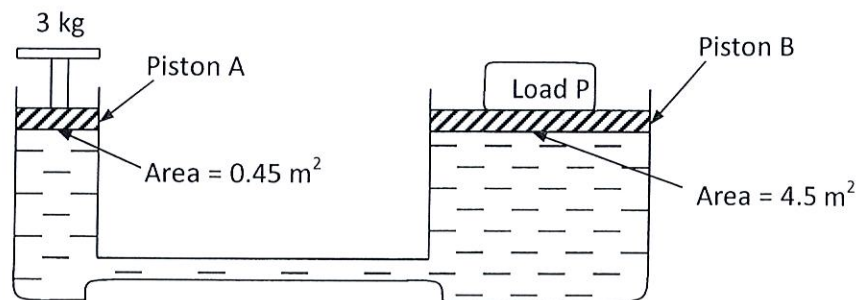


Figure 5(b) /Rajah 5(b)

- i. If 3 kg of load are placed on piston A, determine the force should be applied at piston B. (use, $g = 9.81 \text{ m/s}^2$)

Jika 3 kg beban diletakkan pada omboh A, tentukan daya yang dikenakan pada omboh B. (guna, $g = 9.81 \text{ m/s}^2$)

[5 marks]

[5 markah]

- ii. If piston A moves down by 2.5 m when force is applied, calculate the distance of piston B when it moves upward.

Sekiranya omboh A bergerak ke bawah sebanyak 2.5 m setelah daya dikenakan, kirakan jarak omboh B apabila ia bergerak ke atas.

[4 marks]

[4 markah]

- iii. If load P is replaced with 180 kg of mass, determine the force should be applied on piston A in order to support the weights on piston B.

(Acceleration due to gravity, $g = 9.81 \text{ m/s}^2$)

Jika beban P digantikan dengan jisim 180 kg, tentukan daya yang harus digunakan di omboh A untuk menyokong berat pada omboh B.

(guna, $g = 9.81 \text{ m/s}^2$)

[6 marks]

[6 markah]

QUESTION 6

SOALAN 6

- | | |
|------------|--|
| CLO1
C1 | <p>(a) Give the definition for the following terms:
<i>Berikan definisi bagi istilah-istilah berikut:</i></p> <p>i. Heat Capacity [2 marks]
<i>Muatan Haba</i> [2 markah]</p> <p>ii. Specific Heat Capacity. [2 marks]
<i>Muatan Haba Tentu.</i> [2 markah]</p> |
| CLO1
C2 | <p>(b) State THREE (3) methods of heat transfer and explain the process of each method.
<i>Nyatakan TIGA (3) kaedah pemindahan haba dan terangkan prosesnya.</i></p> <p style="text-align: right;">[6 marks]
[6 markah]</p> |
| CLO3
C3 | <p>(b) The mass of X is 3.5 kg while the mass of Y is m kg. Given that the specific heat capacity of X is 4200 J/kg°C and Y is 390 J/kg°C, the initial temperature of X is 29 °C and Y is 80 °C. When X and Y are mixed, the final temperature of the mixture is 65 °C. Calculate : (Assume that no heat lost to the surrounding).</p> <p><i>Jisim bagi X ialah 3.5 kg manakala jisim bagi Y ialah m kg. Diberi muatan haba tentu bagi X ialah 4200 J/kg°C dan Y ialah 390 J/kg°C, suhu awal X ialah 29 °C dan Y ialah 80 °C. X dan Y dicampurkan, suhu akhir campuran ialah 65 °C. Kira : (Andaikan tiada kehilangan haba ke sekeliling).</i></p> <p>i. Heat of Y. [4 marks]
<i>Haba bagi Y.</i> [4 markah]</p> <p>ii. Mass of Y. [4 marks]
<i>Jisim bagi Y.</i> [4 markah]</p> |

iii. Heat capacity for Y. [3 marks]

Muatan Haba bagi Y. [3 markah]

- d) A 4 kg metal at temperature 600°C is put into 3 kg of water at temperature 30°C . Find the final temperature. (Specific heat capacity of metal is $120\text{ J/kg}^{\circ}\text{C}$, specific heat capacity of water is $4200\text{ J/kg}^{\circ}\text{C}$)
- 4 kg logam pada suhu 600°C dimasukkan ke dalam 3 kg air pada suhu 30°C . Kirakan suhu akhir. (Muatan haba tentu logam ialah $120\text{ J/kg}^{\circ}\text{C}$, muatan haba tentu air ialah $4200\text{ J/kg}^{\circ}\text{C}$)*

[4 marks]

[4 markah]

SOALAN TAMAT

FORMULA DBS1012
ENGINEERING SCIENCE

$$g = 9.81 \text{ m/s}^2$$

$$W = mg$$

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$s = \frac{1}{2}(u + v)t$$

$$v^2 = u^2 + 2as$$

$$F = mg$$

$$F = ma$$

$$F = mg \sin\theta$$

$$F_x = F \cos\theta$$

$$F_y = F \sin\theta$$

$$F_R = \sqrt{(\sum F_x)^2 + (\sum F_y)^2}$$

$$\theta = \tan^{-1}\left(\frac{F_y}{F_x}\right)$$

$$M = Fd$$

$$E_p = mgh$$

$$E_k = \frac{1}{2}mv^2$$

$$W = Fs$$

$$W = F\cos\theta$$

$$P = \frac{W}{t}$$

$$P = Fv$$

$$\rho = \frac{m}{V}$$

$$\rho_{relative} = \frac{\rho_{substance}}{\rho_{water}}$$

$$p = \frac{F}{A}$$

$$p = \rho gh$$

Pascal's Principle,

$$\frac{F_1}{A_1} = \frac{F_2}{A_2}$$

$$F_B = \rho Vg$$

$$Q = mc\theta$$

$$C_{water} = 4,200 \text{ J/kg}^\circ\text{C}$$

$$\rho_{water} = 1,000 \text{ kg/m}^3$$

