

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN MATEMATIK, SAINS & KOMPUTER

PEPERIKSAAN AKHIR

SESI JUN 2017

DBS1012 : ENGINEERING SCIENCE

TARIKH : 31 OKTOBER 2017

MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)

Kertas ini mengandungi **EMPAT BELAS (14)** halaman bercetak.
Struktur (6 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 **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) State each of quantity as a scalar quantity or a vector quantity.

Nyatakan setiap kuantiti sebagai kuantiti skalar atau kuantiti vektor.

- i. A horse moves 5m to the north.

Kuda bergerak 5m ke utara.

[1 mark]

[1 markah]

- ii. The power of bulb is 20W.

Kuasa mentol ialah 20W.

[1 mark]

[1 markah]

- iii. The water temperature in the kettle is 100°C.

Suhu air di dalam cerek ialah 100°C.

[1 mark]

[1 markah]

- iv. Suhana is travelling from Terengganu to Kelantan at 100km/h.

Suhana bergerak dari Terengganu ke Kelantan pada 100km/h.

[1 mark]

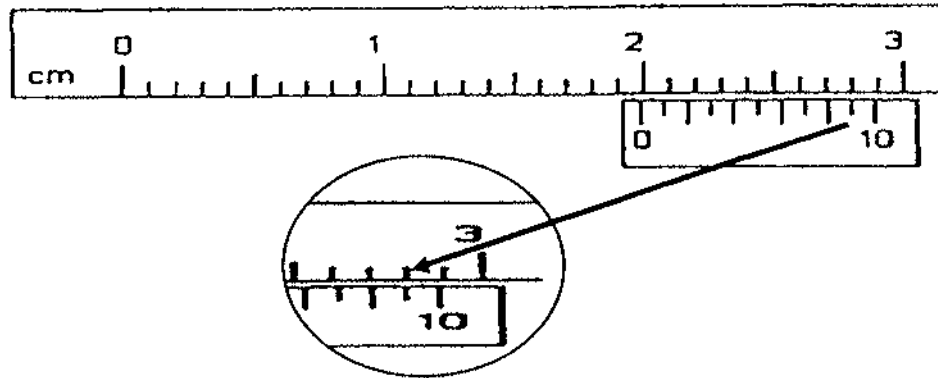
[1 markah]

CLO1
C2

(b) Determine the reading of the following measurement tools.

Nyatakan nilai bacaan bagi alat pengukuran berikut.

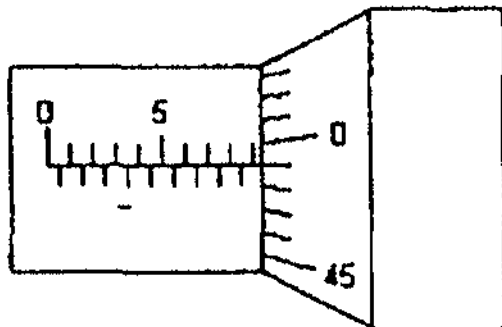
i.



[3 marks]

[3 markah]

ii.



[3 marks]

[3 markah]

CLO3
C3

(c) Convert the following units:

Tukarkan unit berikut:

i. $880 \text{ km/h}^2 \text{ to m/s}^2.$

 $880 \text{ km/h}^2 \text{ kepada m/s}^2.$

[3 marks]

[3 markah]

ii. $8 \text{ g/mm}^3 \text{ to kg/m}^3.$

 $8 \text{ g/mm}^3 \text{ kepada kg/m}^3.$

[3 marks]

[3 markah]

iii. $700 \text{ N/m}^2 \text{ to kN/mm}^2.$

 $700 \text{ N/m}^2 \text{ kepada kN/mm}^2.$

[3 marks]

[3 markah]

iv. $21 \text{ m/s to mm/min.}$

 $21 \text{ m/s kepada mm/min.}$

[3 marks]

[3 markah]

v. $1/2 \text{ day to second.}$

 $1/2 \text{ hari kepada saat.}$

[3 marks]

[3 markah]

QUESTION 2

SOALAN 2

CLO1
C1

(a) State TWO (2) examples for:

Nyatakan DUA (2) contoh bagi :

i. Uniform motion.

Pergerakan seragam.

[2 marks]

[2 markah]

ii. Non-uniform motion.

Pergerakan tidak seragam.

[2 marks]

[2 markah]

CLO1
C2

(b)

i. A car started from a rest and accelerated at 10.23 m/s^2 for 5.5 seconds. Calculate the distance covered by the car.*Sebuah kereta bermula dalam keadaan rehat dan memecut pada 10.23 m/s^2 selama 5.5 saat. Kira jarak yang telah dilalui oleh kereta itu.*

[3 marks]

[3 markah]

ii. A space-rocket is launched and it accelerated uniformly from rest to 160 m/s in 0.075 minutes. Calculate how far the rocket traveled within that time.*Sebuah roket angkasa dilancarkan dan bergerak seragam dari rehat ke 160 m/s dalam masa 0.075 minit. Kirakan berapa jauh roket bergerak dalam masa itu.*

[3 marks]

[3 markah]

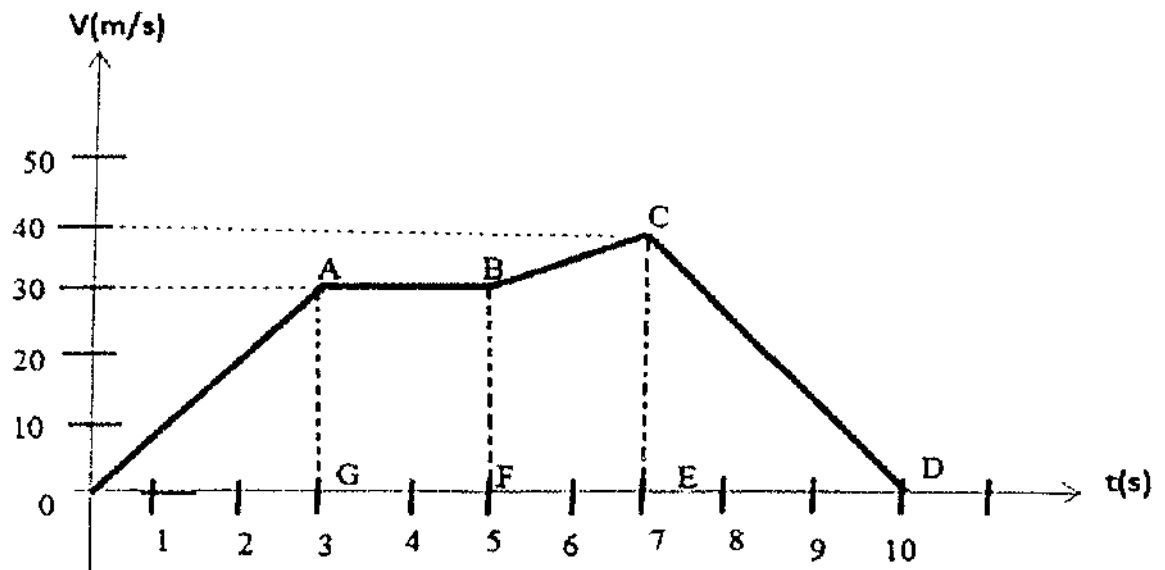


Figure 2 (c)

Rajah 2 (c)

CLO3
C3

(c) Figure 2 (c) shows the velocity - time graph for the motion of an object. Calculate:

*Rajah 2 (c) menunjukkan graf halaju melawan masa bagi pergerakan sebuah objek.**Kirakan:*

- i. Acceleration of the car in the first 3 s.

Pecutan kereta pada 3s pertama.

[3 marks]

[3 markah]

- ii. Deceleration of the car before it stops.

Nyahpecutan kereta itu sebelum berhenti.

[3 marks]

[3 markah]

- iii. Total distance travelled.

Jumlah perjalanan yang dilalui.

[6 marks]

[6 markah]

- iv. Average velocity of the car.

Purata halaju kereta itu.

[3 marks]

[3 markah]

QUESTION 3

SOALAN 3

CLO1
C1

- (a) List **FOUR (4)** example of forces.
Senaraikan EMPAT (4) contoh daya.

[4 marks]

[4 markah]

CLO1
C2

- (b) State **THREE (3)** differences between weight and mass.
Senaraikan TIGA (3) perbezaan antara berat dan jisim.

[6 marks]

[6 markah]

CLO3
C3

- (c)
 i. The solar panels are fitted to a frame supported by a beam, as shown in the Figure 3c(i)(a) and the forces are acted on the beam as shown in the Figure 3c(i)(b) below. Calculate the size of reaction force, R_2 by considering the moments at R_1 .

Panel-panel solar dipasang pada kerangka yang disokong oleh rasuk seperti Rajah 3c(i)(a) dan daya yang bertindak pada rasuk pula ditunjukkan pada Rajah 3c(i)(b) di bawah. Kirakan jumlah daya tindakan pada R_2 dengan mengambil kira momen-momen daya pada R_1 .

[6 marks]

[6 markah]

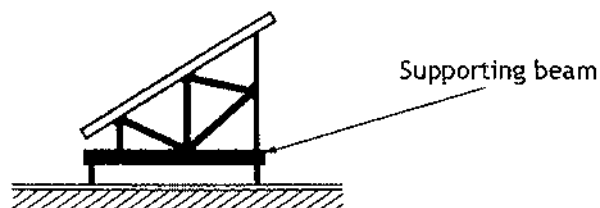


Figure 3c(i)(a) / Rajah 3c(i)(a)

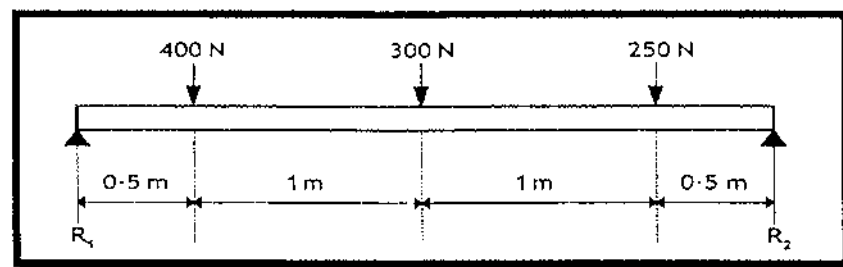


Figure 3c(i)(b) / Rajah 3c(i)(b)

- ii. Calculate the magnitude and angle of the resultant force for **Figure 3c(ii)**.
*Kirakan magnitud dan sudut bagi daya paduan bagi **Rajah 3c(ii)**.*

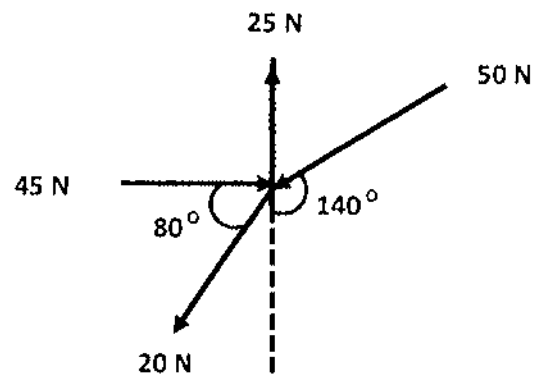


Figure 3c(ii) / *Rajah 3c(ii)*

[9 marks]

[9 markah]

QUESTION 4

SOALAN 4

CLO1
C1

- (a) State the definition and SI unit for the following terms.

Nyatakan takrifan dan unit SI bagi setiap perkataan berikut.

- i. Energy
Tenaga

[2 marks]

[2 markah]

- ii. Work
Kerja

[2 marks]

[2 markah]

CLO1
C2

- (b) In Figure 4 (b) , an object of 5 kg in mass is moved downwards along AB at 18 km/h. Calculate.

Dalam Rajah 4 (b), satu objek berjisim 5 kg bergerak ke bawah di sepanjang AB pada 18 km/h. Kirakan

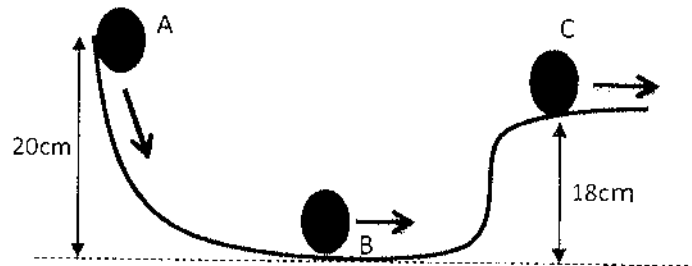


Figure 4(b) / Rajah 4(b)

- i. Total energy at A
Jumlah tenaga di A

[4 marks]

[4 markah]

- ii. Kinetic energy at B
Tenaga kinetik di B.

[2 marks]

[2 markah]

CLO1
C2

- (b) In Figure 4 (b) , an object of 5 kg in mass is moved downwards along AB at 18 km/h. Calculate.

Dalam Rajah 4 (b), satu objek berjisim 5 kg bergerak ke bawah di sepanjang AB pada 18 km/h. Kirakan

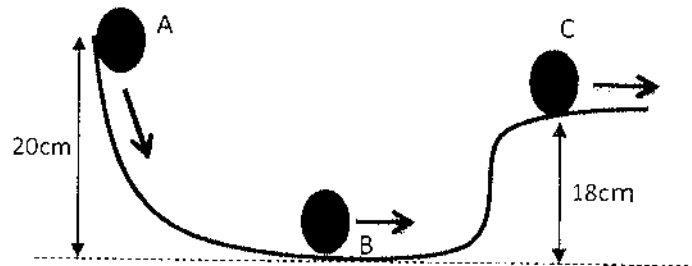


Figure 4(b) / Rajah 4(b)

- i. Total energy at A
Jumlah tenaga di A

[4 marks]

[4 markah]

- ii. Kinetic energy at B
Tenaga kinetik di B.

[2 marks]

[2 markah]

CLO3
C3

- (c) A book with 4,000 g mass is lifted from a book shelf as high as 300 cm from the ground and accidentally fall under the gravitational reaction. Calculate the gravitational potential energy and the kinetic energy possessed by the object under the following situations.

Sebuah buku berjisim 4,000 g ditarik dari rak buku setinggi 300 cm dari tanah dan secara tidak sengaja terjatuh di bawah tindak balas graviti. Kira tenaga keupayaan graviti dan tenaga kinetik dimiliki oleh objek dalam situasi berikut.

- i. Before it is falling.

Sebelum ianya terjatuh.

[6 marks]

[6 markah]

- ii. 1 meter under free fall.

1 meter di bawah jatuhan bebas.

[5 marks]

[5 markah]

- iii. Right after it touched the ground.

Sebaik sahaja menyentuh tanah.

[4 marks]

[4 markah]

QUESTION 5

SOALAN 5

- CLO1 (a) State **TWO** (2) characteristics of solid and gas.

C1

Nyatakan DUA (2) ciri pepejal dan gas.

[4 marks]

[4 markah]

- CLO1 (b) A cuboid in Figure 5(b) below has a mass of 1.0 kg. Calculate the maximum pressure exerted by the cuboid when it is placed on the table.

C2

Rajah 5 (b) kuboid di bawah mempunyai jisim 1.0 kg. Kirakan tekanan maksimum yang dikenakan oleh kuboid apabila diletakkan di atas meja.

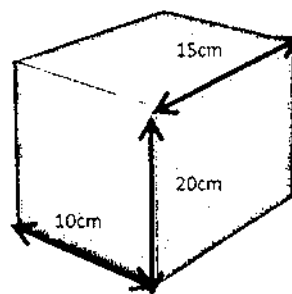


Figure 5(b) / Rajah 5(b)

[6 marks]

[6 markah]

CLO3
C3

(c) Figure 5(c) below shows a simple hydraulic system. Calculate

Rajah 5 (c) di bawah menunjukkan sistem hidraulik yang mudah. Kirakan

- i. The force applied at Piston A.

Daya yang dikenakan di Piston A.

[7 marks]

[7 markah]

- ii. The distance of Piston A when it moves upward if Piston B moves downward by 3m when the force is applied.

Jarak Piston A apabila ia bergerak ke atas jika Piston B bergerak ke bawah dengan 3m apabila daya digunakan.

[3 marks]

[3 markah]

- iii. The force that should be applied on the Piston B in order to support the weight on Piston A if load Q is replaced with 180 kg of mass. (
- $g=9.81\text{m/s}^2$
-)

Daya harus digunakan pada Piston B untuk menyokong beban pada Piston A jika beban Q digantikan dengan 180 kg jisim. ($g=9.81\text{m/s}^2$)

[5 marks]

[5 markah]

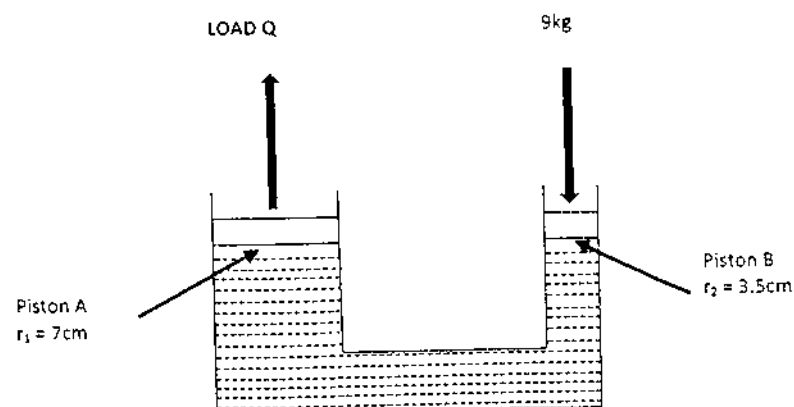


Figure 5(b) / Rajah 5(b)

SULIT

QUESTION 6

SOALAN 6

CLO1
C1

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

i. Heat
Haba

[2 marks]

[2 markah]

ii. Temperature
Suhu

[2 marks]

[2 markah]

CLO1
C2

- (b) State **THREE (3)** methods of heat transfer and explain the process for each method.
Nyatakan TIGA (3) pemindahan haba dan terangkan dengan prosesnya.

[6 marks]

[6 markah]

CLO3
C3

(c)

- i. A 150 g of water at 20 °C is added a 150 g of iron at 90 °C. Calculate the final temperature of the mixture. (Given that, $c_{\text{iron}} = 1434 \text{ J/kg}^\circ\text{C}$ and $c_{\text{water}} = 4200 \text{ J/kg}^\circ\text{C}$)

150 g air pada 20 °C ditambah 150 g besi pada 90 °C. Kira suhu terakhir pada campuran itu. (Diberi $c_{\text{iron}} = 1434 \text{ J/kg}^\circ\text{C}$ and $c_{\text{water}} = 4200 \text{ J/kg}^\circ\text{C}$)

[10 marks]

[10 markah]

- ii. It takes 357.3 J to heat a 37 grams of copper from 17 °C to 89 °C. Calculate the specific heat in Joules/kg°C.

Ia mengambil 357.3 J untuk memanaskan 37 gram tembaga dari 17 °C ke 89 °C. Kira haba tentu dalam Joule / kg °C.

[5 marks]

[5 markah]

SOALAN TAMAT

FORMULA DBS1012 ENGINEERING SCIENCE	
$g = 9.81 \text{ m/s}^2$	$W = Fs$
$W = mg$	$W = Fs \cos \theta$
$v = u + at$	$P = \frac{W}{t}$
$s = ut + \frac{1}{2} at^2$	$P = Fv$
$s = \frac{1}{2}(u + v)t$	$\rho = \frac{m}{V}$
$v^2 = u^2 + 2as$	$\rho_{\text{relative}} = \frac{\rho_{\text{substance}}}{\rho_{\text{water}}}$
$F = ma$	$P = \frac{F}{A}$
$F = mg \sin \theta$	$P_{\text{liquid}} = \rho gh$
$F_x = F \cos \theta$	$\frac{F_1}{A_1} = \frac{F_2}{A_2}$
$F_y = F \sin \theta$	$A_1 h_1 = A_2 h_2$
$F_R = \sqrt{(\sum F_x)^2 + (\sum F_y)^2}$	$F_B = \rho Vg$
$\theta = \tan^{-1} \left(\frac{\sum F_y}{\sum F_x} \right)$	$Q = mc\theta$
$M = Fd$	$c_{\text{water}} = 4,200 \text{ J/kg}^\circ\text{C}$
$E_p = mgh$	$\rho_{\text{water}} = 1,000 \text{ kg/m}^3$
$E_k = \frac{1}{2} mv^2$	$\text{Efficiency} = \frac{P_{\text{out}}}{P_{\text{in}}} \times 100\%$