

**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 scalar and vector quantity and give example for each.

*Takrifkan kuantiti skalar dan vector dan beri contoh setiap satu.*

[4 marks]

[4 markah]

CLO1  
C2

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

*Tentukan nilai bacaan bagi alat pengukuran berikut.*

i.

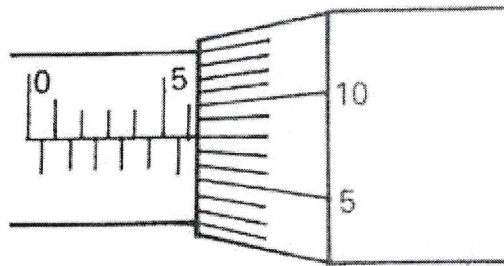
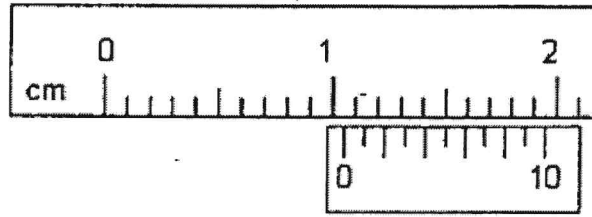


Figure 1b (i)/ Rajah 1b (i)

[3 marks]

[3 markah]

ii.

Figure 1b(ii)/ *Rajah 1b (ii)*

[3 marks]

[3 markah]

CLO3  
C3

(c) Convert the following units:

*Tukarkan unit berikut:*i.  $8568 \text{ kg/m}^3$  to  $\text{g/cm}^3$  $8568 \text{ kg/m}^3$  kepada  $\text{g/cm}^3$ 

[3 marks]

[3 markah]

ii.  $670 \text{ km/h}^2$  to  $\text{m/s}^2$  $670 \text{ km/h}^2$  kepada  $\text{m/s}^2$ 

[3 marks]

[3 markah]

iii.  $24 \text{ g/mm}^3$  to  $\text{kg/m}^3$  $24 \text{ g/mm}^3$  kepada  $\text{kg/m}^3$ 

[3 marks]

[3 markah]

iv.  $45 \text{ mm/min}$  to  $\text{m/s}$  $45 \text{ mm/min}$  kepada  $\text{m/s}$ 

[3 marks]

[3 markah]

- v.  $920 \text{ mm}^2$  to  $\text{m}^2$   
 $920 \text{ mm}^2$  kepada  $\text{m}^2$

[3 marks]

[3 markah]

## QUESTION 2

### SOALAN 2

CLO1  
C1

- (a) Define the following terms and state the SI units:  
*Berikan definisi dan nyatakan unit SI bagi istilah berikut:*

- i. Displacement  
*Sesaran*

[2 marks]

[2 markah]

- ii. Acceleration  
*Pecutan*

[2 marks]

[2 markah]

CLO1  
C2

- (b) Give **THREE (3)** differences between speed and velocity.  
*Berikan TIGA (3) perbezaan di antara laju dan halaju.*

[6 marks]

[6 markah]

CLO3  
C3

- (c) A car that starts to move from point A needs to go through points B and C before it reaches point D. The time taken to move from point A to B is 20 seconds, until it reaches velocity of 30m/s. Then it moves from point B to C in 30 seconds, until its velocity becomes 55 m/s. However, during the last 10 seconds, the car decelerates until it stops at point D.

*Sebuah kereta mula bergerak dari titik A perlu melalui titik B dan C sebelum sampai ke titik D. Masa diambil untuk bergerak dari titik A ke B adalah 20 saat, sehingga ia mencapai halaju 30m/s. Kemudian ia bergerak dari titik B ke C dalam masa 30 saat, sehingga halajunya menjadi 55 m/s. Bagi 10 saat terakhir, kereta itu menjadi perlahan sehingga ia berhenti di titik D.*

- i. Calculate the time taken for the car to reach maximum velocity.

*Kirakan masa kereta tersebut mencapai halaju maksimum.*

[2 marks]

[2 markah]

- ii. Sketch a velocity-time graph for that car.

*Lakarkan graf halaju-masa bagi kereta itu.*

[5 marks]

[5 markah]

- iii. Calculate acceleration from point B to C.

*Kira pecutan dari titik B ke C.*

[3 marks]

[3 markah]

- iv. From the velocity-time graph, determine the total distance.

*Daripada graf halaju-masa, tentukan jumlah jarak yang dilalui.*

[5 marks]

[5 markah]

**QUESTION 3****SOALAN 3**CLO1  
C1

(a) i. State the definition and SI unit of Force.

*Nyatakan definisi dan SI unit bagi Force.*

[2 marks]

[2 markah]

ii. State **TWO (2)** effects of force in everyday life.*Nyatakan **DUA (2)** kesan daya dalam kehidupan harian.*

[2 marks]

[2 markah]

CLO1  
C2

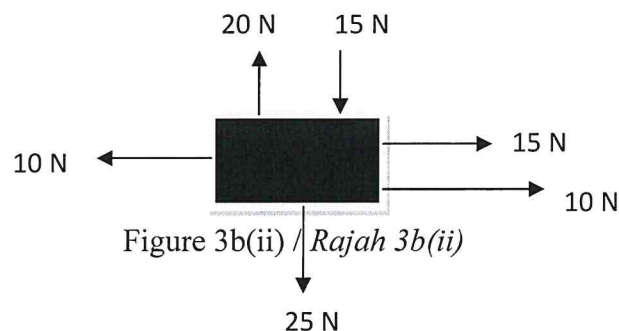
(b) i. A force of 100N is applied to an object of 15 kg mass on a flat surface. Find its acceleration.

*Satu daya 100 N dikenakan pada objek yang berjisim 15 kg di atas permukaan yang rata. Cari pecutan yang terhasil.*

[2 marks]

[2 markah]

ii. Calculate the net force acting on the x-axis and y-axis of an object in Figure 3b(ii).

*Kirakan daya bersih bertindak pada paksi-x dan paksi-y bagi objek dalam Rajah 3b(ii).*

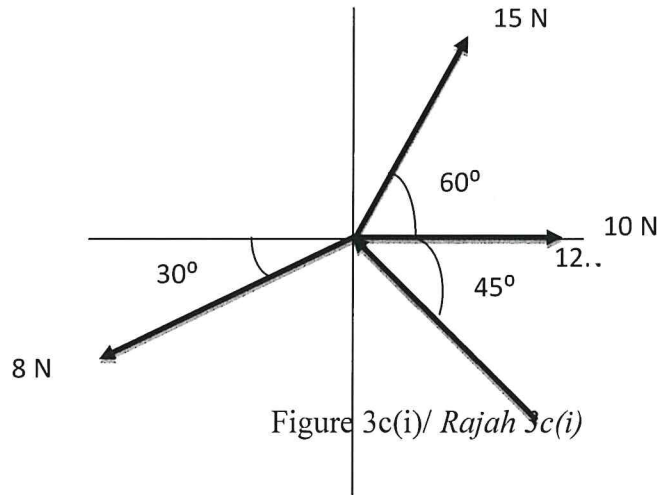
[4 marks]

[4 markah]

CLO3  
C3

(c) i. Calculate the resultant force and determine its direction for Figure 3c(i).

*Kira daya paduan dan tentukan arah bagi Rajah 3c(i).*

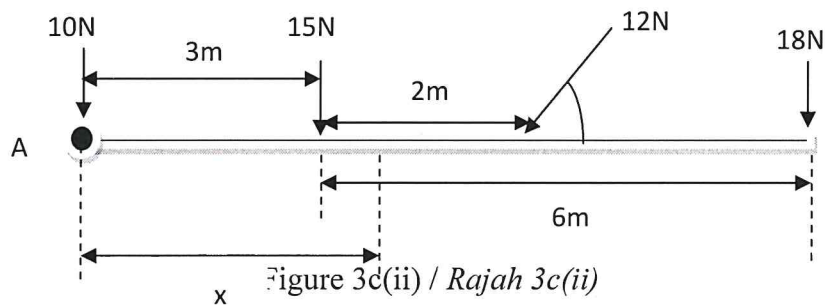


[9 marks]

[9 markah]

ii. Figure 3c(ii) shows a loaded beam. Find the distance of  $x$  from point A to keep the beam in equilibrium.

*Rajah 3c(ii) menunjukkan rasuk yang dikenakan beban. Kirakan jarak  $x$  dari titik A supaya rasuk berada dalam keadaan seimbang.*



[6 marks]

[6 markah]

**QUESTION 4****SOALAN 4**CLO1  
C1

- (a) i. Define and state the SI unit of Power.

*Nyatakan definisi dan unit SI untuk Kuasa.*

[2 marks]

[2 markah]

- ii. State **TWO (2)** principles of conservation of energy.

*Nyatakan DUA (2) prinsip keabadian tenaga.*

[2 marks]

[2 markah]

CLO1  
C2

- (b) An elevator lifts a 505 kg box at a height of 22 m at a velocity of 4m/s. Calculate:

*Sebuah lif mengangkat kotak 505 kg pada ketinggian 22 m dengan halaju 4m/s.*

*Kirakan:*

- i. Work done by the elevator.

*Kerja yang dilakukan oleh lif.*

[4 marks]

[4 markah]

- ii. Power exerts by the elevator during the trip.

*Kuasa yang dihasilkan semasa perjalanan.*

[2 marks]

[2 markah]

CLO3  
C3

- c) i. At Semariang Theme Park, Azman who has a mass of 74kg rides on a rollercoaster as shown in Figure 4c(i). Calculate:

*Di Taman Tema Semariang, Azman yang mempunyai jisim 74kg, bermain rollercoaster seperti Rajah 4c(i). Kirakan:*

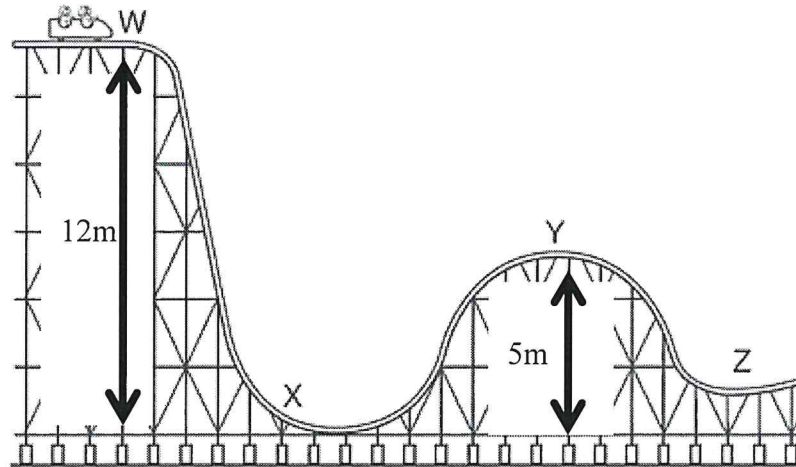


Figure 4c(i) / Rajah 4c(i)

- a. Total energy at W.

*Jumlah tenaga di W.*

[2 marks]

[2 markah]

- b. Kinetic energy at X.

*Tenaga kinetic di X.*

[2 marks]

[2 markah]

- c. Kinetic energy and potential energy at Y.

*Tenaga kinetik dan tenaga keupayaan di Y.*

[5 marks]

[5 markah]



- ii. An electric motor has an input power which consumed 0.055kW. The motor was activated for 1 minute and produced 3142 J. Find the efficiency of the motor.

*Motor elektrik mempunyai kuasa input yang menggunakan 0.055kW.*

*Motor ini telah diaktifkan untuk 1 minit dan menghasilkan 3142 J.*

*Tentukan kecekapan motor.*

[6 marks]

[6 markah]

### QUESTION 5

#### SOALAN 5

CLO 1  
C1

- (a) Give **TWO (2)** characteristics for each of the following:

*Berikan **DUA (2)** ciri bagi setiap yang berikut:*

- i. Solid

*Pepejal*

[2 marks]

[2 markah]

- ii. Liquid

*Cecair*

[2 marks]

[2 markah]

CLO 1  
C2

(b) A metal block with density of  $750 \text{ kg/m}^3$  is located on a floor. The weight of the metal block is 1500 N. Calculate:

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

*Sebuah bongkah besi berketumpatan  $750 \text{ kg/m}^3$  diletakkan di atas lantai. Berat bongkah besi tersebut ialah 1500 N. Kirakan:*

*(Diberi  $g=9.81 \text{ m/s}^2$ )*

i. mass of the metal block

*jisim bongkah besi*

[2 marks]

[2 markah]

ii. volume of the metal block

*isipadu bongkah besi*

[2 marks]

[2 markah]

iii. relative density of the metal block

*ketumpatan bandingan bongkah besi*

[2 marks]

[2 markah]

CLO 3  
C3

- (c) i. A large piston of a hydraulic jack in Figure 5c(i) has a cross-sectional area of  $0.5\text{m}^2$  and the small piston has a cross-sectional area of  $0.02\text{m}^2$ . The upward force for lifting a load placed on top of the large piston is  $7000\text{N}$ .

*Piston besar sebuah jek hidraulik pada Rajah 5c(i) mempunyai luas keratan Rentas  $0.5\text{m}^2$  dan piston kecil mempunyai luas keratan rentas  $0.02\text{m}^2$ . Daya keatas untuk mengangkat beban pada bahagian atas piston besar ialah  $7000\text{N}$ .*

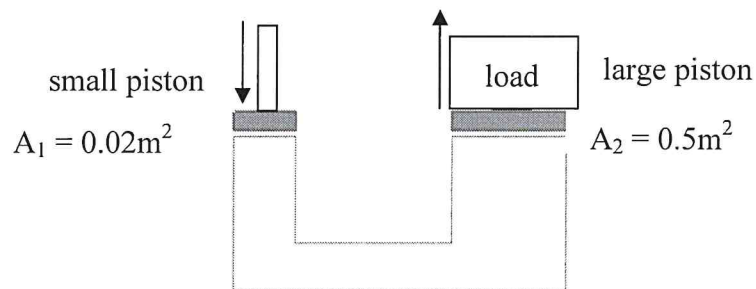


Figure 5c(i) / Rajah 5c(i)

- a. Calculate the downward force on the small piston.  
*Kirakan daya kebawah pada bahagian piston kecil.*
- [4 marks]  
[4 markah]
- b. If the distance moved by the small piston is  $150\text{cm}$ , what is the distance moved by the large piston.  
*Jika jarak pergerakan pada piston kecil ialah  $150\text{cm}$ , berapakah jarak pergerakan pada piston besar.*
- [5 marks]  
[5 markah]

- ii. A cuboid with density of  $1500 \text{ kg/m}^3$  and volume of  $800 \text{ cm}^3$  is immersed in water. (Given  $g=9.81 \text{ m/s}^2$ ). Calculate the actual weight of the cuboid.

*Sebuah kuboid dengan ketumpatan  $1500 \text{ kg/m}^3$  dan berisipadu  $800 \text{ cm}^3$  telah tenggelam di dalam air. (Diberi  $g=9.81 \text{ m/s}^2$ ). Kirakan berat sebenar kuboid.*

[6 marks]

[6 markah]

### QUESTION 6

#### SOALAN 6

- CLO1  
C1 (a) Give **TWO (2)** differences between temperature and heat.  
*Berikan **DUA (2)** perbezaan antara suhu dan haba.*

[4marks]

[4 markah]

- CLO1  
C2 (b) State and explain **THREE (3)** processes of heat transferred  
*Nyatakan dan terangkan **TIGA (3)** proses pemindahan haba.*

[6 marks]

[6 markah]

- CLO3  
C3 (c) i. Calculate the initial temperature of  $3.2 \text{ kg}$  of water if  $500000 \text{ J}$  of heat is required to raise the temperature until it reaches  $100^\circ \text{C}$ .  
(Specific heat capacity of water:  $4.2 \text{ kJ/kg}^\circ \text{C}$ )

*Kira suhu awal  $3.2 \text{ kg}$  jika air  $500000 \text{ J}$  haba yang diperlukan untuk menaikkan suhu sehingga mencecah  $100^\circ \text{C}$ .*

*( Muatan haba tentu air:  $4.2 \text{ kJ} / \text{kg}^\circ \text{C}$  )*

[5 marks]

[5 markah]

- ii. 500 g sand with temperature of  $120^{\circ}\text{C}$  is put into the 100 g aluminum container that has initial temperature of  $30^{\circ}\text{C}$ . Find the final temperature if there is no heat lost to the surrounding during that process.

(Specific heat capacity of sand:  $290\text{J}/\text{kg}^{\circ}\text{C}$ )

(specific heat capacity of aluminium:  $700\text{J}/\text{kg}^{\circ}\text{C}$ )

*500 g pasir dengan suhu  $120^{\circ}\text{C}$  dimasukkan ke dalam bekas aluminium seberat 100 g yang mempunyai suhu awal  $30^{\circ}\text{C}$ . Cari suhu akhir jika tiada kehilangan haba ke persekitaran semasa proses itu berlaku.*

*(Muatan haba tentu pasir:  $290\text{J}/\text{kg}^{\circ}\text{C}$ )*

*(Haba muatan aluminium:  $700\text{J}/\text{kg}^{\circ}\text{C}$ )*

[10 marks]

[10 markah]

### SOALAN TAMAT

**FORMULA DBS1012  
ENGINEERING SCIENCE**

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