INSTRUCTION:

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

ARAHAN :

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

QUESTION 1

SOALAN 1

CLO1 C1 (a) Define random error and systematic error and give **ONE (1)** example for each error.

*Takrifkan ralat rawak dan ralat sistematik dan berikan **SATU (1)** contoh untuk setiap ralat.*

[4 marks]

[*4 markah*]

CLO1 C3 (b) Change the following units :

Tukarkan unit berikut :

i. 240 km/h^2 to m/s^2

240 km/h^2 kepada m/s^2

[3 marks]

[*3 markah*]

ii. 2.83 g/cm^3 to kg/m^3

2.83 g/cm^3 kepada kg/m^3

[3 marks]

[*3 markah*]

CLO1
C3

(c) Solve the following problems:
Selesaikan masalah-masalah berikut:

i. Aminah drove a car with a constant velocity. When she noticed a cow in the middle of the road, she braked immediately with deceleration of 5 m/s^2 and the car stops after 5 seconds. Calculate the distance traveled by the car from the time Aminah applied the brake until it stops.

Aminah memandu kereta dengan halaju yang malar. Apabila dia melihat seekor lembu berada di tengah jalan, dia membrek serta-merta dengan nyahpecutan 5 m/s^2 dan kereta berhenti selepas 5 saat. Kirakan jarak yang dilalui oleh kereta daripada masa Aminah menekan brek sehingga kereta berhenti.

[5 marks]
[*5 markah*]

ii. Figure 1 (c)(ii) shows the velocity-time graph of the motion of a car.
Rajah 1 (c)(ii) menunjukkan graf halaju-masa bagi pergerakan sebuah kereta.

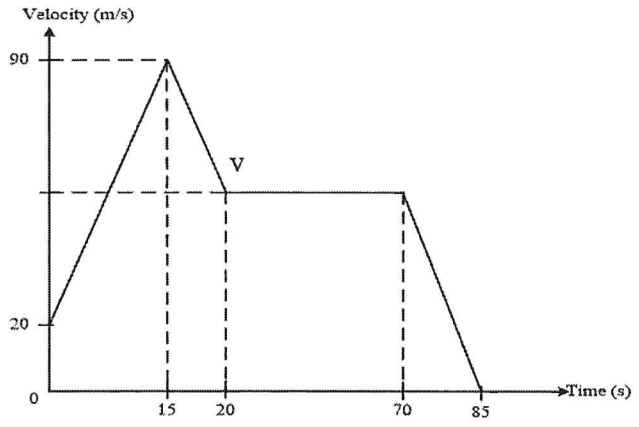


Figure 1 (c)(ii) / *Rajah 1 (c)(ii)*

a. Calculate the initial acceleration.
Kirakan pecutan awal.

[2 marks]
[*2 markah*]

b. Calculate the value of V if the deceleration is -5 m/s^2.
Kirakan nilai V jika nyahpecutan ialah -5 m/s^2.

[3 marks]
[*3 markah*]

c. Calculate the total distance travelled by the car.
Kirakan jumlah jarak yang dilalui oleh kereta.

[5 marks]
[*5 markah*]

QUESTION 2

SOALAN 2

CLO1
C1

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

Nyatakan takrifan kuasa dan unit SI.

[2 marks]

[*2 markah*]

ii. State **FOUR (4)** principles of conservation of energy.

*Nyatakan **EMPAT (4)** prinsip keabadian tenaga.*

[4 marks]

[*4 markah*]

CLO1
C2

(b) i. Explain the difference between Kinetic Energy and Potential Energy. Then, give **ONE (1)** example for each of them.

*Secara ringkas, terangkan perbezaan antara Tenaga Kinetik dan Tenaga Keupayaan. Kemudian, berikan **SATU (1)** contoh setiapnya.*

[4 marks]

[*4 markah*]

ii. During the physical exercise, Aiman, with a mass of 42 kg, is lifted to a height of 320 cm. Isa, with a mass of 50 kg, is lifted to a height of 250 cm. Explain which of the boys gained more potential energy.

Semasa latihan fizikal, Aiman dengan jisim 42 kg telah naik ke atas pada ketinggian 320 cm. *Isa dengan jisim 50 kg, telah naik pada ketinggian 250 cm. Terangkan siapakah yang menghasilkan tenaga keupayaan yang lebih tinggi.*

[6 marks]

[*6 markah*]

CLO1
C3

(c) A box with mass of 250 kg is being lifted to a window located 10 m above the ground using a system of pulleys and electric motor.
Sebuah kotak yang berjisim 250 kg diangkat ke tingkap yang terletak 10 m daripada tanah dengan menggunakan sistem takal dan motor diesel.

i. If the motor has a power output of 800 W, calculate the time taken to raise the box to the window?
Jika motor tersebut mempunyai kuasa keluaran sebanyak 800 W, kirakan masa yang diambil untuk mengangkat kotak ke tingkap?

[4 marks]
[*4 markah*]

ii. Calculate the time taken to lift the box if the input power of the motor is 1500 W and the efficiency is 85%.
Kirakan masa yang diambil untuk mengangkat kotak sekiranya kuasa masukan untuk motor adalah 1500 W dan kecekapannya adalah 85%.

[5 marks]
[*5 markah*]

QUESTION 3

SOALAN 3

CLO1
C1

(a) State **THREE (3)** differences between solid and gas.

*Nyatakan **TIGA (3)** perbezaan antara pepejal dan gas.*

[6 marks]

[*6 markah*]

CLO1
C3

(b) Solve the following problems:

Selesaikan masalah-masalah berikut:

i. A solid metal cylinder has radius, $r = 5 \times 10^{-3}$ m and length, $L = 5 \times 10^{-2}$ m. If its mass is 0.060 kg, calculate the density in unit kg/m^3 and relative density of the metal. ($V_{cylinder} = \pi r^2 L$)

Satu silinder pepejal logam mempunyai jejari, $r = 5 \times 10^{-3}$ m dan panjang, $L = 5 \times 10^{-2}$ m. Jika jisimnya adalah 0.060 kg, kirakan ketumpatan dalam unit kg/m^3 dan ketumpatan bandingan bagi pepejal tersebut.

($V_{silinder} = \pi r^2 L$)

[5 marks]

[*5 markah*]

ii. A container is filled with mercury up to a level of 8 m, 6 m of water and 3 m of oil. The density of oil, water and mercury are 800 kgm^{-3}, 1000 kgm^{-3} and 13600 kgm^{-3} respectively. Calculate the total pressure exerted by the liquids at the base.

Satu bekas diisi dengan merkuri sehingga paras 8 m, dengan air sehingga paras 6 m dan minyak sehingga paras 3 m. Ketumpatan minyak, air dan merkuri adalah masing-masing 800 kgm^{-3}, 1000 kgm^{-3} dan 13600 kgm^{-3}. Kirakan jumlah tekanan yang dikenakan oleh cecair-cecair ini ke atas dasar bekas.

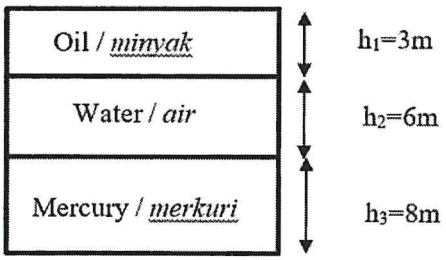


Figure 3(b)(ii) / *Rajah 3 (b)(ii)*

[5 marks]
[*5 markah*]

CLO1
C3

(c) A hot air balloon with a total mass of fabric, basket and pilot is 480 kg. It is filled with hot air of density 0.95 kgm^{-3}. If the volume of the balloon is 2000 m^3, calculate :-

Belon udara panas dengan jumlah jisim fabrik, bakul dan juruterbang adalah 480 kg. Ianya diisikan dengan udara panas yang berketumpatan 0.95 kgm^{-3}. Jika isipadu belon adalah 2000 m^3 , kirakan:-

i. The total weight of the balloon with hot air in it.
Jumlah berat belon yang berisi udara panas di dalamnya.

[4 marks]
[*4 markah*]

ii. The buoyant force exerted on the balloon when the surrounding air has a density of 1.20 kgm^{-3}.
Daya tujahan yang bertindak ke atas belon apabila ketumpatan udara persekitaran adalah 1.20 kgm^{-3}.

[3 marks]
[*3 markah*]

iii. Maximum load the balloon can carry so that it still can rise upwards.
Beban maksima yang boleh dibawa oleh belon supaya masih boleh naik ke atas.

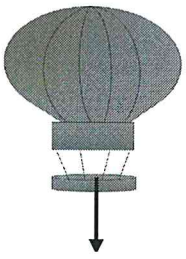


Figure 3(c)(iii) / *Rajah 3 (c)(iii)*

[2 marks]

[*2 markah*]

QUESTION 4

SOALAN 4

CLO1
C1

(a) State **THREE (3)** methods of heat transfer and give **ONE (1)** example for each method.

*Nyatakan **TIGA (3)** kaedah pemindahan haba dan berikan **SATU (1)** contoh untuk setiap kaedah.*

[6 marks]

[*6 markah*]

CLO1
C3

(b) Calculate:

Kirakan:

i. It takes 355.3 J to heat 40 g of copper from 17 ^{0}C to 89 ^{0}C. Calculate the specific heat in J/kg^{0}C.

Ia mengambil 355.3 J untuk memanaskan 40 g tembaga dari 17 ^{0}C ke 89 ^{0}C. Kirakan haba tentu dalam J/kg^{0}C.

[5 marks]

[*5 markah*]

ii. The water with mass of 500 g at 20 ^{0}C temperature is heated till 100 ^{0}C.

Air berjisim 500 g pada suhu 20 ^{0}C dipanaskan sehingga 100 ^{0}C.

a. Calculate the heat quantity of water if the specific heat capacity of water is 4200 J/kg^{0}C.

Kira kuantiti haba air jika muatan haba tentu air ialah 4200 J/kg^{0}C.

[3 marks]

[*3 markah*]

b. If the same of heat quantity of water is applied, calculate the value of the specific latent heat of vaporisation of water.
Jika kuantiti haba yang sama digunakan, kira nilai bagi muatan tentu haba pendam bagi pengewapan air.

[2 marks]
[2 *markah*]

CLO1
C3

(c) A silver spoon of mass 50.0 g is at a temperature of 20 ^{0}C. This spoon is used to stir coffee which is at temperature of 90 ^{0}C. After stirring the final temperature reached by the spoon and coffee is 89 ^{0}C. The mass of the coffee is 200 g. (Specific heat capacity of the spoon = 0.23 kJkg^{-1} ^{0}C^{-1})

Sudu perak berjisim 50.0 g berada pada suhu 20 ^{0}C. Sudu ini digunakan untuk mengacau kopi yang berada pada suhu 90 ^{0}C. Selepas dikacau, suhu akhir yang dicapai oleh sudu dan air kopi adalah 89 ^{0}C. Jisim bagi air kopi adalah 200 g. (Muatan haba tentu bagi sudu = 0.23 kJkg^{-1} ^{0}C^{-1})

i. Calculate heat absorbed by the spoon.
Kirakan haba yang diserap oleh sudu.

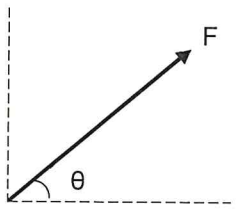
[4 marks]
[*4 markah*]

ii. Calculate the specific heat capacity of the coffee.
Kirakan muatan haba tentu bagi air kopi.

[5 marks]
[*5 markah*]

SOALAN TAMAT

FORMULA DBS10012
ENGINEERING SCIENCE

$g = 9.81\ m/s^2$	$W = Fs$
$w = mg$	$W = mgh$
$v = u + at$	$W = Fs\cos\theta$ 
$s = ut + \frac{1}{2}at^2$	
$s = \frac{1}{2}(u+v)t$	
$v^2 = u^2 + 2as$	
$F = ma$	$P = \frac{W}{t}$
$F = mg\sin\theta$	$P = Fv$
$F_x = F\cos\theta$	$\rho = \frac{m}{V}$
$F_y = F\sin\theta$	$\rho_{relative} = \frac{\rho_{substance}}{\rho_{water}}$
$F_R = \sqrt{(\sum F_x)^2 + (\sum F_y)^2}$	
$\theta = \tan^{-1}\left(\frac{\sum F_y}{\sum F_x}\right)$	$P_{liquid} = \rho gh$
$M = Fd$	$P = \frac{F}{A}$
$E_p = mgh$	$\frac{F_1}{A_1} = \frac{F_2}{A_2}$
$E_k = \frac{1}{2}mv^2$	$A_1h_1 = A_2h_2$
$Efficiency = \frac{P_{useful\ output}}{P_{input}} \times 100\%$	$F_B = \rho Vg$
$Efficiency = \frac{E_{useful\ output}}{E_{input}} \times 100\%$	$Q = mc\Delta\theta$
	$Q = mL$
	$C_{water} = 4{,}200\ J/kg°C$
	$\rho_{water} = 1{,}000\ kg/m^3$

Length, Area, Mass and Volume Conversion

Length		
1 inch (in)		2.54 centimeters (cm)
1 foot (ft)	12 inches (in)	30.48 centimetres (cm)
1 yard (yd)	3 feets (ft)	0.9144 metre (m)
1 mile (mi)	1,760 yards (yd)	1.60934 kilometres (km)
Area		
1 in^2		6.4516 cm^2
1 ft^2		0.09 m^2
1 yd^2	9 ft^2	0.8361 m^2
1 acre	4,840 yd^2	4046.86 m^2 / 0.405 hectare
1 $mile^2$	640 acres	2.590 km^2
Mass (weight)		
1 ounce (oz)		28.35 grams (g)
1 pound (lb)		453.59 grams (g)
Volume		
1 gallons (gal)		3.8 liters (L)
1 ft^3		0.03 m^3
1 yd^3		0.76 m^3

Temperature Conversion

Temperature	
Convert Fahrenheit (F) to Celcius (C)	(degrees F – 32) x 0.555
Convert Celcius (C) to Fahrenheit (F)	(degrees C x 1.8) + 32