KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR

SESI II : 2025/2026

DBS10042: ENGINEERING SCIENCE

TARIKH : 06 MEI 2026
MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)

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

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

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 (a) Define the following terms and give **TWO (2)** examples:

*Takrifkan istilah berikut dan berikan **DUA (2)** contoh:*

i. scalar quantity

kuantiti skalar

[3 marks]

[*3 markah*]

ii. vector quantity

kuantiti vektor

[3 marks]

[*3 markah*]

CLO1 (b) Change the following units:

Tukarkan unit yang berikut:

i. 80 km/hr to m/s.

80 km/j kepada m/s.

[3 marks]

[*3 markah*]

ii. 543 kg/m^3 to g/cm^3.

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

[3 marks]

[*3 markah*]

iii. 2 m/s^2 to km/min^2.

2 m/s^2 kepada km/min^2.

[3 marks]

[*3 markah*]

CLO1 (c) Determine the reading of the measurement tool below.

Tentukan bacaan bagi alat pengukur di bawah.

i. Micrometer screw gauge reading.

Bacaan tolok skru mikrometer.

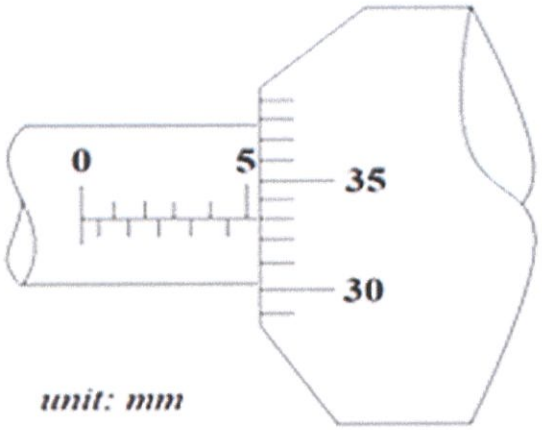


Figure 1(c)i / *Rajah 1(c)i*

[4 marks]

[*4 markah*]

ii. Vernier caliper reading with negative zero error = - 0.05mm.

Bacaan angkup vernier dengan ralat sifar negatif = - 0.05mm.

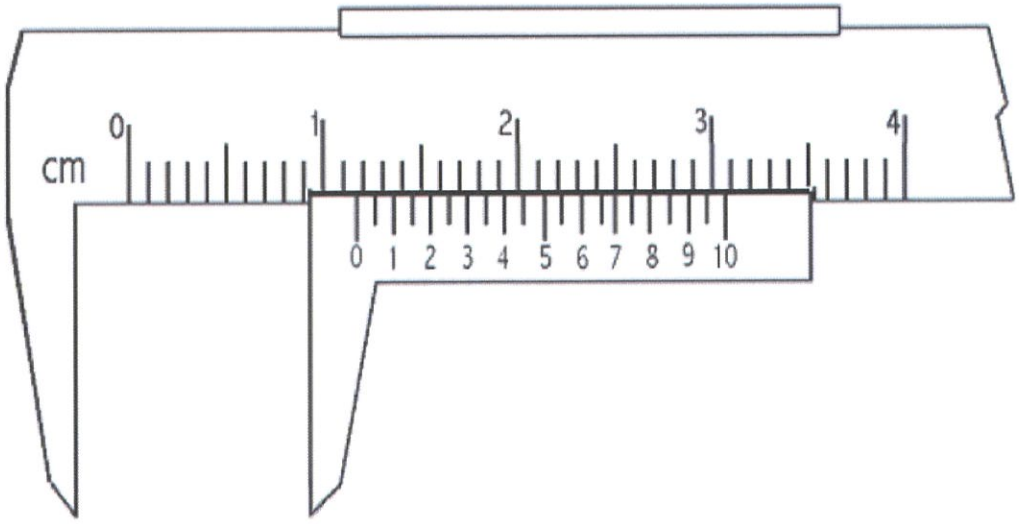


Figure 1(c)ii / *Rajah 1(c)ii*

[6 marks]

[*6 markah*]

QUESTION 2

SOALAN 2

CLO1 (a) i. Define uniform motion and state **TWO (2)** examples.
*Takrifkan gerakan seragam dan nyatakan **DUA (2)** contoh.*

[3 marks]
[*3 markah*]

ii. Define distance and speed, and state their SI units.
Takrifkan jarak dan kelajuan, serta nyatakan unit SI bagi kedua-duanya.

[4 marks]
[4 *markah*]

CLO1 (b) A motorcycle is travelling along a straight road with an initial velocity of 21 m/s. The rider accelerates uniformly at 1.7 m/s^2 for 12 s. Immediately after that, the rider applies the brakes and the motorcycle decelerates uniformly at 5.0 m/s^2 until it comes to rest.
Sebuah motosikal bergerak di sepanjang jalan lurus dengan halaju awal 21 m/s. *Penunggang memecut secara seragam dengan pecutan* 1.7 m/s^2 *selama 12 s. Sejurus selepas itu, penunggang menekan brek dan motosikal mengalami nyahpecutan seragam 5.0* m/s^2 *sehingga berhenti sepenuhnya.*

i. Calculate the velocity of the motorcycle after 6 s.
Hitung halaju motosikal selepas 6 s.

[3 marks]
[3 *markah*]

ii. Calculate the total time taken from the start of acceleration until the motorcycle comes to rest.
Kira jumlah masa yang diambil dari permulaan pecutan sehingga motosikal berhenti sepenuhnya.

[5 marks]
[5 *markah*]

CLO1

(c) Figure 2 (c) shows the velocity–time graph that illustrates the motion of a car travelling along a straight road. Using information obtained from the figure:
Rajah 2 (c) menunjukkan graf halaju–masa yang menggambarkan pergerakan sebuah kereta yang bergerak di sepanjang jalan lurus. Dengan merujuk rajah tersebut:

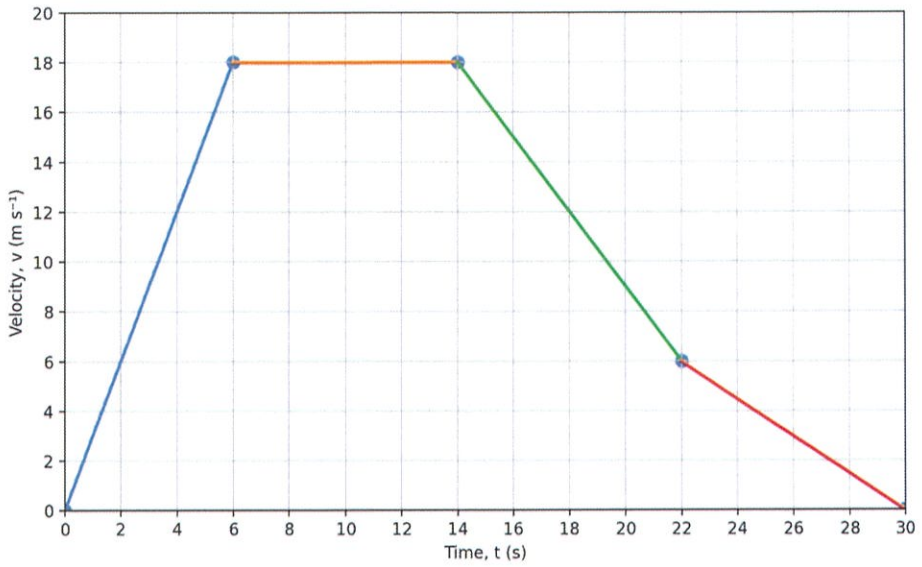


Figure 2(c) / *Rajah 2(c)*

i. Calculate the acceleration of the car from 0 s to 6 s and the deceleration of the car from 14 s to 22 s.
Kirakan pecutan kereta dari 0 s hingga 6 s dan nyahpecutan kereta dari 14 s hingga 22 s.

[6 marks]
[6 *markah*]

ii. Calculate the total distance travelled by the car throughout the entire motion.
Kira jumlah jarak yang dilalui oleh kereta sepanjang keseluruhan pergerakan.

[4 marks]
[4 *markah*]

QUESTION 3

SOALAN 3

CLO1 (a) i. Define work dan its SI unit.
Takrifkan kerja dan unit SI nya.

[2 marks]
[*2 markah*]

ii. Define kinetic energy dan its SI unit.
Takrifkan tenaga kinetik dan unit SI nya.

[2 marks]
[*2 markah*]

iii. State **THREE (3)** principle of conservation of energy with **ONE (1)** suitable example regarding the conservation of energy in real life.
*Nyatakan **TIGA (3)** prinsip keabadian tenaga dengan **SATU (1)** contoh yang sesuai berkaitan prinsip keabadian tenaga.*

[4 marks]
[*4 markah*]

CLO1 (b) i. A worker uses a broom to push water across the floor with a force of 55 N acting at an angle of 60° to the floor. If the broom moves 12 m horizontally, calculate the work done by the worker.
Seorang pekerja menggunakan penyapu untuk menolak air di lantai dengan daya 55 N pada sudut 60° terhadap lantai. Jika penyapu bergerak sejauh 12 m secara mendatar, kirakan kerja yang dilakukan oleh pekerja tersebut.

[4 marks]
[*4 markah*]

ii. A cement mixer truck of mass 25 000 kg is moving along a straight road. Its kinetic energy is 73 000 J. Calculate the velocity of the truck.
Sebuah trak pengadun simen berjisim 25 000 kg bergerak di atas jalan lurus. Tenaga kinetik trak tersebut ialah 73 000 J. Kirakan halaju trak itu.

[4 marks]
[*4 markah*]

CLO1 (c) A crane lifts a weight of 2 000 N to a height of 5 m in 4 seconds. The crane uses 12 000 J of energy from its motor.
Sebuah kren mengangkat berat 2 000 N ke ketinggian 5 m dalam masa 4 saat. Kren menggunakan tenaga sebanyak 12 000 J dari motor.

i. Calculate the power output of the crane.
Kirakan kuasa keluaran kren.

[5 marks]
[*5 markah*]

ii. Calculate the efficiency of the crane.
Hitungkan kecekapan kren.

[4 marks]
[*4 markah*]

QUESTION 4

SOALAN 4

CLO1 (a) i. List **THREE (3)** methods of heat transfer with suitable examples of daily life situation for each method.
*Senaraikan **TIGA (3)** kaedah pemindahan haba dengan contoh yang sesuai situasi harian untuk setiap kaedah.*

[6 marks]
[*6 markah*]

ii. State the definition and SI unit of pressure.
Nyatakan definisi dan unit SI bagi tekanan.

[2 marks]
[*2 markah*]

CLO1 (b) i. A metal block with density of 550 kg/m^3 is located on a floor. The weight of the metal block is 1235 N. Calculate the volume of the metal block. (Given g = 9.81 m/s^2)
Sebuah bongkah besi berketumpatan 550 kg/m^3 diletakkan di atas lantai. Berat bongkah tersebut ialah 1235 N. Kirakan isipadu bongkah besi tersebut. (Diberi g = 9.81 m/s^2)

[4 marks]
[*4 markah*]

ii. Figure 4(b)ii shows a hydraulic lift with a force F_1 acting on a circular piston with an area of 0.75 m^2. The pressure generated is transmitted through a liquid to the second piston with an area of 3.5 m^2. Calculate the downward force (F_1) acting on piston A.

Rajah 4(b)ii di bawah menunjukkan lif hidraulik dengan nilai daya F_1 yang bertindak pada bulatan omboh dengan luas 0.75 m^2. Tekanan yang dihasilkan dihantar melalui cecair ke omboh yang kedua dengan keluasan 3.5 m^2. Kira nilai daya (F_1) ke bawah pada omboh A.

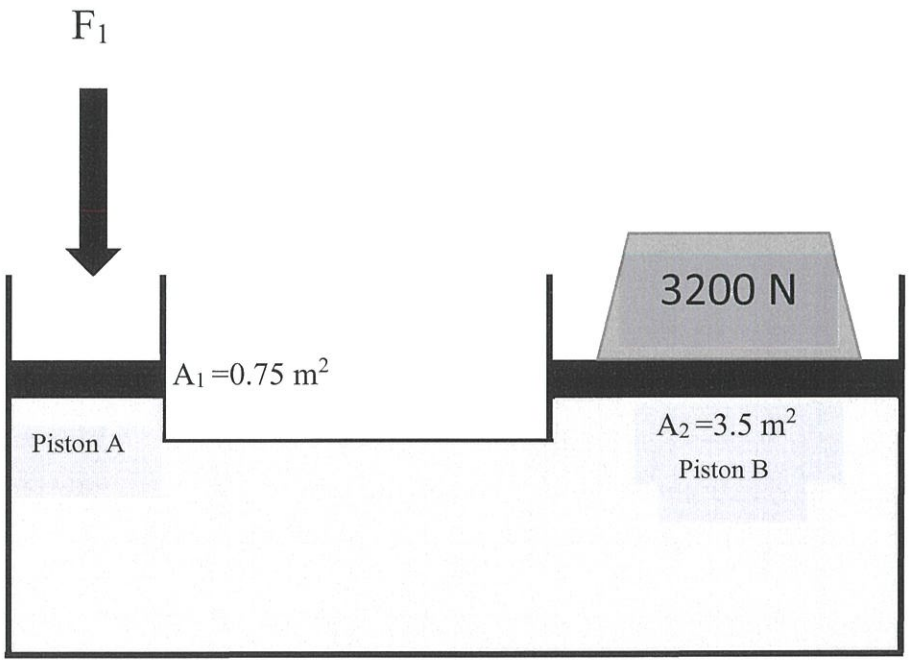


Figure 4(b)ii / *Rajah 4(b)ii*

[4 marks]

[*4 markah*]

CLO1

(c) i. 350 J of energy required to raise the temperature of an aluminium from 25°C to 40°C. Calculate the mass of an aluminium.
(Given: specific heat capacity of aluminium = 913 J/ kg°C)
Sebanyak 350 J tenaga diperlukan untuk menaikkan suhu aluminium daripada 25°C to 40°C. Kira jisim bagi aluminium.
(Diberi : muatan haba tentu aluminium = 913 J/ kg°C)

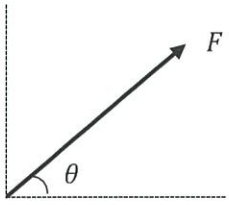
[3 marks]
[*3 markah*]

ii. A 0.164 kg of cuprum cube with temperature of 120°C was placed in a container which contain 0.5 kg of water. The equilibrium temperature of the mixture is 52°C. Calculate the initial temperature of the water before it is mixed with cuprum cube.
(Given: specific heat capacity of cuprum is 387 J/kg°C)
(Given: specific heat capacity of water is 4200 J/kg°C)
Kiub kuprum yang berjisim 0.164 kg pada suhu 120°C dituangkan ke dalam bekas yang mengandungi 0.5 kg air. Suhu campuran tersebut ialah 52°C. Kirakan suhu awal bagi air sebelum dicampurkan dengan kiub kuprum.
(Diberi : muatan haba tentu bagi kuprum adalah 387 J/kg°C)
(Diberi : muatan haba tentu bagi air adalah 4200 J/kg°C)

[6 marks]
[*6 markah*]

SOALAN TAMAT

FORMULA DBS10042
ENGINEERING SCIENCE

$g = 9.81\ m/s^2$	$W = F \times d$
$w = mg$	$W = mgh$
$v = u + at$	$W = Fd\ cos\ \theta$
$s = ut + \frac{1}{2}at^2$	$F_x = F\ cos\ \theta$ $F_y = F\ sin\ \theta$  $F_R = \sqrt{\left(\sum F_x\right)^2 + \left(\sum F_y\right)^2}$ $\theta = tan^{-1}\left(\frac{F_y}{F_x}\right)$
$s = \frac{1}{2}(u + v)\ t$	
$v^2 = u^2 + 2as$	
$F = ma$	
$F_g = mg$	
$F = mg\ sin\ \theta$	$P = \frac{W}{t}$
$\rho = \frac{m}{V}$	$P = F \times v$
$\rho_{relative} = \frac{\rho_{subtance}}{\rho_{water}}$	$P = \rho gh$
$M = F \times d$	$P = \frac{F}{A}$
$E_p = mgh$	$\frac{F_1}{A_1} = \frac{F_2}{A_2}$
$E_k = \frac{1}{2}mv^2$	$A_1h_1 = A_2h_2$
$Efficiency = \frac{P_{output}}{P_{input}} \times 100\%$	$F_B = \rho Vg$
$Efficiency = \frac{E_{output}}{E_{input}} \times 100\%$	$Q = mc\Delta\theta$
$Efficiency = \frac{W_{output}}{W_{input}} \times 100\%$	$Q = mL$
$\rho_{water} = 1000\ kg/m^3$	$C_{water} = 4200\ J/kg°C$

Length, Area, Mass, and Volume Conversion

Length		
1 inch (in)		2.54 centimeter (cm)
1 foot (ft)	12 inches (in)	30.48 centimeter (cm)
1 yard (yd)	3 feets (ft)	0.9144 meter (m)
1 mile (mi)	1,760 yards (yd)	1.60934 kilometer (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 gallon (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 Celsius (C)	(degrees F - 32) x 0.555
Convert Celsius (C) to Fahrenheit (F)	(degrees C x 1.8) + 32