

SULIT



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 I : 2025/2026

DBS10042: ENGINEERING SCIENCE

TARIKH : 22 NOVEMBER 2025

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)

SULIT

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 | <p>(a) Define the following terms with TWO (2) examples:
<i>Takrifkan terma berikut berserta DUA(2) contoh:</i></p> <p>i. base quantity.
<i>kuantiti asas.</i></p> <p style="text-align: right;">[3 marks]
[3 markah]</p> <p>ii. vector quantity.
<i>kuantiti vektor.</i></p> <p style="text-align: right;">[3 marks]
[3 markah]</p> |
| CLO1 | <p>(b) Change the following units:
<i>Tukarkan unit yang berikut:</i></p> <p>i. 1.97 km/min to m/s
<i>1.97 km/min kepada m/s</i></p> <p style="text-align: right;">[3 marks]
[3 markah]</p> <p>ii. 0.975 gcm⁻³ to kgm⁻³
<i>0.975 gcm⁻³ kepada kgm⁻³</i></p> <p style="text-align: right;">[3 marks]
[3 markah]</p> |

- iii. 0.3048 m/s^2 to km/hr^2
 0.3048 m/s^2 kepada km/hr^2

[3 marks]

[3 markah]

CLO1

- (c) Write the actual reading for the following:

Tuliskan bacaan sebenar bagi yang berikut:

- i. if the zero error of the vernier caliper is -0.03 cm .
jika ralat sifar angkup vernier adalah -0.03 cm .

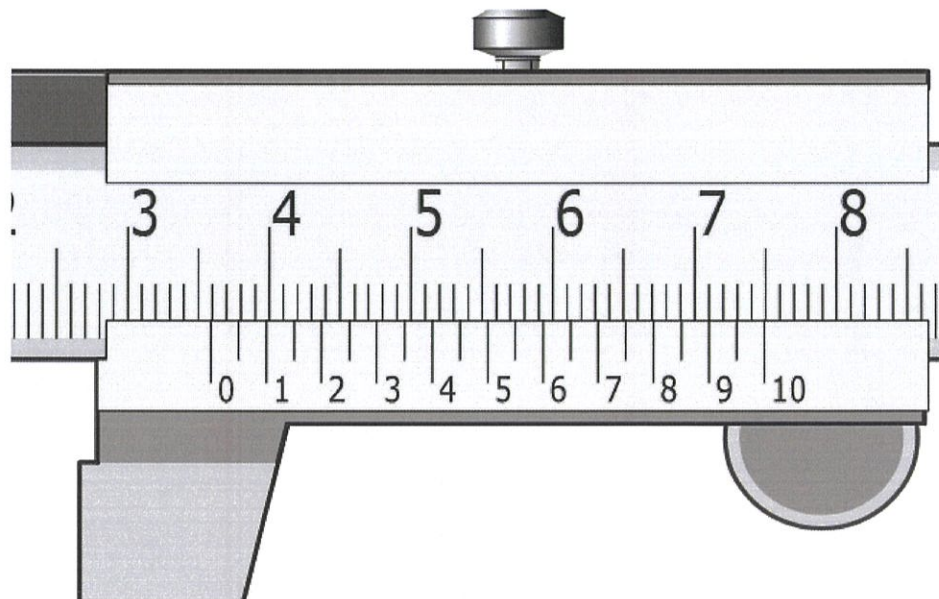


Figure 1(c)i./ *Rajah 1(c)i.*

[5 marks]

[5 markah]

- ii. if the zero error is 0.05 mm.
jika ralat sifar adalah 0.05 mm.

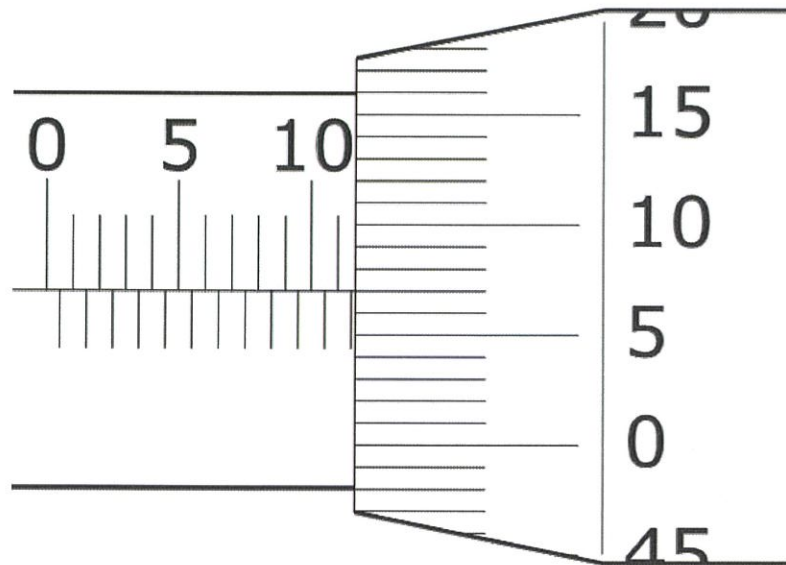


Figure 1(c)ii./ *Rajah 1(c)ii.*

[5 marks]

[5 markah]

QUESTION 2**SOALAN 2**

- | | |
|------|--|
| CLO1 | <p>(a) i. Define uniform motion with TWO (2) examples.
 <i>Takrifkan gerakan seragam berserta DUA (2) contoh.</i></p> <p style="text-align: right;">[3 marks]
[3 markah]</p> <p>ii. Give TWO (2) differences between speed and velocity.
 <i>Berikan DUA (2) perbezaan antara laju dan halaju.</i></p> <p style="text-align: right;">[4 marks]
[4 markah]</p> |
| CLO1 | <p>(b) A car with constant acceleration 0.5 m/s^2 moves initially 60 m/s in 120 second. Calculate the:
 <i>Sebuah kereta dengan pecutan malar 0.5 m/s^2 bergerak dengan halaju awal 60 m/s dalam 120 saat. Kirakan:</i></p> <p>i. final velocity in m/s
 <i>halaju akhir dalam m/s</i></p> <p style="text-align: right;">[4 marks]
[4 markah]</p> <p>ii. distance travelled in meter, m
 <i>jarak yang dilalui dalam meter, m</i></p> <p style="text-align: right;">[4 marks]
[4 markah]</p> |

CLO1 (c)

Figure 2c(i) shows a motorcycle moves in a straight road. Its velocity increases from 12 m/s to 32 m/s in 10 seconds. It then maintains its velocity for 6 seconds before coming to rest in 4 seconds.

Rajah 2c(i) menunjukkan sebuah motosikal bergerak pada satu jalan lurus. Halajunya bertambah dari 12 m/s kepada 32 m/s dalam masa 10 saat. Ia kemudian mengekalkan halajunya selama 6 saat sebelum berhenti dalam masa 4 saat.

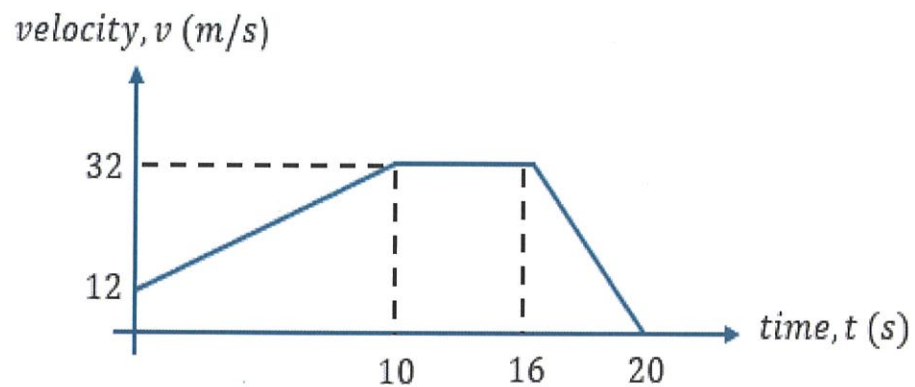


Figure 2(c)i./Rajah 2(c)i.

- i. Calculate the acceleration and deceleration of the motorcycle.

Kirakan pecutan dan nyahpecutan motosikal tersebut.

[6 marks]

[6 markah]

- ii. Calculate the total distance travelled.

Kirakan jumlah jarak yang dilalui.

[4 marks]

[4 markah]

QUESTION 3**SOALAN 3**

- CLO1 (a) i. Define potential energy and its SI unit.
Takrifkan tenaga keupayaan dan unit SI nya.
[2 marks]
[2 markah]
- ii. Define power and its SI unit.
Takrifkan kuasa dan unit SI nya.
[2 marks]
[2 markah]
- iii. State **FOUR (4)** types of renewable energy.
*Senaraikan **EMPAT (4)** jenis tenaga yang diperbaharui.*
[4 marks]
[4 markah]
- CLO1 (b) Nazrin with a mass of 80 kg hiked to the peak of a hill 95 m above the street level. The time required to reach the peak is 480 seconds.
Nazrin dengan jisim 80 kg mendaki puncak bukit pada ketinggian 95 m daripada aras jalan. Masa yang diperlukan untuk ke puncak adalah 480 saat.
- i. Calculate the work done by Nazrin.
Kirakan kerja yang dilakukan oleh Nazrin.
[4 marks]
[4 markah]
- ii. Calculate the power produced by Nazrin.
Kirakan kuasa yang dihasilkan oleh Nazrin.
[4 marks]
[4 markah]

- CLO1 (c) In a volleyball match, Nasuha makes a serve with a volleyball that has a mass of 0.2806 kg. The ball moves with a speed of 30 m/s and reaches highest position of 5 m.
- Dalam perlawanan bola tampar, Nasuha membuat servis dengan bola tampar yang berjisim 0.2806 kg. Bola tersebut bergerak dengan kelajuan 30 m/s dan mencapai kedudukan tertinggi 5 m.*
- i. Calculate the kinetic energy (E_K) and potential energy (E_P) of the ball.
- Kirakan tenaga kinetik (E_K) dan tenaga keupayaan (E_P) bola tersebut.*
- [6 marks]
[6 markah]
- ii. Calculate the total energy of the ball (E_T).
- Kirakan jumlah tenaga bola tersebut (E_T).*
- [3 marks]
[3 markah]

QUESTION 4**SOALAN 4**

- CLO1 (a) i. List **TWO (2)** characteristics of solids, liquid and gases.
Senaraikan DUA (2) ciri-ciri pepejal, cecair dan gas.
- [6 marks]
[6 markah]
- ii. State the definition and the SI unit of temperature.
Nyatakan definisi dan unit SI bagi suhu.
- [2 marks]
[2 markah]
- CLO1 (b) i. An aquarium with dimensions of $0.9\text{ m} \times 1.2\text{ m} \times 0.7\text{ m}$ has a mass of 8.4 kg. Calculate the density of the block.
Sebuah blok dengan dimensi $0.9\text{ m} \times 1.2\text{ m} \times 0.7\text{ m}$ mempunyai jisim 8.4 kg. Kirakan ketumpatan blok tersebut.
- [3 marks]
[3 markah]

- ii. Figure 4(b)ii shows a basic hydraulic system. A load of mass m (kg) is placed on the larger piston, which has a cross-sectional area of 0.4 m^2 . Calculate the mass of the load required to maintain equilibrium if the pressure is 9810 N/m^2 .

Rajah 4(b)ii menunjukkan satu sistem hidraulik asas. Satu beban berjisim m (kg) diletakkan pada omboh yang lebih besar, yang mempunyai luas keratan rentas 0.4 m^2 . Kirakan jisim beban yang diperlukan untuk mengekalkan keseimbangan jika tekanan ialah 9810 N/m^2 .

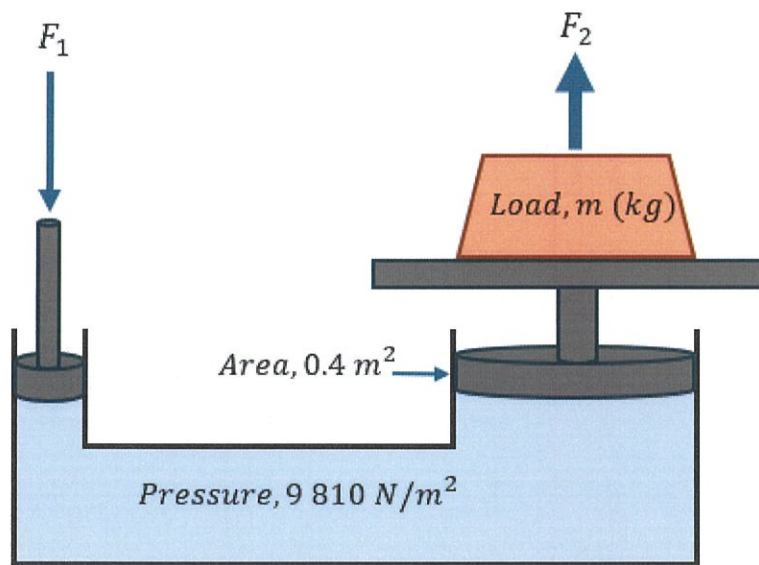


Figure 4(b)ii./Rajah 4(b)ii.

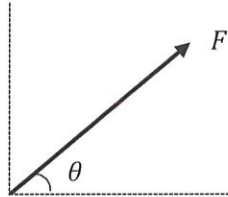
[5 marks]

[5 markah]

- CLO1 (c) i. Calculate the quantity of heat required to raise the temperature of 0.7 kg of sulfuric acid from 20°C to 70°C. (Given: specific heat capacity of sulfuric acid, $c_{\text{sulfuric}} = 1.42 \text{ kJ / kg}^\circ\text{C}$).
- Kirakan kuantiti haba yang diperlukan untuk menaikkan suhu 0.7 kg asid sulfurik daripada 20°C kepada 70°C. (Diberi: haba tentu asid sulfurik, $c_{\text{sulfurik}} = 1.42 \text{ kJ / kg}^\circ\text{C}$).*
- [3 marks]
[3 markah]
- ii. A brass plate of mass 1.2 kg is heated in an oven to 98°C. It is then transferred into 2.5 kg of water at 30°C. Determine the final temperature when thermal equilibrium is reached. Assume no heat loss to the surroundings.
- (Given the specific heat capacity of brass plate, $c_{\text{brass}} = 380 \text{ kJ / kg}^\circ\text{C}$ and specific heat capacity of water, $c_{\text{water}} = 4200 \text{ kJ / kg}^\circ\text{C}$).
- Satu plat Loyang berjisim 1.2 kg dipanaskan di dalam ketuhar sehingga mencapai suhu 98°C. Plat Loyang tersebut kemudian dimasukkan ke dalam 2.5 kg air yang bersuhu 30°C. Tentukan suhu akhir apabila keseimbangan terma tercapai. Anggapkan tiada kehilangan haba ke persekitaran.*
- (Diberi haba tentu bagi plat loyang, $c_{\text{loyang}} = 380 \text{ kJ / kg}^\circ\text{C}$ dan haba tentu bagi air, $c_{\text{air}} = 4200 \text{ kJ / kg}^\circ\text{C}$)*
- [6 marks]
[6 markah]

SOALAN TAMAT

**FORMULA DBS10042
ENGINEERING SCIENCE**

$g = 9.81 \text{ m/s}^2$	$W = F \times d$
$w = mg$	$W = mgh$
$v = u + at$	$W = Fd \cos \theta$
$s = ut + \frac{1}{2}at^2$	$F_x = F \cos \theta$ $F_y = F \sin \theta$  $F_R = \sqrt{(\sum F_x)^2 + (\sum F_y)^2}$ $\theta = \tan^{-1} \left(\frac{F_y}{F_x} \right)$
$s = \frac{1}{2}(u + v) t$	
$v^2 = u^2 + 2as$	
$F = ma$	
$F_g = mg$	
$F = mg \sin \theta$	$P = \frac{W}{t}$
$\rho = \frac{m}{V}$	$P = F \times v$
$\rho_{\text{relative}} = \frac{\rho_{\text{substance}}}{\rho_{\text{water}}}$	$P = \rho gh$
$M = F \times d$	$P = \frac{F}{A}$
$E_p = mgh$	$\frac{F_1}{A_1} = \frac{F_2}{A_2}$
$E_k = \frac{1}{2}mv^2$	$A_1 h_1 = A_2 h_2$
$\text{Efficiency} = \frac{P_{\text{output}}}{P_{\text{input}}} \times 100\%$	$F_B = \rho Vg$
$\text{Efficiency} = \frac{E_{\text{output}}}{E_{\text{input}}} \times 100\%$	$Q = mc\Delta\theta$
$\text{Efficiency} = \frac{W_{\text{output}}}{W_{\text{input}}} \times 100\%$	$Q = mL$
$\rho_{\text{water}} = 1000 \text{ kg/m}^3$	$C_{\text{water}} = 4200 \text{ J/kg}^\circ\text{C}$

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 feet (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)	$(\text{degrees F} - 32) \times 0.555$
Convert Celsius (C) to Fahrenheit (F)	$(\text{degrees C} \times 1.8) + 32$