

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 & KOMPUTER

PEPERIKSAAN AKHIR

SESI I : 2025/2026

FB10073 : PHYSICS 1

TARIKH : 05 DISEMBER 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

- (a) Physical quantities are defined as anything that can be measured. Figure 1(a) shows two vectors of $\vec{v}_1$ and $\vec{v}_2$ acted on particle O at origin.

Kuantiti fizik ditakrifkan sebagai apa-apa yang boleh diukur. Rajah 1(a) menunjukkan dua vektor iaitu $\vec{v}_1$ dan $\vec{v}_2$ bertindak pada zarah O pada asalan.

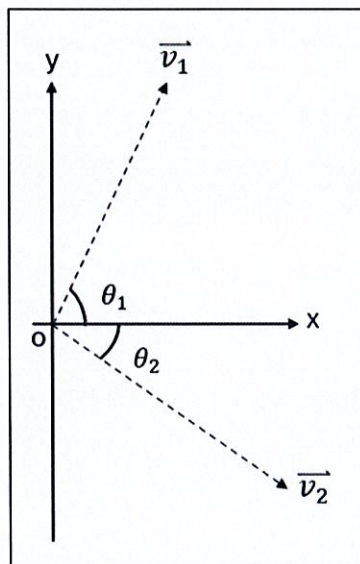


Figure 1(a) / Rajah 1(a)

- i. Express the magnitude of the resultant vectors on particle O into x-component and y-component.

Ungkapkan magnitud vektor yang terhasil pada zarah O kepada komponen-x dan komponen-y.

[5 marks]

[5 markah]

CLO2

- ii. Consider that $\vec{v}$ represent velocity, where $v = u + at$. Demonstrate whether the expression is dimensionally correct or incorrect.

Pertimbangkan bahawa $\vec{v}$ mewakili halaju, di mana $v = u + at$. Tunjukkan sama ada ungkapan itu betul atau salah dari segi dimensi.

[3 marks]

[3 markah]

CLO1

- (b) Figure 1(b) shows the v-t graph for the motion of an object moving in a straight line. The positive direction is to the right.

Rajah 1(b) menunjukkan graf v-t bagi gerakan objek yang bergerak dalam garis lurus. Arah positif adalah ke kanan.

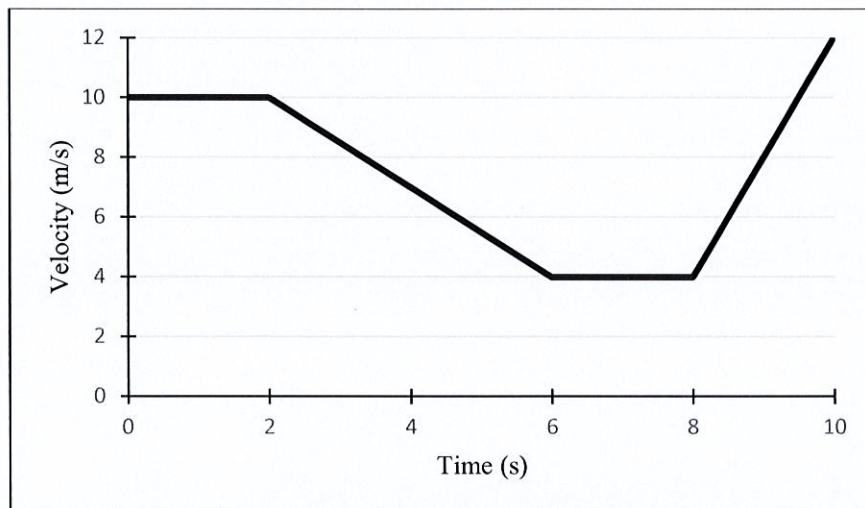


Figure 1(b) / Rajah 1(b)

- i. State **TWO (2)** differences between speed and velocity.

*Nyatakan **DUA (2)** perbezaan antara laju dan halaju.*

[4 marks]

[4 markah]

- ii. Explain qualitatively the motion of the object in Figure 1(b).

Terangkan secara kualitatif gerakan objek pada Rajah 1(b).

[4 marks]

[4 markah]

CLO2

- (c) A pellet is fired from an air rifle at a speed of 180 m/s towards a stack of cardboard with 12 cm thickness. It emerges with a speed of 150 m/s.

Sebuah pelet dilepaskan daripada senapang angin pada kelajuan 180 m/s ke arah timbunan kadbod dengan ketebalan 12 cm. Kemudian, halajunya menjadi 150 m/s.

- i. Calculate the acceleration and direction through the cardboard.

Kira pecutan dan arah melalui kadbod.

[5 marks]

[5 markah]

- ii. Calculate time taken to get through the cardboard.

Kira masa yang diambil untuk melalui kadbod itu.

[4 marks]

[4 markah]

QUESTION 2

SOALAN 2

CLO1

- (a) i. Figure 2(a) i. shows work done by forces on an object on a horizontal surface. Label the name of the work done accordingly.

Rajah 2(a) i. menunjukkan kerja yang dilakukan oleh daya yang bertindak ke atas objek pada permukaan mengufuk. Labelkan nama kerja yang dilakukan dengan sewajarnya.

[5 marks]

[5 markah]

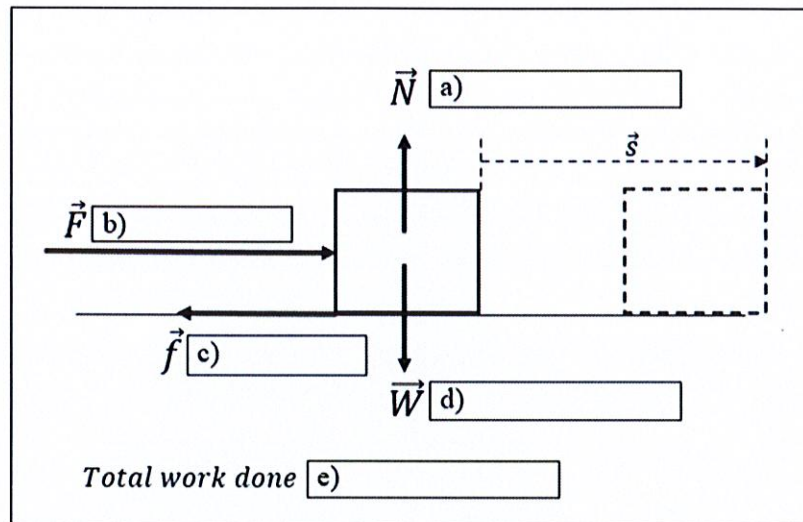


Figure 2(a) i. / Rajah 2(a) i.

- ii. Compare **TWO (2)** differences between conservative and non-conservative forces with **ONE (1)** example.

Bandingkan DUA (2) perbezaan antara daya konservatif dan bukan konservatif beserta SATU (1) contoh.

[5 marks]

[5 markah]

CLO2

- (b) A 5.0 kg block is placed 1.5 m directly above the top end of a vertical spring as shown in Figure 2(b). It has a spring constant of 1750 N/m. Calculate the maximum compression undergone by the spring when the object falls on it.

Sebuah bongkah 5.0 kg diletakkan 1.5 m tepat di atas hujung atas spring menegak seperti ditunjukkan dalam Rajah 2(b). Spring mempunyai pemalar spring 1750 N/m. Kirakan mampatan maksimum yang dilalui oleh spring apabila objek jatuh di atasnya.

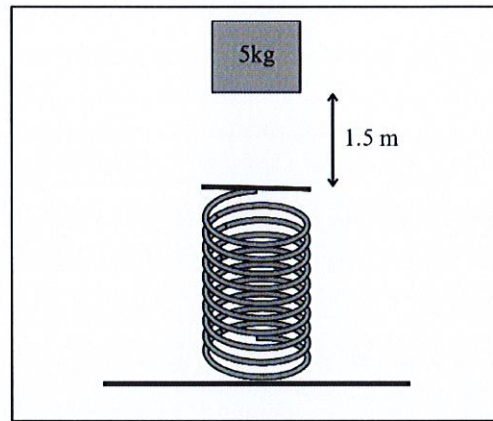


Figure 2(b) / Rajah 2(b)

[7 marks]

[7 markah]

CLO2

- (c) i. An object of mass 2.0 kg travels along horizontal floor under the action of a force F . The Figure 2(c) shows the graph of F against displacement x . The speed of the object at $s = 0$ is 10 ms^{-1} . Determine the speed of the object at $s=10 \text{ m}$.

Sebuah objek berjisim 2.0 kg bergerak secara mengufuk sepanjang lantai di bawah tindakan daya F . Rajah 2(c) menunjukkan graf F melawan sesaran x . Kelajuan objek pada $s=0$ ialah 10 ms^{-1} . Tentukan kelajuan objek pada $s=10 \text{ m}$.

[4 marks]

[4 markah]

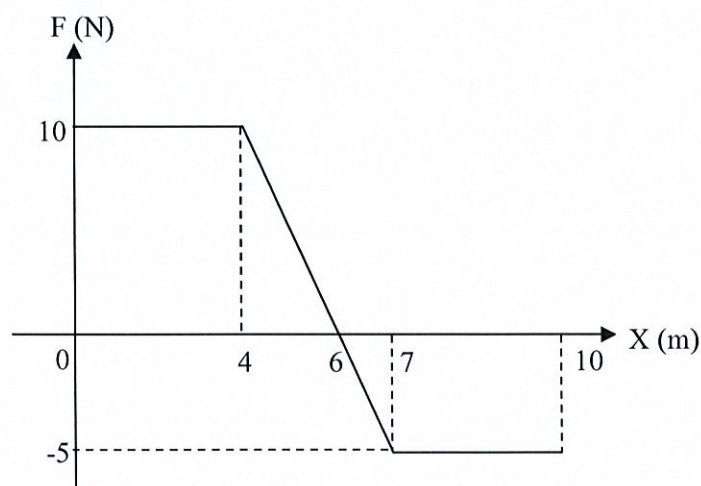


Figure 2(c) / Rajah 2 (c)

- ii. A 120 kg motorcycle accelerates uniformly from rest to 25 ms^{-1} in 5 s. Calculate the instantaneous power of the motorcycle at time $t = 3 \text{ s}$.

Sebuah motosikal 120 kg memecut secara seragam dari pegun kepada 25 ms^{-1} dalam 5 s. Hitung kuasa segera motosikal itu pada masa $t = 3 \text{ s}$.

[4 marks]

[4 markah]

QUESTION 3

SOALAN 3

- CLO1 (a) i. Define the average angular velocity and average angular acceleration and its unit.

Takrifkan purata halaju sudut dan purata pecutan sudut dan unit-unitnya.

[4 marks]

[4 markah]

- ii. Given that s , v , and a are quantities related to linear motion. Copy and complete the Table 3(a)(ii) with the corresponding quantities in rotational motion and their relationships.

Diberi bahawa s , v , dan a ialah kuantiti yang berkaitan dengan gerakan linear. Salin dan lengkapkan Jadual 3(a)(ii) dengan kuantiti yang sepadan dalam gerakan putaran dan hubungannya.

Linear motion	Rotational Motion	Relationship
s		
v		
a		

Table 3(a)(ii) / Jadual 3(a)(ii)

[6 marks]

[6 markah]

- CLO1 (b) Assume that a car is parked on a bridge as depicted in Figure 3(b). The car weighs 1325 kg, which acts on its centre of gravity. The bridge weighs 297 kg m^{-1} , which is evenly distributed. The bridge is assumed to be rigid.

Andaikan bahawa sebuah kereta berada di atas jambatan seperti yang digambarkan dalam Rajah 3(b). Kereta itu mempunyai berat 1325 kg, yang bertindak pada pusat gravitinya. Jambatan itu seberat 297 kgm^{-1} , yang diagihkan sama rata. Jambatan itu diandaikan adalah tegar.

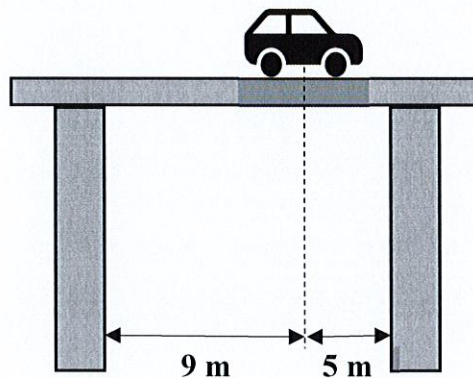


Figure 3(b) / Rajah 3(b)

What are the reaction forces on the supports at both ends of the bridge?

Apakah daya tindak balas pada penyokong di kedua-dua hujung jambatan?

[7 marks]

[7 markah]

CLO2

- (c) A cylindrical roller with a mass of 3.2 kg revolves at 1750 revolutions per minute. If the cross section of the roller has a diameter of 36.0 cm.

$$\left[\text{moment of inertia of cylindrical drum} = \frac{1}{2}mr^2 \right]$$

Sebuah penggelek silinder berjisim 3.2 kg berputar pada 1750 putaran seminit.

Jika keratan rentas penggelek mempunyai diameter 36.0 cm.

$$\left[\text{momen inersia bagi dram silinder} = \frac{1}{2}mr^2 \right]$$

- i. Calculate the angular momentum of the cylindrical roller.
Kira momentum sudut penggelek silinder

[4 marks]

[4 markah]

- ii. Determine the torque required to stop the cylindrical roller in 7.0 seconds.
Tentukan tork yang diperlukan untuk menghentikan penggelek silinder dalam 7.0 saat.

[4 marks]

[4 markah]

QUESTION 4

SOALAN 4

CLO1

- (a) i. The equation of stationary/standing wave is given as

Diberi persamaan gelombang pegun adalah

$$y = 4 \cos\left(\frac{\pi}{10}x\right) \sin(50\pi t)$$

where y and x are in meter and t is in second. What is its amplitude, wave number and angular frequency of the waves?

di mana y dan x adalah dalam meter dan t adalah dalam saat. Apakah amplitud, nombor gelombang dan frekuensi sudut gelombang?

[3 marks]

[3 markah]

- ii. The Figure 4(a)(ii) shows the pattern of a standing wave.

Rajah 4(a)(ii) menunjukkan corak gelombang pegun.

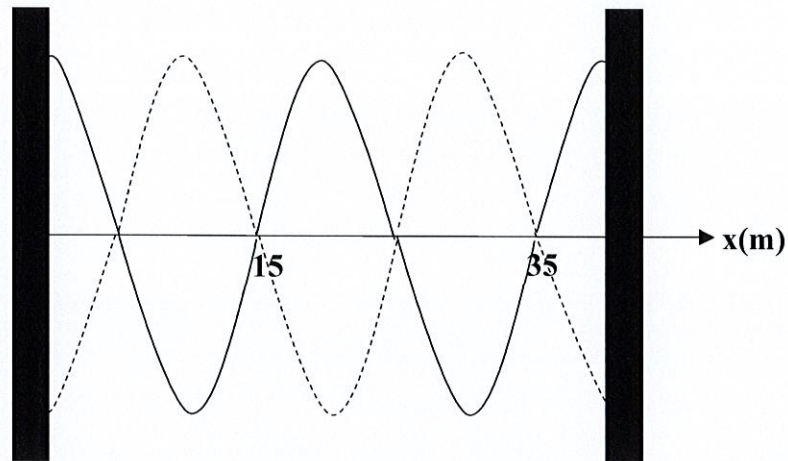


Figure 4(a)ii. / *Rajah 4(a)ii.*

Based on the Figure 4(a)(ii), state

Berdasarkan Rajah 4(a)(ii), nyatakan

- The number of nodes
Bilangan titik nod
- The number of antinodes
Bilangan titik antinod
- Half-wavelength
Sepuluh panjang gelombang
- Wavelength
Panjang gelombang

[4 marks]

[4 markah]

- CLO2 (b) A 160 cm long string of mass 9.0 g oscillates at 190 Hz with its harmonic number, $n=3$ and a maximum amplitude of 5.0 mm. Determine the wavelength of the standing wave as well as the tension in the string.
- Satu tali panjang berukuran 160 cm dan berjisim 9.0 g telah mengalami getaran pada kadar 190 Hz dengan nombor harmoniknya, $n=3$ beserta amplitud maksimum 5.0 mm. Tentukan panjang gelombang pegun dan tegangan dalam tali.*
- [8 marks]
[8 markah]
- CLO2 (c) A train approaching a person standing near the track at a speed of 180 kmh^{-1} generates a sound with a frequency of 1.5 kHz. [Assume the speed of sound is 340 ms^{-1}]
- Sebuah kereta api telah menghampiri seseorang yang berdiri berhampiran landasan pada kelajuan 180 kmj^{-1} menghasilkan bunyi dengan frekuensi 1.5 kHz. [Andaikan kelajuan bunyi ialah 340 ms^{-1}].*
- i. Determine the frequency of the sound heard by the person when the train is approaching and when the train moves away.
- Tentukan nilai frekuensi bunyi yang didengari oleh orang tersebut apabila kereta api menghampirinya dan apabila kereta api bergerak pergi menjauhinya.*
- [7 marks]
[7 markah]
- ii. Calculate the percentage change in the frequency of the sound heard by the person as the train passes by.
- Kirakan peratus perubahan frekuensi bunyi yang didengari oleh orang itu selepas kereta api itu berlalu.*
- [3 marks]
[3 markah]

SOALAN TAMAT

FORMULA PHYSICS 1

Physical Quantities and Measurements	
$\vec{A} \cdot \vec{B} = AB \cos \theta$	$\vec{A} \times \vec{B} = AB \sin \theta$
Kinematics of Linear Motion	
$v = u + at$	$s = ut + \frac{1}{2}at^2$
$v^2 = u^2 + 2as$	$s = \frac{1}{2}(u + v)t$
$g = 9.81 \text{ ms}^{-2}$	
Dynamics of Linear Motion	
$p = mv$	$J = F\Delta t$
$J = \Delta p = mv - mu$	$f = \mu N$
Work, Energy and Power	
$w = mg$	$W = Fs$
$F = ma$	$P = Fv$
$W = Fs \cos \theta$	$P = \frac{\Delta E}{\Delta t}$
$P = \frac{W}{t} = \frac{\Delta E}{\Delta t}$	$K = \frac{1}{2}mv^2$
$\eta = \frac{P_{out}}{P_{in}} \times 100\%$	$U = mgh$
$W_{total} = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$	$U_s = \frac{1}{2}kx^2 = \frac{1}{2}Fx$
$W = U_f - U_i$	$F = kx$
$E = K + U$	
Circular Motion	
$s = r\theta$	$v = r\omega$
$f = \frac{1}{T}$	$\omega = \frac{\Delta \theta}{\Delta t}$
$\omega = \frac{2\pi}{T} = 2\pi f$	$a_c = \frac{v^2}{r} = r\omega^2 = v\omega$
$F_c = \frac{mv^2}{r} = mr\omega^2 = mv\omega$	

Rotation of Rigid Body	
$v = r\omega$	$s = r\theta$
$\alpha = \frac{\Delta\omega}{\Delta t}$	$a_t = r\alpha$
$\tau = F \times r$	$\omega = \omega_0 + \alpha t$
$\tau = rF \sin \theta$	$\theta = \omega_0 t + \frac{1}{2}\alpha t^2$
$I = \sum mr^2$	$\omega^2 = \omega_0^2 + 2\alpha\theta$
$I = mr^2\alpha$	$\theta = \frac{1}{2}(\omega_0 + \omega)t$
$\tau = I\alpha$	$I_{ring} = MR^2$
$P = \tau\omega$	$I_{disc/solid\ cylinder} = \frac{1}{2}MR^2$
$L = I\omega$	$I_{solid\ sphere} = \frac{2}{5}MR^2$
$K = \frac{1}{2}I\omega^2$	$I_{hollow\ sphere} = \frac{2}{3}MR^2$
$W = \tau\theta$	$I_{rod} = \frac{1}{12}ML^2$
$K = \frac{1}{2}m\omega^2(A^2 - x^2)$	
Oscillations and Waves	
$x = A \sin \omega t$	$\frac{d(\sin x)}{dt} = \cos x ; \quad \frac{d(\cos x)}{dt} = -\sin x$
$v = \frac{dy}{dt} = \omega A \cos \omega t = \pm \omega \sqrt{A^2 - x^2}$	$a = \frac{dv}{dt} = \frac{d^2x}{dt^2} = -A\omega^2 \sin \omega t = -\omega^2 x$
$y(x, t) = A \sin(\omega t \pm kx)$	$y = A \cos kx \sin \omega t$
$v_y = A\omega \cos(\omega t \pm kx)$	$v = \sqrt{\frac{T}{\mu}}$
$v = \omega A$	$F = kx$
$\omega = 2\pi f$	$E = \frac{1}{2}m\omega^2 A^2$
$a = -\omega^2 x$	$U = \frac{1}{2}m\omega^2 x^2$
$f_n = \frac{nv}{2L}$	$f = \frac{1}{T}$
$f_n = \frac{n}{2L} \sqrt{\frac{T}{\mu}}$	$v = f\lambda$
$k = \frac{2\pi}{\lambda}$	$T = 2\pi \sqrt{\frac{l}{g}} ; \quad T = 2\pi \sqrt{\frac{m}{k}}$
$\mu = \frac{m}{l}$	$f_a = \left(\frac{v \pm v_0}{v \mp v_s} \right) f$