



**KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI**

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

JABATAN KEJURUTERAAN MEKANIKAL

PEPERIKSAAN AKHIR

SESI II : 2025/2026

DJJ30093: ENGINEERING MECHANICS

TARIKH : 11 MEI 2026

MASA : 02.30 PETANG – 04.30 PETANG (2 JAM)

Kertas ini mengandungi **LAPAN (8)** 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 struktur. Jawab **SEMUA** soalan.

QUESTION 1**SOALAN 1**

- CLO1 (a) Describe the differences between the scalar quantity and vector quantity, and give **TWO (2)** examples for each quantity.

Huraikan perbezaan antara kuantiti skalar dan kuantiti vektor serta berikan DUA (2) contoh bagi setiap kuantiti.

[4 marks]

[4 markah]

- CLO1 (b) Figure 1(b) is subjected to three force, F_1 , F_2 and F_3 . Calculate:

Rajah 1(b) dikenakan tiga daya, iaitu F_1 , F_2 dan F_3 . Hitungkan:

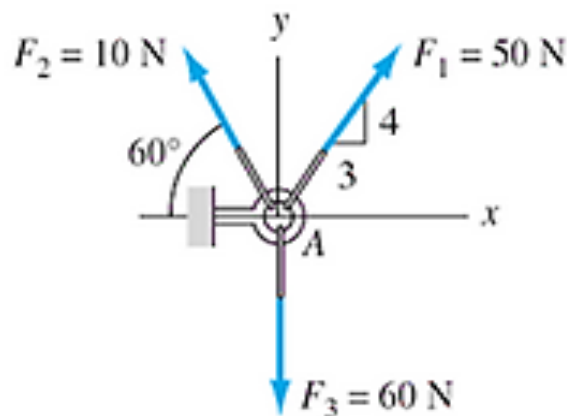


Figure 1(b) / Rajah 1(b)

- i. each force into component x and y.
setiap daya kepada pada komponen x dan y.

[5 marks]

[5 markah]

- ii. the magnitude of resultant force.
magnitud daya paduan.

[2 marks]

[2 markah]

- iii. the direction of the three concurrent forces.
arah bagi tiga daya yang bertemu pada satu titik.

[2 marks]

[2 markah]

CLO1

- (c) Figure 1(c) shows a load of 10kg hanging in equilibrium, take $\theta = 64.3^\circ$.
Rajah 1(c) menunjukkan satu jisim 10 kg tergantung dalam keadaan keseimbangan, dengan sudut $\theta = 64.3^\circ$.

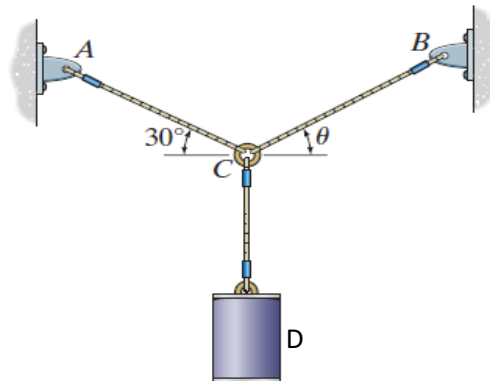


Figure 1(c) / Rajah 1(c)

- i. Draw and label the Free Body Diagram.
gambarajah Badan Bebas.

[2 marks]

[2 markah]

- ii. Approximate the tension forces in wire AC and CB.
Anggarkan daya tegangan dalam wayar AC dan CB.

[10 marks]

[10 markah]

QUESTION 2

SOALAN 2

CLO2

- (a) Figure 2(a) shows a truss member with load $F = 10\text{ kN}$ at joint C. Calculate:

Rajah 2(a) menunjukkan satu anggota kekuda dengan beban $F = 10\text{ kN}$ pada sendi C. Hitungkan:

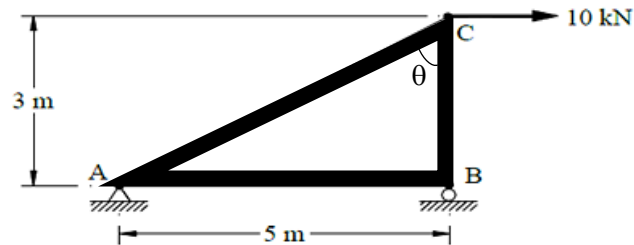


Figure 2(a) / Rajah 2(a)

- i. the external force at support B.
daya luar pada penyokong B.

[3 marks]

[3 markah]

- ii. the external force at support A.
daya luar pada penyokong A.

[3 marks]

[3 markah]

- iii. the internal force in member AC and BC.
daya dalaman dalam anggota AC dan BC.

[5 marks]

[5 markah]

CLO2

- (b) The *Howe bridge truss* is subjected to the loading shown in Figure 2(b). Determine:

Kekuda jambatan Howe tertakluk kepada beban yang ditunjukkan dalam rajah 2(b). Tentukan:

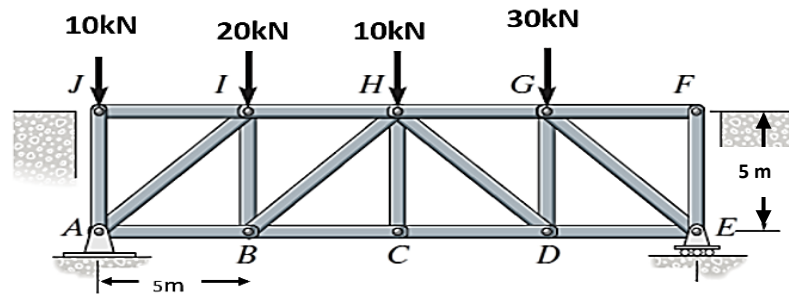


Figure 2(b) / Rajah 2(b)

- i. the external force in support A and E.

daya luaran pada sokongan A dan E

[5 marks]

[5 markah]

- ii. The forces in members *HI*, *HB*, and *BC*, and indicate whether they are in tension or compression.

Daya dalam ahli HI, HB, dan BC, dan nyatakan sama ada anggota berada dalam ketegangan atau mampatan.

[9 marks]

[9 markah]

QUESTION 3**SOALAN 3**

CLO1

- (a) Describe the definition of kinematics.

Huraikan definisi kinematik.

[4 marks]

[4 markah]

CLO1

- (b) A car is travelling at a speed of 80 m/s when the brakes are suddenly applied, causing a constant deceleration of 10 m/s^2 . Express:

Sebuah kereta sedang bergerak pada kelajuan 80 m/s apabila brek ditekan secara tiba-tiba, menyebabkan nyahpecutan berterusan sebanyak 10 m/s^2 .

Nyatakan:

- i. time required to stop the car.

Masa yang diperlukan untuk memberhentikan kereta.

[4 marks]

[4 markah]

- ii. the distance travelled before stopping.

Jarak yang dilalui sebelum berhenti.

[4 marks]

[4 markah]

CLO1

- (c) vehicle starts moving from rest and accelerates uniformly for 40 seconds and reaches a velocity of 15 m/s at the end of the acceleration. Its velocity is maintained for 150 seconds and then it decelerates to stop within 60 seconds.

Sebuah kenderaan mula bergerak dari keadaan rehat dan memecut secara seragam selama 40 saat sehingga mencapai halaju 15 m/s pada akhir pecutan tersebut. Halajunya dikekalkan selama 150saat dan ia kemudiannya menyahpecut untuk berhenti dalam masa 60 saat.

- i. Sketch a velocity (v) against time (t) graph for the whole journey

Lakarkan graf halaju(v) melawan masa (t) bagi keseluruhan perjalanan

[5 marks]

[5 markah]

- ii. Calculate the acceleration and the deceleration of the vehicle.

Kirakan pecutan dan nyahpecutan kenderaan tersebut.

[4 marks]

[4 markah]

- iii. Calculate the total distance of the journey.

Kirakan jumlah jarak perjalanan tersebut.

[4 marks]

[4 markah]

QUESTION 4**SOALAN 4**

- CLO1 (a) Describe the definition of work and energy.
Huraikan definisi kerja dan tenaga.
- [4 marks]
[4 markah]
- CLO1 (b) A 70N force shown in Figure 4(b) is applied horizontally to a 10 kg block at rest for a net displacement of 200m across a frictionless surface. Express:
Daya 70N yang ditunjukkan dalam Rajah 4(b) dikenakan secara mendatar pada bongkah 10 kg dalam keadaan diam untuk sesaran bersih 200m merentasi permukaan tanpa geseran. Nyatakan:

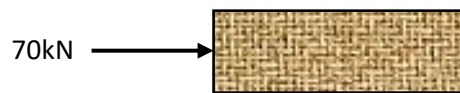


Figure 4(b) / Rajah 4

- i. the unit of Work Done
unit bagi Kerja (Work Done)
- [1 marks]
[1 markah]
- ii. the work done by the block
kerja yang dilakukan oleh blok
- [3 marks]
[3 markah]
- iii. the final speed of the block by using the work and energy principle.
Kelajuan akhir bongkah itu dengan menggunakan prinsip kerja dan tenaga.
- [4 marks]
[4 markah]

CLO1

- (c) A 50 kg block shown in Figure 4(c) rests on a horizontal plane for which the coefficient of kinetic friction is 0.30. If the crate is subjected to a 400N towing force as shown.

Sebuah bongkah 50 kg yang ditunjukkan dalam rajah 4(c) terletak pada satah mengufuk dengan pekali geseran kinetik ialah 0.30. Jika bongkah dikenakan daya tarikan 400N seperti yang ditunjukkan.

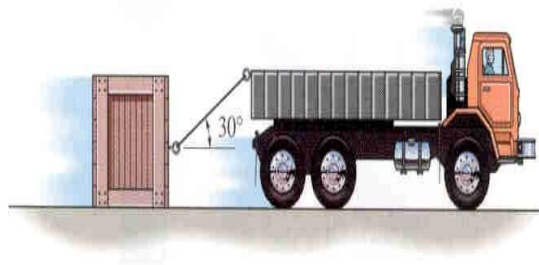


Figure 4(c) / Rajah 4 (c)

- i. Show the Free Body Diagram.

Tunjukkan Rajah Badan Bebas.

[4 marks]

[4 markah]

- ii. Calculate the normal force of the block.

Hitungkan daya normal bagi blok tersebut.

[3 marks]

[3 markah]

- iii. Solve the velocity of the crate in 5 sec starting from rest.

Selesaikan halaju bongkah dalam 5 saat bermula dari pegun.

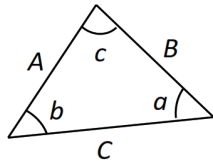
[6 marks]

[6 markah]

SOALAN TAMAT

STATICS

1. TRIANGLE RULE



Sine law:

$$\frac{A}{\sin a} = \frac{B}{\sin b} = \frac{C}{\sin c}$$

Cosine law:

$$C = \sqrt{A^2 + B^2 - 2AB \cos c}$$

2. ADDITION OF SYSTEM OF COPLANAR FORCE

$$\left(\vec{} \right) \Sigma F_x = F_{1x} + F_{2x} - F_{3x}$$

$$(+\uparrow) \Sigma F_y = F_{1y} - F_{2y} + F_{3y}$$

$$F_R = \sqrt{(\Sigma F_x)^2 + (\Sigma F_y)^2}$$

$$\theta = \tan^{-1} \left(\frac{\Sigma F_y}{\Sigma F_x} \right)$$

3. CARTESIAN VECTOR

$$\mathbf{F} = F_x \mathbf{i} + F_y \mathbf{j} + F_z \mathbf{k}$$

$$\mathbf{u}_A = \frac{\mathbf{F}}{F} = \frac{F_x}{F} \mathbf{i} + \frac{F_y}{F} \mathbf{j} + \frac{F_z}{F} \mathbf{k}$$

$$\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1$$

$$\mathbf{F}_R = \Sigma \mathbf{F} = \Sigma F_x \mathbf{i} + \Sigma F_y \mathbf{j} + \Sigma F_z \mathbf{k}$$

$$\mathbf{r} = (x_B - x_A) \mathbf{i} + (y_B - y_A) \mathbf{j} + (z_B - z_A) \mathbf{k}$$

$$\mathbf{F} = F \mathbf{u} = F \frac{\mathbf{r}}{r}$$

4. EQUILIBRIUM OF PARTICLE

$$\Sigma \mathbf{F} = 0$$

$$F = ks$$

DYNAMICS

1. RECTILINEAR MOTION OF PARTICLES

$$v = \frac{ds}{dt}$$

$$a = \frac{dv}{dt}$$

$$a ds = v dv$$

2. UNIFORM RECTILINEAR MOTION

- *a constant:*

$$v = u + at$$

$$v^2 = u^2 + 2as$$

$$s = ut + \frac{1}{2}at^2$$

$$s = \frac{1}{2}(v + u)t$$

$$v = r\omega$$

$$a = r\alpha$$

$$\omega = \frac{2\pi N}{60}$$

3. WORK OF FORCE

$$U_{1-2} = (F \cos \alpha) \Delta s$$

4. KINETIC ENERGY OF PARTICLE

$$KE = \frac{1}{2}mv^2$$

$$U_{1-2} = T_2 - T_1$$

5. POTENTIAL ENERGY

$$PE = mgh$$

6. ANGULAR MOTION

$$\omega_2 = \omega_1 + \alpha t \quad \theta = \omega_1 t + \frac{1}{2} \alpha t^2$$

$$\omega_2^2 = \omega_1^2 + 2\alpha\theta \quad \theta = \frac{1}{2}(\omega_2 + \omega_1)t$$