

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

DBM10163: ENGINEERING MATHEMATICS 1

TARIKH : 27 NOVEMBER 2025

MASA : 8.30 AM – 10.30 AM (2 JAM)

Kertas ini mengandungi **ENAM (6)** halaman bercetak.

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Kertas Graf, 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**

CLO 1

a)

- i. Simplify the following expressions.

Mudahkan ungkapan berikut

$$\frac{8n}{27n^2 + 9n} \div \frac{10n}{21n + 7}$$

[4 marks]

[4 markah]

CLO 2

- ii. Solve, $3x^2 - 12x = -3$ by using completing the square method.

Selesaikan, $3x^2 - 12x = -3$ dengan menggunakan kaedah penyempurnaan kuasa dua.

[6 marks]

[6 markah]

CLO 2

- b) Solve the following partial fraction.

Selesaikan pecahan separa berikut.

$$\frac{5x + 13}{x^2 + 4x - 5}$$

[7 marks]

[7 markah]

- CLO 1 c) Diagram 1 (c) shows a quadrilateral PQRS. Calculate:
Rajah 1 (c) menunjukkan segiempat PQRS. Kirakan:

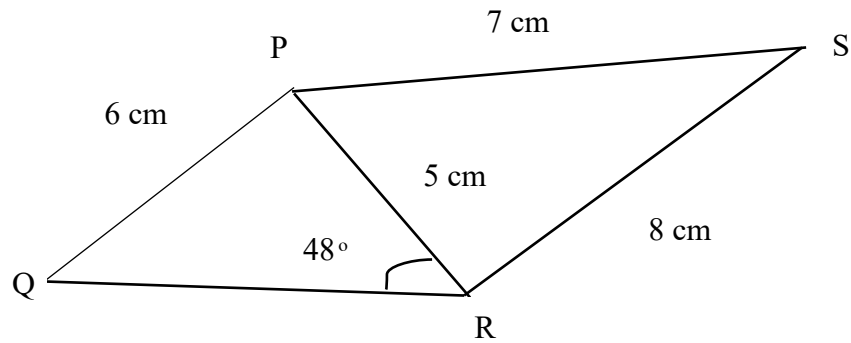


Diagram 1(c) / *Rajah 1 (c)*

- i. $\angle PSR$

[4 marks]

[4 markah]

- ii. $\angle PQR$

[4 marks]

[4 markah]

QUESTION 2

SOALAN 2

- CLO 1 a) Given that $w = 6 + 2i$, $x = -3 - 2i$ and $y = -2 - 3i$. Express each of the following:
- Diberi $w = 6 + 2i$, $x = -3 - 2i$ dan $y = -2 - 3i$. Ungkapkan yang berikut:*
- i. $5w+3x$ [3 marks]
[3 markah]
- ii. y^2 [4 marks]
[4 markah]
- CLO 2 b) Draw the Argand Diagram for $T = 6 - 8i$ using graph paper. Then, write the modulus and argument from the diagram.
- Lukis rajah Argand $T = 6 - 8i$ menggunakan kertas graf. Kemudian, tulis modulus dan argumen daripada rajah.*
- [6 marks]
[6 markah]
- CLO 2 c) Change the complex number below in term as stated in the bracket:
- Tukarkan persamaan nombor kompleks berikut dalam persamaan yang dinyatakan seperti dalam kurungan:*
- i. $Z = 5.34 - 8.1i$ (polar form)
(*bentuk polar*) [6 marks]
[6 markah]
- ii. $Z = -27 + 3.5i$ (trigonometric form)
(*bentuk trigonometrik*) [6 marks]
[6 markah]

QUESTION 3

SOALAN 3

CLO 1 a) Given matrix $A = \begin{bmatrix} 2 & -3 & 5 \\ 7 & 2 & 10 \end{bmatrix}$, $B = \begin{bmatrix} 7 & 6 & 8 \\ 0 & 6 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 3 \\ 4 & 3 \\ 0 & 1 \end{bmatrix}$, indicate:

Diberi matrik $A = \begin{bmatrix} 2 & -3 & 5 \\ 7 & 2 & 10 \end{bmatrix}$, $B = \begin{bmatrix} 7 & 6 & 8 \\ 0 & 6 & 3 \end{bmatrix}$ *dan* $C = \begin{bmatrix} 2 & 3 \\ 4 & 3 \\ 0 & 1 \end{bmatrix}$, *tunjukkan:*

i. The element of A_{23} , B_{12} , C_{32} , C_{22}

Unsur pada A_{23} , B_{12} , C_{32} , C_{22}

[4 mark]

[4 markah]

ii. $C^T + B - A$

[5 marks]

[5 markah]

CLO 2 b) Given that $A = \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ and $|AB| = 3$, calculate $(AB)^{-1}$

Diberi $A = \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ *dan* $|AB| = 3$, *kirakan* $(AB)^{-1}$

[5 marks]

[5 markah]

CLO 2 c) Calculate the values of x , y and z for the following linear simultaneous equation by using Cramer's Rule.

Kirakan nilai x , y *dan* z *bagi persamaan linear serentak berikut dengan menggunakan kaedah Cramer's Rule.*

$$3x + 2y + z = 4$$

$$2x - 3y + 3z = 6$$

$$x + 4y - z = -5$$

[11 marks]

[11 markah]

QUESTION 4

SOALAN 4

CLO 1

a) Given that $\vec{P} = 3i - 4j$, $\vec{Q} = 5i + 2j$, and $\vec{R} = -i + 3j$

Diberi $\vec{P} = 3i - 4j$, $\vec{Q} = 5i + 2j$, dan $\vec{R} = -i + 3j$

i. Express vector unit for $\vec{P} - \vec{Q}$

Ungkapkan unit vector bagi $\vec{P} - \vec{Q}$

[5 marks]

[5 markah]

ii. Represent vector $\vec{P} + \vec{R}$ by using Parallelogram method.

Menunjukkan vector $\vec{P} + \vec{R}$ menggunakan kaedah Segiempat Selari.

[5 marks]

[5 markah]

CLO 2

b) Given that $A = i - j + 3k$, $B = 7i + 4j + 5k$ and $C = 3i + 6j + 7k$. Calculate:

Diberi $A = i - j + 3k$, $B = i + 4j + 5k$ and $C = 3i + 6j + 7k$. Kira:

i. Angle between \overrightarrow{AB} and \overrightarrow{BC}

Sudut antara \overrightarrow{AB} dan \overrightarrow{BC}

[10 marks]

[10 markah]

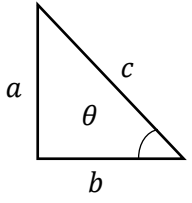
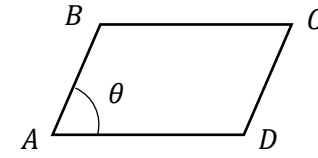
ii. Area of triangle ABC

Luas segitiga ABC

[5 marks]

[5 markah]

SOALAN TAMAT

<p><u>QUADRATIC EQUATION</u></p> <ol style="list-style-type: none"> Quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ Completing the square, $\left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2 + c = 0$ 	<p><u>COMPLEX NUMBER</u></p> <ol style="list-style-type: none"> Modulus of $z = \sqrt{a^2 + b^2}$ Argument of $z = \tan^{-1}\left(\frac{b}{a}\right)$ Cartesian Form, $z = a + bi$ Polar Form, $z = r\angle\theta$ Exponential Form, $z = re^{\theta i}$ Trigonometric Form, $z = r(\cos\theta + i \sin\theta)$ Multiplication of complex number $z_1 \times z_2 = z_1 \cdot z_2 \angle(\theta_1 + \theta_2)$ Division of complex number $\frac{z_1}{z_2} = \frac{ z_1 }{ z_2 } \angle(\theta_1 - \theta_2)$
<p><u>TRIGONOMETRY</u> <u>Pythagoras' Theorem</u></p>  $c^2 = a^2 + b^2$ <p><u>Trigonometric Identities</u></p> <ol style="list-style-type: none"> $\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\cos^2\theta + \sin^2\theta = 1$ $1 + \tan^2\theta = \sec^2\theta$ $1 + \cot^2\theta = \operatorname{cosec}^2\theta$ <p><u>Compound Angle</u></p> <ol style="list-style-type: none"> $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$ $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$ <p><u>Double Angle</u></p> <ol style="list-style-type: none"> $\sin 2A = 2 \sin A \cos A$ $\cos 2A = \cos^2 A - \sin^2 A$ $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$ <p><u>Formula of Triangle</u></p> <ol style="list-style-type: none"> Sine Rules; $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ Cosine Rules; $a^2 = b^2 + c^2 - 2bc \cos A$ Area of Triangle = $\frac{1}{2} ab \sin C$ 	<p><u>MATRIX</u></p> <ol style="list-style-type: none"> Cofactor, $C = (-1)^{i+j} M_{ij}$ Adjoint, $\operatorname{Adj}(A) = C^T$ Inverse of Matrix, $A^{-1} = \frac{1}{ A } \operatorname{Adj}(A)$ Cramer's Rule, $x = \frac{ A_1 }{ A }, \quad y = \frac{ A_2 }{ A }, \quad z = \frac{ A_3 }{ A }$ <p><u>VECTOR AND SCALAR</u></p> <ol style="list-style-type: none"> Unit Vector, $\hat{u} = \frac{\vec{u}}{ u }$ $\cos\theta = \frac{\vec{A} \cdot \vec{B}}{ A B }$ Scalar (dot) Product, $\vec{A} \cdot \vec{B} = a_1 a_2 + b_1 b_2 + c_1 c_2$ Vector (cross) Product, $\vec{A} \times \vec{B} = \begin{vmatrix} i & j & k \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}$ Area of parallelogram ABCD $A = \vec{AB} \times \vec{AD}$  Area of triangle ABC $A = \frac{1}{2} \vec{AB} \times \vec{AC}$ 