

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 PAGI – 10.30 PAGI (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:

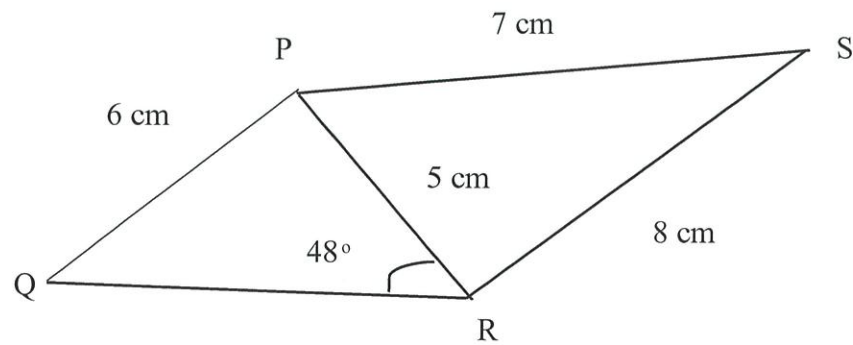


Diagram 1(c) / *Rajah 1 (c)*

- 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.*
- $$\begin{aligned} 3x + 2y + z &= 4 \\ 2x - 3y + 3z &= 6 \\ x + 4y - z &= -5 \end{aligned}$$
- [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 $A = i - j + 3k$, $B = 7i + 4j + 5k$ 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

FORMULA SHEET FOR ENGINEERING MATHEMATICS 1 (DBM10163)

QUADRATIC EQUATION

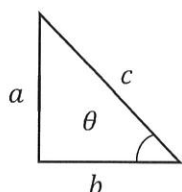
1. Quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2. Completing the square,

$$\left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2 + c = 0$$

TRIGONOMETRY

Pythagoras' Theorem



$$c^2 = a^2 + b^2$$

Trigonometric Identities

1. $\tan \theta = \frac{\sin \theta}{\cos \theta}$
2. $\cos^2 \theta + \sin^2 \theta = 1$
3. $1 + \tan^2 \theta = \sec^2 \theta$
4. $1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$

Compound Angle

1. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
2. $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
3. $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$

Double Angle

1. $\sin 2A = 2 \sin A \cos A$
2. $\cos 2A = \cos^2 A - \sin^2 A$
3. $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$

Formula of Triangle

1. Sine Rules; $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
2. Cosine Rules; $a^2 = b^2 + c^2 - 2bc \cos A$
3. Area of Triangle = $\frac{1}{2} ab \sin C$

COMPLEX NUMBER

1. Modulus of $z = \sqrt{a^2 + b^2}$
2. Argument of $z = \tan^{-1} \left(\frac{b}{a}\right)$
3. Cartesian Form, $z = a + bi$
4. Polar Form, $z = r \angle \theta$
5. Exponential Form, $z = re^{i\theta}$
6. Trigonometric Form, $z = r(\cos \theta + i \sin \theta)$
7. Multiplication of complex number
8. Division of complex number

$$z_1 \times z_2 = |z_1| \cdot |z_2| \angle (\theta_1 + \theta_2)$$

$$\frac{z_1}{z_2} = \frac{|z_1|}{|z_2|} \angle (\theta_1 - \theta_2)$$

MATRIX

1. Cofactor, $C = (-1)^{i+j} M_{ij}$
2. Adjoint, $\operatorname{Adj}(A) = C^T$
3. Inverse of Matrix, $A^{-1} = \frac{1}{|A|} \operatorname{Adj}(A)$
4. Cramer's Rule,

$$x = \frac{|A_1|}{|A|}, \quad y = \frac{|A_2|}{|A|}, \quad z = \frac{|A_3|}{|A|}$$

VECTOR AND SCALAR

1. Unit Vector, $\hat{u} = \frac{\vec{u}}{|u|}$

$$2. \cos \theta = \frac{\vec{A} \cdot \vec{B}}{|\vec{A}| |\vec{B}|}$$

3. Scalar (dot) Product,

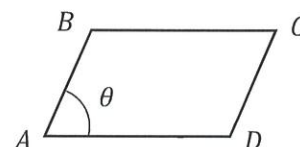
$$\vec{A} \cdot \vec{B} = a_1 a_2 + b_1 b_2 + c_1 c_2$$

4. Vector (cross) Product,

$$\vec{A} \times \vec{B} = \begin{vmatrix} i & j & k \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}$$

5. Area of parallelogram ABCD

$$A = |\vec{AB} \times \vec{AD}|$$



6. Area of triangle ABC

$$A = \frac{1}{2} |\vec{AB} \times \vec{AC}|$$

