

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 : 2024/2025

DBM10063: MATHEMATICAL COMPUTING

TARIKH :

MASA :

Kertas ini mengandungi **SEMBILAN (9)** 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) Change the following numbering systems into octal number.

Tukarkan sistem nombor berikut kepada nombor asas lapan.

i. 10111010_2

[5 marks]

[5 markah]

ii. $FC4_{16}$

[5 marks]

[5 markah]

CLO1 (b) Solve the following arithmetic operations:

Selesaikan operasi aritmetik berikut:

i. $(1011101_2 + 1100001_2) - (1100001_2 + 110101_2)$

[5 marks]

[5 markah]

ii. $(10100100_2 - 1011101_2) \times 11_2$

[5 marks]

[5 markah]

iii. $(11010_2 \times 110_2) + 1101011_2$

[5 marks]

[5 markah]

QUESTION 2

SOALAN 2

CLO1 (a) Simplify the following algebraic expressions:

Ringkaskan ungkapan algebra berikut:

i.
$$\frac{4}{x+5} + \frac{24}{x^2+4x-5}$$

[5 marks]

[5 markah]

ii.
$$\frac{2x}{x^2-4} - \frac{1}{x-2}$$

[5 marks]

[5 markah]

iii.
$$\frac{x-3}{x^2+3x-4} - \frac{2}{x+4}$$

[5 marks]

[5 markah]

- CLO1 (b) Solve the following quadratic equations by using the method given:
Selesaikan persamaan kuadratik berikut dengan menggunakan kaedah yang dinyatakan:
- i. $x^2 - 2x - 10 = 3x + 4$ (Factorization method)
(*Kaedah Pemfaktoran*)
[4 marks]
[4 markah]
- ii. $\frac{4x^2+x-3}{x} = 2$ (Quadratic formula)
(*Rumus Kuadratik*)
[6 marks]
[6 markah]

QUESTION 3**SOALAN 3**

CLO2 (a) Solve each of the following complex numbers in the form of $a + bi$.

Selesai setiap nombor kompleks berikut dalam bentuk $a + bi$.

i. $(3 + i)(2 - 5i)$

[4 marks]

[4 markah]

ii. $\frac{2 + 7i}{3 - 5i}$

[5 marks]

[5 markah]

iii. $-i(3 + 4i)(2 - 3i)$

[6 marks]

[6 markah]

- CLO2 (b) Given $Z_1 = 5 - i$ and $Z_2 = 6 (\cos 30^\circ + i \sin 30^\circ)$.
Diberi $Z_1 = 5 - i$ dan $Z_2 = 6 (\cos 30^\circ + i \sin 30^\circ)$.
- i. Change Z_2 to Exponential form.
Tukarkan Z_2 kepada bentuk Exponen.
- [2 marks]
[2 markah]
- ii. Change Z_1 to Polar and Trigonometric Form.
Tukarkan Z_1 kepada bentuk Polar dan Trigonometri.
- [5 marks]
[5 markah]
- iii. Calculate $Z_1 Z_2$ and write the answer in Polar Form.
Kirakan $Z_1 Z_2$ dan tuliskan jawapan dalam bentuk Polar.
- [3 marks]
[3 markah]

QUESTION 4

SOALAN 4

- CLO2 (a) Given matrix $A = \begin{bmatrix} -2 & a \\ -1 & 4 \\ b & 3 \end{bmatrix}$, identify the element of:

Diberi matrik $A = \begin{bmatrix} -2 & a \\ -1 & 4 \\ b & 3 \end{bmatrix}$, tentukan unsur bagi:

i. A_{12} if $A_{12} = A_{11} + A_{22}$

[2 marks]

[2 markah]

ii. A_{31} if $A_{31} = A_{22} \times A_{32}$

[2 marks]

[2 markah]

- CLO2 (b) Given matrix $A = \begin{bmatrix} 3 & 1 \\ -4 & 0 \\ 2 & 5 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 4 \\ 1 & 3 \\ 5 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 5 & 0 \\ -3 & 1 \\ 4 & 7 \end{bmatrix}$, calculate:

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

i. $A + B$

[2 marks]

[2 markah]

ii. $2(B - C)$

[3 marks]

[3 markah]

iii. $(2B)^T - (2C)^T$

[6 marks]

[6 markah]

CLO2 (c) Solve the following matrix equations by using Cramer's Rule.

Selesaikan persamaan matrik berikut dengan menggunakan kaedah Petua Cramer.

$$\begin{bmatrix} 2 & -2 & 1 \\ 3 & 1 & -1 \\ 1 & -3 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 7 \\ 0 \end{bmatrix}$$

[10 marks]

[10 markah]

SOALAN TAMAT

FORMULA SHEET FOR DBM10063: MATHEMATICAL COMPUTING

BASIC ALGEBRA

1. Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

MATRICES AND LINEAR ALGEBRA

1. Inverse Matrix: $A^{-1} = \frac{1}{|A|} \text{adj}A$

2. Cramer's Rule:

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

COMPLEX NUMBER

1. Modulus: $|z| = \sqrt{a^2 + b^2}$
2. Argument: $\arg z = \tan^{-1} \left(\frac{b}{a} \right)$

Complex number in other forms

1. Cartesian form: $z = a + bi$
2. Polar form: $z = |z| \angle \theta$
3. Exponential form: $z = |z| e^{i\theta}$
4. Trigonometric form: $|z|(\cos \theta + i \sin \theta)$

Multiplication & Division

1. $(a \angle \theta_a) \cdot (b \angle \theta_b) = (a)(b) \angle (\theta_a + \theta_b)$
2. $\frac{(a \angle \theta_a)}{(b \angle \theta_b)} = \left(\frac{a}{b} \right) \angle (\theta_a - \theta_b)$

DIFFERENTIATION

1.	$\frac{d}{dx}(k) = 0, k \text{ is constant}$	2.	$\frac{d}{dx}(ax^n) = anx^{n-1}$ [Power Rule]
3.	$\frac{d}{dx}(f(x) \pm g(x)) = f'(x) \pm g'(x)$	4.	$\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$ [Product Rule]
5.	$\frac{d}{dx} \left(\frac{u}{v} \right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$ [Quotient Rule]	6.	$\frac{dy}{dx} = \frac{du}{dx} \times \frac{dy}{du}$ [Chain Rule]

Tangent and Normal Equation

$$y - y_1 = m(x - x_1)$$

INTEGRATION

1.	$\int ax^n dx = \frac{ax^{n+1}}{n+1} + c; \{n \neq -1\}$	2.	$\int (ax + b)^n dx = \frac{(ax + b)^{n+1}}{(a)(n+1)} + c; \{n \neq -1\}$
3.	$\int k dx = kx + c, k \text{ is constant}$	4.	$\int_a^b f(x) dx = F(b) - F(a)$