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 II : 2024/2025

DBM10063 : MATHEMATICAL COMPUTING

TARIKH : 16 MEI 2025
MASA : 8.30 PAGI - 10.30 PAGI (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)** questions. Answers **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **EMPAT (4)** soalan. Jawap **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO1

(a) A digital system processes numbers in various bases. Change the following numbers into their binary equivalents.

Sistem digital memproses nombor dalam pelbagai asas. Tukarkan nombor berikut kepada bentuk binari yang setara.

i. 245_8

[5 marks]

[5 *markah*]

ii. $B3_{16}$

[5 marks]

[5 *markah*]

CLO1

(b) Calculate the following binary arithmetics.
Kirakan aritmetik perduaan berikut.

i. $1011_2 \times 11_2 + 10101_2$

[5 marks]
[5 *markah*]

ii. $1101011_2 - (1010_2 \times 101_2)$

[6 marks]
[6 *markah*]

iii. $(101101_2 + 11011_2) - (10110_2 + 1101_2)$

[4 marks]
[4 *markah*]

QUESTION 2

SOALAN 2

CLO1 (a) Simplify the following algebraic expressions:

Permudahkan ungkapan algebra berikut:

i. $\dfrac{10x(x+1)-4(x-1)}{2}$

[5 marks]

[5 *markah*]

ii. $\dfrac{3x+3}{x^2-1}-\dfrac{2}{x-1}$

[5 marks]

[5 *markah*]

iii. $\dfrac{3x-9}{x^2-2x}\div\dfrac{x-3}{2x}$

[5 marks]

[5 *markah*]

CLO1 (b) Solve the following quadratic equations using the stated method.

Selesaikan persamaan kuadratik berikut dengan menggunakan kaedah yang dinyatakan.

i. $x(x-2)=3$ (Factorization method)

(*Kaedah Pemfaktoran*)

[5 marks]

[*5 markah*]

ii. $x^2=5-2x$ (Quadratic Formula)

(*Formula Kuadratik*)

[5 marks]

[*5 markah*]

QUESTION 3

SOALAN 3

CLO2 (a) Assume $P = 3 - 2i$ and $Q = 7 + 4i$.

Andaikan $P = 3 - 2i$ *dan* $Q = 7 + 4i$.

i. Sketch the Argand Diagram of Q

Lakarkan Rajah Argand bagi Q

[3 marks]

[*3 markah*]

ii. Calculate $\frac{P}{Q}$

Kirakan $\frac{P}{Q}$

[6 marks]

[6 *markah*]

iii. Calculate the modulus and argument of P

Kirakan modulus dan hujah bagi P

[6 marks]

[6 *markah*]

CLO2 (b) Given that $Z_1 = 4(\cos 35° + i \sin 35°)$ and $Z_2 = 12e^{1.0821i}$.
Diberi $Z_1 = 4(\cos 35° + i \sin 35°)$ dan $Z_2 = 12e^{1.0821i}$.

i. Change Z_1 and $Z_2$to Polar form.
Tukarkan Z_1 dan Z_2 kepada bentuk Polar.

[4 marks]
[4 *markah*]

i. Solve $Z_1 \times Z_2$ in Polar form.
Selesaikan $Z_1 \times Z_2$ dalam bentuk Polar.

[3 marks]
[3 *markah*]

ii. Calculate $Z_2 \div Z_1$ in Polar form.
Kirakan $Z_2 \div Z_1$ dalam bentuk Polar.

[3 marks]
[3 *markah*]

QUESTION 4

SOALAN 4

CLO2 (a) Given matrices $A = \begin{bmatrix} 3 & 1 \\ 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 3 \\ 2 & -3 \end{bmatrix}$.

Diberi matrik $A = \begin{bmatrix} 3 & 1 \\ 0 & 2 \end{bmatrix}$ *dan* $B = \begin{bmatrix} -4 & 3 \\ 2 & -3 \end{bmatrix}$.

i. Identify $A - B$.

Kenal pasti $A - B$.

[2 marks]

[2 *markah*]

ii. Express $2B^T$.

Nyatakan $2B^T$.

[2 marks]

[2 *markah*]

CLO2 (b) Given matrix $M = \begin{bmatrix} 3 & 2 & -1 \\ 0 & 1 & 1 \\ 2 & -2 & -1 \end{bmatrix}$.

Diberi matriks $M = \begin{bmatrix} 3 & 2 & -1 \\ 0 & 1 & 1 \\ 2 & -2 & -1 \end{bmatrix}$.

i. Calculate the determinant of matrix M.

Kirakan penentu bagi matriks M.

[2 marks]

[2 *markah*]

ii. Calculate the minor of matrix M.

Kirakan minor bagi matriks M.

[4 marks]

[4 *markah*]

iii. Compute the inverse of the matrix M.
Kirakan songsangan bagi matriks M.

[5 marks]
[5 *markah*]

(c) Solve the following system of simultaneous equations by using Cramer's Rule, where the determinant is 4.
Selesaikan persamaan serentak yang berikut dengan menggunakan Petua Cramer, dimana penentunya ialah 4.

$$x + y + z = 3$$
$$x + 3y - 2z = 5$$
$$2y - z = 1$$

[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: $A^{-1} = \frac{1}{|A|} adjA$
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. $(a \angle \theta_a).(b \angle \theta_b) = (a)(b) \angle (\theta_a + \theta_b)$
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.	$\frac{d}{dx}\big(f(x) \pm g(x)\big) = f'(x) \pm g'(x)$	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.	$\int_a^b f(x)dx = F(b) - F(a)$