

**SULIT**



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

**JABATAN MATEMATIK, SAINS & KOMPUTER**

**PEPERIKSAAN AKHIR**

**SESI I : 2022/2023**

**DBM10063 : MATHEMATICAL COMPUTING**

**TARIKH : 29 DISEMBER 2022**

**MASA : 8.30 AM – 10.30 AM (2 JAM)**

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Kertas ini mengandungi **LAPAN (8)** halaman bercetak.

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

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**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  
C3

(a) i) Change the following:

*Tukarkan yang berikut:*

a) 3 words to nibbles.

*3 words kepada nibbles.*

[2 marks]

[2 markah]

b) 16 nibbles to bytes.

*16 nibbles kepada bytes.*

[2 marks]

[2 markah]

ii) Change  $2170_{10}$  to octal number.*Tukar  $2170_{10}$  kepada nombor asas lapan.*

[3 marks]

[3 markah]

iii) Change  $637_8$  to hexadecimal number.*Tukar  $637_8$  kepada nombor asas enam belas.*

[3 marks]

[3 markah]

CLO1  
C3

(b) Solve the following:

*Selesaikan yang berikut:*

i)  $1011_2 \times 111_2 + 1101_2$

[5 marks]

[5 markah]

ii)  $(11101_2 - 110_2) \times 101_2$

[5 marks]

[5 markah]

iii)  $(10111_2 + 10101_2) - (1001_2 \times 11_2)$

[5 marks]

[5 markah]

**QUESTION 2****SOALAN 2**CLO1  
C2

(a) Express the following in the simplest form:

*Nyatakan berikut dalam bentuk paling ringkas:*

i)  $5(p + 3a) - 6(p - 2a)$

[2 marks]

[2 markah]

ii)  $(m - 3)^2 - 4m(1 - 2m)$

[3 marks]

[3 markah]

iii)  $\frac{2x + 2}{x^2 + 2x + 1} - \frac{3}{x + 2}$

[5 marks]

[5 markah]

iv)  $\left(\frac{5}{x + 5} - \frac{3}{x + 3}\right) \div \frac{2x}{x + 3}$

[5 marks]

[5 markah]

CLO1  
C3

(b) Solve the following quadratic equations by using the given method:

*Selesaikan persamaan kuadratik berikut dengan menggunakan kaedah yang dinyatakan:*

i)  $3x(x - 3) = x - 3$  (Factorization method)  
(*Kaedah pemfaktoran*)

[5 marks]

[5 markah]

ii)  $x(x - 2) = 9$  (Quadratic formula)  
(*Formula kuadratik*)

[5 marks]

[5 markah]

## QUESTION 3

## SOALAN 3

CLO2  
C3

- (a) i) Given that  $u = -4 + 8i$ ,  $v = 3 - 2i$  and  $w = -2 + 4i$ . Calculate  $vw + u$  in the form of  $a + bi$ .

*Diberi  $u = -4 + 8i$ ,  $v = 3 - 2i$  dan  $w = -2 + 4i$ . Kirakan  $vw + u$  dalam bentuk  $a + bi$ .*

[5 marks]

[5 markah]

- ii) Identify the modulus and argument for the following complex numbers. Then, sketch Argand's diagram.

*Kenalpasti modulus dan argument nombor kompleks berikut. Kemudian, lakarkan gambarajah Argand.*

a)  $z = -4 + 6i$

[5 marks]

[5 markah]

b)  $z = 3i - 2i^2$

[5 marks]

[5 markah]

CLO2  
C3(b) Given that  $Z_1 = 6(\cos 30^\circ + i \sin 30^\circ)$  and  $Z_2 = 18e^{0.8727i}$ .*Diberi  $Z_1 = 6(\cos 30^\circ + i \sin 30^\circ)$  dan  $Z_2 = 18e^{0.8727i}$ .*i) Change  $Z_2$  to Polar form.*Tukarkan  $Z_2$  dalam bentuk Polar.*

[2 marks]

[2 markah]

ii) Find  $Z_1 \times Z_2$  and express the answer in Polar form.*Cari  $Z_1 \times Z_2$  dan nyatakan jawapan dalam bentuk Polar.*

[3 marks]

[3 markah]

iii) Find  $\frac{Z_2}{Z_1}$  and express the answer in Cartesian form.*Cari  $\frac{Z_2}{Z_1}$  dan nyatakan jawapan dalam bentuk Cartesian.*

[5 marks]

[5 markah]

## QUESTION 4

## SOALAN 4

CLO2  
C2 (a) Given  $A = \begin{pmatrix} 2 & 1 & 2 \\ 3 & -1 & 4 \end{pmatrix}$ ,  $B = \begin{pmatrix} 3 & 0 & 3 \\ 1 & 5 & -1 \end{pmatrix}$  and  $C = \begin{pmatrix} 2 & 1 \\ -3 & 5 \\ 2 & -3 \end{pmatrix}$ , find:

*Diberi  $A = \begin{pmatrix} 2 & 1 & 2 \\ 3 & -1 & 4 \end{pmatrix}$ ,  $B = \begin{pmatrix} 3 & 0 & 3 \\ 1 & 5 & -1 \end{pmatrix}$  dan  $C = \begin{pmatrix} 2 & 1 \\ -3 & 5 \\ 2 & -3 \end{pmatrix}$ , cari:*

i)  $A - B$

[2 marks]

[2 markah]

ii)  $-C^T$

[2 marks]

[2 markah]

CLO2  
C3 (b) Given  $D = \begin{pmatrix} 1 & 1 & 3 \\ 2 & 0 & 4 \\ 3 & 2 & 1 \end{pmatrix}$ , identify inverse of  $D$ .

*Diberi  $D = \begin{pmatrix} 1 & 1 & 3 \\ 2 & 0 & 4 \\ 3 & 2 & 1 \end{pmatrix}$ , kenalpasti songsangan  $D$ .*

[10 marks]

[10 markah]

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

*Selesaikan yang berikut dengan menggunakan Petua Cramer.*

$$3x + 3y + 4z = 6$$

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

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

[11 marks]

[11 markah]

## SOALAN TAMAT



## FORMULA SHEET FOR DBM10063 : MATHEMATICAL COMPUTING

<p><b><u>BASIC ALGEBRA</u></b></p> <p>1. Quadratic Formula:</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	<p><b><u>COMPLEX NUMBER</u></b></p> <p>1. Modulus: <math> z  = \sqrt{a^2 + b^2}</math></p> <p>2. Argument: <math>\arg z = \tan^{-1} \left( \frac{b}{a} \right)</math></p> <p><u>Complex number in other forms</u></p> <p>1. Cartesian form: <math>z = a + bi</math></p> <p>2. Polar form: <math>z =  z  \angle \theta</math></p> <p>3. Exponential form: <math>z =  z  e^{i\theta}</math></p> <p>4. Trigonometric form: <math> z (\cos \theta + i \sin \theta)</math></p> <p><u>Multiplication &amp; Division</u></p> <p>1. <math>(a \angle \theta_a) \cdot (b \angle \theta_b) = (a)(b) \angle (\theta_a + \theta_b)</math></p> <p>2. <math>\frac{(a \angle \theta_a)}{(b \angle \theta_b)} = \left( \frac{a}{b} \right) \angle (\theta_a - \theta_b)</math></p>						
<p><b><u>MATRICES AND LINEAR ALGEBRA</u></b></p> <p>1. Inverse Matrix: <math>A^{-1} = \frac{1}{ A } \text{adj}A</math></p> <p>2. Cramer's Rule:</p> $x = \frac{ A_1 }{ A }, y = \frac{ A_2 }{ A }, z = \frac{ A_3 }{ A }$							
<p><b><u>DIFFERENTIATION</u></b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">1. <math>\frac{d}{dx}(k) = 0, k \text{ is constant}</math></td> <td style="width: 50%; padding: 5px;">2. <math>\frac{d}{dx}(ax^n) = anx^{n-1}</math> [Power Rule]</td> </tr> <tr> <td style="padding: 5px;">3. <math>\frac{d}{dx}(f(x) \pm g(x)) = f'(x) \pm g'(x)</math></td> <td style="padding: 5px;">4. <math>\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}</math> [Product Rule]</td> </tr> <tr> <td style="padding: 5px;">5. <math>\frac{d}{dx} \left( \frac{u}{v} \right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}</math> [Quotient Rule]</td> <td style="padding: 5px;">6. <math>\frac{dy}{dx} = \frac{du}{dx} \times \frac{dy}{du}</math> [Chain Rule]</td> </tr> </table>		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]
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<p><u>Tangent and Normal Equation</u></p> $y - y_1 = m(x - x_1)$							

## 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.	$\int_a^b f(x) dx = F(b) - F(a)$