

**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. Explain a binary number  
*Terangkan nombor asas dua*
- [2 marks]  
[2 markah]
- ii. Convert  $127340_8$  to hexadecimal number.  
*Tukarkan  $127340_8$  kepada asas enambelas.*
- [4 marks]  
[4 markah]
- iii. Convert  $5DC3_{16}$  to octal number.  
*Tukarkan  $5DC3_{16}$  kepada asas lapan.*
- [4 marks]  
[4 markah]

CLO1  
C3

- (b) Solve the numbering system of the following:  
*Selesaikan sistem nombor yang berikut:*
- i.  $712_8 + 988_{10}$  (give the answer in octal)  
*(berikan jawapan dalam asas lapan)*
- [3 marks]  
[3 markah]
- ii.  $1110101010_2 - 415_8$  (give the answer in binary)  
*(berikan jawapan dalam asas dua)*
- [3 marks]  
[3 markah]

- iii.  $ABC_{16} + 1101_8$  (give the answer in hexadecimal)  
(*berikan jawapan dalam asas enambelas*)  
[4 marks]  
[4 markah]
- iv.  $111011_8 + 7E_{16}$  (give the answer in decimal)  
(*berikan jawapan dalam asas sepuluh*)  
[5 marks]  
[5 markah]

## QUESTION 2

## SOALAN 2

CLO1  
C3

(a) Express each of the following in the simplest form:

*Ungkapkan setiap yang berikut dalam bentuk termudah:*

i.  $k(6 - m) + m(k + 2)$

[2 marks]

[2 markah]

ii.  $10m^2n^3 - (4mn - 2m^2n^3 + 3) + 5$

[3 marks]

[3 markah]

iii.  $\frac{a+b}{c^2} \times \frac{c^4}{a^2-b^2}$

[3 marks]

[3 markah]

iv.  $\frac{3x+6}{x^2+2x}$

[3 marks]

[3 markah]

v.  $\left(\frac{3}{a+3} - \frac{4}{a+4}\right) \times \left(\frac{a+4}{a}\right)$

[4 marks]

[4 markah]

CLO1  
C3

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

*Selesaikan persamaan kuadratik berikut dengan menggunakan kaedah yang diberikan.*

i.  $6x^2 - 11x = 10$  by using the factorization method

$6x^2 - 11x = 10$  dengan menggunakan kaedah pemfaktoran

[5 marks]

[5 markah]

ii.  $4x^2 + 3x - 2 = 0$  by using the quadratic formula

$4x^2 + 3x - 2 = 0$  dengan menggunakan formula kuadratik

[5 marks]

[5 markah]

## QUESTION 3

## SOALAN 3

CLO2  
C3

(a) Calculate the following complex numbers:

*Kirakan nombor kompleks berikut:*

i.  $2(7 - 2i) - 3(-1 + 5i)$

[2 marks]

[2 markah]

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

[5 marks]

[5 markah]

CLO2  
C3(b) Given  $Z = -2 + 7i$ :*Diberi  $Z = -2 + 7i$ :*

i. Sketch the Argand's Diagram.

*Lakarkan Rajah Argand.*

[2 marks]

[2 markah]

ii. Calculate the modulus and argument.

*Kira modulus dan hujah.*

[4 marks]

[4 markah]

iii. Express  $Z$  in the trigonometric form.*Nyatakan  $Z$  dalam bentuk trigonometri.*

[2 marks]

[2 markah]

CLO2  
C3(c) Given  $Z_1 = 5 - 3i$ ,  $Z_2 = 7(\cos 80^\circ + i \sin 80^\circ)$  and  $Z_3 = 9e^{2.11i}$ :*Diberi  $Z_1 = 5 - 3i$ ,  $Z_2 = 7(\cos 80^\circ + i \sin 80^\circ)$  dan  $Z_3 = 9e^{2.11i}$ :*i. Express  $Z_1$ ,  $Z_2$  and  $Z_3$  in polar form.*Nyatakan  $Z_1$ ,  $Z_2$  dan  $Z_3$  dalam bentuk polar.*

[7 marks]

[7 markah]

ii. Solve  $\frac{Z_3}{Z_1 \times Z_2}$  in polar form.*Selesaikan  $\frac{Z_3}{Z_1 \times Z_2}$  dalam bentuk polar.*

[3 marks]

[3 markah]

## QUESTION 4

## SOALAN 4

CLO2  
C2

(a) Given  $P = \begin{bmatrix} -2 & 5 \\ 0 & 6 \end{bmatrix}$ ,  $Q = \begin{bmatrix} 3 & 1 \\ 7 & -1 \end{bmatrix}$  and  $R = \begin{bmatrix} 4 & 7 \\ 5 & 8 \end{bmatrix}$ . Calculate:

Diberi  $P = \begin{bmatrix} -2 & 5 \\ 0 & 6 \end{bmatrix}$ ,  $Q = \begin{bmatrix} 3 & 1 \\ 7 & -1 \end{bmatrix}$  dan  $R = \begin{bmatrix} 4 & 7 \\ 5 & 8 \end{bmatrix}$ . Kirakan:

i.  $P + Q - R$

[2 marks]

[2 markah]

ii.  $(R - Q)^T$

[3 marks]

[3 markah]

CLO2  
C3

(b) Determine inverse of a matrix  $B = \begin{bmatrix} 1 & 3 & 5 \\ 2 & 4 & 8 \\ 0 & 1 & 2 \end{bmatrix}$ , if  $|B| = -2$ .

Tentukan songsangan bagi matrik  $B = \begin{bmatrix} 1 & 3 & 5 \\ 2 & 4 & 8 \\ 0 & 1 & 2 \end{bmatrix}$ , sekiranya  $|B| = -2$ .

[10 marks]

[10 markah]

CLO2  
C3

- (c) Find the value of x and y for the simultaneous equations by using Cramer's Rule:

*Cari nilai x dan y bagi persamaan serentak berikut dengan menggunakan Petua Cramer:*

$$\begin{bmatrix} 2 & -4 & 6 \\ 0 & 1 & -3 \\ 5 & -7 & -9 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -8 \\ 5 \\ 10 \end{bmatrix}$$

[10 marks]

[10 markah]

**SOALAN TAMAT**

## FORMULA SHEET FOR DBM 10063 : 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.  $\frac{(a \angle \theta_a)}{(b \angle \theta_b)} = \left(\frac{a}{b}\right) \angle (\theta_a - \theta_b)$