

SULIT

(CLO yang tertera hanya sebagai rujukan)

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.
Bahagian A: Struktur (3 soalan)
Bahagian B: Struktur (3 soalan)
Dokumen sokongan yang disertakan : Kertas Graf, Formula

TARIKH : 31 OKTOBER 2016
MASA : 8.30 AM - 10.30 AM (2 JAM)

DBM1013: ENGINEERING MATHEMATICS I

SESI JUN 2016

PEPERIKSAAN AKHIR

JABATAN MATEMATIK, SAINS & KOMPUTER

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI



SULIT

SECTION A : 75 MARKS

BAHAGIAN A : 75 MARKAH

INSTRUCTION:

This section consists of THREE (3) structured questions. Answer ALL questions.

ARAHAN:

Bahagian ini mengandungi TIGA (3) soalan struktur. Jawab SEMUA soalan.

QUESTION 1

SOALAN 1

CLO 1
C2

(a) Simplify each of the following equations into a single algebraic fraction. Perudahkanlahkan setiap persamaan yang berikut ke dalam pecahan algebra tunggal.

i.
$$\frac{2(x-1)^4(x-5)}{x-3} \times \frac{x-1}{x-3} - \frac{(4x-12)}{(2x-2)} - \frac{x-1}{(4x-12)}$$
 [3 marks] [3 markah]

ii.
$$\frac{x^2-1}{x^2+2x+1} \div \frac{x^2-4}{x^2+4x+4}$$
 [4 marks] [4 markah]

iii.
$$\frac{8}{4b-4} \times \frac{d}{b^2-b}$$
 [3 marks] [3 markah]

CLO 1
C3

(b) Solve the following quadratic functions below using the specific method
 Selsaikan fungsi kuadratik di bawah dengan menggunakan kaedah yang
 dinyatakan

i. $(3x + 1)(x - 1) = 15$

(Factorization Method)
 (Kaedah Pemfaktoran)

[5 marks]

[5 markah]

ii. $18x^2 + 27x - 35 = 0$

(Quadratic Formula)
 (Kuadratik Formula)

[5 marks]

[5 markah]

iii. $4x^2 - 9x = 0$

(Completing The Square Method)
 (Kaedah Melengkapkan Kuasa Dua)

[5 marks]

[5 markah]

QUESTION 2
SOALAN 2

(-6-3)

[5 marks]

[5 markah]

CLO1

C2

(a) Solve the partial fractions for $\frac{(x+6)(x-3)}{4x+9}$.
 Selesaikan pecahan separa bagi $\frac{(x+6)(x-3)}{4x+9}$.

CLO1

C3

(b) Given that partial fraction of $\frac{4x^2}{(x-1)(x^2-4x+4)}$ are $\frac{A}{x-1} + \frac{B}{(x-2)} + \frac{C}{(x-2)^2}$. Find the values of A, B and C.

Diberi pecahan separa bagi $\frac{4x^2}{(x-1)(x^2-4x+4)}$ ialah $\frac{A}{x-1} + \frac{B}{(x-2)} + \frac{C}{(x-2)^2}$. Cari nilai bagi A, B dan C.

[9 marks]

[9 markah]

CLO1

C3

(c) Express $\frac{x^5+4}{x^3-2x}$ into partial fraction.

Nyatakan $\frac{x^5+4}{x^3-2x}$ kepada pecahan separa.

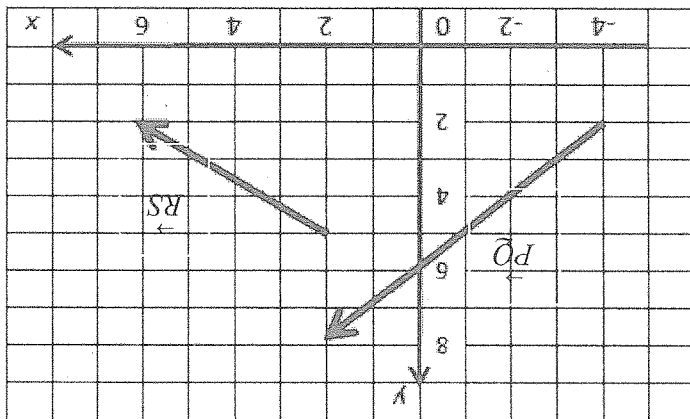
[11 marks]

[11 markah]

QUESTION 3
SOALAN 3

CLO2
C2

(a) The diagram below shows the vectors of \vec{PQ} and \vec{RS} in a Cartesian plane. Rajah di bawah menunjukkan vector \vec{PQ} dan \vec{RS} dalam Rajah Cartesian.



i. Express each of these vectors in the $xi + yj$ form. [2 marks]

Ungkapkan setiap vector tersebut dalam bentuk $xi + yj$. [2 markah]

ii. Determine the value of $\vec{RS} - \vec{PQ}$. [3 marks]

Tentukan nilai bagi $\vec{RS} - \vec{PQ}$. [3 markah]

iii. Calculate the unit vector of \vec{RS} . [5 marks]

Kirakan vector unit bagi \vec{RS} . [5 markah]

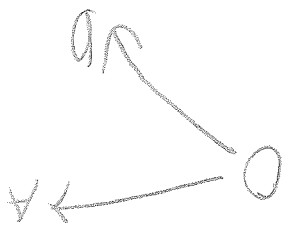
CLO2

C3

(b) Given A, B, C and D are the points with coordinates $(-1,4,3)$, $(7,2,-3)$, $(4,2,2)$, and $(6,-3,5)$ respectively. Calculate:

Diberi A, B, C and D adalah titik-titik pada koordinat $(-1,4,3)$, $(7,2,-3)$, $(4,2,2)$, dan $(6,-3,5)$ masing-masing. Kirakan:

i. \vec{AD}



[2 marks]

ii. $\left| \vec{CB} \right|$



[4 marks]

[4 markah]

iii. $\vec{AD} \times \vec{CB}$

[4 marks]

[4 markah]

iv. $\vec{CB} \cdot (\vec{AD} - \vec{CB})$

[5 marks]

[5 markah]

SECTION B : 25 MARKAH

BAHAGIAN B : 25 MARKAH

INSTRUCTION:

This section consists of THREE (3) structured questions. Answer ONE(1) question only.

ARAHAN :

Bahagian ini mengandungi TIGA (3) soalan struktur. Jawab SATU(1) soalan sahaja.

QUESTION 4

SOALAN 4

(a) Given $\cos \theta = \frac{3}{5}$. Without using the calculator, find the values of the

following:

$\cos \theta = \frac{3}{5}$. Tanpa menggunakan kalkulator, dapatkan nilai-nilai

berikut:

i) $\sin \theta$

[2 marks]

ii) $\tan \theta$

[2 marks]

iii) $\sec \theta$

[3 marks]

iv) $\cot \theta$

[3 marks]

[3 markah]

CLO 2
C3Dapatkan sudut - sudut di antara $0^\circ \leq \theta \leq 360^\circ$.(b) Find the angles between $0^\circ \leq \theta \leq 360^\circ$.

i) $\cos \theta = 0.8660$

[4 marks]

[4 markah]

ii) $6 \sec^2 \theta - 8 = \tan \theta$

[11 marks]

[11 markah]

QUESTION 5
SOALAN 5

CLO2 C2

(a) Solve each of the following complex numbers in the form of $a + bi$.
Selesaikan setiap nombor kompleks berikut dalam bentuk $a + bi$.

i. $(2 - 5i) - (3 + 4i)$ [2 marks] [2 markah]

ii. $(-5 + i) + (12 - 3i)$ [2 marks] [2 markah]

iii. $\frac{(3 + 2i)(5 - 3i)}{4 - 5i}$ [6 marks] [6 markah]

CLO2 C3

(b) Given that $Z_1 = 8(\cos 20^\circ + i \sin 20^\circ)$ and $Z_2 = 16e^{0.5236i}$.
Diberi $Z_1 = 8(\cos 20^\circ + i \sin 20^\circ)$ dan $Z_2 = 16e^{0.5236i}$.

i) Find the modulus and argument Z_2 . [3 marks] [3 markah]

Dapatkan modulus dan Argumen Z_2 .

ii) Express Z_2 in Cartesian form. [2 marks] [2 markah]

Nyatakan Z_2 dalam bentuk Cartesian.

iii) Find $Z_1 \times Z_2$ and express the answer in Cartesian form. [5 marks] [5 markah]

Cari $Z_1 \times Z_2$ dan nyatakan jawapan dalam bentuk Cartesian.

iv) Find $\frac{Z_1}{Z_2}$ and express the answer in Cartesian form. [5 marks] [5 markah]

Cari $\frac{Z_1}{Z_2}$ dan nyatakan jawapan dalam bentuk Cartesian.

QUESTION 6

SOALAN 6

CLO2
C2

(a) Given the matrix below,

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 2 \\ 2 & 1 & 2 \end{pmatrix}, B = \begin{pmatrix} 3 & 0 & 4 \\ 1 & -1 & 2 \\ 1 & -1 & 2 \end{pmatrix} \text{ and } C = \begin{pmatrix} 6 & 2 & 0 \\ 1 & 3 & 1 \\ 0 & -2 & 0 \end{pmatrix}$$

Di beri matrik seperti di bawah,

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 2 \\ 2 & 1 & 2 \end{pmatrix}, B = \begin{pmatrix} 3 & 0 & 4 \\ 1 & -1 & 2 \\ 1 & -1 & 2 \end{pmatrix} \text{ and } C = \begin{pmatrix} 6 & 2 & 0 \\ 1 & 3 & 1 \\ 0 & -2 & 0 \end{pmatrix}$$

Calculate :

Kira :

i. $(A - B)$

[2 marks]

[2 markah]

ii. $-C^T$

[2 marks]

[2 markah]

iii. $3B^T + C$

[3 marks]

[3 markah]

iv. AC

[3 marks]

[3 markah]



CLO2

C3

- (b) Solve the following equation by using the inverse matrix method.
Selesaikan persamaan berikut dengan menggunakan kaedah matrik songsang.

$$2x - 4y + 3z = -3$$

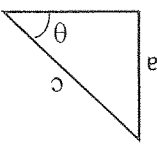
$$x + 2y - 5z = 9$$

$$-3x - y + 2z = -9$$

[15 marks]

[15 markah]

SOALAN TAMAT

<p style="text-align: center;">FORMULA OF TRIANGLE</p> <ol style="list-style-type: none"> 1. Sine Rules; $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ 2. Cosine Rules; $a^2 = b^2 + c^2 - 2bc \cos A$ 3. Area of Triangle = $\frac{1}{2} ab \sin C$ 	<p style="text-align: center;">QUADRATIC EQUATION</p> <ol style="list-style-type: none"> 1. Quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ 2. Completing the square, $\left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2 + c = 0$
<p style="text-align: center;">COMPLEX NUMBER</p> <ol style="list-style-type: none"> 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; $z = r(\cos \theta + i \sin \theta)$ 	<p style="text-align: center;">MATRIX</p> <ol style="list-style-type: none"> 1. Cofactor; $C = (-1)^{i+j} M_{ij}$ 2. Adjoin; $\text{Adj}(A) = C^T$ 3. Inverse of Matrix; $A^{-1} = \frac{1}{ A } \text{Adj}(A)$ 4. Cramer's Rule; $x = \frac{ A_1 }{ A }, y = \frac{ A_2 }{ A }, z = \frac{ A_3 }{ A }$
<p style="text-align: center;">VECTOR & SCALAR</p> <ol style="list-style-type: none"> 1. Unit Vector; $\hat{u} = \frac{ u }{ u }$ 2. $\cos \theta = \frac{A \cdot B}{ A B }$ 3. Scalar Product; $A \cdot B = a_1 a_2 + b_1 b_2 + c_1 c_2$ 4. Vector Product; $A \times B = \begin{vmatrix} i & j & k \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}$ 5. Area of parallelogram ABC; $AB \times BC$ 	<p style="text-align: center;">TRIGONOMETRY</p> <p style="text-align: center;"><i>Pythagoras' Theorem</i></p>  <p style="text-align: center;">$c^2 = a^2 + b^2$</p> <p style="text-align: center;">$\sin \theta = \frac{a}{c}$ $\cos \theta = \frac{b}{c}$ $\tan \theta = \frac{\sin \theta}{\cos \theta}$ $\cos^2 \theta + \sin^2 \theta = 1$ $1 + \tan^2 \theta = \sec^2 \theta$ $1 + \cot^2 \theta = \csc^2 \theta$</p> <p style="text-align: center;"><i>Trigonometric Identities</i></p>
<p style="text-align: center;">DOUBLE-ANGLE</p> <ol style="list-style-type: none"> 1. $\sin 2A = 2 \sin A \cos A$ 2. $\cos 2A = \cos^2 A - \sin^2 A$ 3. $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A} = 2 \cos^2 A - 1 = 1 - 2 \sin^2 A$ 	<p style="text-align: center;">COMPOUND-ANGLE</p> <ol style="list-style-type: none"> 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. $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$