

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR
SESI DISEMBER 2015

DBM1013 : ENGINEERING MATHEMATICS 1

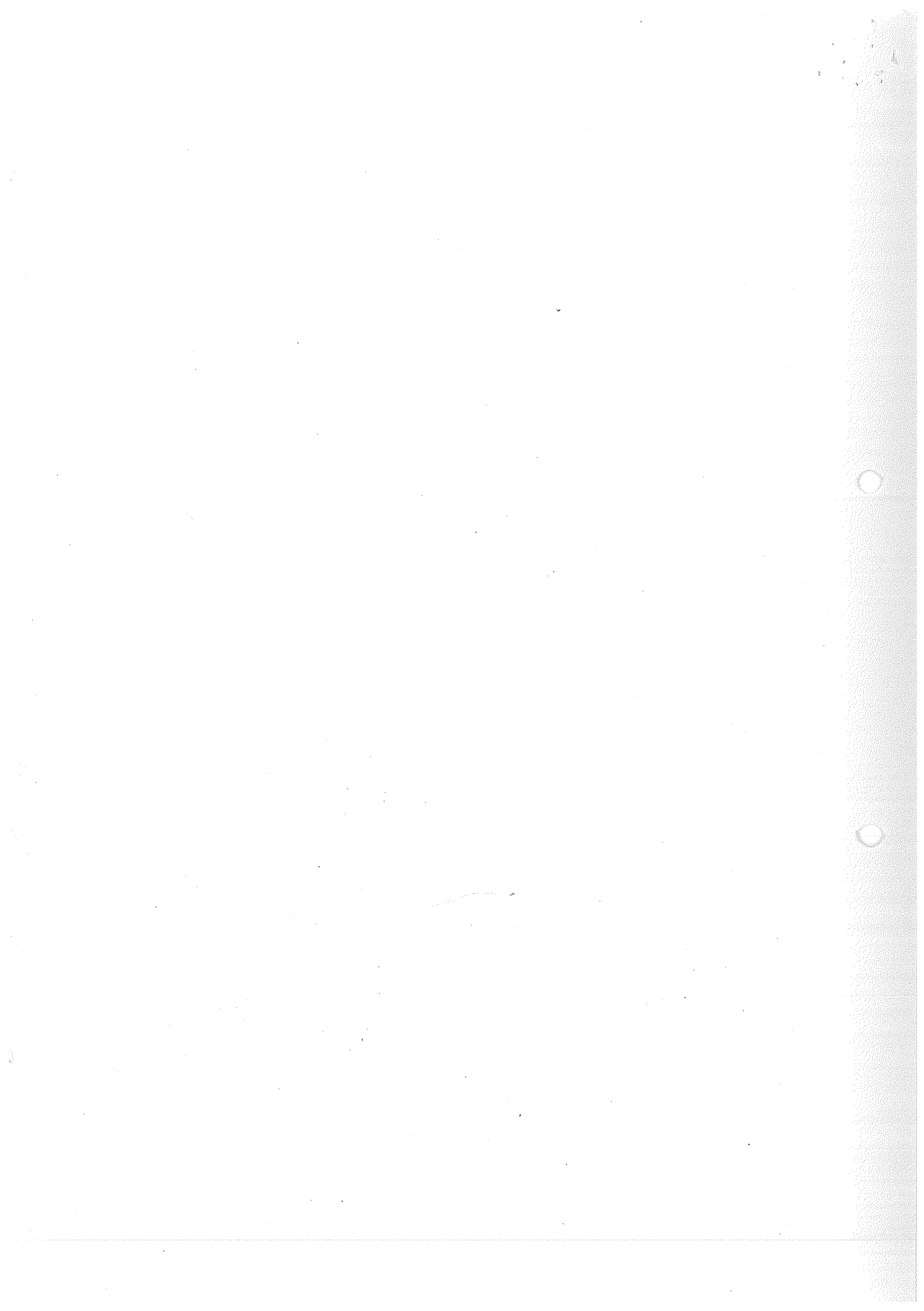
TARIKH : 04 APRIL 2016
MASA : 8.30 AM – 10.30 AM (2 JAM)

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

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

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

CLO1

a) Simplify each of the following into a single algebraic fraction.

C2

Permudahkan setiap yang berikut ke dalam pecahan algebra tunggal.

i. $2pq - 4pr + pr - 2rq + 3qp$

[2 marks]

[2 markah]

ii. $\frac{3x+6}{x^2-4}$

[3 marks]

[3 markah]

iii. $\frac{2}{m} + \frac{5}{n}$

[2 marks]

[2 markah]

iv. $(6x+8y) \times \frac{y}{4x}$

[3 marks]

[3 markah]

CLO1

b) Solve the following equations:

C3

Selesaikan persamaan persamaan berikut:

i. $4x - x^2 = 0$ (By using factorization method.)

$4x - x^2 = 0$ (*Dengan menggunakan kaedah pemfaktoran.*)

[3 marks]

[3 markah]

ii. $4x^2 + 3x - 2 = 0$ (By using quadratic formula.)

$4x^2 + 3x - 2 = 0$ (*Dengan menggunakan kuadratik formula.*)

[6 marks]

[6 markah]

iii. $2x^2 + 8x = 5$ (By using completing the square method.)

$2x^2 + 8x = 5$ (*Dengan menggunakan kaedah penyempurnaan kuasa dua.*)

[6 marks]

[6 markah]

QUESTION 2
SOALAN 2

CLO2
C1

a) Given matrix $A = \begin{bmatrix} -2 & a \\ b+1 & 8 \\ 5 & 10 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 8 \\ 6 & 9 \\ 2c+3 & 10 \end{bmatrix}$. If $A=B$, find the values of

a, b and c.

Diberi matrik $A = \begin{bmatrix} -2 & a \\ b+1 & 8 \\ 5 & 10 \end{bmatrix}$ dan $B = \begin{bmatrix} -2 & 8 \\ 6 & 9 \\ 2c+3 & 10 \end{bmatrix}$. Jika $A = B$, cari nilai-

nilai a, b dan c.

[4 marks]

[4 markah]

CLO2
C2

b) The determinant of matrix $A = \begin{bmatrix} 1 & 0 & 3 \\ x & 1 & 2 \\ 2 & 1 & 3 \end{bmatrix}$ is 10.

Penentu bagi matrik $A = \begin{bmatrix} 1 & 0 & 3 \\ x & 1 & 2 \\ 2 & 1 & 3 \end{bmatrix}$ adalah 10.

i. Calculate the value of x

Kirakan nilai x

[2 marks]

[2 markah]

ii. Convert matrix A into inverse matrix, A^{-1}

Tukarkan matrik A kepada matrik songsang, A^{-1}

[8 marks]

[8 markah]

CLO2
C3

c) Solve the following equations by using Cramer's Rule:

Selesaikan persamaan berikut dengan menggunakan Petua Cramer:

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

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

$$-2x + 3z = 8$$

[11 marks]

[11 markah]

QUESTION 3

SOALAN 3

CLO2
C2

- a) Given A and B are the points with coordinate (4,6) and (10,2).
Diberi, A dan B adalah koordinat dengan titik (4,6) dan (10,2).

- i. Sketch vector \overrightarrow{AB} by using a triangle method.

Lakarkan vektor \overrightarrow{AB} menggunakan kaedah segitiga.

[2 marks]

[2 markah]

- ii. Determine the value of \overrightarrow{AB} .

Tentukan nilai bagi \overrightarrow{AB} .

[4 marks]

[4 markah]

- iii. Calculate the magnitude of vector \overrightarrow{AB} .

Kira nilai bagi vektor \overrightarrow{AB} .

[2 marks]

[2 markah]

- iv. Find the value of $A - B$.

Dapatkan nilai $A - B$.

[2 marks]

[2 markah]

CLO2
C3

b) A, B and C is a triangle with (1,3,6), (3,-2,6) and (3,4,-7). Calculate :
A, B dan C merupakan segitiga dengan bucu-bucu (1,3,6), (3,-2,6) dan (3,4,-7). Kirakan :

i. \overrightarrow{AB}

[2 marks]

[2 markah]

ii. \overrightarrow{BC}

[2 marks]

[2 markah]

iii. $\overrightarrow{AB} \times \overrightarrow{BC}$

[4 marks]

[4 markah]

iv. Area of triangle ABC

Luas segitiga ABC

[3 marks]

[3 markah]

v. Unit vector of $\overrightarrow{AB} \times \overrightarrow{BC}$ *Vektor unit $\overrightarrow{AB} \times \overrightarrow{BC}$*

[4 marks]

[4 markah]

SECTION B: 25 MARKS

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 berstruktur. Jawab **SATU (1)** soalan sahaja.

QUESTION 4

SOALAN 4

CLO1
C2

- a) Given $5x + 1 = A(x - 1) + B(x + 1)$, find the values of A and B
Diberi $5x + 1 = A(x - 1) + B(x + 1)$, cari nilai A dan B:

[4 marks]

[4 markah]

CLO1
C3

- b) Solve the following partial fractions:
Selesaikan pecahan separa berikut:

i.
$$\frac{10x}{x^2 - 25}$$

[6 marks]

[6 markah]

ii.
$$\frac{3}{x(x - 2)^2}$$

[7 marks]

[7 markah]

iii.
$$\frac{1}{x(x^2 + 4)}$$

[8 marks]

[8 markah]

QUESTION 5

SOALAN 5

CLO1
C2

- a) Given that $\sin \theta = \frac{5}{13}$ with $0^\circ \leq \theta \leq 360^\circ$. Without using a calculator, find the values for the following:

Diberi $\sin \theta = \frac{5}{13}$ dengan $0^\circ \leq \theta \leq 360^\circ$. Tanpa menggunakan kalkulator, cari nilai-nilai bagi:

i. $\tan \theta$

[3 marks]

[3 markah]

ii. $\operatorname{cosec} \theta$

[3 marks]

[3 markah]

iii. $\cot \theta$

[3 marks]

[3 markah]

iv. $\cos \theta$

[1 mark]

[1 markah]

CLO1
C3

- (b) Find the values for the following trigonometric function by showing the quadrants.

Dapatkan nilai bagi fungsi trigonometri dengan menunjukkan sukuan.

i. $\cos \theta = 0.2542$ where $0^\circ \leq \theta \leq 360^\circ$

[7 marks]

[7 markah]

ii. $\tan \theta = -5.1446$ where $0^\circ \leq \theta \leq 360^\circ$

[8 marks]

[8 markah]

QUESTION 6
SOALAN 6CLO1
C2

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

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

[2 marks]
[2 markah]

ii. $3[(2i - 1) - (-1 + 5i)]$

[3 marks]
[3 markah]

iii. $\frac{4 - 2i}{-2 - 6i}$

[5 marks]
[5 markah]

CLO2
C3

- b) Find the modulus and argument for the following complex number:
Carikan modulus dan hujah bagi nombor kompleks berikut:

i. $5 - 10i$

[5 marks]
[5 markah]

ii. $-4 - 7i$

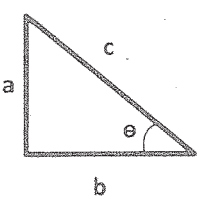
[5 marks]
[5 markah]

iii. $21 - 20i$

[5 marks]
[5 markah]

SOALAN TAMAT

FORMULA SHEET FOR ENGINEERING MATHEMATICS (DBM1013)

<p><u>QUADRATIC EQUATION</u></p> $X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $\left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2 + c = 0$	<p><u>FORMULA OF TRIANGLE</u></p> <p><i>Sine Rules</i>; $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$</p> <p><i>Cosine Rules</i>; $a^2 = b^2 + c^2 - 2bc \cos A$</p> <p><i>Area of Triangle</i> = $\frac{1}{2} ab \sin C$</p>
<p><u>MATRIX</u></p> <p><i>Cofactor</i>, $C = (-1)^{(i+j)} M_{ij}$</p> <p><i>Adjoin</i>, $Adj(A) = C^T$</p> <p><i>Inverse of Matrix</i>, $A^{-1} = \frac{1}{ A } Adj(A)$</p>	<p><u>COMPLEX NUMBER</u></p> <p><i>Modulus of z</i> = $\sqrt{a^2 + b^2}$</p> <p><i>Argument of z</i> = $\tan^{-1} \left(\frac{b}{a}\right)$</p> <p><i>Cartesian Form</i>; $z = a + bi$</p> <p><i>Polar Form</i>; $z = r \angle \theta$</p> <p><i>Exponential Form</i>; $z = re^{i\theta}$</p>
<p><u>TRIGONOMETRY</u></p> <p><u>Pythagoras' Theorem</u> <u>Trigonometry Identities</u></p> <div style="display: flex; align-items: center;"> <div style="flex: 1;">  </div> <div style="flex: 2;"> $\tan \theta = \frac{\sin \theta}{\cos \theta}$ $\cos^2 \theta + \sin^2 \theta = 1$ $1 + \tan^2 \theta = \sec^2 \theta$ $c^2 = a^2 + b^2$ $1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$ </div> </div>	<p><u>VECTOR & SCALAR</u></p> <p><i>Unit Vector</i>, $\hat{u} = \frac{u}{ u }$</p> $\vec{A} \cdot \vec{B} = a_1 a_2 + b_1 b_2 + c_1 c_2$ $\vec{A} \times \vec{B} = \begin{vmatrix} i & j & k \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}$ <p><i>Area of parallelogram ABC</i> = $\vec{AB} \times \vec{bc}$</p>
<p><u>COMPOUND-ANGLE</u></p> $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$ $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$	<p><u>DOUBLE-ANGLE</u></p> $\sin 2A = 2 \sin A \cos A$ $\cos 2A = \cos^2 A - \sin^2 A$ $= 1 - 2 \sin^2 A$ $= 2 \cos^2 A - 1$ $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$