

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR
SESI DISEMBER 2014

DBM1013: ENGINEERING MATHEMATICS 1

TARIKH : 16 APRIL 2015
MASA : 8.30 AM - 10.30 AM (2 JAM)

Kertas ini mengandungi **SEPULUH (10)** halaman bercetak.

Bahagian A: Struktur (3 soalan)

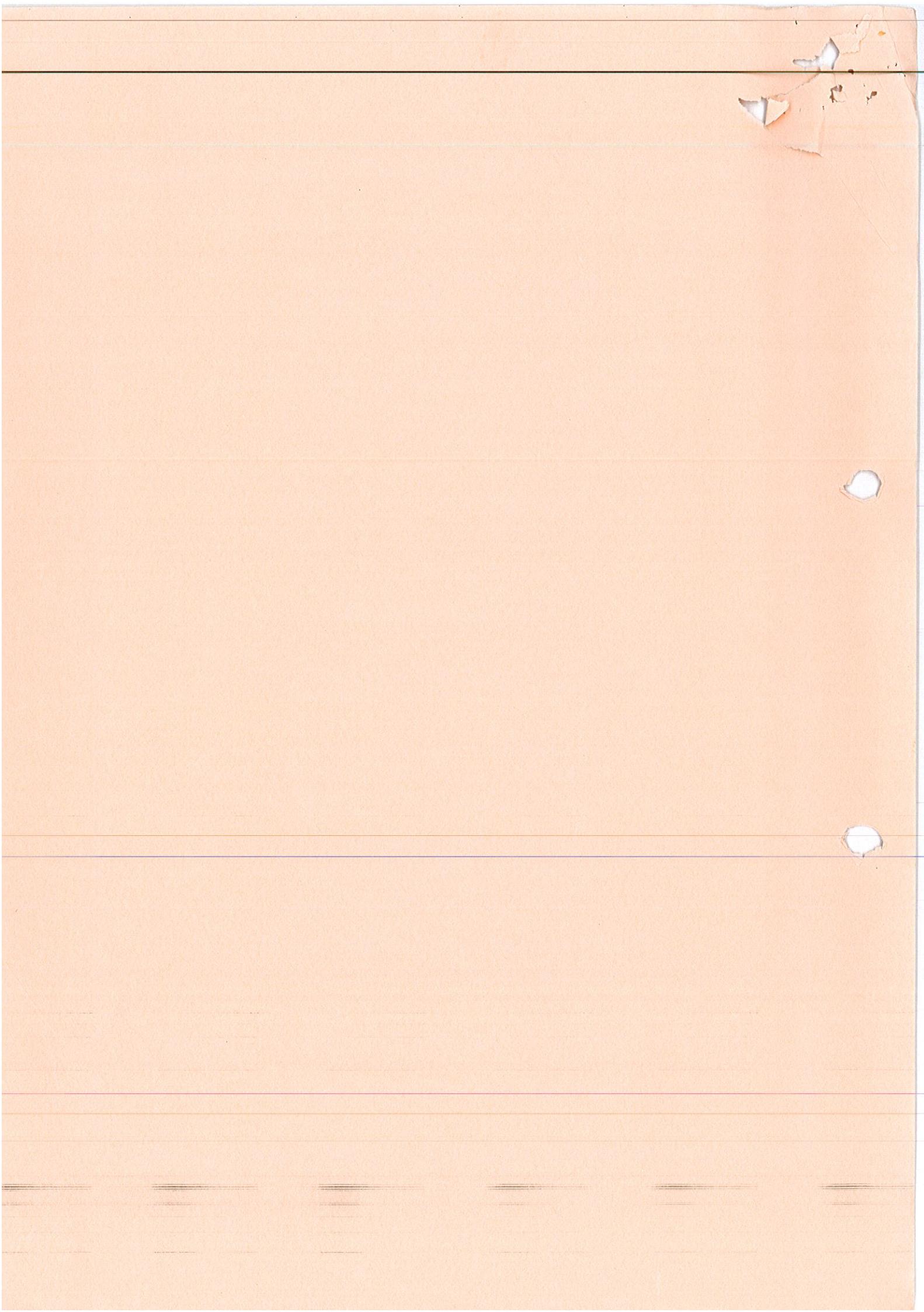
Bahagian B: Struktur (3 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALANINI 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 berstruktur. Jawab **SEMUA** soalan.

QUESTION 1**SOALAN 1**

CLO1

C3

- a) Simplify the following expressions to the lowest term.

Permudahkan ungkapan berikut kepada sebutan terendah.

i. $\frac{4abc}{3x} \div \frac{6ab^2}{10xy}$ [2 marks]

[2 markah]

ii. $\frac{a-b}{c} \times \frac{c^2}{a^2-b^2}$ [3 marks]

[3 markah]

iii. $\left(\frac{6}{x+6} - \frac{5}{x+5} \right) \times \left(\frac{x+5}{x} \right)$ [5 marks]

$$\frac{6}{n+6} - \frac{5}{n+5} \times \left(\frac{1}{n} \right)$$

[5 markah]

CLO2

C3

- b) Solve the following quadratic equations:

Selesaikan persamaan kuadratik berikut:

i. $2x^2 - 5x = 1$ (Quadratic formula method.) [6 marks]

[6 markah]

ii. $x(3x + 10) = 77$ (Completing the square) [9 marks]

[9 markah]

QUESTION 2
SOALAN 2

CLO 1
C3

a) Given $A = \begin{bmatrix} 4 & 5 \\ 3 & -1 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -5 & 1 \\ 4 & -1 & 3 \end{bmatrix}$, $C = \begin{bmatrix} 3 & 1 \\ 5 & -2 \\ 7 & 6 \end{bmatrix}$, find:

Diberi $A = \begin{bmatrix} 4 & 5 \\ 3 & -1 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -5 & 1 \\ 4 & -1 & 3 \end{bmatrix}$, $C = \begin{bmatrix} 3 & 1 \\ 5 & -2 \\ 7 & 6 \end{bmatrix}$, dapatkan:

i. $A + B^T$ [2 marks]

[2 markah]

ii. $(A - C)^T$ [2 marks]

[2 markah]

CLO 2
C3

b) If $M = \begin{bmatrix} 2 & 5 & 6 \\ -1 & 0 & 4 \\ 7 & 3 & 1 \end{bmatrix}$, $N = \begin{bmatrix} 1 & 2 \\ 0 & 3 \\ 7 & 2 \end{bmatrix}$, compute:

Jika $M = \begin{bmatrix} 2 & 5 & 6 \\ -1 & 0 & 4 \\ 7 & 3 & 1 \end{bmatrix}$, $N = \begin{bmatrix} 1 & 2 \\ 0 & 3 \\ 7 & 2 \end{bmatrix}$, kirakan:

i. Determinant M [2 marks]

[2 markah]

ii. MN [4 marks]

[4 markah]

CLO 2
C3

c) Solve the simultaneous equation below by using inverse matrix method.

Selesaikan persamaan serentak di bawah dengan menggunakan kaedah songsangan matrik.

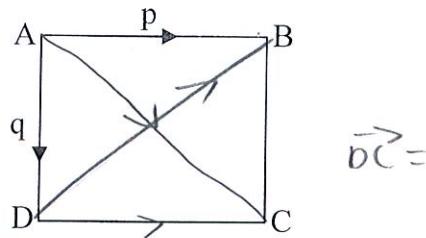
$$\begin{aligned}x - 2y + z &= 3 \\2x + y - z &= 5 \\3x - y + 2z &= 12\end{aligned}$$

[15 marks]
[15 markah]

3

$$\begin{matrix} 2x + (-2y) & x & z \\ 2x & 2y & 2z \end{matrix} \xrightarrow{\text{subtraction}}$$

QUESTION 3
SOALAN 3



- CLO1
C2
- a) Based on diagram above, $\overrightarrow{AB} = p$ and $\overrightarrow{AD} = q$. Express in terms of p and q :
Berdasarkan kepada rajah di atas, $\overrightarrow{AB} = p$ dan $\overrightarrow{AD} = q$. Ungkapkan dalam sebutan p dan q :
- (i) \overrightarrow{AC} [2 marks]
[2 markah]
- (ii) \overrightarrow{DB} [2 marks]
[2Markah]
- CLO2
C3
- b) Given, A and B are the point with coordinate (2,3) and (5,1) respectively.
Diberi, A dan B adalah koordinat dengan titik (2,3) dan (5,1) masing-masing.
- (i) Sketch vector \overrightarrow{AB} using triangle method. [2 marks]
Lakarkan vektor \overrightarrow{AB} menggunakan kaedah segitiga [2markah]
- (ii) Define the value of \overrightarrow{AB} [2 marks]
Tentukan nilai bagi \overrightarrow{AB} [2markah]
- (iii) Calculate the magnitude of vector \overrightarrow{AB} [2 marks]
Kira nilai bagi vektor \overrightarrow{AB} [2markah]

CLO3
C3c) A, B and C is a triangle with $(0,1,3)$, $(4, -1,2)$ and $(1,3, -5)$ respectively.

Calculate:

A, B dan C merupakan sebuah segitiga dengan bucu-bucu $(0,1,3)$, $(4, -1,2)$ dan $(1,3, -5)$ masing-masing. 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 [4 marks]
Luas segitiga ABC [4 markah]
- v. Unit vector of $\overrightarrow{AB} \times \overrightarrow{BC}$ [3 marks]
Vektor unit $\overrightarrow{AB} \times \overrightarrow{BC}$ [3 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
C3

- a) Express the following fractions into partial fraction.

Nyatakan pecahan-pecahan yang berikut kepada pecahan separa.

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

[5 markah]

ii. $\frac{8x-42}{x^2+3x-18}$ [5 marks]

[5 markah]

CLO2
C3

- b) Solve the following partial fractions.

Selesaikan pecahan separa berikut.

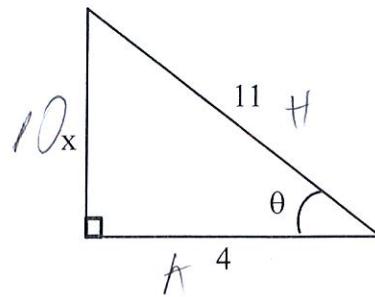
i. $\frac{2x+3}{x^2(1-x)} = \frac{2n+3}{n^2 \cdot n} = \frac{2n+3}{n^2} A$ [6 marks]

[6 markah]

ii. $\frac{3-5x+3x^2}{(1-2x)(1+x^2)}$ [9 marks]

[9 markah]

QUESTION 5
SOALAN 5



$$\cos \theta = \frac{4}{11}$$

Diagram 5
Rajah 5

$$\cos \theta = 1$$

- CLO1 a) Based on the Diagram 5 above, find the values of :
Berdasarkan Rajah 5 di atas, cari nilai-nilai bagi:

- i. $\tan \theta$ [4 marks]
[4 markah]
- ii. $cosec \theta$ [3 marks]
[3 markah]
- iii. $\cot \theta$ [3 marks]
[3 markah]

- CLO2 b) Solve the following trigonometric equations:
Selesaikan persamaan trigonometri berikut:

- i. $3 \sin 2x - 1 = 1$, for $0^\circ < x < 360^\circ$ [5 marks]
[5 markah]
- ii. $4 \cosec^2 x - 7 = 4 \cot x$, for $0^\circ < x < 360^\circ$ [10 marks]
[10 markah]

QUESTION 6
SOALAN 6

- CLO1 a) Given that $J = -2 + 3i$, $K = 5 - 9i$, $L = -2 - 4i$. Express each of the following in the form of $a + bi$

Diberi persamaan $J = -2 + 3i$, $K = 5 - 9i$, $L = -2 - 4i$. Ungkapkan persamaan berikut dalam bentuk $a + bi$

i. $J + L$ [2 marks]

[2 markah]

ii. $2(L - K)$ [3 marks]

[3 markah]

iii. $\frac{J}{L}$ [5 marks]

[5 markah]

- CLO 2 b) Given that $M = (-8 - 3i)$, $N = (-4 - 3i)$. Find the modulus, the argument and sketch the Argand's Diagram for:

Diberi $M = (-8 - 3i)$, $N = (-4 - 3i)$. Dapatkan modulus, hujahan, dan lakarkan gambarajah Argand's bagi:

i. M [7 marks]

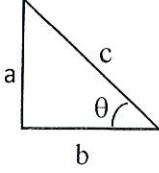
[7 markah]

ii. MN [8 marks]

[8 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>Sine Rules; $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$</p> <p>Cosine Rules; $a^2 = b^2 + c^2 - 2bc \cos A$</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, Adj(A)</i> $= C^T$</p> <p><i>Inverse of Matrix</i>, $A^{-1} = \frac{1}{ A } \text{Adj}(A)$</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></p>  $c^2 = a^2 + b^2$ <p><u>Trigonometric Identities</u></p> $\tan \theta = \frac{\sin \theta}{\cos \theta}$ $\cos^2 \theta + \sin^2 \theta = 1$ $1 + \tan^2 \theta = \sec^2 \theta$ $1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$	<p><u>VECTOR & SCALAR</u></p> <p><i>Unit Vector</i>, $\hat{u} = \frac{\underline{u}}{ u }$</p> <p>$\vec{A} \bullet \vec{B} = a_1a_2 + b_1b_2 + c_1c_2$</p> <p>$\vec{A} \times \vec{B} = \begin{vmatrix} i & j & k \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}$</p> <p><i>Area of parallelogram ABC</i> $= \overrightarrow{AB} \times \overrightarrow{BC}$</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> $\sin 2A = 2 \sin A \cos A$ $\cos 2A = \cos^2 A - \sin^2 A$ $= 1 - 2 \sin^2 A$ $= 2 \cos^2 A - 1$ $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$

