5

SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN MATEMATIK, SAINS & KOMPUTER

PEPERIKSAAN AKHIR

SESI JUN 2016

DBM1033: MATHEMATICAL COMPUTING

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

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.

Struktur (5 soalan)

Dokumen sokongan yang disertakan : Kertas Graf,Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

INSTRUCTION :

This section consists of **FIVE (5)** structured questions. Answer **FOUR (4)** questions only.

ARAHAN :

*Bahagian ini mengandungi **LIMA (5)** soalan berstruktur. Jawab **EMPAT (4)** soalan sahaja.*

QUESTION 1

SOALAN 1

CLO1
C1

a) Write the following data in terms of nibbles.

Tuliskan data-data berikut dalam sebutan nibble.

i. 12 bits [2 marks]

12 bit [*2 markah*]

ii. 2 words [2 marks]

2 word [*2 markah*]

CLO1
C2

b) Convert the following numbers in hexadecimal:

Tukarkan nombor-nombor berikut dalam asas enam belas:

i. 1111101011000011_2 [3 marks]

[*3 markah*]

ii. 355_8 [3 marks]

[*3 markah*]

CLO1
C3

c) Solve the following arithmetic operations and provide your answers in binary form:

Selesaikan operasi aritmetik dan berikan jawapan dalam bentuk perduaan bagi setiap soalan berikut:

i. $20_{10} + A2_{16} - 1011_2$ [5 marks]

[*5 markah*]

ii. $110_2 - 5_8 + 20_{10} + C_{16}$ [7 marks]

[*7 markah*]

iii. $1001_2 \times 101_2$ [3 marks]

[*3 markah*]

QUESTION 2

SOALAN 2

CLO1
C2

(a) i. In Diagram 2(a)(i), O is the centre of the circle. Find the value of x and y.
Dalam Rajah 2(a)(i), O merupakan pusat bagi sebuah bulatan. Cari nilai x dan y.

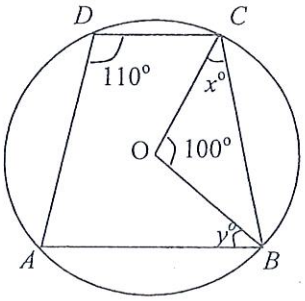

Diagram 2(a)(i) / *Rajah 2(a)(i)*

[4 marks]
[*4 markah*]

ii. Calculate the shaded area for Diagram 2(a)(ii).
Kirakan luas kawasan berlorek bagi Rajah 2(a)(ii).

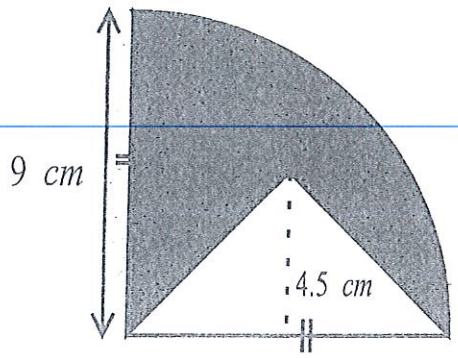

Diagram 2(a)(ii) / *Rajah 2(a)(ii)*

[6 marks]
[*6 markah*]

CLO2
C3

(b) i. Diagram 2(b)(i) shows a cone with a cylindrical hole in the middle where O is a centre of the circle. The radius of the hole is $\frac{1}{3}$ of the radius of the cone. Calculate the volume of the remaining solid. (use $\pi = 3.142$)

Rajah 2(b)(i) menunjukkan sebuah kon dengan lubang silinder di tengah-tengah di mana O adalah pusat bulatan. Jejari lubang tersebut adalah $\frac{1}{3}$ jejari kon. Kirakan isipadu pepejal yang tinggal. (gunakan $\pi = 3.142$)

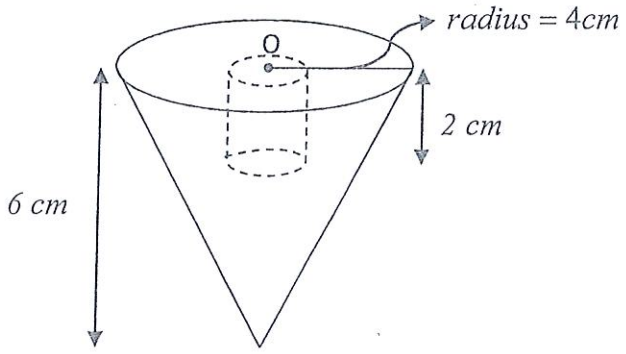

Diagram 2(b)(i) / *Rajah 2(b)(i)*

[5 marks]
[*5 markah*]

ii. In Diagram 2(b)(ii), VX and TW cross each other at Y. Given UV = 5 cm, calculate the perimeter and the area of the shaded region.

Dalam Rajah 2(b)(ii), VX and TW bersilang antara satu sama lain pada Y. Diberi UV = 5 cm, kira ukur lilit dan luas rantau berlorek.

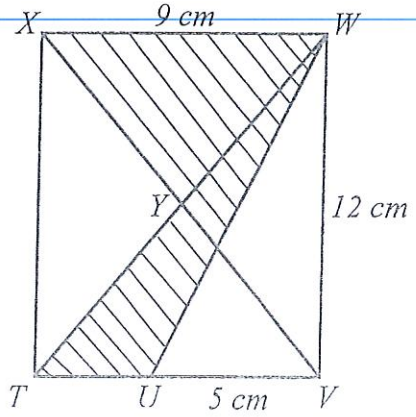

Diagram 2(b)(ii) / *Rajah 2(b)(ii)*

[10 marks]
[*10 makah*]

QUESTION 3

SOALAN 3

CLO1
C2

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

i. $-3(3 - i)$

[2 marks]
[*2 markah*]

ii. $(-1 + 2i) + (-1 + 5i)$

[2 marks]
[*2 markah*]

iii. $(-3 - 5i) - (2 - 6i)$

[2 marks]
[*2 markah*]

iv. $\frac{2-3i}{1+2i}$

[4 marks]
[*4 markah*]

CLO2
C3

b) i. Change $z = 5(\cos 30° + i \sin 30°)$ in Cartesian and Exponential form.
Tukarkan $z = 5(\cos 30° + i \sin 30°)$ *dalam bentuk Cartesian dan Eksponen.*

[4 marks]
[*4 markah*]

ii. Given that $z_1 = -5e^{2.3i}$ and $z_2 = 3e^{1.8i}$. Find $z_1 \times z_2$ and express the answer in exponential form.

Diberi $z_1 = -5e^{2.3i}$ *and* $z_2 = 3e^{1.8i}$. *Cari* $z_1 \times z_2$ *dan tukarkan jawapan dalam bentuk eksponen.*

[3 marks]

[*3 markah*]

iii. Given that $z = -5 + 2i$. Answer the following questions:

Diberi $z = -5 + 2i$. *Jawab soalan berikut:*

(a) Sketch the Argand's diagram for z.

Lakarkan gambar rajah Argand untuk z.

[2 marks]

[*2 markah*]

(b) Find the modulus and the argument for z.

Cari modulus dan argument untuk z.

[5 marks]

[*5 markah*]

(c) Change the answer in Question 3(b)(iii)(b) into polar form.

Tukarkan jawapan Soalan 3(b)(iii)(b) ke dalam bentuk polar.

[1 mark]

[*1 markah*]

QUESTION 4
SOALAN 4

CLO1 C2

a) Differentiate each of the following;

Bezakan setiap yang berikut;

i) $y = 5x^2 + \frac{3}{x^3} + 4$ [2 marks] [2 *markah*]

ii) $y = (\sqrt{x^2 + 5})^3$ [4 marks] [4 *markah*]

iii) $y = \frac{2}{7(2x-1)^3}$ [4 marks] [4 *markah*]

CLO3 C4

b) i. Find the equation of the tangent to the curve $y = x^2 - 2x + 1$ at the point $x = 3$.

Cari persamaan tangen kepada lengkuk $y = x^2 - 2x + 1$ *pada titik* $x = 3$.

[5 marks] [5 *markah*]

ii. Solve the differentiation for $y = \frac{4-6x}{x+5}$

Selesaikan pembezaan bagi $y = \frac{4-6x}{x+5}$

[5 marks] [5 *markah*]

iii. Given $\int_2^4 f(x)\,dx = 2$, find the value of k if $\int_2^4 [f(x) + k]\,dx = 6$

Diberi $\int_2^4 f(x)\,dx = 2$, *cari nilai k jika* $\int_2^4 [f(x) + k]\,dx = 6$

[5 marks] [5 *markah*]

QUESTION 5

SOALAN 5

CLO1 C2

a) Given that matrix $A = \begin{bmatrix} 2 & 4+x & 2y \\ 5 & 8 & 5 \end{bmatrix}$, calculate

Diberi matrik $A = \begin{bmatrix} 2 & 4+x & 2y \\ 5 & 8 & 5 \end{bmatrix}$, kirakan

i) The value of x if $a_{12}=a_{22}$.

Nilai x jika $a_{12}= a_{22}$

[4 marks]

[4 *markah*]

ii) The value of y if $a_{11}+ a_{13}=2a_{23}$.

Nilai y jika $a_{11}+ a_{13}=2a_{23}$

[6 marks]

[6 *markah*]

CLO3 C4

b) Solve the following simultaneous equations by using Cramer's Rule.

Selesaikan persamaan serentak berikut menggunakan Petua Cramer.

$$p + 2q + 3r = 40$$
$$5p - q + 2r = 15$$
$$q = -65 + 7r$$

[15 marks]

[15 *markah*]

SOALAN TAMAT

FORMULA SHEET FOR DBM 1033 – MATHEMATICAL COMPUTING

CIRCLE

Length of an arc

1. $s = r\theta$

Area of a sector

1. $A = \frac{1}{2} r^2 \theta$

Area of a segment

1. $A = \frac{1}{2} r^2 (\theta - \sin\theta)$

AREA AND VOLUME

1. Cylinder : $V = \pi r^2 h$
2. Cone : $V = \frac{1}{3} \pi r^2 h$
3. Sphere : $V = \frac{4}{3} \pi r^3$
4. Pyramid : $V = \frac{1}{3} \times$ area of base $\times$ height
5. Triangular Prism : $V = A \times l$, $note: A = area$
6. Parallelogram : $A = h \times b$
7. Triangle : $A = \left(\frac{1}{2}\right) \times b \times h$
8. Trapezium : $A = h \times \left(\frac{a+b}{2}\right)$

COMPLEX NUMBER

Modulus

1. $|z| = \sqrt{a^2 + b^2}$

Argument

1. $\arg z = \tan^{-1} \frac{b}{a}$

Complex no. In other form

1. Polar form : $|z| \angle\theta$
2. Exponential form : $|z| e^{i\theta}$
3. 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. $\frac{(a\angle\theta_a)}{(b\angle\theta_b)} = \left(\frac{a}{b}\right)\angle(\theta_a - \theta_b)$

MATRIX

Inverse Matrix

1. $A^{-1} = \frac{1}{|A|} adjA$

Cramer's Rule

1. $x = \frac{|A_1|}{|A|}$ $y = \frac{|A_2|}{|A|}$ $z = \frac{|A_3|}{|A|}$

DIFFERENTIATION

$y = ax^n$ $\qquad$ $y = (ax+b)^n$

1. $\frac{dy}{dx} = anx^{n-1}$, 2. $\frac{dy}{dx} = an(ax+b)^{n-1}$
3. Chain Rule : $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$
4. Product Rule : $y = u \times v$

   $y' = uv' + vu'$
5. Quotient Rule : $y = \frac{u}{v}$

   $y' = \frac{vu' - uv'}{v^2}$

INTEGRATION

Indefinite Integration

1. $\int x^n dx = \frac{x^{n+1}}{n+1} + C$
2. $\int (ax+b)^n dx = \frac{(ax+b)^{n+1}}{a(n+1)} + C$

Definite Integration

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