SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR

SESI JUN 2015

DBM1023: MATHEMATICS COMPUTING

TARIKH : 21 OKTOBER 2015
MASA : 2.30 PM - 4.30 PM (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.
Bahagian A: Struktur (5 soalan, jawab 4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SECTION A : 100 MARKS
BAHAGIAN A : 100 MARKAH

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) State the definition of hexadecimal and bit.
Nyatakan maksud heksadesimal dan bit.

[4 marks]
[4 *markah*]

CLO1 C2 (b) Convert the base numbers below:
Tukarkan nombor-nombor asas di bawah:

i. 637_8 into decimal number.
637_8 kepada nombor desimal.

[2 marks]
[2 *markah*]

ii. 11100111_2 into hexadecimal number.
11100111_2 kepada nombor heksadesimal.

[2 marks]
[2 *markah*]

iii. 94_{10} into hexadecimal number.
94_{10} kepada nombor heksadesimal.

[2 marks]
[2 *markah*]

CLO1
C3

(c) Calculate the values of x and y of the following numbers.
Kirakan nilai x and y bagi nombor-nombor berikut.

i. $111\ xxx\ 001_2 + 1\ 010\ 111_2 = 1\ 001\ 010\ 000_2$ [3 marks]
[3 *markah*]

ii. $11111100101_2 = 37y5_8$
[3 marks]
[3 *markah*]

CLO1
C3

(d) Solve the following binary arithmetic operations in binary form.
Selesaikan operasi aritmetik yang berikut dalam bentuk perduaan.

i. $11001001_2 + 110101_2$
[2 marks]
[2 *markah*]

ii. $11001101_2 - 11011_2$
[2 marks]
[2 *markah*]

iii. $70_{10} + F1_{16} - 1001001_2$ [5 marks]
[5 *markah*]

QUESTION 2
SOALAN 2

CLO1 C2

(a) In Diagram 2(a), O is the centre of the circle and PQR is a straight line. Calculate the value of $x°$ and $y°$.

Dalam Rajah 2(a), O adalah pusat bulatan dan PQR adalah satu garis lurus. Hitungkan nilai $x°$ dan $y°$.

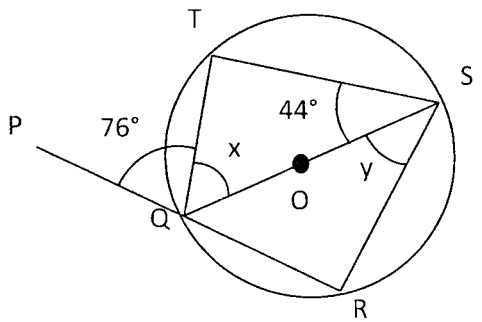

Diagram 2(a)/ *Rajah 2(a)*

[6 marks]
[*6 markah*]

CLO 1 C2

(b) In Diagram 2(b), AD and BC are the arcs of two circles of radius OA and OB respectively. If A is the midpoint of OB and arc AD = 12.5 cm, calculate the area of sector OBC.

Dalam Rajah 2(b), AD dan BC adalah lengkung bagi 2 bulatan yang masing-masing beradius OA dan OB. Jika A adalah titik tengah bagi OB dan lengkung AD=12.5cm, kirakan luas bagi sector OBC.

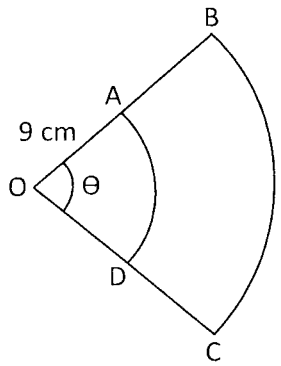

Diagram 2(b)/ *Rajah 2(b)*

[4 marks]
[*4 markah*]

CLO 2
C3

(c)

i. In Diagram 2 (c) (i), PWUV and RSTW are squares. Area of RSTW is 36 cm^2. Find the area of PWUV in cm^2.

Dalam Rajah 2 (c) (i), PWUV dan RSTW ialah segiempat sama sisi. Luas RSTW ialah 36 cm^2. Cari luas PWUV dalam cm^2.

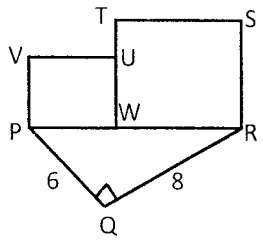

Diagram 2 (c) (i)/ *Rajah 2 (c) (i)*

[7 marks]
[*7 markah*]

ii. Diagram 2 (c) (ii) shows a container in a shape of cuboid and another in a shape of a cylinder. The cuboid is full of water. All of the water in the cuboid is poured into the cylindrical container. Compute the height in cm of the water level in the cylindrical container. [Use π=22/7].

Rajah 2 (c) (ii) menunjukkan satu bekas berbentuk kuboid dan satu lagi bekas berbentuk silinder. Kuboid diisi penuh dengan air. Semua air di dalam kuboid dituang ke dalam bekas silinder. Kira ketinggian (cm) paras air di dalam bekas silinder. [gunakan nilai π=22/7]

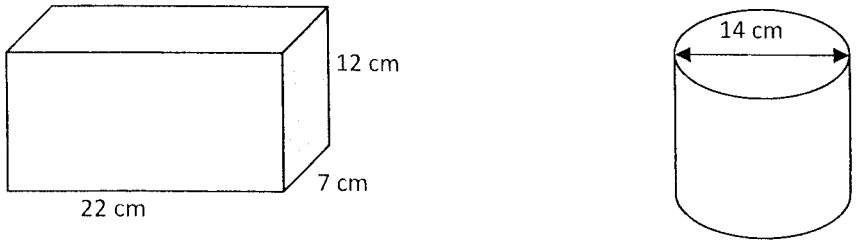

Diagram 2 (c) (ii)/ *Rajah 2 (c) (ii)*

[8 marks]
[*8 markah*]

QUESTION 3

SOALAN 3

CLO 1
C2

(a) Calculate the following expressions in the form of $a + bi$.

Kirakan ungkapan- ungkapan berikut dalam bentuk $a + bi$.

i. $(4-8i)-(-5+10i)+12i$ [3 marks]
[*3 markah*]

ii. $(8-3i)(5-2i)$ [3 marks]
[*3 markah*]

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

CLO 2
C3

(b) Sketch Argand's diagram for the following complex numbers and express it in polar, trigonometric and exponential forms.

Lakarkan gambarajah Argand bagi nombor kompleks yang diberi. Seterusnya ungkapkan dalam bentuk kutub, trigonometri dan eksponen.

i. $z = 4 + 9i$ [7 marks]
[*7 markah*]

ii. $z = 4 - 8i$. [8 marks]
[*8 markah*]

QUESTION 4

SOALAN 4

CLO 1
C2

(a) Differentiate the following with respect to x.
Bezakan setiap yang berikut terhadap x.

i. $y = \dfrac{2x+5}{x-2}$ [4 marks]
[*4 markah*]

ii. $y = 2x^4(3x+1)^3$ [6 marks]
[*6 markah*]

CLO 3
C3

(b) Determine $\dfrac{dy}{dx}$ for function $y = (3x+2)^4$ by using Chain Rule.

Carikan $\dfrac{dy}{dx}$ *bagi fungsi* $y = (3x+2)^4$ *dengan menggunakan kaedah Petua Rantai.*

[5 marks]
[*5 markah*]

CLO3
C3

(c) Calculate the following:
Kirakan yang berikut:

i. $\int_1^5 \left(\dfrac{(x+3)(3x-2)}{3} \right) dx$

[6 marks]
[*6 marka*

ii. $\int \left(\dfrac{8}{(2+4x)^2} \right) dx$

[4 marks]
[*4 markah*]

QUESTION 5

SOALAN 5

CLO3 C2

(a) Given $A = \begin{bmatrix} 5 & 0 \\ -6 & 3 \\ 0 & 2 \end{bmatrix}, B = \begin{bmatrix} 4 & 1 \\ -3 & 6 \\ 2 & 10 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 3 \\ 0 & 6 \end{bmatrix}$. Calculate:

Diberi $A = \begin{bmatrix} 5 & 0 \\ -6 & 3 \\ 0 & 2 \end{bmatrix}, B = \begin{bmatrix} 4 & 1 \\ -3 & 6 \\ 2 & 10 \end{bmatrix}$ *dan* $C = \begin{bmatrix} 1 & -3 \\ 0 & -4 \end{bmatrix}$ *Kira:*

i. $A - B$

[1 mark]

[*1 markah*]

ii. AC

[2 marks]

[*2 markah*]

CLO3 C2

(b) Calculate the inverse of matrix Z if the determinant of matrix Z is -1 and

$$Z = \begin{bmatrix} 1 & 3 & 3 \\ 2 & -3 & -2 \\ 3 & 1 & 2 \end{bmatrix}.$$

Kira songsangan bagi matriks Z jika penentu kepada matriks Z ialah -1 di dan

$$Z = \begin{bmatrix} 1 & 3 & 3 \\ 2 & -3 & -2 \\ 3 & 1 & 2 \end{bmatrix}.$$

[7 marks]

[*7 markah*]

CLO3 C3

c) Calculate the value of x, y and z by using Cramer's Rule.

Kirakan nilai x, y dan z dengan menggunakan Petua Cramer.

$$5x - y + 7z = 4$$
$$6x - 2y + 9z = 5$$
$$2x + 8y - 4z = 8$$

[15 marks]

[*15 markah*]

SOALAN TAMAT

FORMULA

CIRCLE

Length of an arc

1. $s = r\theta$

Area of a sector , Area of a segment

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

SURFACE AREA AND VOLUME

1. Cylinder : $A = 2\pi rh + 2\pi r^2$, $V = \pi r^2 h$

2. Cone : $A = \pi rs + \pi r^2$, $V = \frac{1}{3}\pi r^2 h$

3. Sphere : $A = 4\pi r^2$, $V = \frac{4}{3}\pi r^3$

4. Pyramid : A = area of 4 triangles + area of base

$V = \frac{1}{3} \times$ area of base $\times$ height

COMPLEX NUMBER

Modulus Argument

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

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

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

efinite Integratio n

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

AREA UNDER A CURVE

1.Along x-axis: $A = \int_a^b y dx$

2.Along y-axis: $A = \int_a^b x dy$