



KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR

SESI II : 2025/2026

DBM10143 : CALCULUS AND ALGEBRA

TARIKH : 04 MEI 2026

MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)

Kertas ini mengandungi **TUJUH (7)** halaman bercetak.

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

TERBUKA

INSTRUCTION:

This section consists of **FOUR (4)** questions. Answers **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **EMPAT (4)** soalan. Jawab **SEMUA** soalan.*

QUESTION 1**SOALAN 1**

CLO1

- (a) Convert the following number system into binary and octal.

Tukarkan sistem nombor berikut kepada asas dua dan lapan.

i. 325_{10}

[6 marks]

[6 markah]

ii. ABC_{16}

[4 marks]

[4 markah]

CLO1

- (b) Calculate the following using the binary arithmetic operations:

Hitung operasi berikut menggunakan operasi aritmetik asas dua:

i. $(101110_2 - 1101_2) + (110111_2 + 101101_2)$

[5 marks]

[5 markah]

ii. $11_2 \times (10110_2 + 111_2)$

[5 marks]

[5 markah]

iii. $(11100_2 - 111_2) \times (10_2)$

[5 marks]

[5 markah]

TERBUKA

QUESTION 2

SOALAN 2

- CLO1 (a) Figure 2(a) shows a circle with center O. Calculate:

Rajah 2(a) menunjukkan sebuah bulatan berpusat O. Kirakan:

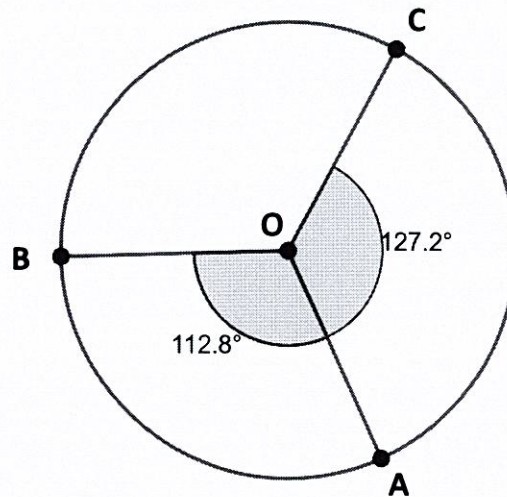


Figure 2(a)/ *Rajah 2(a)*

- i. radius of the OC if an arc length OCB is 15.5 cm.
jejari OC sekiranya panjang lengkok OCB ialah 15.5 cm.

[4 marks]

[4 markah]

- ii. circumference of the circle.
lilitan bulatan.

[3 marks]

[3 markah]

TERBUKA

- CLO1 (b) Figure 2(b) shows a sector OPRQ with centre O and a radius of 7 cm. The length of the arc PRQ is 7.11 cm, calculate:
Rajah 2(b) menunjukkan sebuah sektor OPRQ berpusat O dengan jejari 7 cm. Panjang lengkok PRQ ialah 7.11 cm, kirakan:

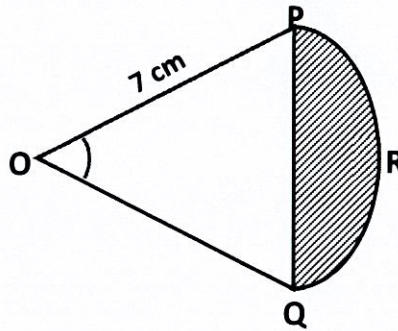


Figure 2(b) /Rajah 2(b)

- i. area of sector OPRQ.
luas kawasan sektor OPRQ.
- ii. area of the shaded segment PRQ.
luas kawasan berlorek segmen PRQ.

[4 marks]

[4 markah]

[4 marks]

[4 markah]

TERBUKA

CLO1 (c)

- i. Figure 2 (c) i shows a solid metal cone has a base radius of 10 cm and a slant height of 15 cm. The entire surface of the cone, including its base, is painted white. Calculate the total surface area to be painted.

Rajah 2 (c) i menunjukkan sebuah kon logam padu mempunyai jejari tapak ialah 10 cm dan tinggi sendeng ialah 15 cm. Keseluruhan permukaan kon itu, termasuk tapaknya, akan dicat dengan warna putih. Hitung jumlah luas permukaan yang perlu dicat itu.

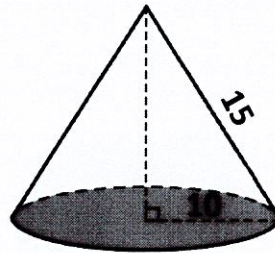


Figure 2(c) i / Rajah 2(c) i

[4 marks]

[4 markah]

- ii. Figure 2 (c) ii shows a spherical water tank has a diameter of 6 m. Initially, the tank is filled full of water. If $\frac{1}{2}$ of the water is drained out for domestic use, calculate the volume, m^3 of the remaining water in the tank.

Rajah 2 (c) ii menunjukkan sebuah tangki air berbentuk sfera mempunyai diameter 6 m. Pada mulanya, tangki itu diisi penuh dengan air. Jika $\frac{1}{2}$ daripada air itu dialirkan keluar bagi kegunaan domestik, kirakan isipadu, m^3 baki air di dalam tangki tersebut.

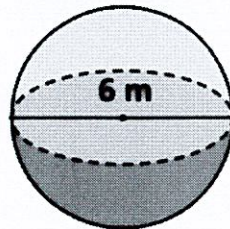


Figure 2(c) ii/ Rajah 2(c) ii

[6 marks]

[6 markah]

TERBUKA

QUESTION 3

SOALAN 3

- CLO1 (a) Given two vectors, $\vec{A}$ and $\vec{B}$ with components $\vec{A} = -2\mathbf{i} + 6\mathbf{j}$ and $\vec{B} = 3\mathbf{i} - 5\mathbf{j}$. Express the values for the following:
Diberi dua vektor, $\vec{A}$ dan $\vec{B}$ dengan komponen $\vec{A} = -2\mathbf{i} + 6\mathbf{j}$ dan $\vec{B} = 3\mathbf{i} - 5\mathbf{j}$. Nyatakan nilai bagi yang berikut:

i. $|\vec{A}|$

[3 marks]

[3 markah]

ii. $\hat{A}$

[3 marks]

[3 markah]

iii. $5\vec{A} + 3\vec{B}$

[4 marks]

[4 markah]

- CLO1 (b) Given two vectors, $S = -3\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$ and $T = -2\mathbf{i} + 6\mathbf{j} + \mathbf{k}$. Calculate:
Diberi dua vektor, $S = -3\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$ dan $T = -2\mathbf{i} + 6\mathbf{j} + \mathbf{k}$. Kirakan:

- i. the angle between vector S and vector T
nyatakan nilai sudut antara vektor S dan vektor T .

[9 marks]

[9 markah]

- ii. the area of the parallelogram formed by two vectors S and T .
luas paralelogram yang dibentuk oleh dua vektor S dan T .

TERBUKA

[6 marks]

[6 markah]

QUESTION 4**SOALAN 4**

- CLO1 (a) Solve the derivative for each of the following functions:
Selesaikan pembezaan bagi setiap fungsi yang berikut:
- i. $y = (3 - 3x)(x^2 + 2)$
(Using Product Rule / *guna Petua Hasil Darab*)
[5 marks]
[5 markah]
- ii. $y = \frac{3+x^2}{x-1}$
(Using Quotient Rule / *guna Petua Hasil Bahagi*)
[5 marks]
[5 markah]
- CLO1 (b) Solve the following integrals:
Selesaikan kamiran berikut:
- i. $\int x^5 - \frac{4}{x^3} + 7x \, dx$
[5 marks]
[5 markah]
- ii. $\int (4 - 3x)(2x + 1) \, dx$
[5 marks]
[5 markah]
- CLO1 (c) Calculate the value of $\int_1^2 (-6 + 5x^2 - 5) \, dx$.
Kirakan nilai bagi $\int_1^2 (-6 + 5x^2 - 5) \, dx$
[5 marks]
[5 markah]

TERBUKA**SOALAN TAMAT**

FORMULA SHEET FOR DBM10143: CALCULUS AND ALGEBRA

VECTOR & SCALAR

1. **Magnitude Vector;** $|\vec{A}| = \sqrt{a^2 + b^2 + c^2}$

2. **Unit Vector;** $\hat{u} = \frac{\vec{u}}{|\vec{u}|}$

3. **Cos θ** = $\frac{\vec{A} \cdot \vec{B}}{|\vec{A}| |\vec{B}|}$

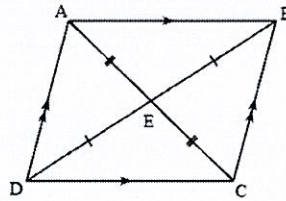
4. **Scalar Product;**

$$\vec{A} \cdot \vec{B} = a_1 a_2 + b_1 b_2 + c_1 c_2$$

5. **Vector Product;**

$$\vec{A} \times \vec{B} = \begin{vmatrix} i & j & k \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}$$

*Formula number 6 & 7, refers to the same diagram



6. **Area of parallelogram ABCD;**

$$A = |\vec{AB} \times \vec{BC}|$$

7. **Area of triangle ABC;**

$$A = \frac{1}{2} |\vec{AB} \times \vec{BC}|$$

GEOMETRY

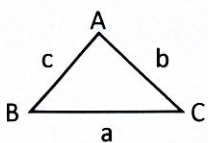
Radian to Degree

$$\theta = \text{value in radian} \times \frac{180^\circ}{\pi}$$

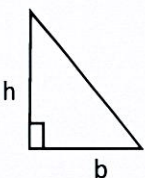
Degree to Radian

$$\theta = \text{value in degree} \times \frac{\pi}{180^\circ}$$

Formula of triangle



$$\text{Area of triangle} = \frac{1}{2} ab \sin c$$



$$\text{Area of right angle triangle} = \frac{1}{2} bh$$

Circumference

$$\text{circumference} = 2\pi r$$

Arc Length

$$s = r\theta \quad (\theta \text{ in radian})$$

Area of Circle

$$A = \pi r^2$$

Area of Sector

$$A = \frac{1}{2} r^2 \theta \quad (\theta \text{ in radian})$$

Area of Segment

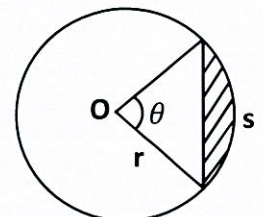
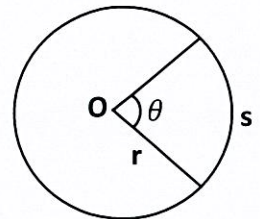
$$A = \frac{1}{2} r^2 (\theta_1 - \sin \theta_2)$$

or

$$A = \frac{1}{2} r^2 \theta_1 - \frac{1}{2} r^2 \sin \theta_2$$

θ_1 must be in radian

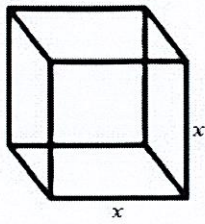
θ_2 must be in degree



TERBUKA

Surface area and Volume

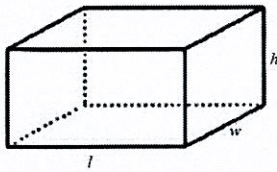
Cube



$$A = 6x^2$$

$$V = x^3$$

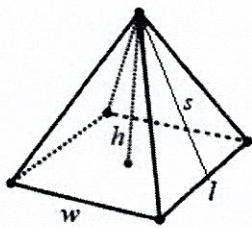
Cuboid



$$A = 2(wh + lw + lh)$$

$$V = lwh$$

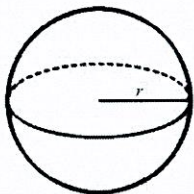
Pyramid



$$A = wl + ls + ws$$

$$V = \frac{1}{3} \times wl \times h$$

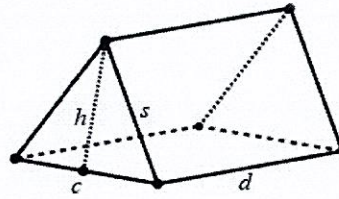
Sphere



$$A = 4\pi r^2$$

$$V = \frac{4}{3}\pi r^3$$

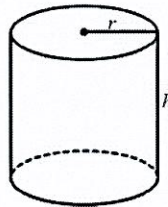
Prism



$$A = ch + cd + 2sd$$

$$V = \frac{1}{2} \times ch \times d$$

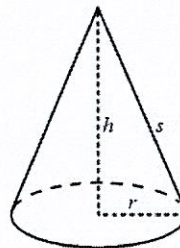
Cylinder



$$A = 2\pi rh + 2\pi r^2$$

$$V = \pi r^2 h$$

Cone



$$A = \pi rs + \pi r^2$$

$$V = \frac{1}{3}\pi r^2 h$$

TERBUKA

DIFFERENTIATION

1.	$\frac{d}{dx}(k) = 0, k \text{ is constant}$	2.	$\frac{d}{dx}(ax^n) = anx^{n-1}$ [Power Rule]
3.	$\frac{d}{dx}(ax + b)^n = n(ax + b)^{n-1} \times \frac{d}{dx}(ax + b)$ [Composite Rule]		
4.	$\frac{d}{dx}(f(x) \pm g(x)) = f'(x) \pm g'(x)$	5.	$\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$ [Product Rule]
6.	$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$ [Quotient Rule]	7.	$\frac{dy}{dx} = \frac{du}{dx} \times \frac{dy}{du}$ [Chain Rule]

INTEGRATION

1.	$\int ax^n dx = \frac{ax^{n+1}}{n+1} + c; \{n \neq -1\}$	2.	$\int (ax + b)^n dx = \frac{(ax + b)^{n+1}}{(a)(n+1)} + c; \{n \neq -1\}$
3.	$\int k dx = kx + c, k \text{ is constant}$	4.	$\int_a^b f(x) dx = F(b) - F(a)$
5.	Along x-axis: $A = \int_a^b y dx$	6.	Along y-axis: $A = \int_a^b x dy$
7.	Volume x-axis: $\pi \int_a^b y^2 dx$	8.	Volume y-axis: $\pi \int_a^b x^2 dx$

TERBUKA