

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENGAJIAN POLITEKNIK
KEMENTERIAN PENDIDIKAN MALAYSIA**

JABATAN MATEMATIK, SAINS DAN KOMPUTER

**PEPERIKSAAN AKHIR
SESI JUN 2014**

BA101 : ENGINEERING MATHEMATICS 1

**TARIKH : 27 OKTOBER 2014
MASA : 8.30 AM - 10.30 AM (2 JAM)**

Kertas ini mengandungi **EMPAT BELAS (14)** halaman bercetak.

Bahagian A: Struktur (3 soalan) – jawab 2 soalan sahaja

Bahagian B: Struktur(3 soalan) – jawab 2 soalan sahaja

Dokumen sokongan yang disertakan : Kertas Graf & Formula

JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT



SECTION A: 50 MARKS
BAHAGIAN A: 50 MARKAH

INSTRUCTION:

This section consists of **THREE (3)** structured questions. Answer **TWO (2)** questions only.

ARAHAN:

Bahagian ini mengandungi **TIGA (3)** soalan struktur. Jawab **DUA (2)** soalan sahaja.

QUESTION 1
SOALAN 1

CLO1
C1

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

Permudahkan ungkapan berikut kepada sebutan terendah.

i.
$$\frac{15p^2q - 20q^2}{-5q}$$

[2 marks]
[2 markah]

ii.
$$\frac{2p+q}{a} \div \frac{4p+2q}{2a^2}$$

[3 marks]
[3 markah]

iii.
$$\frac{4a^2b}{10x^3y^2} \times \frac{2x^2y}{8ab^3c}$$

[2 marks]
[2 markah]

CLO2
C2

- (b) Express the variables in brackets as the subjects of the formula.

Jadikan pembolehubah di dalam kurungan sebagai perkara rumus.

i. $V = \frac{1}{3}\pi r^2 h$ (h)

[2 marks]
[2 markah]

ii. $v^2 = u^2 + 2at$ (a)

[2 marks]
[2 markah]

CLO2
C3

- (c) Solve the following quadratic equations.

Selesaikan persamaan kuadratik berikut.

i. $x^2 + 2x - 8 = 0$ by using the **factorization method.**

[3 marks]
[3 markah]

ii. $2x^2 - 15 = -x$ by using the **quadratic formula.**

[5 marks]
[5 markah]CLO2
C3

- (d) Solve the following simultaneous linear equations by using the
- substitution method.**

Selesaikan persamaan serentak yang berikut dengan menggunakan kaedah gantian.

$3x + 4y = 5$

$2x - 3y = 9$

[6 marks]
[6 markah]

QUESTION 2
SOALAN 2

CLO1
C1

- (a) Find the value of the following expressions and express your answer in standard form.
Cari nilai bagi ungkapan berikut dan nyatakan jawapan anda dalam bentuk piawai

i. $7980 + 238$ [2 marks]
[2 markah]

ii. $3.198 \times 10^{-4} + 47.92 \times 10^{-2}$ [2 marks]
[2 markah]

iii. $7.8931 \times 10^{-12} \times 12.386 \times 10^6$ [2 marks]
[2 markah]

CLO2
C2

- (b) Simplify each of the following indices.
Permudahkan setiap indeks berikut.

i. $3^{n+1} \times 9^n \div 27^{\frac{2}{3}n}$ [4 marks]
[4 markah]

ii. $5^3 \times 25^{2n-1} \div 5^{4n+1}$ [4 marks]
[4 markah]

CLO2
C3

- (c) Given that $\log_2 3 = 1.585$ and $\log_2 5 = 2.322$, without using calculator, calculate the values.

Diberi $\log_2 3 = 1.585$ dan $\log_2 5 = 2.322$, tanpa menggunakan kalkulator, kirakan

i. $\log_2 30$ [4 marks]
[4 markah]

ii. $\log_2 1\frac{2}{3}$ [4 marks]
[4 markah]

CLO2
C3

- (d) Solve the equation ,
- $\log_7 5x = 2\log_7 3$

Selesaikan persamaan $\log_7 5x = 2\log_7 3$

[3 marks]

[3 markah]

QUESTION 3**SOALAN 3**CLO 2
C1

- (a) Given that
- $\sin \theta = \frac{8}{17}$
- , and
- $0^\circ < \theta < 90^\circ$
- . Without using calculator, find the value of:

Diberi $\sin \theta = \frac{8}{17}$ dengan $0^\circ < \theta < 90^\circ$. Tanpa menggunakan kalkulator, cari nilai berikut

- i.
- $\cos \theta$

[3 marks]

[3 markah]

- ii.
- $\operatorname{cosec} \theta$

[3 marks]

[3 markah]

- iii.
- $\sec \theta$

[3 marks]

[3 markah]

CLO 3
C3

- (b) Solve the following trigonometry equation for
- $0^\circ \leq \theta \leq 360^\circ$
- .

Selesaikan persamaan trigonometri berikut untuk $0^\circ \leq \theta \leq 360^\circ$.

$$3 \tan^2 \theta - 2 \tan \theta - 1 = 0$$

[10 marks]

[10 markah]

CLO 3
C3

- (c) **Figure 3a** shows a triangle in a circle, calculate the length of RT if ST = 12cm.

Rajah 3a menunjukkan satu segitiga di dalam sebuah bulatan, kira panjang RT jika ST = 12cm.

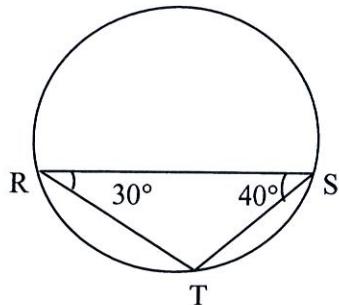


Figure 3a / Rajah 3a

[6 marks]
[6 markah]

SECTION B : 50 MARKS
BAHAGIAN B : 50 MARKAH

INSTRUCTION:

This section consists of THREE (3) structured questions. Answer TWO (2) questions only.

ARAHAN :

Bahagian ini mengandungi TIGA (3) soalan struktur. Jawab DUA (2) soalan sahaja.

QUESTION 4**SOALAN 4**

CLO1
C2

- (a) According to Figure 4(a), AOD and BOE are straight lines. Find the value of x , y and z .

Berdasarkan Rajah 4(a), AOD and BOE adalah garis lurus. Cari nilai x , y and z .

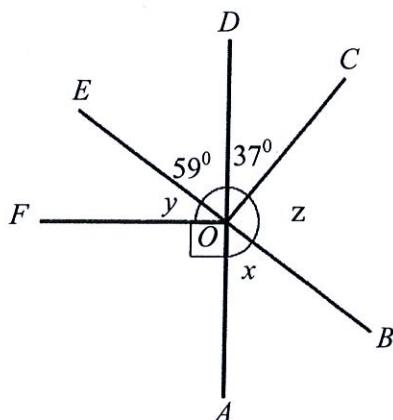


Figure 4(a) / Rajah 4(a)

[5 marks]
[5 markah]

CLO2
C2

- (b) In the **Figure 4(b)**, POS and QOT are diameters of a circle with centre, O. Given that TS = SR and $\angle POT = 130^\circ$. Determine the value of x , y and z .

Dalam Rajah 4(b), POS dan QOT adalah diameter bagi satu bulatan berpusat di O. Diberi TS = SR dan $\angle POT = 130^\circ$. Tentukan nilai x, y dan z.

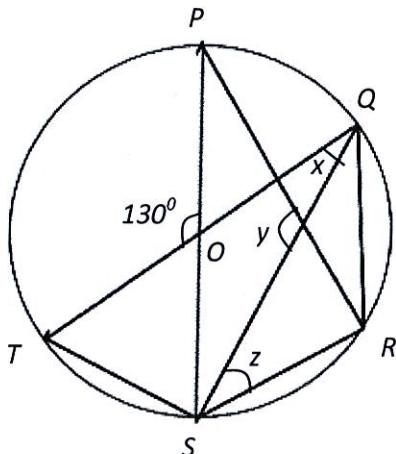


Figure 4(b) / Rajah 4(b)

[10 marks]
[10 markah]

CLO2
C2

- (c) Given the diagram below with $\angle PQT = 90^\circ$. Find the value of x° in **Figure 4(c)**.
*Diberi gambarajah di bawah dengan $\angle PQT = 90^\circ$. Cari nilai x° dalam **Rajah 4(c)**.*

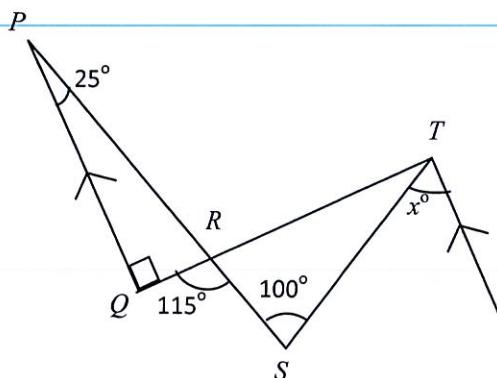


Figure 4(c) / Rajah 4(c)

[6 marks]
[6 markah]

CLO3
C3

- (d) The **Figure 4(d)** shows an equilateral triangle EDF and ABCD is a square. Given that the area of ABCD is 64 cm^2 and $EF = FG = 6 \text{ cm}$. Calculate the perimeter, in cm, of the whole diagram.

Rajah 4(d) menunjukkan segi tiga sama sisi EDF dan ABCD adalah empat segi. Diberi luas kawasan ABCD ialah 64 cm^2 dan $EF = FG = 6 \text{ cm}$. Hitung perimeter, dalam cm, seluruh rajah itu.

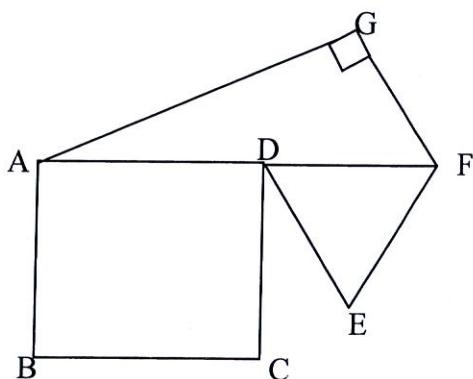


Figure 4(d) / Rajah 4(d)

[4 Marks]
[4 Markah]

QUESTION 5
SOALAN 5

CLO2
C3

- (a) **Figure 5 (a)** shows a sector of a circle BC with centre O. Given that $\angle BOC = 20^\circ$ and the length of the arc BC is 15.36 cm, find:

Rajah 5(a) menunjukkan sektor bulatan BC yang berpusat O. Diberikan $\angle BOC = 20^\circ$ dan panjang lengkok BC adalah 15.36 cm, cari:

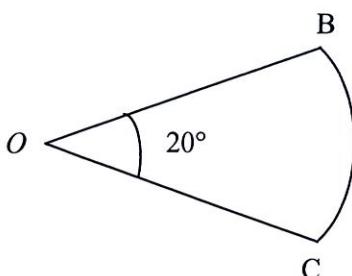


Figure 5(a)/ Rajah 5 (a)

- i. the length of OB

panjang OB

[3 marks]
[3 markah]

- ii. the perimeter of the sector OBC

perimeter sektor OBC

[2 marks]
[2 markah]

CLO 3
C3

- (b) **Figure 5 (b)** shows a triangular prism. Calculate

Rajah 5(b) menunjukkan sebuah prisma yang bersisi segitiga. Kirakan

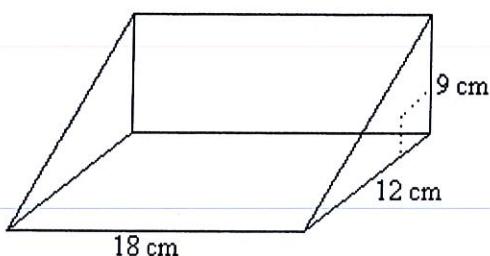


Figure 5(b)/ Rajah 5 (b)

- i. the total surface area of the prism

jumlah luas permukaan bagi prisma tersebut

[7 marks]
[7 markah]

- ii. the volume of the prism

isipadu bagi prisma tersebut.

[3 marks]
[3 markah]

CLO 3
C3

- (c) **Figure 5 (c)** is a combination of a cube and a pyramid. Given that the total surface area of the combined solid is 1339 cm^2 , find

Rajah 5 (c) menunjukkan bahawa suatu objek yang terhasil daripada kiub dan piramid. Diberi bahawa luas permukaan objek tersebut adalah 1339 cm^2 , hitungkan

- i. the value $s \text{ cm}$

nilai $s \text{ cm}$

[5 marks]
[5 markah]

- ii. the volume of the solid

isipadu bagi objek tersebut

[5 marks]
[5 markah]

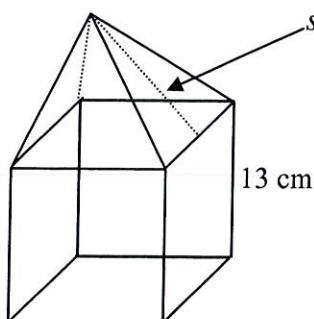


Figure 5(c) / Rajah 5(c)

QUESTION 6
SOALAN 6CLO1
C2

- (a) Given A (-2,7) and B (8,-2). Find the ,
-
- Diberi A (-2,7) dan B (8,-2). Tentukan,*

i. Gradient of line AB

Kecerunan garis lurus AB[2 marks]
[2 markah]

ii. Distance between point A and B

Jarak di antara titik A dan B[3 marks]
[3 markah]

iii. y-intercept

Pintasan y[2 marks]
[2 markah]

iv. The equation of straight line AB

Persamaan garis lurus AB[1 marks]
[1 markah]CLO2
C2

- (b) Find the interception between two straight line for equation
- $y = 2x - 7$
- and
- $y = -x + 6$
- .

Tentukan titik persilangan graf bagi dua garis lurus yang mempunyai persamaan $y = 2x - 7$ dan $y = -x + 6$.[7 marks]
[7 markah]

CLO2
C3

- (c) Table 1 below shows the values of
- x
- and
- y
- of function
- $y = -3x^2 - 5x + 16$
- .

Jadual 1 di bawah menunjukkan nilai-nilai x dan y bagi fungsi

$$y = -3x^2 - 5x + 16$$

x	-4	-3	-2	-1	0	1	2	3
y	-12		14	18			-6	

Table 1/Jadual 1

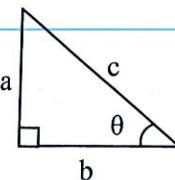
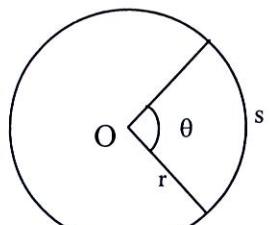
- i. Complete the table

Lengkapkan jadual tersebut[4 marks]
[4 markah]

- ii. Using a scale of
- 2 cm**
- to represent
- 1 unit**
- on the
- x
- axis and a scale of
- 1 cm**
- to represent
- 5 units**
- on the
- y
- axis, draw the graph of
- $y = -3x^2 - 5x + 16$
- for
- $-4 \leq x \leq 3$
- .

Dengan menggunakan skala 2 cm mewakili 1 unit pada paksi x dan 1cm mewakili 5 unit untuk paksi y , lukiskan graf bagi $y = -3x^2 - 5x + 16$ for $-4 \leq x \leq 3$.[6 marks]
[6 markah]**SOALAN TAMAT**

FORMULA SHEET FOR ENGINEERING MATHEMATICS 1 (BA101)

<p>INDICES AND LOGARITHM</p> <p><u>Basic of Index and Logarithm</u></p> <ol style="list-style-type: none"> 1. $y = a^x \leftrightarrow x = \log_a y$ <p><u>Rules of Index</u></p> <ol style="list-style-type: none"> 1. $a^m \times a^n = a^{m+n}$ 2. $\frac{a^m}{a^n} = a^{m-n}$ 3. $(a^m)^n = a^{mn}$ 4. $(ab)^n = a^n b^n$ <ol style="list-style-type: none"> 5. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0$ 6. $a^{-n} = \frac{1}{a^n}, a \neq 0$ 7. $a^{\frac{m}{n}} = \sqrt[n]{a^m}$ <p><u>Rules of Logarithm</u></p> <ol style="list-style-type: none"> 1. $\log_a MN = \log_a M + \log_a N$ 2. $\log_a \frac{M}{N} = \log_a M - \log_a N$ 3. $\log_a N^P = P \log_a N$ <p>FORMULA OF TRIANGLE</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>Area of Triangle $= \frac{1}{2} ab \sin C$</p> <p>TRIGONOMETRY</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>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> $\sin 2A = 2 \sin A \cos A$ $\cos 2A = \cos^2 A - \sin^2 A$ $= 1 - 2 \sin^2 A$ $= 2 \cos^2 A - 1$ $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$	<p>MEASUREMENT</p> <p>Arc Length of a Circle</p> $s = r\theta$ <p>Area of a Sector</p> $A = \frac{1}{2} r^2 \theta$ <p>Area of a Segment</p> $A = \frac{1}{2} r^2 \theta - \frac{1}{2} r^2 \sin \theta$  <p>SURFACE AREA AND VOLUME</p> <p>Cylinder : $A = 2\pi rh + 2\pi r^2$ $V = \pi r^2 h$</p> <p>Cone : $A = \pi rs + \pi r^2$ $V = \frac{1}{3} \pi r^2 h$</p> <p>Sphere : $A = 4\pi r^2$ $V = \frac{4}{3} \pi r^3$</p> <p>Pyramid : $A = \text{area of four triangles} + \text{area of base}$ $V = (1/3) \times (\text{area of base}) \times (\text{height})$</p> <p>GRAPH</p> $y = ax^2 + bx + c, a \neq 0$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $y = mx + c$ <p><u>Mid point</u> $= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$</p> <p><u>Distance</u> $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$</p> <p><u>Vertex</u>, $x = -\frac{b}{2a}$</p> <p>SOLVING QUADRATIC EQUATION</p> <ol style="list-style-type: none"> 1. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ 2. $\left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2 + c = 0$
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