

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 berstruktur. Jawab **DUA (2)** soalan sahaja.

QUESTION 1**SOALAN 1**CLO1
C1

- a) Simplify the following expression to the lowest terms.

Permudahkan ungkapan berikut dalam sebutan terendah.

i. $\frac{4ab}{a} \div \frac{2a}{ab}$

[2 marks]

[2 markah]

ii. $\frac{4p^3 - 6p}{2pq}$

[2 marks]

[2 markah]

iii. $\frac{2+n}{6} - \frac{2-n}{2}$

[5 marks]

[5 markah]

CLO1
C2

- b) Simplify $(2m+3)^2 - 4m(2m-3)$.

[3 marks]

Permudahkan $(2m+3)^2 - 4m(2m-3)$.

[3 markah]

CLO1
C3

- c) Solve the following quadratic equation by using the complete square method.

Selesaikan persamaan kuadratik berikut dengan menggunakan kaedah

penyempurnaan kuasa dua.

[8 marks]

[8 markah]

$$2x^2 - 3x - 5 = 0$$

CLO1
C3

- d) Use the substitution method to find the value of f and g .

Dengan menggunakan Kaedah Penggantian, cari nilai bagi f dan g .

$$\frac{1}{2}f + 3g = 4$$

[5 marks]

[5 markah]

$$4f - 6g = 12$$

SULIT

POLITEKNIK
 Jabatan Pengajian Politeknik

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
 JABATAN PENGAJIAN POLITEKNIK
 KEMENTERIAN PENGAJIAN TINGGI

JABATAN MATEMATIK, SAINS & KOMPUTER

PEPERIKSAAN AKHIR

SESI DISEMBER 2012

BA101: ENGINEERING MATHEMATICS 1

TARIKH : 22 APRIL 2013 (ISNIN)

TEMPOH : 2 JAM (8.30 – 10.30)AM

Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.

Bahagian A: Struktur (3 soalan)

Bahagian B: Struktur (3 soalan)

Dokumen sokongan yang disertakan : Kertas Graf dan Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

QUESTION 3
SOALAN 3

CLO1
C1

- (a) Find the values of the following trigonometric functions by using a scientific calculator.

Dapatkan nilai fungsi trigonometri berikut menggunakan kalkulator saintifik.

- i. $\cos 234^\circ$ [1 mark]
kos 234° [1 markah]
- ii. $\operatorname{cosec} 190^\circ$ [3 marks]
kosek 190° [3 markah]

CLO1
C2

- (b) Given $\sin \theta = \frac{5}{13}$ with $90^\circ < \theta < 180^\circ$. Without using the calculator, find the values of the following:

Diberi $\sin \theta = \frac{5}{13}$ dengan $90^\circ < \theta < 180^\circ$. Tanpa menggunakan kalkulator, dapatkan nilai bagi yang berikut:

- i. $\cos \theta$ [3 marks]
kos θ [3 markah]
- ii. $\tan \theta$ [2 marks]
tan θ [2 markah]
- iii. $\sec \theta$ [2 marks]
sek θ [2 markah]
- iv. $\cot \theta$ [2 marks]
kot θ [2 markah]

QUESTION 2
SOALAN 2

CLO1
C2

- (a) Simplify the following to the simplest terms.

Permudahkan yang berikut dalam sebutan paling mudah.

- (i) $\frac{1}{c^{-2}}(4a^5)^{\frac{1}{2}} \times \frac{8b^{\frac{2}{3}}c^3}{a^3} \times (ab^2c)^2$ [3 marks]
[3 markah]
- (ii) $\frac{16p^3q^2 \times 2p^5q^2r^6}{4p^{-5}q^3r^5}$ [3 marks]
[3 markah]
- (iii) $\log 3 + \log 5 - 4\log 2 + 2\log \frac{3}{5}$ [3 marks]
[3 markah]

CLO1
C3

- (b) Calculate the following.

Kirakan yang berikut.

- (i) $(4^{-3})^2 \times \left(2^{\frac{3}{2}}\right)^4 \div (4^{-5})^2 \div 4^3$ [4 marks]
[4 markah]
- (ii) $4^2 \times \frac{(2^3 \times 4 \times 10^5)}{16 \times 10^7}$ [4 marks]
[4 markah]

CLO1
C3

- (c) Find the value of x and y in each of the following equations.

Cari nilai x dan y bagi setiap persamaan berikut.

- (i) $2^9(7^x)^2 = 2^2 \times 7^3 \div 2^{-7} \times 7^{10}$ [4 marks]
[4 markah]
- (ii) $\log(3-y) - \log(y+6) = 2\log 5$ [4 marks]
[4 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 berstruktur. Jawab **DUA (2)** soalan sahaja.

QUESTION 4 / SOALAN 4

CLO2
C2

- a) In Diagram 4a, PQR is a straight line. Find the value of x .
 Dalam Rajah 4a, PQR ialah garis lurus. Dapatkan nilai x .

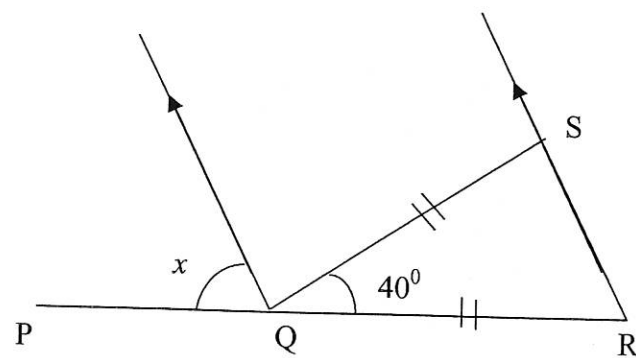


Diagram 4a/Rajah 4a

[5 marks]
[5 markah]

CLO2
C2

- b) In Diagram 4b, PMU is a straight line. Calculate the values of f and h .
 Dalam Rajah 4b, PMU ialah satu garis lurus. Kirakan nilai f dan h .

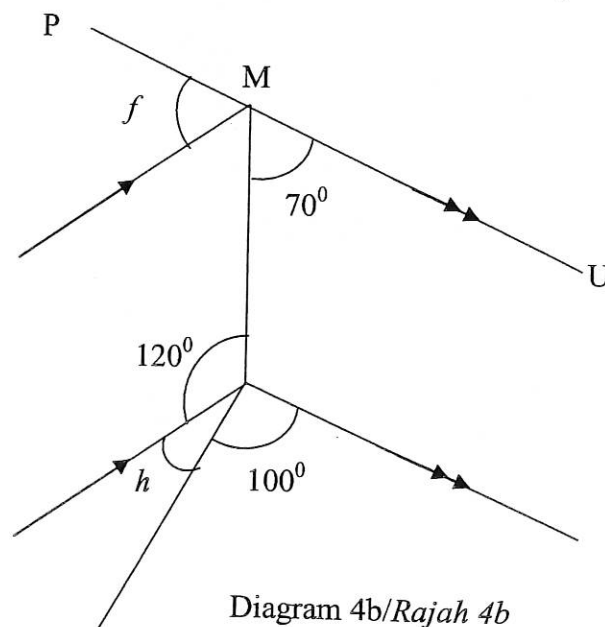


Diagram 4b/Rajah 4b

[6 marks]
[6 markah]

CLO1
C3

- (c) Find the values of θ for $\tan \theta = 5.1446$ where $0^\circ \leq \theta \leq 360^\circ$. [4 marks]
 Dapatkan nilai-nilai θ bagi $\tan \theta = 5.1446$ di mana $0^\circ \leq \theta \leq 360^\circ$. [4 markah]

CLO1
C3

- (d) Given the length of $a = 12\text{cm}$, $c = 15\text{cm}$, $\angle B = 100^\circ$ and angle $\angle C = 50^\circ$ as shown in Diagram 1.

Diberi panjang $a = 12\text{cm}$, $c = 15\text{cm}$, $\angle B = 100^\circ$ dan sudut $\angle C = 50^\circ$ seperti di Rajah 1.

- i. Find the length of b . [4 marks]
 Cari panjang b . [4 markah]
- ii. Find the area of the triangle ABC . [4 marks]
 Dapatkan luas segitiga ABC . [4 markah]

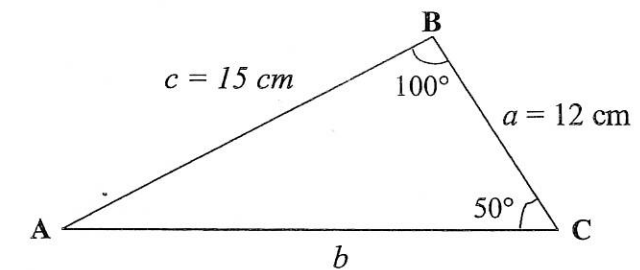


Diagram 1 / Rajah 1

QUESTION 5

SOALAN 5

CLO2
C3

- a) Figure 5(a) shows a similar cylinder shape. Given that the height and volume of cylinder B are 11 cm and 889 cm^3 respectively and the height of cylinder A is 7 cm. Calculate the volume of the cylinder A.

Rajah 5(a) menunjukkan dua buah silinder yang sama bentuk. Diberi tinggi dan isipadu silinder B ialah 11 cm dan 889 cm^3 masing-masing dan tinggi silinder A ialah 7 cm. Kirakan isipadu silinder A.

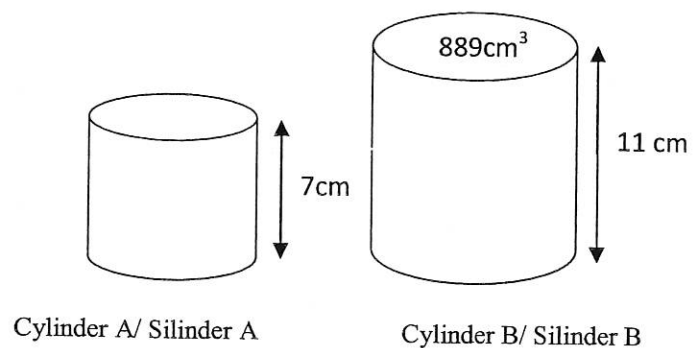


Figure 5(a)/Rajah 5(a)

[5 marks]
[5 markah]

CLO2
C3

- b) In Figure 5(b), OPQ is an isosceles triangle. PR is an arc of a circle with centre O . ORQ is a straight line. Using $\pi = 3.142$, calculate

Rajah 5(b), OPQ adalah segitiga kaki sama. PR adalah lengkung bulatan yang berpusat di O . ORQ adalah garis lurus. Dengan menggunakan $\pi = 3.142$, kirakan

- the length of arc PR .
panjang lengkung PR [4 marks]
[4 markah]
- the perimeter of the shaded region.
perimeter kawasan berlorek [8 marks]
[8markah]
- the area of the shaded region.
luas kawasan berlorek [5 marks]
[5markah]

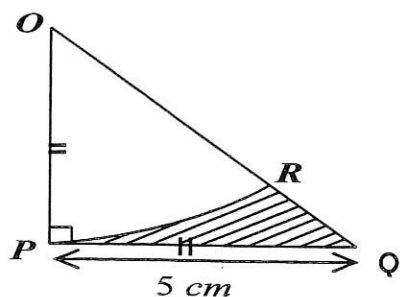


Figure 5(b)/Rajah 5(b)

CLO2
C3

- c) In Diagram 4c, O is a centre of the circle. RST is a straight line. Find the values of x and y .

Dalam Rajah 4c, O ialah pusat bulatan. RST ialah garis lurus Kirakan nilai x dan y .

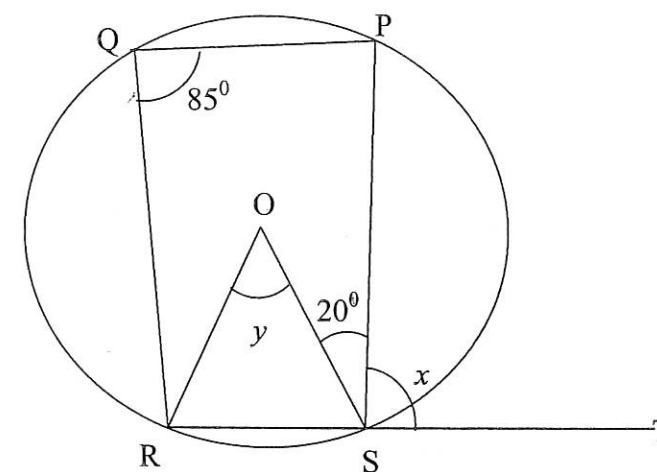


Diagram 4c/Rajah 4c

[7 marks]

[7 markah]

CLO2
C3

- d) Diagram 4d shows three right-angled triangles, PQR , PRS and PST . Find the length of PT .

Rajah 4d menunjukkan tiga bentuk segitiga tepat, PQR , PRS dan PST . Dapatkan panjang PT .

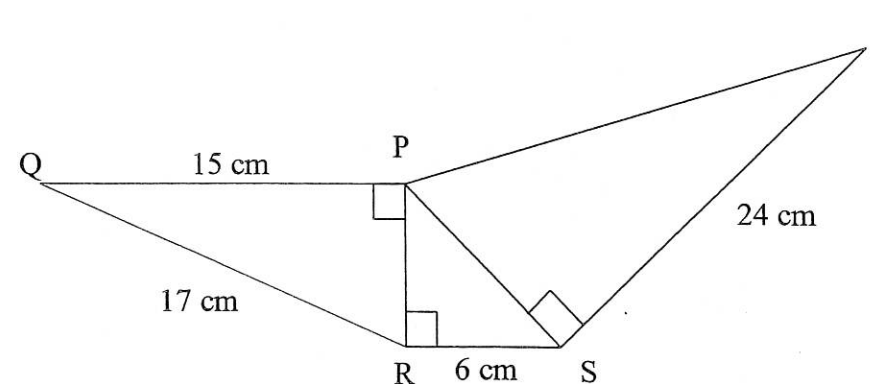


Diagram 4d/Rajah 4d

[7 marks]

[7 markah]

QUESTION 6

SOALAN 6

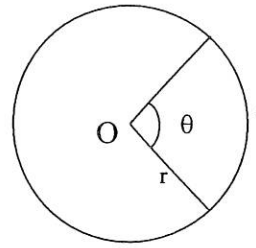
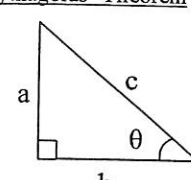
CLO2
C2

- a) Given two (2) coordinates, $A(2,7)$ and $B(4,11)$.
Diberi dua (2) koordinat, $A(2,7)$ dan $B(4,11)$.
- i) Plot a graph of a straight line that joins A and B . [4 marks]
Plotkan graf garis lurus yang menyambungkan A dan B . [4 markah]
- ii) Find the gradient of that line. [2 marks]
Dapatkan kecerunan garisan tersebut. [2 markah]
- iii) Write the equation of the straight line that joins A and B . [4 marks]
Tuliskan persamaan garis lurus yang menyambungkan A dan B . [4 markah]
- iv) On the same graph, draw another straight line of equation $y = -x + 6$. [4 marks]
Pada graf yang sama, lukiskan satu garis lurus lain dengan persamaan $y = -x + 6$. [4 markah]
- v) Determine the coordinate of the intersection point between the graphs. [1 mark]
Tentukan koordinat titik persilangan di antara graf-graf berkenaan. [1 markah]

CLO2
C2

- c) The volume of a cone is 984 cm^3 . Given the height of the cone is 5 cm, find the radius of the base. [3 marks]
- Isipadu sebuah kon ialah 984 cm^3 . Diberi tinggi kon ialah 5 cm, cari jejari tapak bagi kon tersebut.* [3 markah]

FORMULA SHEET FOR ENGINEERING MATHEMATICS (BA101)

<u>INDICES AND LOGARITHM</u>	<u>MEASUREMENT</u>
<p><u>Basic of Index and Logarithm</u></p> <p>1. $y = a^x \leftrightarrow x = \log_a y$</p> <p><u>Rules of Index</u></p> <p>1. $a^m \times a^n = a^{m+n}$ 5. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0$</p> <p>2. $\frac{a^m}{a^n} = a^{m-n}$ 6. $a^{-n} = \frac{1}{a^n}, a \neq 0$</p> <p>3. $(a^m)^n = a^{mn}$ 7. $a^{\frac{m}{n}} = \sqrt[n]{a^m}$</p> <p>4. $(ab)^n = a^n b^n$</p> <p><u>Rules of Logarithm</u></p> <p>1. $\log_a MN = \log_a M + \log_a N$</p> <p>2. $\log_a \frac{M}{N} = \log_a M - \log_a N$</p> <p>3. $\log_a N^P = P \log_a N$</p>	<p>Arc Length of a Circle</p> <p>$s = r\theta$</p> <p>Area of a Sector</p> <p>$A = \frac{1}{2}r^2\theta$</p> <p>Area of a Segment</p> <p>$A = \frac{1}{2}r^2\theta - \frac{1}{2}r^2 \sin \theta$</p> 
<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>Area of Triangle = $\frac{1}{2} ab \sin C$</p>	<p><u>SURFACE AREA AND VOLUME</u></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><u>TRIGONOMETRY</u></p> <p><u>Pythagoras' Theorem</u> <u>Trigonometric Identities</u></p>  <p>$\tan \theta = \frac{\sin \theta}{\cos \theta}$</p> <p>$\cos^2 \theta + \sin^2 \theta = 1$</p> <p>$1 + \tan^2 \theta = \sec^2 \theta$</p> <p>$1 + \cot^2 \theta = \text{cosec}^2 \theta$</p> <p>$c^2 = a^2 + b^2$</p>	<p><u>GRAPH</u></p> <p>$y = ax^2 + bx + c, a \neq 0$</p> <p>$m = \frac{y_2 - y_1}{x_2 - x_1}$</p> <p>$y = mx + c$</p> <p>Mid point = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$</p> <p>Distance = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$</p> <p>Vertex, $x = -\frac{b}{2a}$</p>
<p><u>Compound-angle</u></p> <p>$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$</p> <p>$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$</p> <p>$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$</p> <p><u>Double-angle</u></p> <p>$\sin 2A = 2 \sin A \cos A$</p> <p>$\cos 2A = \cos^2 A - \sin^2 A$ $= 1 - 2 \sin^2 A$ $= 2 \cos^2 A - 1$</p> <p>$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$</p>	<p><u>SOLVING QUADRATIC EQUATION</u></p> <p>1. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$</p> <p>2. $\left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2 + c = 0$</p>

CLO2
C3

SULIT

BA101: ENGINEERING MATHEMATICS 1

b) Table 1 below shows the values of x and y of functions $y = x^2 - 2x + 3$.

Jadual 1 di bawah menunjukkan nilai-nilai x dan y bagi fungsi $y = x^2 - 2x + 3$.

x	-2	-1	0	1	2	3	4
$y = x^2 - 2x + 3$	11		3			6	

Table 1/ Jadual 1

i) Complete the table.

Lengkapkan jadual tersebut.

[4 Marks]

[4 markah]

ii) Using a scale of 1 cm to 1 unit on the x -axis and 1 cm to 1 unit on the y -axis, draw a graph for the function.

Menggunakan skala 1 cm kepada 1 unit pada paksi- x dan 1 cm kepada 1 unit pada paksi- y , lukiskan graf bagi fungsi tersebut.

[6 Marks]

[6 Markah]

SOALAN TAMAT

END OF PAPER