



**KOLEJ YAYASAN PELAJARAN JOHOR
FINAL EXAMINATION**

COURSE NAME : ENGINEERING MATHEMATICS 1
COURSE CODE : MAT 1012
SESSION : JUNE 2023
DURATION : 2 HOURS

**INSTRUCTION TO CANDIDATES /
ARAHAN KEPADA CALON**

1. This examination paper consists of **ONE (1)** part : / PART A (60 Marks) /
*Kertas soalan ini mengandungi **SATU (1)** bahagian: BAHAGIAN A (60 Markah)*
2. Candidates are not allowed to bring any material to the examination room except with the permission from the invigilator. The formula was attached at the back question paper. /
Calon tidak dibenarkan untuk membawa sebarang bahan/nota ke bilik peperiksaan tanpa arahan/kebenaran daripada pengawas. Rumus dilampirkan di belakang kertas soalan peperiksaan.
3. Please check to make sure that this examination pack consists of: /
Pastikan kertas soalan peperiksaan ini mengandungi:
 - i. Question Paper /
Kertas Soalan
 - ii. Answering Booklet /
Buku Jawapan

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO /
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

This examination paper consists of 7 printed pages including front page
Kertas soalan ini mengandungi 7 muka surat termasuk kulit hadapan

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PART A/ BAHAGIAN A

This part contains of **FIVE (5)** questions. Answer **ALL** question in the answering booklet.
Bahagian ini mempunyai LIMA (5) soalan. Jawab SEMUA soalan di dalam buku jawapan.

QUESTION 1/ SOALAN 1

a) Simplify:

Ringkaskan:

i. $\frac{(2x^2y^3)^3}{xy^2}$

ii. $\frac{4}{\sqrt{3} + \sqrt{2}}$

(4 marks / markah)

b) Find the values of x , if:

Dapatkan nilai-nilai bagi x , jika:

i. $2^{x+4} = 8^{-2x}$

ii. $\log_2(x + 3) - \log_2(2 - x) = 1$

(6 marks / markah)

QUESTION 2/ SOALAN 2

Given $g(x) \rightarrow \sqrt{x-2}$, $x \geq 2, x \in R$ and $h(x) \rightarrow \frac{3}{x+4}$, $x \neq -4, x \in R$. Find:

Diberi $g(x) \rightarrow \sqrt{x-2}$, $x \geq 2, x \in R$ dan $h(x) \rightarrow \frac{3}{x+4}$, $x \neq -4, x \in R$. Dapatkan:

- a) Domain and range of $g(x)$.

Domain dan julat bagi $g(x)$.

(4 marks / markah)

- b) $h \circ g(x)$. Find value of $(h \circ g)(2)$.

$h \circ g(x)$. Dapatkan nilai $(h \circ g)(2)$.

(3 marks / markah)

- c) the function of $h^{-1}(x)$.

fungsi bagi $h^{-1}(x)$.

(3 marks / markah)

QUESTION 3/ SOALAN 3

- a) Determine the type of the roots of the following equation:

Tentukan jenis punca bagi persamaan berikut:

$$-2x^2 - x + 8 = 0$$

(3 marks / markah)

- b) Solve the simultaneous equation of the following equation:

Selesaikan persamaan serentak bagi persamaan berikut:

$$2x + y = -9$$

$$x + 2y = 6$$

(3 marks / markah)

- c) The roots of the quadratic equation $3x^2 + 5x - 6 = 0$ are α and β . Find the values of:

Punca-punca persamaan kuadratik $3x^2 + 5x - 6 = 0$ ialah α dan β . Dapatkan nilai-nilai bagi:

i. $(2 + \alpha)(2 + \beta)$

ii. $\frac{1}{\beta} + \frac{1}{\alpha}$

(7 marks / markah)

- d) Solve the following inequalities:

Selesaikan ketaksamaan berikut :

$$(x - 4)(x - 2) \geq 0$$

(3 marks / markah)

QUESTION 4/ SOALAN 4

- a) Convert the angles $\frac{3}{4}\pi$ rad to degree.

Tukarkan sudut $\frac{3}{4}\pi$ rad kepada darjah.

(2 marks / markah)

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

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

$$\cos\theta = -0.6428$$

(4 marks / markah)

- c) Given $\sin A = \frac{12}{13}$ in the second quadrant and $\cos B = \frac{4}{5}$ in the first quadrant.

Evaluate the following expression without using the calculator.

Jika $\sin A = \frac{12}{13}$ dalam sukuan kedua dan $\cos B = \frac{4}{5}$ dalam sukuan pertama. Nilaikan ungkapan berikut tanpa menggunakan kalkulator.

i. $\cos(A - B)$

ii. $\tan(A + B)$

(8 marks / markah)

QUESTION 5/ SOALAN 5

- a) Find the Cartesian coordinates for the point:

Dapatkan koordinat Cartesian bagi titik:

$$\left(4, \frac{\pi}{3}\right)$$

(3 marks / markah)

- b) Find the Polar equation for,

Dapatkan persamaan Kutub bagi,

$$3x^2 + 3y^2 - 4y = 0$$

(3 marks / markah)

- c) Copy and complete the **Table 1** below and sketch the graph of the equation

$$r = 5 - \cos \theta \quad \text{for } 0 < \theta < 360^\circ .$$

(Hint: Use symmetrical properties of the graph)

Salin dan lengkapkan **Jadual 1** di bawah, seterusnya lakarkan graf persamaan

$$r = 5 - \cos \theta \quad \text{untuk } 0 < \theta < 360^\circ .$$

(Panduan: gunakan sifat simetri dalam graf tersebut)

θ	0°	30°	60°	90°	120°	150°	180°
$r = 5 - \cos \theta$							
(r, θ)							

Table 1/ Jadual 1

(4 marks / markah)

[60 MARKS / MARKAH]

END OF QUESTION PAPER/ KERTAS SOALAN TAMAT

LIST OF FORMULA

SENARAI RUMUS

1 Indeks

$$a^m a^n = a^{m+n}$$

$$\left(\frac{a^m}{a^n}\right) = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

$$a^{-n} = \frac{1}{a^n}$$

2 Logaritma

$$\log_a x + \log_a y = \log_a (xy)$$

$$\log_a x - \log_a y = \log_a \left(\frac{x}{y}\right)$$

$$\log_a (x)^n = n \log_a x$$

$$\log_a a = 1$$

$$\log_a 1 = 0$$

3 Quadratic equation
Type of roots

$$= b^2 - 4ac$$

4 Trigonometry

$$\cos^2 \theta + \sin^2 \theta = 1$$

$$\sin 2A = 2 \sin A \cos A$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

5 Polar coordinates

$$x = r \cos \theta$$

$$y = r \sin \theta$$

$$\tan \theta = \frac{y}{x}$$

$$r^2 = x^2 + y^2$$

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