



**KOLEJ YAYASAN PELAJARAN JOHOR
ONLINE FINAL EXAMINATION**

COURSE NAME : **ENGINEERING MATHEMATICS 1**
COURSE CODE : **MAT 1012**
SESSION : **DECEMBER 2021**
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. Answer ALL questions in the answer sheet which is A4 size paper (or other paper with the consent of the relevant lecturer). /
Jawab SEMUA soalan di dalam kertas jawapan iaitu kertas bersaiz A4 (atau lain-lain kertas dengan persetujuan pensyarah berkaitan).
3. Write your details as follows in the upper left corner for each answer sheet: /
Tulis butiran anda sepertimana berikut di penjuru atas kiri bagi setiap kertas jawapan:
 - i. Student Full Name / Nama Penuh Pelajar
 - ii. Identification Card (I/C) No. / No. Kad Pengenalan
 - iii. Class Section / Seksyen Kelas
 - iv. Course Code / Kod Kursus
 - v. Course Name / Nama Kursus
 - vi. Lecturer Name / Nama Pensyarah
4. Each answer sheet must have a page number written at the bottom right corner. /
Setiap helai kertas jawapan mesti ditulis nombor muka surat di penjuru bawah kanan.
5. Answers should be **neat and clear in handwritten form.** /
Jawapan hendaklah ditulis tangan, kemas dan jelas.

**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*

PART A/ BAHAGIAN A

This part contains of **FIVE (5)** questions. Answer **ALL** question in the answer sheet.

Bahagian ini mempunyai LIMA (5) soalan. Jawab SEMUA soalan di dalam buku jawapan.

QUESTION 1/ SOALAN 1

a) Simplify:

Ringkaskan:

i. $\frac{(2p^2q^3)^2}{pq^4}$

ii. $\frac{6}{\sqrt{3} - \sqrt{2}}$

(4 marks / markah)

b) Find the values of x , if:

Dapatkan nilai-nilai bagi x , jika:

i. $3^{x+4} = 27^{-3x}$

ii. $\log_2 5 + \log_2(2x + 1) = 3$

(6 marks / markah)

QUESTION 2/ SOALAN 2

Given $f(x) = x^2 + 4$ and $g(x) = \frac{1}{x+7}$. Find:

Diberi $f(x) = x^2 + 4$ dan $g(x) = \frac{1}{x+7}$. Dapatkan:

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

Domain dan julat bagi $g(x)$.

(4 marks / markah)

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

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

(3 marks / markah)

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

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

(3 marks / markah)

QUESTION 3/ SOALAN 3

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

Tentukan jenis punca bagi persamaan berikut:

$$-2x^2 + 6x - 9 = 0$$

(3 marks / markah)

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

Selesaikan persamaan serentak bagi persamaan berikut:

$$x + 3y = 1$$

$$4x - y = -9$$

(3 marks / markah)

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

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

i. $\alpha^2 + \beta^2$

ii. $\frac{2\beta}{\alpha} + \frac{2\alpha}{\beta}$

(7 marks / markah)

- d) Solve the following inequalities:

Selesaikan ketaksamaan berikut :

$$(x - 7)(x + 10) < 0$$

(3 marks / markah)

QUESTION 4/ SOALAN 4

- a) Convert the angles 125° to radian.

Tukarkan sudut 125° kepada radian.

(2 marks / markah)

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

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

$$\sin\theta = -0.2588$$

(4 marks / markah)

- c) Given $\sin A = \frac{2}{3}$ in the second quadrant and $\cos B = -\frac{2}{7}$ in the third quadrant.

Evaluate the following expression without using the calculator.

Jika $\sin A = \frac{2}{3}$ dalam sukuan kedua dan $\cos B = -\frac{2}{7}$ dalam sukuan ketiga. Nilaiakan ungkapan berikut tanpa menggunakan kalkulator.

i. $\sin(B + A)$

ii. $\tan(A - B)$

(8 marks / markah)

QUESTION 5/ SOALAN 5

- a) Find the Polar coordinates for the point:

Dapatkan koordinat Kutub bagi titik:

$$(-3, -3)$$

(3 marks / markah)

- b) Find the Cartesian equation for,

Dapatkan persamaan Cartesian bagi,

$$r = -4 \sin \theta + \cos \theta$$

(3 marks / markah)

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

$$r = 3 + 3 \cos \theta \text{ for } 0 < \theta < 360^\circ .$$

(Hint: Use symmetrical properties of the graph)

Salin dan lengkapkan **Jadual 1** dibawah, seterusnya lakarkan graf persamaan

$$r = 3 + 3 \cos \theta \text{ untuk } 0 < \theta < 360^\circ .$$

(Panduan: gunakan sifat simetri dalam graf tersebut)

θ	0°	30°	60°	90°	120°	150°	180°
$r = 3 + 3 \cos \theta$							
(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

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

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

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

$$\left(\frac{1}{a^n}\right) = a^{-n}$$

2 Logaritma

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

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

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

$$\log_a a = 1$$

$$\log_a 1 = 0$$

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

$$x = r \cos \theta$$

$$y = r \sin \theta$$

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

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