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**KOLEJ YAYASAN PELAJARAN JOHOR  
ONLINE FINAL EXAMINATION**

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**COURSE NAME : ENGINEERING MATHEMATICS 1**  
**COURSE CODE : MAT 1012**  
**SESSION : DECEMBER 2021**  
**DURATION : 2 HOURS**

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**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.*

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

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

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  $\alpha$  and  $\beta$ . Find the values of:

*Punca-punca persamaan kuadratik  $3x^2 + 5x - 6 = 0$  ialah  $\alpha$  dan  $\beta$ . 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 without using the calculator.

*Jika  $\sin A = \frac{12}{13}$  dalam sukuan kedua dan  $\cos B = \frac{4}{5}$  dalam sukuan pertama. Nilaiakan 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** dibawah, seterusnya lakarkan graf persamaan

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

(Panduan: gunakan sifat simetri dalam graf tersebut)

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

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

$$x = r \cos \theta$$

$$y = r \sin \theta$$

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

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