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**KOLEJ YAYASAN PELAJARAN JOHOR  
FINAL EXAMINATION**

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**COURSE NAME : ENGINEERING MATHEMATICS I**  
**COURSE CODE : MAT1012**  
**EXAMINATION : OCTOBER 2017**  
**DURATION : 2 HOURS**

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**INSTRUCTION TO CANDIDATES**

1. Answer **ALL** Question
  
2. Candidates are not allowed to bring any material to examination room except with the permission from the invigilator.
  
3. Please check to make sure that this examination pack consist of:
  - i. Question Paper
  - ii. Answer Booklet

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**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO**

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*This examination paper consists of 6 printed pages including front page*



Answer ALL question in Answer Booklet.

Jawab SEMUA soalan di dalam Buku Jawapan

### QUESTION 1

a) Simplify

*Ringkaskan*

i.  $(x^6 y^2)^{-\frac{1}{2}}$

ii.  $\frac{2 + \sqrt{5}}{2 - \sqrt{5}}$

(4 marks)

b) Find the values of  $x$ , if:

*Dapatkan nilai-nilai bagi  $x$  jika:*

i.  $2^x = 8^{x+1}$

ii.  $\log_8 x + \log_8 (x+12) = 2$

(6 marks)

### QUESTION 2

Given  $f: x \rightarrow x^2 + 4, x \in \mathbb{R}$  and  $g: x \rightarrow \sqrt{x-1}, x \geq 1$ . Find

*Diberi  $f: x \rightarrow x^2 + 4, x \in \mathbb{R}$  dan  $g: x \rightarrow \sqrt{x-1}, x \geq 1$ . Dapatkan*

a) Domain  $f(x)$  and  $g(x)$

*Domain  $f(x)$  dan  $g(x)$*

(6 marks)

b)  $(f \circ g)(x)$ . Find value of  $x$  if  $(f \circ g)(x) = 4$

*$(f \circ g)(x)$ . Dapatkan nilai  $x$  jika  $(f \circ g)(x) = 4$*

(2 marks)

c) The function  $g^{-1}(x)$

*Fungsi  $g^{-1}(x)$*

(2 marks)

## QUESTION 3

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

*Tentukan jenis punca bagi persamaan berikut*

$$x^2 - 3x - 28 = 0 \quad (1 \text{ mark})$$

- b) Solve the simultaneous equation of equation

*Selesaikan persamaan serentak bagi persamaan*

$$\begin{aligned} 9x - 3y &= 13 \\ 2x + y &= 4 \end{aligned} \quad (3 \text{ marks})$$

- c) If  $\alpha$  and  $\beta$  are the roots of the quadratic equation  $x^2 - 6x + 5 = 0$ , find the values of  $\left(\frac{1}{\alpha}\right) + \left(\frac{1}{\beta}\right)$  and  $\left(\frac{1}{\alpha}\right)\left(\frac{1}{\beta}\right)$ , then form a new equation whose roots are  $\left(\frac{1}{\alpha}\right)$  and  $\left(\frac{1}{\beta}\right)$

*Jika  $\alpha$  dan  $\beta$  adalah punca-punca kepada persamaan kuadratik*

*$x^2 - 6x + 5 = 0$ , dapatkan nilai bagi  $\left(\frac{1}{\alpha}\right) + \left(\frac{1}{\beta}\right)$  dan  $\left(\frac{1}{\alpha}\right)\left(\frac{1}{\beta}\right)$ ,*

*seterusnya bentuk persamaan baru dengan punca-punca  $\left(\frac{1}{\alpha}\right)$  dan  $\left(\frac{1}{\beta}\right)$*  (5 marks)

- d) Solve the following inequalities:

*Selesaikan ketaksamaan berikut :*

$$(x - 7)(x + 13) \geq 0 \quad (3 \text{ marks})$$

## QUESTION 4

- a) Convert the angles
- $75^\circ$
- to radians.

*Tukarkan sudut  $75^\circ$  kepada radian.*

(2 marks)

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

*Selesaikan persamaan untuk  $0 \leq \theta \leq 360^\circ$*

$$2\cos\theta - 1 = 0$$

(4 marks)

- c) Given that
- $\alpha$
- and
- $\beta$
- are acute angles with
- $\sin\alpha = \frac{7}{25}$
- and

$\cos\beta = \frac{5}{13}$ , find value of

*Jika diberi  $\alpha$  dan  $\beta$  adalah sudut tirus dengan  $\sin\alpha = \frac{7}{25}$  dan*

*$\cos\beta = \frac{5}{13}$ , dapatkan nilai*

$$\sin(\alpha + \beta)$$

(4 marks)

## QUESTION 5

- a) Find the Cartesian coordinates for the point

*Dapatkan koordinat Cartesian bagi titik*

(3 marks)

$$\left(\sqrt{2}, -\frac{3\pi}{4}\right)$$

- b) Find the Cartesian equation for

*Dapatkan persamaan Cartesian bagi*

$$r^2 \sin 2\theta = 10$$

(3 marks)

- c) Copy and complete the table below and sketch the graph of the equation
- $r = 4 - 2\cos\theta$
- for
- $0 \leq \theta \leq 360^\circ$

(Hint: Use symmetrical properties of the graph)

*Salin dan lengkapkan jadual berikut, seterusnya lakarkan graf persamaan  $r = 4 - 2\cos\theta$  untuk  $0 \leq \theta \leq 360^\circ$ .**(Panduan: gunakan sifat simetri dalam graf tersebut)*

$\theta$	$0^\circ$	$30^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$150^\circ$	$180^\circ$
$r = 4 - 2\cos\theta$							
$(r, \theta)$							

(4 marks)

END OF QUESTION PAPER

**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

$$x = r \cos \theta$$

$$y = r \sin \theta$$

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

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

