



**KOLEJ YAYASAN PELAJARAN JOHOR
FINAL EXAMINATION**

COURSE NAME : ENGINEERING MATHEMATICS I
COURSE CODE : MAT1012
EXAMINATION : NOVEMBER 2016
DURATION : 2 HOURS

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

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

*This examination paper consists of **8** printed pages including front page*

ANSWER ALL QUESTIONS

JAWAB SEMUA SOALAN

QUESTION 1**a) Simplify**

Ringkaskan

i.
$$\frac{(3x^2)^3}{-9x^4}$$

ii.
$$\frac{9}{5+\sqrt{2}}$$

[5m]

b) Find the values of x , if:Dapatkan nilai-nilai bagi x jika:

i. $5^{-x} = 125$

ii. $\log_3(x-1) - \log_3(x-3) = 1$

[5m]

QUESTION 2**Given** $f: x \rightarrow 4x+1, x \in \mathcal{R}$ **and** $g: x \rightarrow (x-3)^2 + 2, x \geq 3, x \in \mathcal{R}$ Diberi $f: x \rightarrow 4x+1, x \in \mathcal{R}$ dan $g: x \rightarrow (x-3)^2 + 2, x \geq 3, x \in \mathcal{R}$ i. **Find $g \circ f$** Dapatkan $g \circ f$

[2m]

ii. **Find $g^{-1}(x)$ and state domain and range of $g^{-1}(x)$** Dapatkan $g^{-1}(x)$ dan nyatakan domain dan julat $g^{-1}(x)$

[4m]

iii. **Sketch the graphs of $g(x)$ and $g^{-1}(x)$ on the same axes.**Lakarkan graf $g(x)$ dan $g^{-1}(x)$ pada paksi yang sama

[4m]

QUESTION 3

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

Tentukan jenis punca bagi persamaan berikut

$$2x^2 - x + 8 = 0 \quad [2m]$$

- b) **Solve the simultaneous equation of equation**

Selesaikan persamaan serentak bagi persamaan

$$\begin{aligned} 2x + y &= -9 \\ x + 2y &= 6 \end{aligned} \quad [3m]$$

- 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. $(1 + \alpha)(1 + \beta)$ ii. $\frac{1}{4\beta} + \frac{1}{4\alpha}$ [8m]

- d) a) **Solve the following inequalities:**

Selesaikan ketaksamaan berikut :

i. $x^2 - 6x + 8 \geq 0$ [4m]

ii. $\left| \frac{2x - 7}{6} \right| \geq 4$ [3m]

QUESTION 4

- a) Convert the angles $\frac{5\pi}{3} \text{ rad}$ to the degree measure.

Tukarkan sudut $\frac{5\pi}{3} \text{ rad}$ kepada darjah

[2m]

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

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

$$\sin \theta = -0.2588$$

[4M]

- c) Given $\sin \alpha = \frac{2}{3}$ in the second quadrant and $\cos \beta = -\frac{2}{7}$ in the third quadrant, find the following values without the use of table or calculator.

Diberi $\sin \alpha = \frac{2}{3}$ dalam sukuan kedua dan $\cos \beta = -\frac{2}{7}$ dalam sukuan ketiga, nilaikan ungkapan berikut tanpa menggunakan sifir atau kalkulator

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

[4M]

QUESTION 5

- a) Find the Cartesian coordinates for the point

Dapatkan koordinat Cartesian bagi titik

[3m]

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

- b) Find the Polar equation for

Dapatkan persamaan kutub bagi

$$2x^2 + 2y^2 - 5y = 0$$

[3M]

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

(Hint: Use symmetrical properties of the graph)

Salin dan lengkapkan jadual berikut, seterusnya lakarkan graf persamaan $r = 4 + 4\cos\theta$ untuk $0 \leq \theta \leq 360^\circ$.

(Panduan: gunakan sifat simetri dalam graf tersebut)

θ	0°	30°	60°	90°	120°	150°	180°
$r = 4 + 4\cos\theta$							
(r, θ)							

[4M]

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

$$x = r \cos \theta$$

$$y = r \sin \theta$$

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

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