KOLEJ YAYASAN PELAJARAN JOHOR

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FINAL EXAMINATION

COURSE NAME	:	**ENGINEERING MATHEMATICS I**
COURSE CODE	:	**MAT 1012**
EXAMINATION	:	**OCTOBER 2019**
DURATION	:	**2 HOURS**

INSTRUCTION TO CANDIDATES /
ARAHAN KEPADA CALON

1. Answer **ALL** questions in the Answer Booklet. /
   *Jawab **SEMUA** soalan di dalam Buku Jawapan.*

2. Candidates are not allowed to bring any material to 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 consist of: /
   Pastikan kertas soalan peperiksaan ini mengandungi:

   i. Question Paper /
      Kertas Soalan
   ii. Answer 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 **6** printed pages including front page
*Kertas soalan ini mengandungi **6** muka surat termasuk kulit hadapan*

Answer ALL question in the Answer Booklet.

*Jawab **SEMUA** soalan di dalam Buku Jawapan.*

QUESTION 1

a) Simplify:

Ringkaskan:

i. $\left(\frac{5x^6y^{-2}z}{x^2y^3}\right)^2$ ii. $\frac{3}{2-\sqrt{5}}$ (4 marks)

b) Find the values of x, if:

Dapatkan nilai-nilai bagi x, jika:

i. $4^{3x-3}=64^{6x+8}$ ii. $\log_3(x+6)-\log_3(x-4)=2$ (6 marks)

[10 MARKS]

QUESTION 2

Given $f:x\to x^2-4,\ x\in\Re$ and $g:x\to\sqrt{x+2},\ x\geq -2, x\in\Re$. Find:

Diberi $f:x\to x^2-4,\ x\in\Re$ dan $g:x\to\sqrt{x+2},\ x\geq -2, x\in\Re$.
Dapatkan:

a) domain and range of $f(x)$.

domain dan julat bagi $f(x)$. (4 marks)

b) $f\circ g(x)$. Find value of x if $(f\circ g)(x)=5$.

$f\circ g(x)$. Dapatkan nilai x jika $(f\circ g)(x)=5$. (4 marks)

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

fungsi bagi $g^{-1}(x)$. (2 marks)

[10 MARKS]

QUESTION 3

a) Determine the type of the roots of the following equation:
Tentukan jenis punca bagi persamaan berikut:

$$3x^2 - 5x + 3 = 0$$ (2 marks)

b) Solve the simultaneous equation of the following equation:

Selesaikan persamaan serentak bagi persamaan berikut:

$$2x - 3y = 5$$
$$4x + 2y = 6$$ (3 marks)

c) The roots of the quadratic equation $2x^2 + 4x - 5 = 0$ are α and β. Find the values of:

Punca-punca persamaan kuadratik $2x^2 + 4x - 5 = 0$ *ialah* α *dan* β.

Dapatkan nilai-nilai bagi:

i. $(1+\alpha)(1+\beta)$ ii. $\alpha^2 + \beta^2$ (8 marks)

d) Solve the following inequalities:
Selesaikan ketaksamaan berikut :

$$x^2 - x - 6 > 0$$ (4 marks)

[17 MARKS]

QUESTION 4

a) Convert the angles 150° to radian.

Tukarkan sudut 150° *kepada radian.* (2 marks)

b) Solve the equation for $0 \le \theta \le 360^\circ$,

Selesaikan persamaan untuk $0 \le \theta \le 360^\circ$,

$$\tan\theta = -0.7596$$ (4 marks)

c) Given $\tan\alpha = \frac{5}{12}$ in the first quadrant and $\cos\beta = -\frac{24}{25}$ in the third quadrant. Evaluate the following expression without using the calculator.

Diberi $\tan\alpha = \frac{5}{12}$ *dalam sukuan pertama dan* $\cos\beta = -\frac{24}{25}$ *dalam sukuan ketiga. Nilaikan ungkapan berikut tanpa menggunakan kalkulator.*

i. $\sin(\alpha - \beta)$ ii. $\tan(\alpha + \beta)$ (7 marks)

[13 MARKS]

QUESTION 5

a) Find the Cartesian coordinates for the point:
Dapatkan koordinat Cartes bagi titik: (3 marks)

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

b) Find the Cartesian equation for,
Dapatkan persamaan Cartes bagi,

$$r = -5\sin\theta + \cos\theta$$ (3 marks)

c) Copy and complete the Table 1 below and sketch the graph of the equation $r = 4 - 2\sin\theta$ for $0 \le \theta \le 360^\circ$.
(Hint: Use symmetrical properties of the graph)

Salin dan lengkapkan Jadual 1 dibawah, seterusnya lakarkan graf persamaan $r = 4 - 2\sin\theta$ *untuk* $0 \le \theta \le 360^\circ$.
(Panduan: gunakan sifat simetri dalam graf tersebut)

θ	-90°	-60°	-30°	0°	30°	60°	90°
$r = 4 - 2\sin\theta$							
(r, θ)							

Table 1/ *Jadual 1*

(4 marks)

[10 MARKS]

END OF QUESTION PAPER

LIST OF FORMULA
SENARAI RUMUS

1 Index/ *Indeks*

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

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

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

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

2 Logarithm/ *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/
Persamaan kuadratik
Jenis-jenis punca

$$= b^2 - 4ac$$

4 Trigonometry/
Trigonometri

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

$$\sin 2A = 2\sin A kos A$$

$$kos2A = kos^2 A - \sin^2 A$$

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

$$\sin(A \pm B) = \sin A \;\; kosB \;\; \pm \;\; kosA \;\; \sin B$$

$$kos(A \pm B) = kosA \;\; kosB \;\; \mp \;\; \sin A \;\; \sin B$$

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

5 Polar coordinates/
Koordinat kutub

$$x = rkos\theta$$

$$y = r\sin\theta$$

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

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