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FINAL EXAMINATION

COURSE NAME	:	ENGINEERING MATHEMATICS 1
COURSE CODE	:	MAT1012
EXAMINATION	:	MEI 2017
DURATION	:	2 HOURS

INSTRUCTION TO CANDIDATES

1. Answer **ALL** Question in the answer booklet.

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 **6** printed pages including front page*

ANSWER ALL QUESTIONS IN ANSWER BOOKLET

JAWAB SEMUA SOALAN DI BUKU JAWAPAN

QUESTION 1

a)   Simplify;

    Ringkaskan;

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

                                                                        [5marks]

b)   Find the values of x , if:

    Dapatkan nilai-nilai bagi x jika:

    i. $4^{2x+1} = 4^{6x-8}$ ii. $\log_2 x + \log_2 (x-1) = 1$ [5marks]

QUESTION 2

Given $f : x \rightarrow x - 3, \ x \in \Re$ and $g : x \rightarrow x^2 + 4, x \in \Re$

Diberi $f : x \rightarrow x - 3, \ x \in \Re$ dan $g : x \rightarrow x^2 + 4, x \in \Re$

    i.   Find $g \circ f$

        Dapatkan $g \circ f$ [2marks]

    ii.   Find $g^{-1}(x)$ and state domain of $g^{-1}(x)$

        Dapatkan $g^{-1}(x)$ dan nyatakan domain $g^{-1}(x)$ [4marks]

    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.   [4marks]

QUESTION 3

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

   Tentukan jenis punca bagi persamaan berikut;

$$x^2 + 2x + 5 = 0$$ [2marks]

b) Solve the equation below;

   Selesaikan persamaan di bawah;

$$2p - 5q = 11$$
$$p - 3q = 7$$ [4marks]

c) The roots of the quadratic equation $2x^2 - 4x + 10 = 0$ are α and β.
   Find the values of;

   Punca-punca persamaan kuadratik $2x^2 - 4x + 10 = 0$ ialah α dan β.

   Dapatkan nilai-nilai bagi;

   i. $3\alpha + 3\beta$ ii. $\dfrac{1}{\beta} + \dfrac{1}{\alpha}$

                                                                       [7marks]

d) a) Solve the following inequalities:

      Selesaikan ketaksamaan berikut :

   i. $2x^2 + x - 3 > 0$ [4marks]

   ii. $\left| \dfrac{x+4}{3} \right| \leq 2$ [3marks]

QUESTION 4

a) Convert the angles $\frac{3\pi}{4}\,rad$ to the degree;

Tukarkan sudut $\frac{3\pi}{4}\,rad$ kepada darjah;   [2marks]

b) Solve the equation for $0 \leq \theta \leq 360°$

Selesaikan persamaan untuk $0 \leq \theta \leq 360°$

$$\cos\theta = \frac{1}{2}$$ [4marks]

c) Given that α and β are acute angle with $\sin\alpha = \frac{7}{25}$ and $\cos\beta = \frac{5}{13}$, find the following values without the use of table or calculator.

Diberi α dan β adalah sudut tirus dengan $\sin\alpha = \frac{7}{25}$ dan $\cos\beta = \frac{5}{13}$, nilaikan ungkapan berikut tanpa menggunakan sifir atau kalkulator.

$$\sin(\alpha + \beta)$$ [4marks]

QUESTION 5

a) Find the polar coordinates for the point;
    Dapatkan koordinat kutub bagi titik;   [3marks]
$$(-2, -2)$$

b) Find the Cartesian equation for;
    Dapatkan persamaan cartesian bagi;

$$r = 4\cos\theta + 5\sin\theta$$ [3marks]

c) Copy and complete the table below and sketch the graph of the
    equation $r = 4 - \sin\theta$ for $-90° \le \theta \le 90°$
    (Hint: The graph is symmetrical about y-axis)
    *Salin dan lengkapkan jadual berikut, seterusnya lakarkan graf
    persamaan $r = 4 - \sin\theta$ untuk $-90° \le \theta \le 90°$.*
    (Panduan: Graf ini bersimetri dengan paksi-y)

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

[4marks]

END OF QUESTION PAPER

LIST OF FORMULA

SENARAI RUMUS

1 Indeks

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

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

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

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

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

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

$$\sin 2A = 2\sin A kosA$$

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

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

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

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

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

5 Polar coordinates

$$x = rkos\theta$$

$$y = r\sin\theta$$

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

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