

 **INTI** International
University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session : AUGUST 2018

Programme : Diploma in Information and Communication Technology (DICTN)
Diploma in Information Technology (DITN)

Course : **MAT1103: Fundamentals of Mathematics**

Date of Examination : 12 December 2018, (Wednesday)

Time : 5:00pm – 7:00pm Reading Time : Nil

Duration : 2 Hours

Special Instructions :

This question paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided.

Materials permitted : Non programmable calculator

Materials provided : Formula Sheet

Examiner(s) : **Mohd Hafis Bin Zakaria** and Bark Chee Beng

Moderator : Dr Ng Set Foong

This paper consists of 7 printed pages, including the cover page

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY PROGRAMME
(DICTN)

DIPLOMA IN INFORMATION TECHNOLOGY PROGRAMME (DITN)

MAT1103: FUNDAMENTALS OF MATHEMATICS

FINAL EXAMINATION: AUGUST 2018 SESSION

Instructions: This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Let $f(x) = x - 1$ and $g(x) = 2x^2$. Find the followings:

(i) $(f + g)(2)$

(3 marks)

(ii) $(f \cdot g)(2)$

(3 marks)

(b) Solve the following logarithmic equations. Give your answer up to 4 significant figures.

$$\log_2 x - \log_2(x - 3) = 5$$

(5 marks)

(c) Find the following integrals using substitution method.

$$\int 18x^2 \sqrt[4]{6x^3 + 5} dx$$

(5 marks)

(d) Solve the following inequalities. Build a table to test number for each interval.

$$x^2 - 5x > 6$$

(9 marks)

Question 2

(a) Let $f(x) = 3x + 2$ and $g(x) = 5x^2 + 2$. Find the followings:

(i) $g^{-1}(x)$

(4 marks)

(ii) $(g \circ f)(2)$

(5 marks)

(b) Find the equation of the line that passes through the point $(-2, 1)$ and is perpendicular to the line $5y - x = 40$.

(5 marks)

(c) Express the following logarithmic functions in term of $\log x$ and $\log y$.

$$\log_{100} \frac{\sqrt{x}}{y^2}$$

(5 marks)

(d) The length of a rectangular swimming pool is 5 m longer than the double of its width. The area of the pool is 250 m^2 . Find the dimension of the pool.

(6 marks)

Question 3

- (a) Solve the following equations for x . Express your answer up to 3 significant figures where applicable.

(i) $2x^2 + 2x - 4 = 0$ (3 marks)

(ii) $4(3^x) = 5$ (3 marks)

- (b) The first and last term of an arithmetic series are 29 and 179 respectively. If the total number of terms is 25, find the

(i) common difference (3 marks)

(ii) sum of the series (3 marks)

- (c) Find the following integrals.

$$\int_1^2 3x^2 + 4x - 5 dx$$

(4 marks)

- (d) Sketch the graphical solution of the following system of inequalities.

$$5x + y \geq 20$$

$$x + y \leq 12$$

$$x + 3y \geq 18$$

(9 marks)

Question 4

(a) Simplify the expression below to the simplest form and rewrite using only positive exponents.

(i) $2\sqrt{12} - 3\sqrt{48} + \sqrt{27}$

(3 marks)

(ii) $\frac{x^3y^2z^4}{x^5y^2z^2}$

(5 marks)

(b) Given that $\log_2 a = 5$ and $\log_2 b = 2$, find the following:

(i) $a + b$

(3 marks)

(ii) $\log_{a/b} 32$

(5 marks)

(c) Given the following geometric series,

$$3, -9, 27, -81, \dots$$

(i) Find the 10th term.

(6 marks)

(ii) Find the sum of first 10 terms.

(3 marks)

Question 5

(a) Solve the following inequalities.

(i) $-1 < 6 - 2y \leq 6$

(3 marks)

(ii) $|2x - 4| + 4 \leq 8$

(4 marks)

(b) Sketch the graph of the function $y = 5x^2 - 7x + 2$ with the x-intercept, y-intercept and vertex shown clearly.

(6 marks)

(c) Solve the simultaneous solution of the following system.

$$\begin{aligned}x + 2y + 3z &= 6 \\2x - 3y + 2z &= 14 \\3x + y - z &= -2\end{aligned}$$

(6 marks)

(d) Find the derivatives of the following equation using implicit differentiation.

$$y^3 + xy = 2x^2$$

(6 marks)

Question 6

- (a) Given two points $A(5, -3)$ and $B(4, 9)$. Find,
- (i) the distance between the two points, (2 marks)
 - (ii) the midpoint between the two points, (2 marks)
 - (iii) the equation of the straight line passing the two points. (3 marks)
- (b) Simplify the expression below to the simplest form and rewrite using only positive exponents.
- (i) $\frac{x-3}{x^2-4} \cdot \frac{x+2}{x^2-6x+9}$ (3 marks)
 - (ii) $\frac{6}{\sqrt{5}-\sqrt{3}}$ (3 marks)
- (c) Use the Binomial Theorem to find the expansion of $(3 - 2x)^4$ up to and including the term in x^3 . (6 marks)
- (d) Find the derivative of the following function using quotient rule.

$$f(x) = \frac{(x^2 - 8)^3}{x - 2}$$

(6 marks)

-THE END-*MAT1103(final)/August2018/formatted*

