

FINAL
Examination Paper

(COVER PAGE)

Session : APRIL 2018

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

Course : **MAT1103: Fundamentals of Mathematics**

Date of Examination : July 28, 2018 (Saturday)

Time : 11.00am – 1.00pm 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 Micheal Chong

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: APRIL 2018 SESSION

Instruction: 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) Solve the following inequalities. Build a table to test number for each interval.

$$\frac{-x + 6}{x - 3} \leq 0$$

(9 marks)

- (b) Let $f(x) = \frac{1}{x}$ and $g(x) = 2 - x$. Find the followings:

(i) $(f + g)(3)$

(3 marks)

(ii) $(f \cdot g)(3)$

(3 marks)

- (c) Solve the following logarithmic equations.

$$2\log_2 x = 3 + \log_2(x - 2)$$

(5 marks)

- (d) Find the following integrals using substitution method.

$$\int (x^4 + 6)^3 4x^3 dx$$

(5 marks)

Question 2

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

(i) $(f \circ g)(3)$

(4 marks)

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

(5 marks)

(b) Solve the following simultaneous equation using substitution method.

$$\begin{aligned} 3x + y &= 1 \\ -x + 2y &= 9 \end{aligned}$$

(6 marks)

(c) Find the equation of the line that is perpendicular to the line $5x - 2y = 3$ that passes through the point $(-2, 1)$.

(5 marks)

(d) Expand the following logarithmic functions.

$$\log_3 \frac{9x^4}{\sqrt{y}}$$

(5 marks)

Question 3

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

$$x + y \geq 1$$

$$x - y \geq 0$$

$$x \leq 3$$

(9 marks)

- (b) Solve the following equations for x.

(i) $2x^2 - 3x - 5 = 0$

(3 marks)

(ii) $e^{x+3} = 9$

(3 marks)

- (c) Find the sum of all the terms in the arithmetic progression:

$$-9, -2, 5, 12, \dots, 75$$

(6 marks)

- (d) Find the following integrals.

$$\int_0^2 x^3 + 6 dx$$

(4 marks)

Question 4

- (a) The first and the fourth term of a geometric sequence are -2 and -54 respectively. Find,
- (i) the 7th term. (6 marks)
- (ii) the sum of first 7 terms. (3 marks)
- (b) Simplify the expression below to the simplest form and rewrite using only positive exponents.
- (i) $\left(\frac{x^{-5}y^3z^5}{x^{-4}y^{-3}z^2}\right)^{-\frac{1}{3}}$ (5 marks)
- (ii) $5\sqrt{24} - 3\sqrt{96} + \sqrt{6}$ (3 marks)
- (c) Given that $\log_3 a = 5$ and $\log_3 b = 3$, find the following:
- (i) $a + b$ (2 marks)
- (ii) $3 \log_3 ab^{-1}$ (3 marks)
- (iii) $\log_{a/b} 3$ (3 marks)

Question 5

(a) Solve the following inequalities.

(i) $7 \leq 4x - 1 < 15$ (3 marks)

(ii) $\left| \frac{2x-4}{5} \right| > 6$ (4 marks)

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

$$\begin{aligned}x - y + z &= 8 \\2x + 3y - z &= -2 \\3x - 2y - 9z &= 9\end{aligned}$$

(6 marks)

(c) Sketch the graph of the function $f(x) = 4(x + 2)^2 - 1$ by using the graph of $y = x^2$ and a combination of translation and stretching/shrinking. Indicate the y-intercept and vertex point clearly. (6 marks)

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

$$x^2y - 4y + 5x = 0$$

(6 marks)

Question 6

- (a) Find the distance, midpoint and the equation of the straight line that passes through the two points (3,6) and (0,8).
(7 marks)

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

(i) $\left(\frac{x^2+5+6}{x^2-4}\right)\left(\frac{x-2}{x+3}\right)$
(3 marks)

(ii) $\frac{\sqrt{5}}{\sqrt{5}-1}$
(3 marks)

- (c) Expand $(3x - 2y)^5$ in descending power of x .
(6 marks)

- (d) Find the derivative of the following equation.

$$f(x) = 3x(x^3 - 1)^4$$

(6 marks)

~ The End ~

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