INTI International University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session	:	**APRIL 2019**
Programme	:	Diploma in Information Technology (DITN)
Course	:	**MAT1103: Fundamentals of Mathematics**
Date of Examination	:	31 July 2019, (Wednesday)
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**, Aida Idawati and Chan Ah Wah
Moderator	:	Dr Ng Set Foong

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

DIPLOMA IN INFORMATION TECHNOLOGY (DITN)
MAT1103: FUNDAMENTALS OF MATHEMATICS
FINAL EXAMINATION: APRIL 2019 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 $f(x) = 2x^2 - 1$ and $g(x) = \frac{x}{2} - 1$. Find the followings:

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

(3 marks)

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

(3 marks)

(b) Solve the following logarithmic equation.

$$log_3(x + 2) + log_3(x - 4) = 3$$

(5 marks)

(c) Find the following integral using substitution method.

$$\int \sqrt{x}\sqrt{x\sqrt{x} + 1}\ dx$$

(5 marks)

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

$$x^2 + x - 6 > 0$$

(9 marks)

Question 2

(a) Let $f(x) = 3x - 2$ and $g(x) = x^2 + 1$. Find the followings:

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

(4 marks)

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

(5 marks)

(b) Find the equation of line, perpendicular to the line $2x - 3y + 4 = 0$ which line passes through the point $(-2, 5)$.

(5 marks)

(c) Evaluate each of the following:

(i) $\log_{10} \frac{4}{35} + \log_{10} 70 - \log_{10} 2 + 2 \log_{10} 5$

(3 marks)

(ii) $4 \log_3 5 \times 2 \log_5 3$

(2 marks)

(d) Solve the radical equation and verify the answers in case of extraneous solutions.

$$(x + 1) - 6\sqrt{x + 1} + 8 = 0$$

(6 marks)

Question 3

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

(i) $x^4 - 9 = 0$

(3 marks)

(ii) $e^{1+2x} = 2$

(3 marks)

(b) The sum of the 3rd and the 7th terms of an arithmetic sequence is 6 and their product is 8. Find sum of the first sixteen terms.

(6 marks)

(c) Find the following integral.

$$\int_0^1 \sqrt{x}(1 - x^2)dx$$

(4 marks)

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

$$y \leq -\frac{1}{3}x + 5$$
$$y > \frac{2}{3}x - 1$$
$$x \geq -6$$
$$y > 0$$

(9 marks)

Question 4

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

(i) $\sqrt{50} + 2\sqrt{18} - \sqrt{72}$

(3 marks)

(ii) $\dfrac{-3x^2y^3z^2}{18x^3y^4z^2}$

(5 marks)

(b) Find the value of x in each equation below:

(i) $\log_{2x-1} 64 = 2$

(3 marks)

(ii) $7^{5-3x} = 3^{x+2}$ (with answer correct to 4 decimal places)

(5 marks)

(c) Given the following first 3 terms in geometric series,

$$6x + 1, 2x - 3, x - 3$$

(i) Find the possible values of x.

(3 marks)

(ii) Find the possible values of sum of the first nine terms.

(6 marks)

Question 5

(a) Solve the following inequalities.

(i) $-3 \geq -6x + 9 > -45$

(3 marks)

(ii) $\frac{|2+3x|}{2} \geq 2$

(4 marks)

(b) Sketch the graph of the function $f(x) = -3x^2 - 12x - 9$ with the x-intercept, y-intercept and vertex shown clearly.

(6 marks)

(c) Solve the simultaneous solution of the following system using substitution and/or addition method.

$$-6x - 2y - z = -17$$
$$5x + y - 6z = 19$$
$$-4x - 6y - 6z = -20$$

(6 marks)

(d) Find $\frac{d^2y}{dx^2}$ of $y = (x - 1)(x^2 - x + 1)$.

(6 marks)

Question 6

(a) Given the equation of the line $3(y + 2) = 6x - 1$. Find,

(i) the gradient and y-intercept,

(3 marks)

(ii) the parallel equation that passes through the point $(-1, 1)$.

(3 marks)

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

(i) $\frac{(x-1)^2}{6} \div \frac{x^2-1}{4}$

(3 marks)

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

(3 marks)

(c) The 6^{th} term in the expansion of $\left(ax + \frac{b}{x}\right)^{10}$ is 8064. Find a in terms of b.

(6 marks)

(d) Find the derivative of the following equation.

$$x^2 + 2xy - y^2 = 25$$

(7 marks)

-THE END-

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