INTI International University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session	:	**JANUARY/ MARCH 2018**
Programme	:	Diploma in Information and Communication Technology (DICTN)
Course	:	**MAT1103: Fundamentals of Mathematics**
Date of Examination	:	6 March, 2018 (Tuesday)
Time	:	5:00 pm – 7:00 pm 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. All questions carry equal marks.

Materials permitted :
Non programmable calculator

Materials provided :
Formula Sheet

Examiner(s)	:	**Mohd Hafis Bin Zakaria** and Fang Yen Yen
Moderator	:	Mr Cheng Siak Peng

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: JANUARY/ MARCH 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) Simplify the expression below to the simplest form and rewrite using only positive exponents.

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

(ii) $3\sqrt{18} + 2\sqrt{50} - \sqrt{98}$ (3 marks)

(iii) $\frac{a^2-1}{a} \times \frac{a^2}{a^2+2a+1}$ (3 marks)

(iv) $\frac{2}{5+\sqrt{x}}$ (3 marks)

(b) Solve the following equations for x.

(i) $6x^2 - 11x - 10 = 0$ (3 marks)

(ii) $e^{x+2} = 8$ (4 marks)

(c) Find the y-intercept of an equation of the line perpendicular to $3x + 4y = 5$ that passes through the point $(-1, 3)$. (6 marks)

Question 2

(a) Solve the following inequalities.

(i) $7x - 8 < 4x + 7$ (3 marks)

(ii) $\left|\frac{x-2}{3}\right| < 3$ (4 marks)

(iii) $(x + 3)(x + 1) \leq 0$ (8 marks)

(b) Find the values of a and b if the line $2x - 3y = 1$ is parallel to the line $y - (a + 1)x = b$. (5 marks)

(c) Sketch the following quadratic function.

$$f(x) = 2(x + 1)^2 - 8.$$

(5 marks)

Question 3

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

(i) $(f - g)(2)$ (2 marks)

(ii) $(f.g)(2)$ (2 marks)

(iii) $(f \circ g)(2)$ (3 marks)

(iv) $g^{-1}(x)$ (3 marks)

(b) Solve the following logarithmic functions.

(i) $\log_2 x + \log_2(x - 3) = 2$ (5 marks)

(ii) $\ln(x - 3) + \ln(x + 1) = \ln 5$ (5 marks)

(c) Solve the following simultaneous equation.

$$2(x + y) - x = 0$$
$$3(x + y) + 2y = 1$$

(5 marks)

Question 4

(a) Given $f(x) = x^3 - 13x + 12$.

(i) Show that $(x + 4)$ is a factor of $f(x)$. (2 marks)

(ii) Factorize $f(x)$ completely. (4 marks)

(b) Given that $\log_a 2 = 0.3869$, $\log_a 3 = 0.6131$ and $\log_a 5 = 0.8982$.
Solve the following logarithmic function.

$$\log_{25} 24$$

(7 marks)

(c) Given that the first and the fourth term of a geometric sequence are -2 and -54 respectively. Find,

(i) the common ratio. (2 marks)

(ii) the sum of first 6 terms. (3 marks)

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

$$x + y \leq 4$$
$$x - y \leq 6$$
$$x \geq 1$$

(7 marks)

Question 5

(a) Find the derivatives of $xy^2 + 4x - 5y = 10$ using implicit differentiation.

(6 marks)

(b) Find the derivative of the following equation.

$$f(x) = \frac{x^2 + 3x - 1}{x + 4}$$

(6 marks)

(c) Solve the following integral using substitution method.

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

(5 marks)

(d) Find the following integrals.

(i) $\int (x^3 + 5)^2 \, dx$ (3 marks)

(ii) $\int_1^2 3x^2 + 4x - 5 \, dx$ (5 marks)

Question 6

(a) Given the n^{th} term of an arithmetic progression is $2n + 3$. Find

(i) the first term, (2 marks)

(ii) the common difference, (2 marks)

(iii) the 9^{th} term, (2 marks)

(iv) the sum of the first 9 terms. (3 marks)

(b) 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. (4 marks)

(c) Solve the following system of equations.

$$-2x + y - 3z = 2$$
$$2x + 3y = -3$$
$$x + z = 5$$

(5 marks)

(d) Find the value of $\sqrt[7]{0.875}$ to three decimal points. (7 marks)

~THE END~

FORMULA SHEET MAT1103

Formula :

Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Arithmetic Progression:

$$T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

Geometric Progression:

$$T_n = a\, r^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r} \quad ; r < 1$$

$$SS_n = \frac{a(r^n - 1)}{r-1} \quad ; r > 1$$

Binomial Theorem:

$$(a+b)^n = {}^nC_0 a^n b^0 + {}^nC_1 a^{n-1} b^1 + \ldots\ldots + {}^nC_n a^0 b^n$$