INTI International University & Colleges

FINAL
ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session	:	**January 2021**
Programme	:	Diploma in Information Technology (DITN) Diploma in Computer Science (DCS)
Course	:	**MAT1103: Fundamentals of Mathematics**
Date of Examination	:	11 March 2021 (Thursday)
Time	:	12.00noon – 2.30pm Reading Time : Nil
Duration	:	2 Hours 30 Minutes

Special Instructions :

This paper consists of **TWO (2)** sections. Answer **ALL** questions. All questions carry equal marks.

Material permitted :
Non-Programmable Scientific Calculator

Materials provided :
Nil

Examiner(s)	:	**Teng Mei Tuan, Mohd Hafis Zakaria**
Chief Moderator	:	S.M.Elizabethrani

*This paper consists of **5** printed pages, including the cover page*

DIPLOMA IN INFORMATION TECHNOLOGY PROGRAMME (DITN**)**
DIPLOMA IN COMPUTER SCIENCE PROGRAMME (DCS**)**
MAT1103: FUNDAMENTALS OF MATHEMATICS
FINAL ALTERNATIVE ASSESSMENT: JANUARY 2021 SESSION

Instruction: This paper consists of **TWO (2)** sections. Answer **ALL** questions. All questions carry equal marks.

Section A: (50 marks)

Question 1

(a) Solve the expressions below to the simplest form and rewrite using only positive exponents.

(i) $\dfrac{(-2a^2b^{-3})^2}{2a^5b^{-1}}$ (3 marks)

(ii) $\sqrt{27}+\sqrt{48}-\sqrt{12}$ (3 marks)

(iii) $\dfrac{\sqrt{5}+2}{2\sqrt{5}+3}$ (3 marks)

(iv) $\dfrac{x^2-2x-3}{x^2-4}\div\dfrac{x^2+2x-15}{x^2+3x-10}$ (3 marks)

(b) Solve the following inequalities:

(i) $30 \le \frac{5}{9}(x-32) \le 35$ (4 marks)

(ii) $4|x+2|-3 \le 9$ (4 marks)

(c) Solve the equation $\sqrt{2+x}=4-x$.

(5 marks)
(Total: 25 marks)

Question 2

(a) Find the gradient, x and y intercepts for the equation, $x = -\frac{2}{5}y + 2$. (3 marks)

(b) Let $f(x) = \frac{3}{x-1}$ and $g(x) = \frac{1}{x^2}$. Solve the following:

(i) $(f + g)(4)$ (2 marks)

(ii) $(f \bullet g)(4)$ (2 marks)

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

(c) Use completing the square method to find vertex and sketch the graph of the function

$$f(x) = -2x^2 + 12x + 15$$

with the x-intercept, y-intercept and vertex shown clearly. (7 marks)

(d) Solve the following equations for x.

(i) $4^{x+2} = \frac{1}{128^{x-1}}$ (Correct to 4 decimal places) (4 marks)

(ii) $2\log_2 x = 3 + \log_2(x - 2)$ (4 marks)

(Total: 25 marks)

SECTION B: (50 marks)

Question 3

(a) Let $P(x) = 4x^3 - 5x^2 - 2x + 3$. Show that $x-1$ is a factor of $P(x)$.
Hence, by using long division method or otherwise, factorize $P(x)$ completely. (7 marks)

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

$$\begin{aligned} 2x + 2y + z &= 10 \\ 2x + y + 3z &= 16 \\ x - 2y + 2z &= 5 \end{aligned}$$

(6 marks)

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

$$\begin{aligned} x + y &\leq 5 \\ x - y &\leq 2 \\ x - 1 &> 0 \\ y &> 0 \end{aligned}$$

(5 marks)

(d) A piece of 42 cm long copper wire is bent into the shape of a rectangle whose length is twice its width. Find the dimensions of the rectangle.

(4 marks)

(e) Solve the equation, $\sum_{n=2}^{5} 2\left(-\frac{1}{3}\right)^{n+1}$. (3 marks)

(Total: 25 marks)

Question 4

(a) Given the $11, p+1$ and 19 are three consecutive terms of an arithmetic progression and $p+1$ is the sixth term. Find

(i) the value of p, (2 marks)

(ii) the sum of the first 12 terms. (3 marks)

(b) The fourth and seventh term of a geometric progression are $-\frac{3}{8}$ and $-\frac{3}{64}$ respectively. Find

(i) the common ratio, (2 marks)

(ii) the sum of first 10^{th} term. (3 marks)

(c) Find $\frac{dy}{dx}$ for each of the following:

(i) $y = \frac{x^2-4}{x+5}$ (4 marks)

(ii) $y = (x^3 - 2x^2 + 1)^{-4}$ (4 marks)

(d) Find the following integrals:

(i) $\int 12x^3\sqrt[4]{6x^4+5}dx$ (5 marks)

(ii) $\int_1^2 \frac{1}{x^2}\, dx$ (2 marks)

(Total: 25 marks)

~THE END~