

**FINAL  
ALTERNATIVE ASSESSMENT**

(COVER PAGE)

Session : April 2021

Programme : Diploma in Information Technology (DITN)  
Diploma in Computer Science (DCS)

Course : **MAT1103: Fundamentals of Mathematics**

Date of Examination : 28 July 2021 (Wednesday)

Time : 8.00am – 10.30am 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.

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Material permitted : Non-Programmable Scientific Calculator

Materials provided : Nil

Examiner(s) : **Teng Mei Tuan**, Mohd Hafis Zakaria

Chief Moderator : Dr Narinderjit Singh Sawaran Singh

*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: APRIL 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 expression below to the simplest form and rewrite using only positive exponents.

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

(ii)  $2\sqrt{80} + \sqrt{20} - \sqrt{125}$  (3 marks)

(iii)  $\frac{\sqrt{2x+4}}{2\sqrt{2x}}$  (3 marks)

(iv)  $\frac{x^2+5x+6}{x^2-4} \times \frac{x^2+x}{3x^2+x}$  (3 marks)

(b) Solve the following inequalities.

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

(ii)  $-4 + |2(x - 2) + 3| \leq 3$  (5 marks)

(c) Find the equation of the line that is perpendicular to the line  $3x + 4y = 5$  and passes through the point  $(3, -2)$ .

(5 marks)

**(Total: 25 marks)**

**Question 2**

- (a) Find the gradient and y intercepts for the equation,  $\frac{4x}{-3} = \frac{3y+5}{-2}$ . (3 marks)
- (b) Let  $f(x) = 2 + \frac{1}{x}$  and  $g(x) = x^2 - 1$ . Solve the following:
- (i)  $(f + g)(2)$  (2 marks)
  - (ii)  $(f \cdot g)(2)$  (2 marks)
  - (iii)  $(f \circ g)(x)$  (3 marks)
- (c) Given the function  $y = x^2 - 6x - 7$ ,
- (i) find the vertex, (3 marks)
  - (ii) find x-intercept, (1 mark)
  - (iii) find y-intercept, (1 mark)
  - (iv) sketch the graph by showing the vertex, x-intercept, and y-intercept clearly. (2 marks)
- (d) Solve the following equations for  $x$ .
- (i)  $e^{2-3x} = 39$  (Correct to 4 decimal places) (4 marks)
  - (ii)  $\log_4(x + 3) + \log_4(2 - x) = 1$  (4 marks)

**(Total: 25 marks)**

**SECTION B:** (50 marks)**Question 3**

(a) Write each of the following expression in one algorithm.

(i)  $2\log_b x + \frac{1}{3} \log_b y$  (3 marks)

(ii)  $3\log_b x + \frac{1}{2} \log_b (y - 2) - \log_b z$  (4 marks)

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

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

(6 marks)

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

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

(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,  $\sum_{n=3}^6 2 \left(-\frac{1}{5}\right)^{n+2}$ .

(3 marks)

**(Total: 25 marks)**

**Question 4**

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

$$-9, -2, 5, 12, \dots, 75 \quad (5 \text{ marks})$$

- (b) The second and fourth term of a geometric progression is 64 and 36 respectively. Find

(i) the common ratio and first term, (3 marks)

(ii) the sum of first 10<sup>th</sup> term. (2 marks)

- (c) Solve  $\frac{dy}{dx}$  for each of the following.

(i)  $y = \frac{x^2+1}{3x-2}$  (5 marks)

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

- (d) Solve integration for each of the following.

(i)  $\int x^5(x^6 + 5)^5 dx$  (3 marks)

(ii)  $\int_1^2 \frac{6x^4-1}{x^3} dx$  (4 marks)

**(Total: 25 marks)**

**~THE END~**

*MAT1103 (F) / April2021 Session / formatted*