

FINAL
Alternative Assessment

(COVER PAGE)

Session : April 2020

Programme : Foundation in Science (CFSI)

Course : **MAT1210: Mathematics 1**

Date of Examination : 6 August 2020 (Thursday)

Time : 10:00am – 12:30pm Reading Time : Nil

Duration : 2 hours + 30 mins uploading time

Special Instructions :

This paper consists of **FOUR (4)** questions. Answer **ALL** questions.

All questions carry equal marks.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Nil

Examiner(s) : **Ms. Teng Mei Tuan**

Chief Moderator : Dr. Nurulanati binti Othman

This paper consists of 3 printed pages, including the cover page.

FOUNDATION IN SCIENCE (CFSI)
MAT1210: MATHEMATICS 1
FINAL ALTERNATIVE ASSESSMENT: APRIL 2020 SESSION

Instructions: This paper consists of **FOUR (4)** questions. Answer **ALL** questions. All questions carry equal marks.

Question 1

- (a) Solve the following equations in exact value:
- (i) $3^{x^2+3x} = \frac{1}{3^{-4}}$. (3 marks)
- (ii) $\ln(x-2) = \ln(5x+3) - 1$. (4 marks)
- (b) Solve $\cot 3x = -2$ for $0^\circ \leq x \leq 360^\circ$. (6 marks)
- (c) Find the exact value of $\tan \frac{9\pi}{4}$ without using calculator. (2 marks)
- (d) Use the factor theorem to prove that $x-2$ is a factor of $P(x) = x^4 - x^3 - 2x^2 - 2x + 4$. Hence, factorise $P(x)$ completely. (7 marks)
- (e) Rationalize the denominator of $\frac{2\sqrt{15}+15}{15-\sqrt{15}}$. (3 marks)

Question 2

- (a) Solve the radical equation $\sqrt{2x+1} = 1 + \sqrt{x}$. (4 marks)
- (b) Solve the equation $8\sec^3 x = 27$ for $0 < x < 2\pi$. (4 marks)
- (c) Given $f(x) = e^{2x} \tan x$, find $f'(x)$ and $f''(x)$. (7 marks)
- (d) Given that $f(x) = 3 - 5x, x \in \mathfrak{R}$ and $g(x) = (x-1)^2, x \in \mathfrak{R}, x \geq 1$. Find
- (i) the function of $fg(x)$, (2 marks)
- (ii) the inverse function of $g(x)$. (3 marks)
- (e) Find $\frac{dy}{dx}$ for $xy = \sin xy$. (5 marks)

Question 3

- (a) Find all the extrema points and the points of inflexion of $f(x) = x^3 - \frac{x^4}{4}$. (8 marks)
- (b) Differentiate each of the following with respect to x :
- (i) $\sin^3 x$. (2 marks)
- (ii) $\frac{\sec x}{\ln x}$. (3 marks)
- (c) Find $\frac{dy}{dx}$ for $y = x \sec^{-1}(4x+2)$. (5 marks)
- (d) Find the equation of tangent of $y = \ln(x+1)$ at $y = 0$. (3 marks)
- (e) Evaluate $\int_2^3 (2x-3)^{-1} dx$. (4 marks)

Question 4

- (a) Sketch the graph for $y = \sqrt{x}$ and $y = 6 - x$ on the same axes. Calculate the area of the region bounded by the curve $y = \sqrt{x}$, the line $y = 6 - x$ and the y -axis. (5 marks)
- (b) Evaluate each of the following:
- (i) $\int_2^3 \frac{1}{(2x-3)^2} dx$. (4 marks)
- (ii) $\int_0^{\frac{\pi}{2}} \sin^3 x \cos^3 x dx$. (6 marks)
- (c) Find the indefinite integrals of $\int x^2 (x^3 + 5)^{10} dx$ by using integration by substitution. (5 marks)
- (d) Evaluate the definite integral of $\int_1^2 x e^x dx$ by using integration by parts. (5 marks)

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