FINAL
Alternative Assessment

Session	:	**April 2022**
Programme	:	Foundation in Science (CFSI)
Course	:	**MAT1210: Mathematics 1**
Date of Examination	:	2 August 2022 (Tuesday)
Time	:	9:00am – 11:30am Reading Time : Nil
Duration	:	2 hours + 30 minutes (uploading time)
Special Instructions	:	

This paper consists of **FOUR (4)** questions. Answer **ALL** the questions handwritten showing all steps in either **BLUE/BLACK** ink on foolscap papers. All questions carry equal marks.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Formula Booklet 1

Examiner(s)	:	**Ms. Teng Mei Tuan**
Chief Moderator	:	Ms. Nurul Asyima Zulkeflee

*This paper consists of **4** printed pages, including the cover page.*

FOUNDATION IN SCIENCES PROGRAMME (CFSI)
MAT1210: MATHEMATICS 1
FINAL ALTERNATIVE ASSESSMENT: APRIL 2022 SESSION

Instructions: This paper consists of **FOUR (4)** questions. Answer **ALL** the questions handwritten showing all steps in either **BLUE/BLACK** ink on foolscap papers. All questions carry equal marks.

Question 1

(a) Rationalize the denominator of $\frac{2}{\sqrt{7}-3}$. (2 marks)

(b) Solve the radical equation $\sqrt{3x+1}-2=\sqrt{x+1}$ and check your answer. (5 marks)

(c) Find the exact solution for the following equations:
(i) $5^{2x-1}=3^{-x}$. (4 marks)

(ii) $\log_x 2-\log_x(x-1)=1$. (3 marks)

(d) Show that $x-1$ is a factor of $P(x)=x^3-2x^2-5x+6$ and hence factorize the expression completely. (4 marks)

(e) Use the binomial theorem to expand the first three terms of $(2-3x)^5$. (3 marks)

(f) Given $\tan x=\frac{5}{12}$ where x located at $180°<x<270°$, find $\cos 2x$. (4 marks)

Question 2

(a) Find the exact value $\cos\frac{9\pi}{4}$ without using calculator. (3 marks)

(b) Solve the equation $\sin 2x=\sin x$, for $0<x\leq 2\pi$. (4 marks)

(c) Solve the equation $\cot(2x-15°)=1$, for $0°\leq x<360°$. (3 marks)

(d) Given that $f(x)=x+3, x\in\Re$ and $g(x)=2-x^2, x\in\Re^+$. Find

(i) $f\square g(5)$, (2 marks)

(ii) $f\circ g(x)$, (2 marks)

(iii) the inverse function of $g(x)$. (3 marks)

(e) Differentiate each of the followings with respect to x, simplify and factorise the answer:

(i) $\left(\ln^2 x\right)(2x+1)^3$. (4 marks)

(ii) $\frac{e^{2x+1}}{\cos x}$. (4 marks)

Question 3

(a) Find $\frac{dy}{dx}$ for $\sin x + \sin y = y - xy^2 + x^2$ by using implicit differentiation. (7 marks)

(b) Consider the curve given by $f(x) = x^3 + x^2 - x + 2$.

(i) Find the coordinates of the stationary points. (4 marks)

(ii) Determine the nature of the stationary points. (3 marks)

(iii) Find the coordinates of the point of inflection. (3 marks)

(iv) Sketch the graph of the curve $y = f(x)$, label all the stationary points, point of inflection and the y-intercept. (4 marks)

(d) By using integration by parts, show that $\int x \sin x dx$. (4 marks)

Question 4

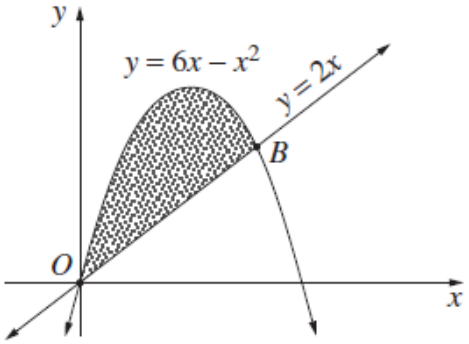
(a) Find each of the followings:

(i) $\int \frac{x}{1-x^2}\, dx$. (3 marks)

(ii) $\int \frac{1}{(1-x)^2}\, dx$ (3 marks)

(iii) $\int x(1-x^2)^2\, dx$ (3 marks)

(b) The graphs of $y = 2x$ and $y = 6x - x^2$ intersect at the origin and point B.



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(i) Show that the coordinates of B are (4, 8). (1 mark)

(ii) Find the shaded area bounded by $y = 6x - x^2$ and $y = 2x$. (3 marks)

(iii) The shaded region is rotated about the x-axis to form a solid. Find the volume of the solid. (4 marks)

(c) Evaluate the following definite integrals.

(i) $\int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \sec^2 x dx$ (2 marks)

(ii) $\int_0^1 e^{2x+1} dx$ (2 marks)

(iii) $\int_0^{\frac{\pi}{2}} \cos^3 x \, dx$. (4 marks)

~THE END~

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