INTI International University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session : **April 2018**

Programme : Foundation In Science (CFSI)

Course : **MAT1210: Mathematics 1**

Date of Examination : July 31, 2018 (Tuesday)

Time : 8.00 am – 10.00 am

Duration : 2 Hours Reading Time : Nil

Special Instructions :

This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

IMPORTANT NOTE : **THIS PAPER SHOULD NOT BE TAKEN OUT OF THE EXAMINATION**

Materials Permitted

Non-programmable Calculator

Materials Provided :

Formula Booklet 1

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

Moderator : Dr. Ch'ng Pei Eng

This paper consists of a cover page and 3 printed pages.

INTI INTERNATIONAL COLLEGE PENANG

FOUNDATION IN SCIENCE (CFSI)
MAT1210: MATHEMATICS 1
FINAL EXAMINATION: APRIL 2018 SESSION

Instructions: This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Solve the exponential equation $3^{x^2+5x} = \frac{1}{3^6}$. (4 marks)

(b) Solve $\tan 2x = -4$ for $0° < x < 360°$. (6 marks)

(c) Determine the remainder, when $P(x) = 2x^3 + 4x^2 - 6x + 7$ is divided by $2x - 1$. (2 marks)

(d) Find the exact value of the following without using calculator:

(i) $\sin 420°$ (3 marks)

(ii) $\tan \frac{7\pi}{4}$ (3 marks)

(e) Find the indefinite integral of $\int \sin^2 x \cos^3 x \, dx$. (7 marks)

Question 2

(a) Solve the radical equation $\sqrt{3x-5} + \sqrt{x-1} = 2$. (6 marks)

(b) Use the factor theorem to determine if $2x - 5$ is a factor of $P(x) = 6x^4 - 15x^3 - 6x^2 + 20x$. (2 marks)

(c) Solve the equation $\cos^2 x = \cos x$ for $0° < x < 360°$. (4 marks)

(d) Given the equation $\ln y - \ln(y-5) = 1$, solve the y in exact solution. (3 marks)

(e) Given $f(x) = xe^{2x}$, find $f'(x)$ and $f''(x)$. (5 marks)

(f) Use implicit differentiation to find $\frac{dy}{dx}$ for $y^2 = \sin(xy)$. (5 marks)

Question 3

(a) Rationalize the denominator of $\frac{\sqrt{5}+\sqrt{7}}{7-\sqrt{5}}$. (4 marks)

(b) Given that $f(x)=2x-1, x\in\Re$ and $g(x)=\frac{3+5x}{x-2}$. Find

(i) the value of $f(3)+g(-5)$, (2 marks)

(ii) the function of for $fg(x)$, (3 marks)

(iii) the inverse function of $f(x)$, (3 marks)

(iv) the value of $f^{-1}(2)$. (2 marks)

(c) Evaluate the definite integral of $\int_0^{\frac{\pi}{4}} x\cos 2x\, dx$ by using integration by parts. (8 marks)

(d) Given the equation $\ln(2+e^{-x})=2$, solve the x in exact solution. (3 marks)

Question 4

(a) Consider the curve given by $f(x)=2x^3+3x^2-36x+4$.

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

(ii) Determine the nature of the stationary points. (5 marks)

(iii) Find all values of x for which $\frac{d^2y}{dx^2}=0$. (4 marks)

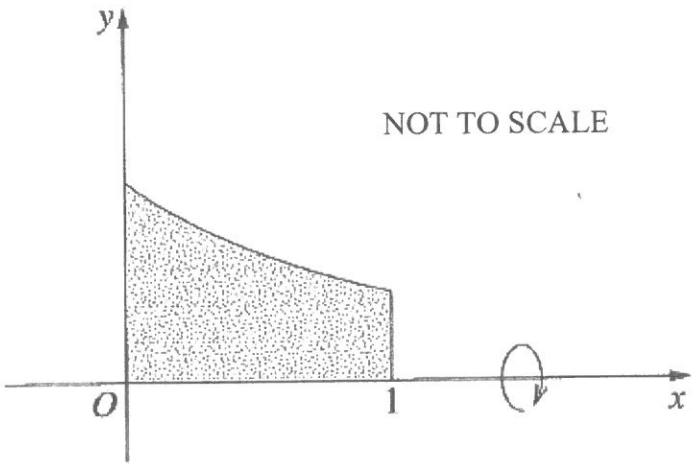
(iv) Sketch the curve with the domain $-4\le x\le 4$. Label all the stationary points, y- intercept and end points. (5 marks)

(v) Find the range for y with the given domain stated in part (iv) (2 marks)

(b) By using implicit differentiation, differentiate $x^2+y^2-2xy=3x-4$ with respect to x. Find $\frac{dy}{dx}$. (5 marks)

Question 5

(a) The diagram shows the region bounded by $y = \frac{3}{(x+2)^2}$, the x-axis, the y-axis, and the line $x = 1$.



(i) Find the area of the shaded region. (4 marks)

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

(b) Evaluate $\int_0^1 \frac{x}{x^2+2}\,dx$. (3 marks)

(c) Evaluate $\int_0^1 e^{x+1}\,dx$. (3 marks)

(d) Differentiate with respect to x.

(i) $(x+2)\ln x$ (2 marks)

(ii) $\frac{\tan x}{e^x}$ (3marks)

(e) Expand $(3+2x)^5$ in ascending powers of x up to and including the term in x^3, simplifying the coefficients. (6 marks)

~THE END~