INTI
International College Penang
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session	:	**April 2017**
Programme	:	Foundation In Science (CFSI)
Course	:	**MAT1210: Mathematics 1**
Date of Examination	:	3 August 2017 (Thursday)
Time	:	11:00am – 1:00pm Reading Time : Nil
Duration	:	2 Hours

Special Instructions :

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

Materials permitted :

Non-Programmable Scientific Calculator

Materials provided :

Formulae booklet 1

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

Moderator : Dr. Ch'ng Pei Eng

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

INTI INTERNATIONAL COLLEGE PENANG

FOUNDATION IN SCIENCE (CFSI)
MAT1210: MATHEMATICS 1
FINAL EXAMINATION: APRIL 2017 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 $3^{x^2+2x} = \frac{1}{3}$. (4 marks)

(b) Solve $\sin 2x = \cos x$ 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) $\sin 390°$ (3 marks)

(ii) $\tan \frac{9\pi}{4}$ (3 marks)

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

Question 2

(a) Solve the radical equation $\sqrt{3x+1} - 2 = \sqrt{x+1}$. (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 $10\sec^2 x - 29\tan x = 0$ for $0° < x < 360°$. (6 marks)

(d) Solve the equation $\log_2 y - \log_2 (y-5) = 3$. (3 marks)

(e) Given $f(x) = x^2 \ln x$, find $f'(x)$ and $f''(x)$. (4 marks)

(f) Use implicit differentiation to find $\frac{dy}{dx}$ for $2x^2 - 3y^2 = 2xy$. (4 marks)

Question 3

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

(b) The radius of a spherical bubble is increasing at the rate of 0.2 cm/s. Find the rate of increase of the volume when the radius is 6cm and gives your answer in π. (Volume of bubble $=\frac{4}{3}\pi r^3$) (5 marks)

(c) (i) Find the derivatives of $y=\cos^4 x\sec(2x)$. (5 marks)

(ii) Hence, find the value of $\frac{dy}{dx}$ when $x=\frac{\pi}{3}$. (2 marks)

(d) Sketch the graph of $y=-\frac{2}{5}x+3$ by showing its y-intercept and x-intercept points.
Thus, find the shortest distance between the y-intercept and x-intercept points. (5 marks)

Question 4

(a) Rationalize the denominator of $\frac{\sqrt{2}+\sqrt{5}}{3-\sqrt{2}}$. (4 marks)

(b) By using implicit differentiation, differentiate $x^2+y^2-2xy=3x-4$ with respect to x. (4 marks)

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

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

(ii) the function of for $gf(x)$ (3 marks)

(iii) the inverse function of $g(x)$ (4 marks)

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

(d) Prove the identity : $\frac{1-\tan^2\theta}{1+\tan^2\theta}=1-2\sin^2\theta$ (5 marks)

Question 5

(a) Consider the curve given by $y = 7 + 4x^3 - 3x^4$.

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

(ii) Find all values of x for which $\frac{d^2y}{dx^2} = 0$. (3 marks)

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

(iv) Sketch the curve for the domain $-1 \le x \le 2$, labelling 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) Simplify $\dfrac{x^{-\frac{1}{3}} y^{\frac{1}{6}} z^{-2} y^{-\frac{1}{2}}}{\left(x^2 y^4\right)^{-\frac{1}{6}}}$ (4 marks)

(c) Find the 4th term of the binomial expansion $\left(x + \frac{1}{x}\right)^6$. (2 marks)

~ The End ~