INTI
International College Penang

FINAL
Examination Paper

(COVER PAGE)

Session	:	**April 2018**
Programme	:	Foundation in Business Information Technology (CFPI)
Course	:	**MAT1215: Fundamentals of Mathematics**
Date of Examination	:	31 July 2018 (Tuesday)
Time	:	2:00PM – 4:00PM Reading Time : Nil
Duration	:	2 hours
Special Instructions	:	

This paper consists of **SIX (6)** questions. Answer any **FIVE (5)** questions in the answer booklet provided. All questions carry equal marks.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Formula Booklet 1 & Graph Paper

Examiner(s)	:	**Bark Chee Beng**
Moderator	:	**Dr. Ch'ng Pei Eng**

*This paper consists of **6** printed pages, including the cover page.*

INTI INTERNATIONAL COLLEGE PENANG

FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY (CFPI)
MAT1215 : FUNDAMENTALS OF MATHEMATICS
FINAL EXAMINATION: APRIL 2018 SESSION

Instructions: This paper consists of **SIX (6)** questions. Answer any **FIVE (5)** questions in the answer booklet provided. All questions carry equal marks. Show complete workings.

Question 1

(a) Simplify each expression by removing parenthesis:

(i) $(6x^4 - 3x^2 + 5) - (-2x^4 + x^3 + x^2)$

(2 marks)

(ii) $3x^3y^4z(xyz - \frac{x}{yz})$

(2 marks)

(b) Factorize each expression completely:

(i) $4x^2 - 36$

(3 marks)

(ii) $9x^2 - 12x + 4$

(3 marks)

(c) Rationalize the denominator of $\frac{1+\sqrt{3}}{1-\sqrt{3}}$.

(4 marks)

(d) Simplify $\left(\frac{4u^2v^{-1}}{3u^{-3}v^2}\right)^2$ and express your answer in positive exponents only.

(4 marks)

(e) (i) Convert 7.102×10^{-3} to decimal notation.

(1 mark)

(ii) Write 2,340,000 in scientific notation.

(1 mark)

Question 2

(a) Given points P(-2, 4) and Q(4, -4).

(i) Find the slope of line PQ.

(2 marks)

(ii) Find the equation of the line PQ.

(3 marks)

(iii) Find the equation of the line that goes through point P but perpendicular to line PQ.

(3 marks)

(b) Given $f(x) = x^2 - 5x + 4$.

(i) Find the vertex of $f(x)$.

(2 marks)

(ii) Find the x and y intercepts. Hence, sketch the graph of $f(x)$.

(4 marks)

(iii) Find the area under the graph $f(x)$ from $x = 2$ to $x = 6$, and the x-axis.

(6 marks)

Question 3

(a) A manufacturing company produces and sells chairs. The cost and revenue functions are given by

$C(x) = 240x + 800$ and $R(x) = -x^2 + 300x$

where x is the number of chairs produced and sold in thousand units, and $C(x)$ and $R(x)$ are in thousand Ringgit.

(i) How many chairs must be sold in order for the company to break-even?

(4 marks)

(ii) Find the profit equation.

(1 mark)

(iii) Determine the number of chairs that must be sold in order to achieve maximum profit. Thus, determine the maximum profit.

(4 marks)

(b) Differentiate the following functions with respect to x :

(i) $y = (3x^2 + 4x + 2)^3$

(3 marks)

(ii) $y = \dfrac{1}{x^2+1}$

(2 marks)

(c) Integrate the following functions with respect to x :

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

(2 marks)

(ii) $\int_1^3 \left(x + \dfrac{1}{x}\right)^2 dx$

(4 marks)

Question 4

(a) (i) Find the 12th term of an arithmetic sequence whose 1st term is 2 and whose 5th term is 14.

(3 marks)

(ii) Find the sum of the arithmetic series $16 + 20 + \ldots + 84$.

(4 marks)

(b) A geometric sequence has 4th term 27 and the 7th term 1. Find the sum of the first three terms of this sequence.

(4 marks)

(c) May invested a lump sum money of RM30,000 in an investment plan. At the end of the 5 years period, she received the total amount RM38,000. At what rate per year on average is the investment return (assuming the rate is compounded yearly over the 5 years)? (Leave your answer in one decimal place and in percentage form.)

(5 marks)

(d) June has deposited in a bank fixed deposit that promises an interest rate of 5% per year, and compounded quarterly. How much will she get at the end of 5 years if she plans to save RM25,000 initially? (Round your answer to the nearest Ringgit.)

(4 marks)

Question 5

(a) Suppose $A = \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 \\ -1 & 2 \end{bmatrix}$

Perform the indicated operations below :

(i) $2A - 3B$

(2 marks)

(ii) $A^{-1}B$

(4 marks)

(b) Determine the value of k if $M = \begin{bmatrix} x+1 & x-1 \\ 2 & 3 \end{bmatrix}$ has no inverse.

(3 marks)

(c) Solve the following matrix C.

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} C = \begin{bmatrix} 0 & 2 \\ 1 & 4 \end{bmatrix}$$

(4 marks)

(d) The system of equations below can be written as $Ax = b$.

$3x + y = 5$
$2x + 3y = 8$

(i) List the matrices A, x and b.

(3 marks)

(ii) Find A^{-1}.

(2 marks)

(iii) Solve for x.

(2 marks)

Question 6

(a) Solve the following linear programming problem graphically :

Maximize : $3x + 4y$

Subject to :

$x + y \leq 9$
$y - x \leq 3$
$x \leq 6$
$x \geq 0,\ y \geq 0$

(10 marks)

(b) A student is to choose three subjects from a list of six subjects from Mathematics (M), Physics (P), Chemistry (C), Biology (B), History (H) nd English (E).

(i) How many ways the student can choose the three subjects?

(1 mark)

(ii) If English is a compulsory subject, how many ways the student can choose the subjects?

(2 marks)

(iii) If the student has to choose two subjects from a group of M, P, C & B, and one subject from remaining group of H & E, how many ways the student can choose?

(2 marks)

(c) A total of 30 students in a class were asked if they like to play Badminton (B) or Tennis (T), and the information obtained as follow :

$n(B \cap T) = 10$

$n(B) = 12$

$n(T) = 13$

(i) Find the number of students that like to play ONLY badminton.

(2 marks)

(ii) Find the number of students that play neither badminton nor tennis.

(3 marks)

-- THE END --