INTI
INTERNATIONAL COLLEGE PENANG (507232-U)
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session	:	**APRIL 2013**
Programme	:	**FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY**
Course	:	**MAT 1215 : FUNDAMENTALS OF MATHEMATICS**
Date of Examination	:	31 July 2013
Time	:	11a.m. – 1p.m. 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 Scientific Calculator

Materials provided :

Formula Booklet 1, Graph paper

Examiner(s) : **Chong Mee Teng**

Moderator : **Ng Xi Ciang**

This paper consists of 5 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE PENANG

FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY

MAT 1215: FUNDAMENTALS OF MATHEMATICS
FINAL EXAMINATION: APRIL 2013 SESSION

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

Question 1

(a) Simplify each expression by removing parentheses:

(i) $(4x^3 + 4x^2 + 7) - (-2x^3 - x - 2)$ (2 marks)

(ii) $-5a^2b(3ab^3 - 2ab^4)$ (2 marks)

(b) Factor each expression.

(i) $2x^2 - 32$ (3 marks)

(ii) $x^4 + 4y + 4x^2 + x^2y$ (3 marks)

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

(d) Simplify $\left(\frac{2ab^{-3}}{3a^{-2}b^2}\right)^2$ and express your answer in positive exponents only. (3 marks)

(e) (i) Convert 7.25×10^{-5} to decimal notation. (2 marks)

(ii) Write 10,840,000 in scientific notation. (2 marks)

Question 2

(a) Given the points $P(-5, 4)$ and $Q(8, -6)$.

(i) Find the slope of PQ. (2 marks)

(ii) Find the equation of the line PQ. (3 marks)

(b) Given $f(x) = 4x^2 - 36x$.

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

(2 marks)

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

(5 marks)

(c) The revenue and cost functions for a company that manufactures components for washing machines were determined to be:

$$R(x) = x(200 - 4x) \text{ and } C(x) = 160 + 20x$$

where x is the number of components in millions and $R(x)$ and $C(x)$ are in millions of dollars.

(i) How many components must be sold in order for the company to break even? (Round answers to nearest million.)

(3 marks)

(ii) Find the profit equation.

(2 marks)

(iii) Determine the maximum profit. How many components must be sold in order to achieve that maximum profit?

(3 marks)

Question 3

(a) Differentiate the following with respect to x:

(i) $y = (2x^2 + 3x + 7)^{10}$

(3 marks)

(ii) $y = \frac{1}{x^4+7}$

(3 marks)

(b) Integrate the following with respect to x:

(i) $\int \left(\frac{2x^2+3}{x}\right)^2 dx$

(3 marks)

(ii) $\int_2^4 \left(x^3 - \frac{16}{x^2}\right) dx$

(3 marks)

(c) Find the area enclosed by the curve $y = x^2 + 2$ and the line $y = 5 - 2x$.

(4 marks)

(d) Evaluate the followings:

(i) $\sum_{k=1}^{3} (6k + 3)$

(2 marks)

(ii) $\sum_{k=1}^{3} (3k^2 + 3)$

(2 marks)

Question 4

(a) Bank A offers a 7 year certificate of deposit (CD) that earns 3.75% compounded continuously.

(i) If RM 5,000 is invested in this CD, how much will it be worth in 7 years?
(3 marks)

(ii) How long will it take for the account to be worth RM 10,000?
(3 marks)

(b) Susan invests RM 2500 for 3 years in an account paying 3.5% annual interest compounded monthly. At the end of that time she moves the money to a different account that pays 4% annual interest compounded quarterly, where it stays for an additional 2 years. What is the value of the account at the end of that time?
(4 marks)

(c) Find the possible values of x for the Geometry Progression, G.P.: $5x-1,-3x-5,2x+5,...$
(4 marks)

(d) An Arithmetic Progression, AP is such that the seventh term is 12 and the sum of the first 17 terms is 255. Find:

(i) The first term and the common difference,
(4 marks)

(ii) The sum of the terms from the 14^{th} to the 26^{th} term.
(2 marks)

Question 5

(a) Julia deposits RM 75 at the end of each quarter for 20 years into an account paying 4.8% annual interest compounded quarterly.

(i) How much is in the account at the end of 20 years?
(2 marks)

(ii) How much did Julia actually contribute to the account?
(2 marks)

(iii) How much interest did the account earn in those 20 years?
(2 marks)

(b) Sam makes a deal to pay RM 400 a month for 3 years on a car loan at 7.2% annual interest compounded monthly to pay for a car.

(i) What is the present value of the car?
(2 marks)

(ii) How much will Sam make in payments for the car?
(2 marks)

(iii) How much interest will he pay on the car loan?
(2 marks)

(c) Perform the indicated operations below:

(i) $\begin{bmatrix} 7 & -2 \\ -5 & -4 \end{bmatrix} - \begin{bmatrix} -3 & 5 \\ -3 & 4 \end{bmatrix}$

(2 marks)

(ii) $\begin{bmatrix} 1 & -2 \\ 0 & 4 \\ 5 & -1 \end{bmatrix} \cdot \begin{bmatrix} 3 \\ -5 \end{bmatrix}$

(2 marks)

(d) Find the x_1 and x_2 by using the inverses.

$$\begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 6 \\ 4 \end{bmatrix}$$

(4 marks)

Question 6

(a) Maximize: $z = 2x + 8y$

Subject to: $x + y \leq 9$
$x - y \geq -3$
$x \leq 3$
$x \geq 0, y \geq 0$

(6 marks)

(b) A survey was done on a college campus to determine how many students owned a cell phone. Of the 140 students surveyed, 95 students owned a cell phone, 65 students had a land line, and 25 students had both a cell phone and a land line.

(i) Use a Venn diagram to represent the sets.

(3 marks)

(ii) How many students surveyed had neither a cell phone nor a land line?

(2 marks)

(iii) How many students had a cell phone but not a land line?

(2 marks)

(c) The English alphabet consists of 21 consonants and 5 vowels.

(i) In how many ways can 4 consonants and 2 vowels be selected?

(2 marks)

(ii) How many words consisting of 4 consonants and 2 vowels can be formed?

(2 marks)

(iii) How many of the words in part (ii) begin with ***R***?

(3 marks)

--THE END--

MAT1211(F)/apr13/cmt