



**FINAL**  
Examination Paper  
(COVER PAGE)

Session : April 2016

Programme : Foundation in Business Information Technology (CFPI)

Course : **MAT1215: FUNDAMENTALS OF MATHEMATICS**

Date of Examination : 29 July 2016, Friday

Time : 11.00am – 1.00pm 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.

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

Materials permitted :

Non-programmable scientific calculator

Materials provided :

Formula Booklet 1 & Graph Paper

Examiner(s) : Mr. Chan Ah Wah

Moderator : Ch'ng Pei Eng

This paper consists of 7 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE PENANG  
 FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY (CFPI)  
 MAT1215 : FUNDAMENTALS OF MATHEMATICS  
 FINAL EXAM : APRIL 2016 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) Given that  $A = \{-17, -2, -1.2, 0, \frac{6}{2}, 4.\overline{45}, \sqrt{36}, \frac{19}{3}, \sqrt{47}\}$ , list down the elements of A that belong to the following sets:
- (i) Set of even integer(s)
  - (ii) Set of irrational number(s)
- [2 marks]
- (b) Simplify each of the following expressions:
- (i)  $(3x^2 + 4x - 3) + (2x^2 - 3x - 1) - (x^2 + x + 7)$
  - (ii)  $5\sqrt{24} - 3\sqrt{96} + 9\sqrt{6}$
- [2 marks]  
[2 marks]
- (c) Factorize each of the following expressions:
- (i)  $x^2 + 4y - xy - 4x$
  - (ii)  $8p^2 - 50$
- [2 marks]  
[2 marks]
- (d) Rationalize the denominator of  $\frac{8\sqrt{3}}{1 - 7\sqrt{3}}$ .
- [3 marks]
- (e) Simplify  $\frac{(2x^3y^{11})(z^{-5})^4}{5x^{-12}(xz)^{-2}}$  and express your answer in positive exponents only.
- [3 marks]
- (f) Use scientific notation to simplify  $\frac{(320,000)^2(0.0009)}{12,000^2}$  and write you answer in scientific notation.
- [4 marks]

**Question 2**

(a) Find the domain of the following functions:

(i)  $f(x) = \sqrt{3x - 2}$  [2 marks]

(ii)  $f(x) = \frac{x + 1}{x - 2}$  [2 marks]

(b) Find the equation of the line passing through  $(2, 7)$  and parallel to the line  $y = 4x + 9$ . [3 marks]

(c) Given  $f(x) = -x^2 + 4x - 1$

(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]

(d) The total cost of producing a product is given by  $C(x) = 100x + 2000$  and the selling price for each unit is given by  $u(x) = -0.02x + 400$ . Find

(i) the profit function, [2 marks]

(ii) the marginal profit at  $x = 15$  and interpret your answer, [3 marks]

(iii) the quantity of the product that has to be produced in order to maximize the profit. [2 marks]

**Question 3**

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

(i)  $y = 2x + \frac{8}{x^3}$  [2 marks]

(ii)  $y = (1 - 2x)^2$  [2 marks]

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

(i)  $\int \frac{x^4 + x^3 - 2}{x^3} dx$  [2 marks]

(ii)  $\int_1^3 \frac{4}{(3x + 2)^2} dx$  [3 marks]

(c) Find the area enclosed by the curve  $y = 1 - x^2$  and  $y = x - 1$ . [3 marks]

(d) Find  $T_{30}$  of an arithmetic progression in which  $T_5 = 13$  and  $T_9 = 25$ . [3 marks]

(e) State the number of terms for the geometric progression  $1, 4, \dots, 1024$ .  
[2 marks]

(f) Express  $4.75757575\dots$  as a fraction in its lowest terms.  
[3 marks]

#### Question 4

(a) Kelvin has invested a sum of money 10 years ago in a savings account that has since paid interest at the rate of 6% per year compounded continuously. His investment is now worth RM1822.12. How much did he originally invest?  
[3 marks]

(b) Mr. Amir invested RM5,000 in a savings account four years ago. His investment is now worth RM12,300. Find the rate of interest per year if the money was compounded quarterly.  
[5 marks]

(c) A recreational vehicle costs RM80,000. You pay 10% down payment and amortize the rest with equal monthly payments over a 7 year period. The interest is 9.25% compounded monthly.

(i) What is the loan amount?  
[2 marks]

(ii) What will the monthly payment be?  
[3 marks]

(iii) How much is the total interest paid?  
[2 marks]

(d) USG Annuity & Life offered an annuity that pays 7.25% compounded monthly. If RM1,000 is deposited into this annuity every month, how much is in the account after 15 years? How much is the interest earned?  
[5 marks]

#### Question 5

(a) Evaluate the following:

(i)  $\sum_{j=1}^5 \frac{1}{j}$   
[2 marks]

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

(b) Suppose  $\mathbf{A} = \begin{bmatrix} 1 & -1 \\ -5 & -2 \end{bmatrix}$  and  $\mathbf{B} = \begin{bmatrix} -2 & 6 \\ -1 & 4 \end{bmatrix}$ .

Perform the indicated operations below:

(i)  $\mathbf{A+B}$

[2 marks]

(ii)  $\mathbf{AB}$

[2 marks]

(c) Solve the following:

$$\mathbf{X} \begin{bmatrix} 2 & 1 \\ -1 & -1 \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ 2 & -1 \end{bmatrix}$$

[4 marks]

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

$$2x + 3y - 2z = 6$$

$$x - y + 2z = 3$$

$$4x + 2y + 5z = 1$$

(i) List the matrices  $\mathbf{A}$ ,  $\mathbf{x}$ , and  $\mathbf{b}$ .

[3 marks]

(ii) Evaluate  $|\mathbf{A}|$ .

[3 marks]

(iii) Does  $\mathbf{A}^{-1}$  exist? Explain.

[2 marks]

### Question-6

(a) Solve the following linear programming problem graphically :

Maximize :  $P = 7x + 8y$

Subject to :

$$x + 2y \leq 300$$

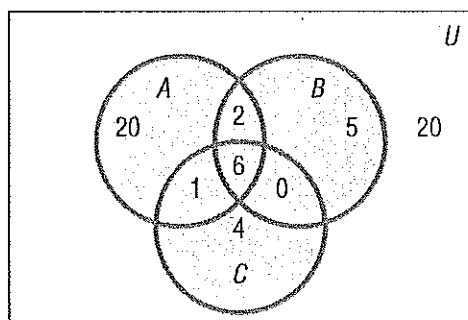
$$3x + 2y \leq 480$$

$$x \geq 0$$

$$y \geq 0$$

[6 marks]

- (b) A group of 9 people consisting of 2 boys, 3 girls, and 4 adults. In how many ways can a team of 4 be chosen if
- both boys are in the team, [2 marks]
  - the adults are either all in the team or all not in the team, [3 marks]
  - at least 2 girls are in the team. [3 marks]
- (c) For the given Venn Diagram, answer the following questions:



- How many are in A? [1 mark]
- How many are in A or B? [1 mark]
- How many are in A and C? [1 mark]
- How many are not in B? [1 mark]
- How many are in neither A nor C? [1 mark]
- How many are in B but not in C? [1 mark]

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