FINAL
Alternative Assessment

(COVER PAGE)

Session	:	**April 2020**
Programme	:	Foundation in Business Information Technology (CFPI)
Course	:	**MAT1215 : Fundamentals of Mathematics**
Date of Examination	:	5 August 2020 (Wednesday)
Time	:	2:00pm – 4:30pm Reading Time : Nil
Duration	:	2 hours 30 minutes
Special Instructions	:	

This paper consists of **FIVE (5)** questions. Answer **ALL FIVE (5)** questions.

All questions carry equal marks.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Formula Booklet 1 & Graph Paper

Examiner(s)	:	**Mr. Bark Chee Beng**
Chief Moderator	:	Mr.Goh Chok Huat

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

FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY (CFPI)
MAT1215 : FUNDAMENTALS OF MATHEMATICS
FINAL ALTERNATIVE ASSESSMENT: APRIL 2020 SESSION

Instructions: This paper consists of **FIVE (5)** questions. Answer **ALL FIVE (5)** questions. All questions carry equal marks. Show complete workings.

Question 1

(a) Simplify each expression:

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

(2 marks)

(ii) $\sqrt{108} - \sqrt{48} + \sqrt{12}$

(3 marks)

(b) Factorize each expression completely:

(i) $3x^2 - 192$

(3 marks)

(ii) $5x^2 + 2x - 3$

(2 marks)

(c) Rationalize the denominator of $\frac{\sqrt{2}+2}{\sqrt{5}+1}$.

(4 marks)

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

(4 marks)

(e) Convert 1.100011 x 10^{-4} to decimal notation.

(1 mark)

(f) Write 200,332,200 in scientific notation.

(1 mark)

Question 2

(a) The monthly revenue and cost functions for a company manufacturing a new model of smartphone were determined to be:

$$R(x) = 800x \text{ and } C(x) = 70x + 300000$$

where *x* represents the number of units sold.

(i) Find the profit function.

(2 marks)

(ii) How many smartphones must be sold monthly in order for the company to breakeven? Round your answer to the nearest integer.

(3 marks)

(iii) What is the profit if 5,000 smartphones are sold in a particular month?

(1 mark)

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

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

(2 marks)

(ii) $y = \frac{3}{3x-2}$

(3 marks)

(c) Determine the following:

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

(1 mark)

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

(5 marks)

(d) Find the equation of the line passing through the point (3, 4) and parallel to the line $2x + 3y = 6$.

(3 marks)

Question 3

(a) Solve the following linear programming problem graphically:

Maximize: $2x + 5y$

Subject to: $6x + 11y \leq 66$
$10x + 5y \leq 60$
$x \geq 0,\ y \geq 0$

(8 marks)

(b) Given $f(x) = x^2 + 4x - 21$.

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

(2 marks)

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

(5 marks)

(iii) Find the area enclosed by the graph $f(x)$, the x-axis and the lines $x = 2$ and $x = 5$.

(5 marks)

Question 4

(a) Given the first four terms of a geometric sequence: -2, 6, -18, 54,…

(i) Find the 13^{th} term of the sequence.

(2 marks)

(ii) Find the sum of the first 12 terms of the sequence.

(3 marks)

(b) An arithmetic sequence has the 5^{th} term 22 and the 15^{th} term 62. Find the 63^{th} term.

(5 marks)

(c) If a single sum of RM5,000 is invested at 8% per annum compounded quarterly, what is the total amount of the investment at the end of 6th year?

(4 marks)

(d) A team of student representatives consists of 8 students is to be formed. The team will be chosen from a group of 7 boys and 6 girls. Find the number of teams that can be formed such that each team consists of

(i) 5 girls,

(2 marks)

(ii) more boys than girls.

(4 marks)

Question 5

(a) Given the matrices $= \begin{bmatrix} 3 & 4 \\ 1 & -2 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 2 \\ -1 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 4 & x+1 \\ 3 & 2x-1 \end{bmatrix}$. Find

(i) A - $2B$,

(2 marks)

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

(4 marks)

(iii) value of x if $C = \begin{bmatrix} 4x & x+1 \\ 2 & 2x-1 \end{bmatrix}$ has no inverse.

(4 marks)

(b) Solve the following system of equations by the inverse of the coefficient matrix.

$$\begin{aligned} 5x + 2y &= -1 \\ 2x + 7y &= 12 \end{aligned}$$

(5 marks)

(c) A total of 120 office workers of a company were asked whether they own IOS operating system (I) tablet and/or Android operating system (A) tablet, and the information obtained is given below:

$$n(I \cap A) = 12,\ n(I) = 40,\ n(A) = 34$$

(i) Represent the information in a Venn Diagram.

(3 marks)

(ii) Find the number of office workers that has IOS operating system tablets but not Android operating system tablets.

(1 mark)

(iii) Find the number of office workers that has neither IOS operating system tablets nor Android operating system tablets.

(1 mark)

-- THE END –

MAT1215(F)/Apr2020