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FINAL
Examination Paper

(COVER PAGE)

Session	:	JANUARY 2018
Programme	:	FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY **(CFPI)**
Course	:	**MAT1215 : FUNDAMENTALS OF MATHEMATICS**
Date of Examination	:	5 March 2018, Monday
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

Materials permitted :

Non-Programmable Scientific Calculator

Materials provided :

Formulae Booklet 1 & Graph Paper

Examiner(s) : **Mr. CHAN Ah Wah**

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 EXAM : JANUARY 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) Given that $\mathbf{A} = \left\{\sqrt{36}, -1.2, \frac{19}{3}, 0, \sqrt{11}, \frac{6}{2}, 1.23, -17, \pi\right\}$, 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) $\dfrac{\frac{x}{y} - \frac{y}{x}}{\frac{1}{y} + \frac{1}{x}}$

[2 marks]

(ii) $\dfrac{(x+h)^2 - x^2}{h}$

[2 marks]

(c) Factorize each of the following expressions:

(i) $x^2 + 4y - xy - 4x$

[2 marks]

(ii) $8x^2 - 50$

[2 marks]

(d) Rationalize the denominator of $\dfrac{\sqrt{3}}{1 - 2\sqrt{3}}$.

[3 marks]

(e) Simplify $\dfrac{(2x^3y^{11})(z^{-5})^4}{5x^{-12}(xz)^{-2}}$ and express your answer in positive exponents only.

[3 marks]

(f) Use scientific notation to simplify $\dfrac{(320,000)^2(0.0009)}{12,000^2}$ and write you answer in scientific notation.

[4 marks]

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Question 2

(a) Find the domain of the following functions:

(i) $f(x) = \sqrt{3x+2}$

[2 marks]

(ii) $f(x) = \dfrac{x+1}{x-5}$

[2 marks]

(b) Find the equation of the line passing through $(1, -1)$ and parallel to the line $y = 5x - 2$.

[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 interprete 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) $y = x - \dfrac{2}{x^3}$

[2 marks]

(ii) $y = (1+3x)^2$

[2 marks]

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

(i) $\displaystyle\int \frac{x^4 + 2x^3 - 1}{x^2}\,dx$

[2 marks]

(ii) $\displaystyle\int_1^3 \frac{2}{(3x+1)^2}\,dx$

[3 marks]

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

[3 marks]

(d) Find the 30^{th} term of an arithmetic progression in which the fifth term is 13 and the ninth term is 25.

[3 marks]

(e) State the number of terms for the geometric progression $1, 4, 8, \ldots, 1024$.

[2 marks]

(f) Express $4.75757575\ldots$ as a fraction in its lowest terms.

[3 marks]

Question 4

(a) Melvin has invested a sum of money 10 years ago in a savings account that has since paid interest at the rate of 5% per year compounded continuously. His investment is now worth RM2060.90. How much did he originally invest?

[3 marks]

(b) Ahmad 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 car 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) Universal 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) $\sum_{j=1}^{4} \frac{1}{j+1}$

[2 marks]

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

[2 marks]

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(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) **A+B**

[2 marks]

(ii) **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 $\mathbf{Ax} = \mathbf{b}$.

$$\begin{aligned} 2x + 3y - 2z &= 6 \\ x - \ y + 2z &= 3 \\ 4x + 2y + 5z &= 1 \end{aligned}$$

(i) List the matrices **A**, **x**, and **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

(i) both boys are in the team?

[2 marks]

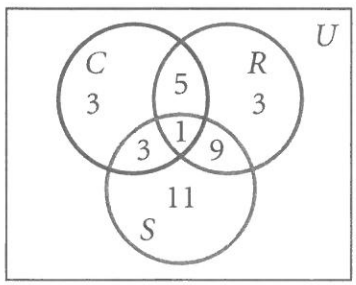
(ii) the adults are either all in the team or all not in the team?

[3 marks]

(iii) at least 2 girls are in the team?

[3 marks]

(c) Given below is the Venn Diagram with 3 interlocking circles labeled as R, C, and S. Answer the following questions:



(i) How many are in R?

[1 mark]

(ii) How many are in R or C?

[1 mark]

(iii) How many are in R and S?

[1 mark]

(iv) How many are not in C?

[1 mark]

(v) How many are in neither R nor S?

[1 mark]

(vi) How many are in C but not in S?

[1 mark]

End of Paper

<mat1215(F)/jan2018/chanaw>