INTI International University & Colleges

FINAL

Examination Paper

(COVER PAGE)

Session	:	**AUGUST 2019**
Programme	:	Diploma in Business (DIB)
Course	:	**MAT1106: Business Mathematics**
Date of Examination	:	December 12, 2019 (Thursday)
Time	:	8:00am – 10:00am 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.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Formula sheet, Graph paper

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Moderator : Dr Ch'ng Pei Eng

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

DIPLOMA IN BUSINESS PROGRAMME (DIB)
MAT1106 BUSINESS MATHEMATICS
FINAL EXAMINATION: AUGUST 2019 SESSION

Instructions: This paper consists of **SIX (6)** structured-type questions. Answer **FIVE (5)** out of SIX structured-type the questions in the answer booklet provided. All questions carry equal marks of 20 marks.

Question 1

(a) Simplify the following:

(i) $-2\left(\sqrt{75}-\sqrt{147}\right)$ (3 marks)

(ii) $\left(\dfrac{5m^{-2}n^{3}}{10n^{-1}m^{2}}\right)^{-1}$ (4 marks)

(iii) $\left(x^{3}+x^{2}+1\right)\left(x^{2}-1\right)-4x\left(x^{2}-x+2\right)-3x^{2}+2x$ (3 marks)

(b) Factorize the expression completely: $5-40x^{3}$. (3 marks)

(c) Solve the quadratic equation by using formula: $5x\left(5x-8\right)=-7$. (5 marks)

(d) Solve $3-2x\left(3-2x\right)+x\left(4x+1\right)=8x^{2}-7$. (2 marks)

(Total: 20 marks)

Question 2

(a) Given that $f(x)=2x-2$ and $g(x)=x^2-1$. Find

(i) $2g(3)-f\left(\frac{2}{3}\right)$.

(3 marks)

(ii) Solve for x if $\left[f(x)\right]^2=4g(x)$

(4 marks)

(b) Find the equation of the line that passes through the point (-2, 5) and (2, -15).

(5 marks)

(c) Given $f(x)=x^2-4x-5$, draw the graph of $f(x)$ by indicating the vertex point, y – intercept and x – intercept clearly.

(8 marks)

(Total: 20 marks)

Question 3

(a) Differentiate $y=-\left(2x^2+5x-1\right)^{-1}$ with respect to x:

(3 marks)

(b) A manufacturer sells x units of headphones per year at a price of RMp per unit, where x is in millions. The demand function for the smartphone is $p(x)=1500-5x$. The total cost function, in RM, of manufacturing x units of headphone is given by, $C(x)=5000+350x$.

(i) Write down the profit function. (3 marks)

(ii) Determine the output level to maximize the profit and find the maximum profit.

(5 marks)

(iii) Find the price per unit for the smartphone.

(2 marks)

(c) Find $\int_{-1}^{0}\left(x^2-2x\right)(3x+1)\,dx$.

(5 marks)

(d) Integrate $\int\left(\frac{3x^2}{2}-x+1\right)dx$.

(2 marks)

(Total: 20 marks)

Question 4

(a) If RM5,000 is invested at a simple interest rate of 0.5% per annum, what is the simple amount after 5 years?

(2 marks)

(b) Find the future value of RM 200,000 which was invested for 60 months at 4.5% interest rate, compounded annually. Find the interest earned.

(4 marks)

(c) Lisa wants to further study and the study fees is about RM 55,000.

(i) She applies for personal loan from a bank with 3.65% interest compounded monthly for 10 years. What is her monthly installment? (3 marks)

(ii) What is the total charged amount for the interest from bank? (2 marks)

With the monthly installment, Lisa realizes that she cannot afford to pay the monthly installment. She can only afford to pay RM 300 per month.

(iii) What is the amount of loan that Lisa can apply with RM 300 monthly installment?

(3 marks)

(d) After attending a financial workshop, Sophia realizes that she needs money for her newborn daughter's college fund. She plans to deposit every 3 months, RM 500 into an account with 3.45% interest compounded quarterly. What is the amount for her daughter's college fund when her daughter is 18 years old?

(3 marks)

(e) Find the amount that must be deposited monthly at 5.1% compounded monthly for 5 years to accumulate an amount of RM 95,000.

(3 marks)

(Total: 20 marks)

Question 5

(a) Given matrix $A=\begin{bmatrix} 2 & -1 \\ 1 & -3 \end{bmatrix}$ and $B=\begin{bmatrix} 2 & 0 & -1 \\ -1 & 2 & 2 \end{bmatrix}$. Find:

(i) $\left(A^T\right)^{-1}$

(4 marks)

(ii) $B^T A$

(3 marks)

(b) Solve the system of equations by using any matrices method:

$$2x-3y=3$$
$$5x=3y+12$$

(5 marks)

(c) The table below shows the sales of smartphones in a company for the past 5 months.

Months	**Sales (RM '000)**
January	120
February	90
March	100
April	75
May	110

Obtain a trend value for this data using exponential smoothing where the smoothing constant is α=0.3. Hence, find the forecast for the month June.

(8 marks)

(Total: 20 marks)

Question 6

(a) If $P=8x+7y$, find the maximum value of P subject to the given constraints:

$$x+4y\geq 40$$
$$2x+y\geq 20$$
$$0\leq x\leq 20$$
$$0\leq y\leq 20$$

(8 marks)

(b) Given the first three terms in a geometric sequence: 2, -4, 8, ...

(i) Find the 10^{th} term of the sequence.

(2 marks)

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

(3 marks)

(c) Find the coordinates of the turning point of the given curves and determine their nature.

$$f(x) = x^3 - 2x^2 + 10$$

(7 marks)

(Total: 20 marks)

~The End~

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