INTI International University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session	:	August 2016
Programme	:	Diploma in Business (DIB)
Course	:	**MAT1106: Business Mathematics**
Date of Examination	:	06 December, 2016 (Tuesday)
Time	:	2:00pm – 4:00pm Reading Time : Nil
Duration	:	2 Hours

Special Instructions :

Answer any **FIVE (5)** structured-type questions.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Formula sheet, Graph paper

Examiner(s)	:	**Dinesh Kumar Govindasamy,** Fang Yen Yen, Billy Siew, Angeline Tan, Cetha Achutan Nair, Foo Kai Pin and Si Chong En
Moderator	:	Dr Ch'ng Pei Eng

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

DIPLOMA IN BUSINES PROGRAMME (DIB)
MAT1106: BUSINESS MATHEMATICS
FINAL EXAMINATION: AUGUST 2016 SESSION

Instruction: 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 the following: $3\sqrt{8} + 2\sqrt{32}$ (4 marks)

(b) Perform: $(x + 1)(x^3 + 4x^2 + 4x)$ (2 marks)

(c) Factorize the following:

(i) $x^2 - 9$ (2 marks)

(ii) $x^3 + 27$ (2 marks)

(d) Solve the equation by using *formula*: $9x^2 - 6x - 11 = 0$ (5 marks)

(e) Solve the equation: $\frac{1}{6x^2} + \frac{1}{6x} = \frac{1}{x^2}$ (3 marks)

(f) Solve the inequality: $3 - 2x < 7$ (2 marks)

Question 2

(a) Given $f(x) = 3x$ and $g(x) = x^2 + x$. Find the following:

(i) $f(x) + g(x)$ (2 marks)

(ii) $\frac{f(-1)-g(2)}{f(3)}$ (2 marks)

(iii) Solve for x if : $g(x) = f(2)$ (4 marks)

(b) Find the equation of the line that passes through the point $(-2, -3)$ and $(1, 9)$. (4 marks)

(c) Given $f(x) = x^2 - 4x - 12$, sketch the graph of $f(x)$ and indicate the vertex, y-intercept and x-intercept clearly. (6 marks)

(d) Simplify: $(3x^2)^3$ (2 marks)

Question 3

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

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

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

(i) Find the profit function. (3 marks)

(ii) Determine the production level that earns the company *maximum* profit. (3 marks)

(iii) Find the price for each washing machine component at the production level that earns the company *maximum* profit. (3 marks)

(iv) Find the company's *maximum* profit. (2 marks)

(v) Find the break-even quantity. (4 marks)

(b) Given the first four terms of an arithmetic progression is $2, 8, 14, 20 \ldots$ Find the sum of the first 50 terms. (3 marks)

(c) Given the first four terms of a geometric progression is $2, 6, 18, 54 \ldots$ Find the sum of the first 6 terms. (2 marks)

Question 4

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

(i) Find $2A + 3B$ (3 marks)

(ii) Find the matrix X if: $\frac{X}{2} = AB$ (4 marks)

(b) Solve the following system of equations by using *any matrices method.*

$$8x + 5y = 2$$

$$2x - 4y = -10$$

(4 marks)

(c) Differentiate the following with respect to x :

(i) $f(x) = (3x^2 + 2x)^4$ (2 marks)

(ii) $f(x) = (2x + 1)(x - 2)$ (2 marks)

(d) Evaluate the integral $\int_{-1}^{1} (3x^3 + x^2 + 2x - 1)dx$. (5 marks)

Question 5

(a) Solve the system of inequalities graphically and find the *maximum* value of $p = x + 3y$.

$$x + y \geq 9$$
$$x - y \geq -3$$
$$x \leq 4$$
$$x \geq 0, y \geq 0$$

(7 marks)

(b) RM 80,000 is invested for 10 years in a bank earning a simple interest rate of 4.25% per annum. Find the simple amount at the end of the investment.

(3 marks)

(c) Surfside Hardware has been in business for a few years and is doing well. The owner has decided to save for a future expansion to a second location. He invests \$1,000 at the end of every month at 12% interest compounded monthly. How much will be available for the second store after 5 years? Find the interest earned. (5 marks)

(d) Find the amount to be invested every 3 months once at 9% compounded quarterly to accumulate RM 50,000 in three years. Find the interest earned. (5 marks)

Question 6

(a) PPT Co. has recorded the number of orders in (*thousands of units*) each month:

Month	Orders in (*thousands of units*)
1	125
2	126
3	128
4	127
5	130
6	131
7	132

(i) Use a three-month moving average ($k = 3$) of the company orders to forecast for the month 6 and thus find the forecast error for the month 6.

(3 marks)

(ii) Use a five-month moving average ($k = 5$) for the company orders to forecast for the month 8. (2 marks)

(b) Simplify the following expressions:

(i) $\dfrac{x^2 - 5x - 14}{x^2 - 49}$ (2 marks)

(ii) $\dfrac{1}{x-1} - \dfrac{1}{x} + \dfrac{2}{x-1}$ (3 marks)

(c) Find the *relative maximum* and *relative minimum* of the function

$$f(x) = x^3 - 4x^2 - 3x + 7$$

(7 marks)

(d) Find the ***inverse*** of the matrix $\begin{bmatrix} 3 & 1 \\ 2 & 2 \end{bmatrix}$. (3 marks)

~ The End ~

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