



**FINAL**  
Examination Paper  
(COVER PAGE)

Session : January 2014

Programme : Diploma In Business (DIB)

Course : MAT1103 : Fundamentals Of Mathematics

Date of Examination : March 10, 2014

Time : 8:00am – 10:00am Reading Time: \_\_\_\_\_

Duration : 2 Hours

Special Instructions :

Answer any **FOUR (4)** structured-type questions.

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Materials permitted : Non-Programmable Calculator

Materials provided : Nil

Examiner (s) : Mr. Dinesh Kumar, Billy Siew Woo Bing, Fang Yen Yen, Cetha Achutan .

Moderator : Dr. Ch'ng Pei Eng

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

## INTI INTERNATIONAL COLLEGE SUBANG

DIPLOMA IN BUSINESS PROGRAMME (DIB)  
 MAT1103: FUNDAMENTALS OF MATHEMATICS  
 FINAL EXAMINATION: JANUARY 2014 SESSION

**Instruction :** Answer any **FOUR (4)** out of **SIX (6)** structured-type questions.

**Question 1**

(a) Simplify the following expression.

(i)  $(x^2 - x - 2) \cdot \frac{x^2 + 3x + 2}{x^2 - 4}$  (4 marks)

(ii)  $\frac{2x}{x^2 - 4} - \frac{1}{x^2 - 3x + 2} + \frac{x + 1}{x^2 + x - 2}$  (5 marks)

(b) Perform the division by using *synthetic division* method, write the answer in the form of *Quotient +  $\frac{\text{remainder}}{\text{divisor}}$*  Form.

$$\frac{5x^2 + 6x^3 + 4}{1 + x}$$

(4 marks)

(c) Simplify each of the expression:

(i)  $\left(\frac{2a^0b}{ab^{-3}}\right)^2$  (2 marks)

(ii)  $\left(\frac{a^4b}{3a^{-3}b^2}\right)^{-3}$  (3 marks)

(d) Factorise completely:  $x^4 - x^4y^4$  (4 marks)

(e) Simplify  $\sqrt[3]{24x^5} + \sqrt[3]{81x^5}$  (3 marks)

**Question 2**

- (a) Show that the points  $(-5, 1)$ ,  $(2, 0)$  and  $(-2, -3)$  are the vertices of a right triangle. (5 marks)
- (b) Find the equation of the line with  $x$ -intercept 4 that is perpendicular to  $x - 3y = 12$ . (5 marks)
- (c) Determine the length and midpoint of the line segment between  $P(6, -3)$  and  $Q(-3, 2)$ . (4 marks)
- (d) A sales representative earns a monthly salary plus commission on sales. Her pay this month will be RM 2000 on sales of RM 10000. Last month, her pay was RM 2720 on sales of RM 16000.
- (i) Find the equation that gives her monthly pay in terms of her sales level. (6 marks)
- (ii) Calculate her monthly pay if she does a sales of RM 22000 in a month. (2 marks)
- (e) Solve for  $x$ :  

$$-3(x - 5) = 2(6 - 7x)$$
 (3 marks)

**Question 3**

- (a) Simplify:  $\sqrt{\frac{1}{2}} + \sqrt{\frac{1}{8}}$  (4 marks)
- (b) Solve the following equations for  $x$ .
- (i)  $\frac{1}{x+1} + \frac{5}{2x-4} = 1$  (5 marks)
- (ii)  $x^2 + 7x + 1 = 0$  (5 marks)
- (c) Solve for  $x$ :  $\sqrt{2x+3} - \sqrt{x+1} = \sqrt{x-2}$  (7 marks)
- (d) The length of a rectangle exceeds its width by 3 feet. If its area is to be 40 square feet, find its dimensions. (4 marks)

## Question 4

(a) By using the Factor Theorem, show that  $(x - 2)$  is a factor of  $f(x) = 3x^3 - 5x^2 + 3x - 10$  (3 marks)

(b) Solve the inequality.

$$\left| \frac{3}{5}x - \frac{4}{2} \right| - 2 \geq 2$$

(5 marks)

(c) Given  $f(x) = \frac{1}{x+1}$  and  $g(x) = \frac{2x-1}{x+3}$ , find

(i)  $f - g(x)$  (3 marks)

(ii)  $f \circ g(x)$  (3 marks)

(iii) The value of  $x$ , if  $f \circ g(x) = \frac{1}{2}$  (3 marks)

(d) Solve the system of inequalities graphically.

$$\begin{cases} 2x + y \geq 1 \\ -x + 2y \leq 4 \\ 5x + 3y > -15 \end{cases}$$

(5 marks)

(e) If one painter can paint a house in 6 days and another painter can paint the same house in 3 days, how long will it take them to paint the house if they work together? (3 marks)

## Question 5

(a) Graph the quadratic function  $f(x) = x^2 - 10x + 25$ , by showing the vertex, x-intercepts and y-intercepts clearly. (6 marks)

(b) Solve the system of equations and calculate  $x + y + z$ .

$$\begin{aligned} x + y + z &= 1 \\ 2x - y + z &= 3 \\ -x + y - 3z &= -7 \end{aligned}$$

(6 marks)

(c) Solve the following equations and give your answers to four significant figures if necessary.

(i)  $\log_6 8 - \log_6 x = \log_6(x - 2)$  (5 marks)

(ii)  $15^{3x-2} = 10$  (4 marks)

(iii)  $2^{x^2+2x} = \frac{1}{2}$  (4 marks)

### Question 6

(a) The first three terms of an arithmetic sequence are  $x$ ,  $2x + 5$ ,  $5x + 2$ , find

(i) the value of  $x$ . (2 marks)

(ii) the sum of the first 40 terms in this sequence. (4 marks)

(b) The common ratio of a geometric sequence is 3 and the fourth term is 54. Find the sum of the first 5 terms of this sequence. (5 marks)

(c) Find the inverse function for  $f(x) = \frac{2x-3}{6x+1}$  (4 marks)

(d) Expand  $(2x - 3y)^4$ , in descending powers of  $x$  (6 marks)

(e) Find the third term in the expansion of  $\left(\frac{x}{2} + y\right)^5$  in descending powers of  $x$ . (4 marks)

**-THE END-**

MAT1103(F)/JANUARY 2014/DINESH