



FINAL  
Examination Paper

(COVER PAGE)

Session : August 2012

Programme : Diploma In Business (DIB)  
Diploma In Information And Communication Technology (DICTN)

Course : MAT1103 : Fundamentals Of Mathematics

Date of Examination : December 12, 2012

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

Duration : 2 Hours

Special Instructions :

Answer any FOUR (4) structured-type questions.

Materials permitted : \_\_\_\_\_  
Nil

Materials provided : \_\_\_\_\_  
Nil

Examiner (s) : Mr. Clement Chang Soon Seng, Kumatha Thinakaran, Dinesh Kumar, Aung Min.

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)  
 DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY PROGRAMME  
 MAT 1103: FUNDAMENTALS OF MATHEMATICS  
 FINAL EXAMINATION: AUGUST 2012 SESSION

**Instructions:** This questions paper consists of SIX (6) questions. Answer any FOUR (4) questions in the answer booklet provided. Each question carries a total of 25 marks.

**Question 1**

- (a) Simplify the following expression. Leave your answer without negative exponents.

$$\frac{(3x^2y^{-3})^2}{(6xy^{-2})} \quad (3 \text{ marks})$$

- (b) Solve the following equation for x.

$$\left| \frac{3x-4}{2} \right| + 5 = 15 \quad (5 \text{ marks})$$

- (c) Factorise completely each of the following polynomials.

(i)  $2x^2 - 18$  (3 marks)

(ii)  $3x^2 + 5x - 8$  (3 marks)

- (d) Rationalize the denominator of the following expressions.

(i)  $\frac{\sqrt{2} - \sqrt{3}}{1 - \sqrt{3}}$  (3 marks)

(ii)  $\frac{5}{\sqrt{x} + 2}$  (4 marks)

(e) Simplify:  $\frac{x^2-1}{x} \div \frac{x^2+2x+1}{x^2}$  (4 marks)

**Question 2**

(a) Solve the following equations:

(i)  $\frac{3}{5} + \frac{7}{x+2} = 2$  (3 marks)

(ii)  $\sqrt{y+2} = 4 - y$  (3 marks)

(b) Determine the length and midpoint of the line segment between the end points  $(-2, -3)$  and  $(-4, -6)$ . (4 marks)

(c) Solve the following inequalities.

(i)  $4x - 5 > 2x + 1$  (2 marks)

(ii)  $\frac{3x-7}{5} < 2(x-1)$  (4 marks)

(iii)  $4|x+2| - 3 \leq 9$  (4 marks)

(d) Find the equation of the line that passes through the point  $(-1, -2)$  and is parallel to the line  $y = -4x + 3$ . (5 marks)**Question 3**(a) Graph the quadratic function  $f(x) = x^2 - 6x + 8$  by showing its vertex, x and y intercepts clearly. (8 marks)(b) Let  $f(x) = 2x^2 - 1$  and  $g(x) = \frac{1}{2}x - 1$ , find

(i)  $(f + g)(-3)$  (2 marks)

(ii)  $(f \cdot g)(2)$  (2 marks)

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

(c) Solve the following equations. Give the answer up to four significant figures if necessary.

(i)  $4^{2x+1} = 5^{1-3x}$  (3 marks)

(ii)  $\log x + \log(x - 3) = \log 18$  (4 marks)

(iii)  $e^{1+3x} = 39$  (3 marks)

#### Question 4

(a) By using the Factor Theorem, show that  $(x - 2)$  is a factor of  $f(x) = x^3 + x^2 - 12$ . (3 marks)

(b) Solve the simultaneous equations.

$$x - y + z = 0$$

$$x + y + 2z = -1$$

$$-x - y + z = 0$$

(6 marks)

(c) Use synthetic division to divide  $f(x) = 5x^3 - 8x^2 + 3$  by  $(x - 2)$ . (6 marks)

(d) Sketch the graphical solution of the following system of inequalities:

$$3x - 2y \geq 5$$

$$2x + y \geq 8$$

$$x \leq 5$$

(7 marks)

(e) Find the equation of a straight line which is joining the points (2,3) and (4,7). (3 marks)

#### Question 5

(a) Expand  $(2x + 5y)^3$  in descending powers of  $x$ . (6 marks)

(b) Given that 2, 8 and 32 are the first three consecutive terms of a geometric sequence, find the sum of the first eight terms in this sequence. (5 marks)

(c) If 5, 8 and 11 are the first three consecutive terms of an arithmetic sequence, determine the sum of the first 40 terms in this sequence. (5 marks)

(d) Find the third term of the expansion of  $(2x - y)^5$  in descending powers of  $x$ . (4 marks)

(e) Evaluate:  
 $\sum_{x=2}^7 (3x + 1)^2 - 3 \sum_{x=2}^7 x(3x + 2)$  (5 marks)

**Question 6**

- (a) State the domain and range of the function defined by  $y = \sqrt{3x - 2}$ . (5 marks)
- (b) Find the inverse of  $f(x) = \frac{3x + 2}{x - 3}$ . (5 marks)
- (c) The sum of two numbers is 7 and the sum of the square of the two numbers is 29. Find the possible values of the two numbers. (5 marks)
- (d) Perform the long division on the expression below (5 marks)
- $$(4x^3 + 10x^2 + 8x + 20) \div (2x + 4)$$
- (e) Given a polynomial  $P(x) = 2x^4 - 10x^3 + 17x^2 - 14x - 3$ .
- (i) Is  $x - 3$  a factor of  $P(x)$ ? (2 marks)
- (ii) Find the remainder if  $P(x)$  is divided by  $x + 3$  by using the Remainder Theorem. (3 marks)

**-The End -**