



FINAL
Examination Paper

(COVER PAGE)

Session : April 2013

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

Course : **MAT1103 : Fundamentals Of Mathematics**

Date of Examination : July 29, 2013

Time : 8:00am – 10:00am Reading Time: _____

Duration : 2 Hours

Special Instructions :

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

Materials permitted :
Non-Programmable Calculator

Materials provided :
Nil

Examiner (s) : Mr. Aung Min, Caroline Sion, Dinesh Kumar, Saemila Devi,
Tan Seng Kuan, Chan Ah Wah.

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 (DICTN)

MAT 1103: FUNDAMENTALS OF MATHEMATICS

FINAL EXAMINATION: APRIL 2013 SESSION

Instructions: This question paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Simplify the following expressions. Leave your answer without using negative exponents.

(i)
$$\frac{4(x^2y^{-1}z^3)^2}{(3x^{-4}y)^4} \quad (3 \text{ marks})$$

(ii)
$$\left(\frac{x^6y^{-2}z^3}{y^3z^{-8}}\right)^5 \quad (3 \text{ marks})$$

(b) Factorize completely.

(i) $9a^2 - 30a + 25 \quad (2 \text{ marks})$

(ii) $x^4 - 81 \quad (3 \text{ marks})$

(c) Simplify: $\frac{4}{x} \div \left(\frac{3x^2y}{x^2} \cdot \frac{6x^2}{x^5}\right) \quad (3 \text{ marks})$

(d) Rationalize the denominator of the following expressions.

(i)
$$\frac{7-3\sqrt{5}}{7+3\sqrt{5}} \quad (4 \text{ marks})$$

(ii)
$$\frac{\sqrt{2x+4}}{\sqrt{2x}} \quad (3 \text{ marks})$$

(e) Find three numbers such that the second number is 3 more than twice the first number, and the third number is four times the first number. The sum of the three numbers is 178.

(4 marks)

Question 2

(a) Solve the following inequalities.

(i) $-5x + 3 \leq -2$ (3marks)

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

(iii) $\left| \frac{2x+3}{3} - \frac{1}{2} \right| < 1$ (5 marks)

(b) Solve the following equations for x.

(i) $x - \sqrt{5x - 6} = 0$ (4 marks)

(ii) $|2x + 3| = 7$ (4 marks)

(iii) $x + 4 = \sqrt{\frac{6x+6}{5}} + 3$ (4 marks)

Question 3(a) Divide $(2x^3 - x^2 + 3)$ by $(x - 3)$ using long division method. (5 marks)(b) Sketch the graph of the function $y = \frac{1}{2}(x - 3)^2 + 1$ by using the graph of $y = x^2$ and a combination of translation and stretching/shrinking. (8 marks)(c) Let $f(x) = x - 1$ and $g(x) = 2x^2$.

Find:

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

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

(iii) $\left(\frac{f}{g}\right)(x)$ (2 marks)

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

(v) $g^{-1}(x)$ (3 marks)

Question 4

(a) Solve the following equations. Give the answer up to 4 significant figures where necessary.

(i) $e^{3x-1} = 4$ (3 marks)

(ii) $(8^x)^x = 4^{x+1} \cdot 8^x$ (5 marks)

(iii) $2\log_{10}(x+2) + \log_{10} 4 = \log_{10} x + 4\log_{10} 3$ (5 marks)

(b) Given that $\log_x 3 = p$ and $\log_x 5 = q$, express $\log_x \left(\frac{5x^2}{27}\right)$ in terms of p and q . (5 marks)

(c) Sketch the graphical solution of the system of inequalities:

$$x + y \leq 5$$

$$x - 3y \leq -3$$

$$x \geq 0.$$

(7 marks)

Question 5

(a) Find the fifth term of the expansion of $(2x - 1)^8$ in descending powers of x . (4 marks)

(b) Expand $\left(2 + \frac{x}{3}\right)^4$ in descending powers of x . (6 marks)

(c) Find the number of terms in the following arithmetic sequence.

$$-3, -8, -13, \dots, -163$$
 (3 marks)

(d) The twelfth and eighteenth terms of an arithmetic sequence are 50 and 74 respectively. Find:

(i) The first term and the common difference (4 marks)

(ii) The sum of first 50th terms. (4 marks)

- (e) The third and the sixth terms of a geometric sequence are 108 and -32 respectively. Find the first term and the common ratio. (4 marks)

Question 6

- (a) Find the slope and the y-intercept of the line determined by the equation $\frac{3x}{-2} = \frac{3y-2}{-3}$ (4 marks)
- (b) If M (5, -4) is the midpoint of line AB and if the coordinates of B are (-2,5), find
- (i) The coordinates of A (3 marks)
- (ii) The slope of the line AB (3 marks)
- (c) The sum of three consecutive even integers is 270. What are the integers? (4 marks)
- (d) Determine whether $4x - 5y = 20$ and $5x - 4y = 40$ are parallel, perpendicular or neither. (5 marks)
- (e) Solve the simultaneous equations.

$$x + 2y + z = 8$$

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

$$x + y - 2z = -3 \quad (6 \text{ marks})$$

-The End -

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