INTI
International College Subang
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session	:	**April 2014**
Programme	:	Diploma In Information And Communication Technology (DICTN)
Course	:	**MAT1103 : Fundamentals Of Mathematics**
Date of Examination	:	July 22, 2014
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,** Kumathan A/P Thinakaran.

Moderator : Dr. Ng Set Foong

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

INTI INTERNATIONAL COLLEGE SUBANG

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY PROGRAMME (DICTN)
MAT 1103: FUNDAMENTALS OF MATHEMATICS
FINAL EXAMINATION: APRIL 2014 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) $\left(\frac{9x^5y^{-3}}{3x^{-5}y^3}\right)^{-2}$ (3 marks)

(ii) $\frac{3x^3y^{-5}}{(3x^2y^{-3})^2}$ (3 marks)

(b) Factorize completely each of the following polynomials.

(i) $2x^2 - 3x - 5$ (3 marks)

(ii) $5x^2 - 20$ (3 marks)

(c) Simplify the expressions completely. Assume that all variables represent positive variables.

(i) $\frac{4}{x} \times \frac{6x^2}{x^5} \div \frac{3x^2y}{x^2}$ (3 marks)

(ii) $\frac{2x^2+32}{8} \times \frac{2}{x^2+16}$ (4 marks)

(d) Rationalize the denominator of the following expressions.

(i) $\frac{4}{\sqrt{3}+2}$ (3 marks)

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

Question 2

(a) Solve the following equations for x.

(i) $\sqrt{\frac{8x+43}{3}} - 1 = x$ (5 marks)

(ii) $\frac{1}{2}\left|2x - \frac{1}{3}\right| - \frac{1}{4} = 1$ (4 marks)

(b) Solve the following inequalities.

(i) $7 \leq 4x - 1 < 15$ (3 marks)

(ii) $\left|\frac{2x-4}{5}\right| > 6$ (4 marks)

(iii) $-4 + |2(x-2) + 3| \leq 3$ (5 marks)

(c) A piece of 42 cm long copper wire is bent into the shape of a rectangle whose length is twice its width. Find the dimensions of the rectangle.

(4 marks)

Question 3

(a) Given a function $f(x) = 8 - 2x - x^2$.

(i) State the x-intercept and y-intercept of the function. (3 marks)

(ii) State the minimum/ maximum value of the function. (3 marks)

(iii) Sketch the graph and clearly show the axis of symmetry. (4 marks)

(b) Let $f(x) = 3x^3 - 2$ and $g(x) = \frac{2x+3}{x-1}$.

Find the followings:

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

(ii) $(f.g)(2)$ (2 marks)

(iii) $(f \circ g)(2)$ (4 marks)

(iv) $g^{-1}(x)$ (4 marks)

(c) By using the Factor Theorem, determine whether $(x + 1)$ is a factor of

$f(x) = x^3 + 3x^2 - 4x - 12$. (3 marks)

Question 4

(a) A line passes through the points (2,5) and (1,4).

(i) Write the equation of that line. (3 marks)

(ii) Calculate the distance between these two points. (2 marks)

(iii) Find the midpoint between these two points. (2 marks)

(b) Find the simultaneous solution of the following system.

$$2x + 2y + z = 10$$
$$2x + y + 3z = 16$$
$$x - 2y + 2z = 5$$

(6 marks)

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

$$2x + 2y \leq 10$$
$$x - y \leq 2$$
$$x - 1 > 0$$

(7 marks)

(d) Divide $f(x) = 5x^3 - 8x^2 + 3$ by $(x - 2)$ using long division. (5 marks)

Question 5

(a) Find the 9th term in the expansion of $(x-2y)^{13}$. (4 marks)

(b) Expand $(3x - 2y)^5$ in descending powers of x. (6 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.

(4 marks)

(d) The second term of the geometric sequence is 64 and the fourth term is 36. Calculate:

(i) The first term

(ii) The common ratio (6 marks)

(e) A boy drops a ball from a height of $y\ cm$ above the floor. After the first bounce, the ball reaches the height of h_1 cm which is $\frac{2}{3}y$. After the second bounce, the ball reaches the height of h_2 cm, which is $\frac{2}{3}$ of its previous height, until it stops eventually. Given $y = 270$, find the number of bounces the ball would have made when it bounces to the height of $80\ cm$.

(5 marks)

Question 6

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

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

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

(iii) $e^{2-3x} = 39$ (4 marks)

(b) Write each of the following expressions in one logarithm.

(i) $2\log_b x + \frac{1}{3}\log_b y$ (4 marks)

(ii) $3\log_b x + \frac{1}{2}\log_b(y-2) - \log_b z$ (4 marks)

(c) Find the equation of the line that is perpendicular to the line $5x - 2y = 3$ and passing through the point (-2, 1).

(5 marks)

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