INTI
International College Subang
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FINAL
Examination Paper

(COVER PAGE)

Session	:	**January 2014**
Programme	:	Diploma In Information And Communication Technology (DICTN)
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.

Materials permitted : Non-Programmable Calculator

Materials provided : Nil

Examiner (s) : **Ms. S.M Elizabethrani,** Kumathan A/P Thinakaran.

Moderator : Dr. Ng Set Foong

This paper consists of 6 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE SUBANG

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY (DICTN)
MAT1103: FUNDAMENTAL OF MATHEMATICS
FINAL EXAMINATION: JANUARY 2014 SESSION

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

Question 1

(a) Simplify the followings and write answers without negative exponents.

(i) $\sqrt[3]{125x^6} \times \sqrt[3]{8y^9}$. (3 marks)

(ii) $\left(5\sqrt{2}-\sqrt{5}\right)\left(-\sqrt{2}+3\sqrt{5}\right)$ (3 marks)

(b) Rationalize the denominator: $\dfrac{\sqrt{k}}{\sqrt{k}+5}$. (3 marks)

(c) Simplify $2\sqrt{80}+\sqrt{20}-\sqrt{125}$ (3 marks)

(d) Solve the following equations:

$$4-\sqrt{2+3x}=x\,.$$ (4 marks)

(e) Find the distance between points $A(2\sqrt{2},-1)$ and $B(\sqrt{2},11)$.
Hence find the midpoint of AB. (4 marks)

(f) The width of a rectangle is 12cm lesser than the length. If the perimeter of the rectangle is 120cm, find the dimension of the rectangle. (3 marks)

(g) To increase the sales, a shopkeeper decided to reduce the price of all items by 25%. If a customer walks away with a coffee table for RM230, what is the original price of the table?

(2 marks)

Question 2

(a) Given that $R(x) = x - 1$ and $S(x) = 2x - 5$, find

(i) $S^{-1}(x)$, (2 marks)

(ii) $SR(x)$, (3 marks)

(iii) $RS(-1)$ (3 marks)

(iv) $R^2(x)$ (2 marks)

(b) Given that $f(x) = -2x^2 + 10x + 1$. Sketch the graph of $f(x)$. Indicate the coordinates of vertex and y – intercept on the graph. (6 marks)

(c) Solve the inequality

(i) $4x^2 \geq 40 - 27x$. (3 marks)

(ii) $\frac{3}{x-1} \leq \frac{1}{x+2}$. (3 marks)

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

Question 3

a) Solve the following equation for x:

(i) $7^{3(x-1)} - \frac{1}{49} = 0$, (3 marks)

(ii) $7 - 2e^{7x} = 3$, (3 marks)

(iii) $27^{2x}.81^{3x} = \frac{1}{3^{9x-1}}$. (3 marks)

(b) Given that $\log_3 a = 5$ and $\log_3 b = 3$, find the following:

(i) a + b, (2 marks)

(ii) $3\log_3 ab^{-1}$, (3 marks)

(iii) $\log_{a/b} 3$. (3 marks)

(c) Solve the following logarithmic equation:

$$\log_7 4x - \log_7 4 = 4\log_7 \sqrt{x}$$ (3 marks)

(d) Solve the following system of equations:

$$y^2 - x^2 = -5$$
$$3y^2 + 2x^2 = 30$$ (5 marks)

Question 4

a) Solve the following linear system simultaneously:

$$15x + 10y + 8z = 270$$
$$3x + 6y + 6z = 108$$
$$2x + 4y + 6z = 82$$

(6 marks)

b) The sum of two consecutive odd numbers is 96. Find the numbers. (3 marks)

c) Find the fourth term of the expansion of $(2x-3)^6$. (3 marks)

d) Solve the following equations:

i) $|8x-1|-15=-7$. (4 marks)

ii) $\left|\frac{2+x}{5}\right|+1=7$ (4 marks)

e) Sketch the graphical solution of the following system of inequalities:

$$x + 2y \le 4$$
$$y - 2x > -6$$
$$y \le x$$
$$y \ge -6$$

(5 marks)

Question 5

(a) Expand $(2x+1)^2$ using Binomial theorem. (3 marks)

(b) Given that 11, $p+1$, and 19 are three consecutive terms of an arithmetic progression, and $p+1$ is the sixth term. Find the

(i) value of p, (2 marks)

(ii) sum of the first 12 terms. (3 marks)

(c) The common ratio of a geometric progression is 1/3 and the sum to infinity is 21. Find the first three terms of the sequences. (3 marks)

(d) Simplify $\left(\frac{128m^7n^{-10}}{64m^{-3}n^2}\right)^{-2}$ without negative exponents. (3 marks)

(e) Given that the first, second and third term of an geometric progression are $x+2$, 8x and 64. Find the values of x. (4 marks)

(f) Solve the inequality $5x(2x-9)<0$. (3 marks)

(g) The area of a triangle is 49 meter^2. Find the height of the triangle if it is twice its base? (4 marks)

Question 6

a) Given the first 5 terms of an arithmetic progression:

$$-15, x, y, z, 9$$

Find the values of x, y and z. (5 marks)

b) How many terms are there in the arithmetic progression of

$$200, 187, 174, \ldots, -8$$

(3 marks)

c) Solve $3x^2 - 5x = 6$ for x

Hint: use quadratic formula. (3 marks)

d) The nth term of geometric series is given by $\frac{3(2^n)}{8}$, find

(i) first term, (1 mark)
(ii) common ratio, (2 marks)
(iii) T_6, (2 marks)
(iv) S_6. (3 marks)

e) The sum of the first 20 terms of an arithmetic series is 45. The sum of the first 40 terms of the series is 290. Find the first term and the common difference of the series. Hence, find the 6^{th} term of the series.

(6 marks)

-The End-

FORMULA

Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

General term of a Binomial Expansion:

$$(a+b)^n = {}^nC_r \; a^{n-r} b^r$$

The nth term of a Binomial Expansion:

$$(a+b)^n = {}^nC_{r-1} \; a^{n-r+1} b^{r-1}$$

Arithmetic Progression:

$$T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}[2a + (n-1)d)] \quad \text{or} \quad S_n = \frac{n}{2}(a+l)$$

Geometric Progression:

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r-1} \quad , r > 1 \qquad \text{or} \qquad S_n = \frac{a(1-r^n)}{1-r} \quad , r < 1$$