INTI International University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session	:	**APRIL 2017**
Programme	:	Diploma in Information and Communication Technology (DICTN)
Course	:	**MAT1103: Fundamentals of Mathematics**
Date of Examination	:	01 August, 2017 (Tuesday)
Time	:	5:00pm – 7:00pm Reading Time : Nil
Duration	:	2 Hours

Special Instructions :

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

Materials permitted :
Non programmable calculator

Materials provided :
Formula Sheet

Examiner(s) : **S.M. Elizabethrani,** Fang Yen Yen

Moderator : Dr Ng Set Foong

This paper consists of 7 printed pages, including the cover page

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY (DICTN)
MAT1103: FUNDAMENTALS OF MATHEMATICS
FINAL EXAMINATION: APR 2017 SESSION

Instructions: This 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 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:

$$4-\sqrt{2+3x}=x.$$ (6 marks)

(e) Find the distance between points $A(2\sqrt{2},-1)$ and $B(\sqrt{2},11)$.
(3 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. (4 marks)

Question 2

(a) Solve each equation. Check for extraneous solutions.

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

(ii) $2x=1-\sqrt{2-x}$ (6 marks)

(b) Let $f(x)=\frac{1}{x}$ and $g(x)=2-x$, Find:

(i) $(f+g)(x)$ (1 mark)

(ii) $fg(x)$ (2 marks)

(iii) $(g \circ f)(2)$ (3 marks)

(c) The sum of 3 consecutive integers is 456. What are the integers? (4 marks)

(d) Solve the following:

$$\log_{10} x + \log_{10}(x-3) = 1$$ (4 marks)

Question 3

(a) Solve the following inequalities,

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

(ii) $9x > 4x^2$, (3 marks)

(iii) $|2(1-3x)|+10 \geq 13$. (4 marks)

(b) Solve the following system graphically.

$$\begin{aligned} 3x+y &\geq 1 \\ x &\leq 3y \\ -3 \leq x &< 3 \\ y &< 3 \end{aligned}$$

(5 marks)

(c) Given that $f(x) = 3x^2+16x-12$.

(i) Find the vertex for $f(x)$ and state whether the vertex is a minimum or maximum point. (3 marks)

(ii) Sketch the graph of $f(x)$ by indicating the vertex, x- and y-intercepts. (5 marks)

(d) Find the midpoint of the line passing through the points (4,5) and (-2,2).

(2 marks)

Question 4

(a) Solve the following simultaneous equations.

(i) $\frac{4}{x}+\frac{3}{y}=2$

$4y+3x+3=0$

(6 marks)

(ii) $x+y=0$

$2x^2-xy+y^2=16$

(6 marks)

(b) Given a polynomial $P(x)=2x^4-10x^3+17x^2-14x-3$.

(i) Show that $(x-3)$ a factor of $P(x)$. (2 marks)

(ii) Show that $(x+3)$ is not a factor of $P(x)$. (2 marks)

(iii) Find the results if $P(x)$ is divided by $(x+3)$. (5 marks)

(c) Expand of $(2a+b)^3$ (4 marks)

Question 5

(a) Find the inverse function of $f(x)=\sqrt{3-x}$. (4 marks)

(b) Given $k-3$, $k+1$ and $4k-2$ are first 3 terms of a geometric sequence.

(i) Find the possible values of k. (5 marks)

(ii) Find the first term and common ratio for each value of k (4 marks)

(c) Expand each of the following logarithms.

(i) $\ln x^3 y^4 z^5$ (2 marks)

(ii) $\log_3\left(\frac{9x^4}{\sqrt{y}}\right)$ (4 marks)

(d) 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)

Question 6

(a) Differentiate the following equations with respect to x:

(i) $y = (3-5x)^6$ (2 marks)

(ii) $y = \sqrt{16+3x}$ (2 marks)

(iii) $y = (3x-7)(2+5x)$ (3 marks)

(b) Integrate the following:

(i) $\int \frac{4}{x^4} dx$, (2 marks)

(ii) $\int \left(\frac{2-x}{5}\right)(x) dx$, (2 marks)

(iii) $\int \frac{x^2}{\sqrt[3]{x}} dx$. (2 marks)

(c) How many terms are there in the arithmetic progression of

200, 187, 174,…,-8. (4 marks)

(d) Solve $3x^2 - 5x = 6$ for x.

Hint: use quadratic formula. (3 marks)

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

(i) first term, (2 marks)

(ii) common ratio. (3 marks)

~The End~

Formula :

Quadratic Formula:

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

Arithmetic Progression:

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

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

Geometric Progression:

$$T_n = a\, r^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r} \quad ; r < 1$$

$$SS_n = \frac{a(r^n - 1)}{r-1} \quad ; r > 1$$

Binomial Theorem:

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