INTI International University & Colleges

FINAL
Examination Paper

(COVER PAGE)

Session	:	January 2017
Programme	:	Diploma in Information and Communication Technology (DICTN)
Course	:	**MAT1103: Fundamentals of Mathematics**
Date of Examination	:	08 March, 2017 (Wednesday)
Time	:	11:00am – 1:00pm 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 Booklet 1

Examiner(s)	:	**Fang Yen Yen**
Moderator	:	Dr Ng Set Foong

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

INTI INTERNATIONAL COLLEGE SUBANG

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY (DICTN)
MAT1103: FUNDAMENTALS OF MATHEMATICS
FINAL EXAMINATION: JANUARY 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) Find the equation of the line that passes through the origin and perpendicular to the line $3y = 2x+6$ (5 marks)

(b) Solve $-2(x-4) = -6(x+2) + 3x$ (2 marks)

(c) Find the first order derivatives of y with respect to x. Simplify your answer.

(i) $h(x) = \dfrac{4\sqrt{x}}{x^2 - 2}$ (4 marks)

(ii) $y = \left(1 + \sqrt{x^3}\right)\left(x^{-3} - 2\sqrt[3]{x}\right)$ (4 marks)

(iii) $g(x) = \log_2 3x$ (3 marks)

(d) Find the gradient and intercepts for the equation, $x = -\dfrac{3}{4}y + 5$ (4 marks)

(e) Find the 5th term in the expansion for $\left(x^2 + \dfrac{1}{x}\right)^9$ (3 marks)

Question 2

(a) Solve the inequalities:

(i) $-4 < 5-3x \leq 17$ (3 marks)

(ii) $|x-2| = -1$ (2 marks)

(iii) $|4x+5| > 3$ (4 marks)

(b) Solve $x^3 - 8x = 0$. (2 marks)

(c) Evaluate the following integrals :

(i) $\int_{-2}^{0} 2t^2\sqrt{1-4t^3}\,dt$ (4 marks)

(ii) $\int \frac{x}{\sqrt{1-4x^2}}\,dx$ (4 marks)

(d) Given $f(x) = x^3 - 3x^2 - 9x + 6$.

(i) Find the first and second derivatives. (2 marks)

(ii) Find all possible maximum and minimum points. (4 marks)

Question 3

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

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

(ii) $2x+1=2-\sqrt{2-x}$ (5 marks)

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

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

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

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

(c) The sum of 3 consecutive integers is 678. What are the integers? (3 marks)
The integers are 225, 226, 227

(d) Solve the system of equations: (6 marks)

$$2x-y-2z=-3$$
$$x+3y+z=-1$$
$$5x-4y+3z=10$$

Question 4

(a) Solve the systems of inequalities graphically. (6 marks)

$$\frac{3}{2}x-3y\geq 6$$
$$2x+2y\geq 14$$
$$x\geq 0$$
$$y\geq 0$$

(b) Given $f(x)=-2x^2+12x+13$.

(i) Find the y-intercept and x-intercepts. (3 marks)

(ii) Find the vertex point. (2 marks)

(iii) Sketch the graph f (x). (3 marks)

(c) Solve $x-xe^{x+1}=0$. (4 marks)

(d) The sum of two numbers is 7 and the sum of their squares is 29. Find the two numbers. (5 marks)

(e) Find the midpoint between the points (–2, 4) and (–3, 2). (2 marks)

Question 5

(a) The lengths of the sides of a triangle are y^2, $y + 1$, and 7 meters. If the perimeter is 20 meters, what is the value of y? (4 marks)

(b) Expand of $(2a-b)^5$ (3 marks)

(c) 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)

(d) Simplify 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)

(e) Differentiate $y = 3xe^{3x}$ (3 marks)

Question 6

(a) Find the sum of all the even numbers from 50 to 150, inclusive. (5 marks)

(b) Solve the following:

(i) $4\log(1-5x)-2=0$ (4 marks)

(ii) $\log x+\log(x-3)-1=0$ (4 marks)

(c) Sketch the graph of $y=-\frac{2}{5}x+3$ by showing its y-intercept and x-intercept points. And thus, find the distance of the y-intercept and x-intercept points. (4 marks)

(d) Find $f^{-1}(x)$ if $f(x)=\sqrt{e^x+2}$ (4 marks)

(e) Find the 16^{th} term of a geometric progression whose first term is -2 and whose fourth term is -54. (4 marks)

~ The End ~

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