INTI
International College Subang
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session : **January 2015**

Programme : Diploma In Information And Communication Technology (DICTN)

Course : **MAT1103 : Fundamentals Of Mathematics**

Date of Examination : March 17, 2015

Time : 2:00pm – 4:00pm 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,** 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 PROGRAMME (DICTN)
MAT 1103: FUNDAMENTALS OF MATHEMATICS
FINAL EXAMINATION: JANUARY 2015 SESSION

Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Simplify $\left(125x^{-6}y^{15}\right)^{\frac{1}{3}}$ and express your final answer only in **POSITIVE** exponents.

(2 marks)

(b) Find the following products in simplest form:

(i) $(36)^{\frac{3}{2}} \times (625)^{\frac{1}{2}}$.

(2 marks)

(ii) $(2x-6)(5x+11)$.

(2 marks)

(c) Simplify $2\sqrt{20}+\sqrt{45}-\sqrt{80}$.

(2 marks)

(d) Solve the following equations for x:

(i) $\left|\frac{2+x}{5}\right|+1=7$.

(5 marks)

(ii) $2x(2x-9)=0$.

(4 marks)

(e) Rationalize the denominator: $\frac{2}{\sqrt{2}-3}$.

(3 marks)

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

(5 marks)

Question 2

(a) Solve $2^{x-1} = 11$ for x and give the answer correct to 3 decimal places. (4 marks)

(b) Solve $\log_7(2x) - \log_7(5-x) + \log_7(x-2) = 0$ for x. (4 marks)

(c) Find the value of a :

(i) $8\left(2^{a-1}\right) = 64^a$ (3 marks)

(ii) $\log_a 512 = 3$ (2 marks)

(d) Solve the following system of equations:

$$x - y + z = 8$$
$$2x + 3y - z = -2$$
$$3x - 2y - 9z = 9$$

(6 marks)

(e) Solve the following simultaneous equation:

$$x + y = 2$$
$$2x^2 - 5x - y = 4$$

(6 marks)

Question 3

(a) Find the slope and the y-intercept of the line determined by the equation $\frac{4x}{-3} = \frac{3y+5}{-2}$ (4 marks)

(b) Write an equation of the line passing through (3, –2) and perpendicular to $3x + 4y = 5$. (4 marks)

(c) Given that $f(x) = 2 + \frac{1}{x}$ and $g(x) = x^2 - 1$, find

(i) $f^2(1)$ (2 marks)

(ii) $g^{-1}(1)$ (3 marks)

(iii) $gf(-1)$ (2 marks)

(d) Sketch the graph of the function given below:

$$f(x) = x^2 - 6x - 7$$

show its vertex (maximum or minimum), x and y- intercepts clearly on the graph.

(6 marks)

(e) The sum of three consecutive odd numbers is 99. Find the numbers.

(4 marks)

Question 4

(a) Solve the following inequalities:

(i) $-5x - 2 > -3(x+2) + 17$. (3 marks)

(ii) $2x^2 + 9x > 5$. (4 marks)

(iii) $-2 \leq \frac{3(x+7)}{5} \leq 6$. (3 marks)

(iv) $2|5x - 4| \leq 8$. (3 marks)

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

$$x + 2y \leq 4$$
$$y - 2x > -6$$
$$y \geq -1$$

(5 marks)

(c) Find the distance between the points (–2, 4) and (–3, 2). (3 marks)

(d) Graph $3x - y = 6$ for $x \leq 1$. Hence, find the range of the function. (4 marks)

Question 5

(a) Solve the following equations. Give your answers up to 3 decimal places where necessary.

(i) $9e^{5x} = 1269$ (2 marks)

(ii) $2 + 4\ln x = 16$ (2 marks)

(b) Find the sum of all the terms in the arithmetic progression:

$-9, -2, 5, 12, \ldots, 75.$ (6 marks)

(c) Find the sum of the first 10 terms of the geometric progression:

$7, -14, 28, -56, \ldots$ (4 marks)

(d) The sum of the first 7 terms of an arithmetic progression is 84, find the common difference if the 7^{th} term is 45.

(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)

(f) The sum of a number and 9 is multiplied by –2, and the answer is –8. Find the number.

(3 marks)

Question 6

(a) Simplify $5\sqrt{24}-3\sqrt{96}+9\sqrt{6}$.

(3 marks)

(b) The length of a rectangle is 8 cm more than its width. Find the dimension of the rectangle if its area is 84cm^2.

(4 marks)

(c) If the price a computer is RM1500 after 40% discount, find the original price of the computer.

(2 marks)

(d) Simplify the following

(i) $2(10xy-4x^2y^2-3y^3)+(-9x^2y^2+4y^3-7xy)$ (2 marks)

(ii) $\left(\frac{2x^3y^{-6}}{-4y^{-2}}\right)^2$ (3 marks)

(e) Given A(-2, 3) and B(7, -5), find

(i) the distance of AB, (2 marks)

(ii) equation of the line AB in standard form. (3 marks)

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

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

-THE END-

Formulae:

Quadratic Formula

$ax^2 + bx + c = 0 \qquad a \neq 0$

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

Arithmetic Progression

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

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

Geometric Progression

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

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

Binomial Theorem

$(k+1)^{th}$ *term for* $(a+b)^n$:

${}^nC_k . a^{n-k} . b^k$