



STAMFORD COLLEGE

SCHOOL OF COMPUTER SCIENCES DIPLOMA IN INFORMATION TECHNOLOGY

SEC101 : MODERN APPLIED MATHEMATICS

Date : 07 March 2007 (Wednesday)

Time : 9.00 a.m. – 11.00 a.m.

Duration: 2 hours

Instructions to Candidates

Section A – Question 1 is **COMPULSORY**.

Section B – Answer any **FOUR** questions.

Please ensure that this examination paper contains **SIX** questions on **FOUR** printed pages before you start the examination.

Books, papers and other written materials are not allowed to be brought into the examination hall. A candidate who violates the examination rules of Stamford College or commits a malpractice will be disqualified from the examination.

Candidates may use calculators provided the calculators give no printout, have no work display facilities, are silent and cordless.

Write your Examination Index Number on each page of your answer booklet.

ANSWER ALL QUESTIONS.

Question 1

(a) Solve the following inequalities:

(i) $-9 < -2x + 1$

(ii) $-2 < 5x + 8 < 18$

(iii) $|2x - 2| > 6$

(iv) $x^2 - 10 > 3x$

(8 Marks)

(b) Solve the following quadratic equations:

(i) $x^2 = 64$

(ii) $3x(x - 4) + 12$

(4 Marks)

(c) Solve the following linear equation:

(i) $-4q - (-20) = 80$

(ii) $4x - 2 - (3 - 4x) = 43$

(iii) $2(3 + t) = 4(t - 5) + 6$

(iv) $x / 3 + 2 = 9$

(8 Marks)

(Total = 20 Marks)

Question 2

- (a) In a survey it was found that 37 people read magazine A, 31 read magazine B and 48 read magazine C, 10 people read both magazine A and B, 8 people read both magazine B and C, 7 people read both magazine A and C and 6 people read all the three. Find the number of people who read the following types of magazine:

- (i) only A
- (ii) only B
- (iii) only C
- (iv) only one type of magazine
- (v) only two types of magazine

(10 Marks)

- (b) Given $\Sigma = \{x: -1 \leq x \leq 10, x \text{ an integer}\}$, $A = \{1,2,3,4,5,6\}$, $B = \{0,2,4,6,8\}$ and $C = \{1,3,5,7,9\}$, find:

- (i) $A \cup B \cup C$
- (ii) $A \cap B \cap C$
- (iii) $(A \cup B) \cap C$
- (iv) $(A \cup B) \cap (A \cup C)$
- (v) $(A' \cap C') \cup B$

(10 Marks)

(Total = 20 Marks)

Question 3

- (a) Given the functions $f(x) = x^2 + 1$ and $g(x) = x - 1$, find:

- (i) $f \circ g(x)$
- (ii) $g \circ f(x)$
- (iii) $f \circ f(x)$
- (iv) $g \circ g(x)$

(10 Marks)

- (b) (i) Find the equation of line through $(-4, 2)$ and $(6, -1)$.
- (ii) Find an equation of line through $(3, -3)$ which is perpendicular to the line

$$Y = 2x + 5.$$

(10 Marks)
(Total = 20 Marks)

Question 4

(a) Find the derivative of the given function:

i) $f(x) = (x^3 - 12x)(3x^2 + 2x)$

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

iii) $f(x) = 3x^2$

(8 Marks)

(b) Evaluate the following integrals:

(i) $\int (x - 2)(x + 4) dx$

(ii) $\int_{-2}^2 (x + 2) dx$

(iii) $\int_0^2 (8x^3 - 3x^2 + 2) dx$

(9 Marks)

(c) Find:

i) $\lim_{x \rightarrow 1} (x^3 + 1)$

ii) $\lim_{x \rightarrow 2} \frac{(x^3 - 4)}{x - 2}$

(3 Marks)
(Total = 20 Marks)

Question 5

(a)

$$\text{Given } A = \begin{bmatrix} 8 & 9 & 8 \\ 6 & 4 & 9 \\ 0 & 8 & 7 \end{bmatrix}, B = \begin{bmatrix} 8 & 3 & 2 \\ 1 & 8 & 4 \\ 9 & 2 & 1 \end{bmatrix}$$
$$C = \begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$$

Find:

- (i) $A + B$
- (ii) $A - B$
- (iii) $-2(A + 2B)$
- (iv) Inverse of C

(10 Marks)

(b) Solve the following simultaneous equation by matrix methods:

- (i) $2x + 3y = 3$
 $3x + y = 8$
- (ii) $3x - 2y = 12$
 $2x - 5y = 19$

(10 Marks)

(Total = 20 Marks)

- END OF PAPER -

