



THE COUNCIL OF COMMUNITY COLLEGES OF JAMAICA

ASSOCIATE OF SCIENCE EXAMINATION

SEMESTER I – 2009 DECEMBER

PROGRAMME: INFORMATION TECHNOLOGY
MANAGEMENT INFORMATION SYSTEMS

COURSE NAME: DISCRETE MATHEMATICS AND ALGEBRA
CODE: (MATH1103)

YEAR GROUP: ONE

DATE: WEDNESDAY, DECEMBER 9, 2009

TIME: 9:00 – 12:00 NOON

DURATION: 3 HOURS

EXAMINATION TYPE: FINAL



INSTRUCTIONS:

SECTION B: ANSWER ANY TWO (2) QUESTIONS FROM THIS SECTION.

SECTION B

Instruction: Answer any two (2) questions from this section

Question 1

a. Convert the following:

i. 1737_8 to hexadecimal **(4 marks)**

ii. 101010.1011_2 to decimal **(3 marks)**

iii. 3.8125_{10} to binary **(3 marks)**

b. Compute the following:

i. $110001_2 - 1111_2$ **(5 marks)**

ii. $F3B2_{16} - C9DA_{16}$ **(5 marks)**

iii. $5671_8 - 3567_8$ **(5 marks)**

(Total 25 marks)

Question 2

Determine the following

i. Find the sum in binary: $110111101_2 + 462_8 + 1DC_{16}$ **(8 marks)**

ii. $1010_2 \overline{)1011010_2}$ **(5 marks)**

iii. Compute: $1.1_2 \times 1.1_2$ **(3 marks)**

iv. Construct the truth table for $\sim p \leftrightarrow \sim q$ **(6 marks)**

v. Define the “tautology” **(3 marks)**

(Total 25 marks)

Question 3

- a. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{1, 3, 5, 9\}$ and $T = \{1, 5, 8, 10\}$ Determine the each of the following,
- A^1
 - B^1
 - $A^1 \cap B^1$
 - $A \cap B$
 - $A \cup B$
 - $(A \cup B)^1$ **(6 marks)**
- b. Draw a suitable Venn diagram to represent the information given above. **(2 marks)**
- c. In a class of 35 students, 25 take mathematics and 29 take Literature, 4 of the students take neither of the two subjects. Calculate the number of students who take:
- Mathematics and Literature **(5 marks)**
 - Mathematics only **(2 marks)**
 - Literature only. **(2 marks)**
- d. Use the principle of mathematical induction to prove that $1^3 + 2^3 + 3^3 + 4^3 + 5^3 + \dots + n^3 = \frac{1}{4}n^2(n+1)^2$ **(8 marks)**

(Total 25 marks)**Question 4**

- a. Given $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 3 \\ 2 & 0 \\ 5 & 4 \end{bmatrix}$ $C = \begin{bmatrix} 3 & -1 & 4 \\ -2 & 3 & 1 \end{bmatrix}$ Determine:
- AB **(2 marks)**
 - BC **(3 marks)**
 - $C^T A$ **(3 marks)**
 - A^2 **(2 marks)**

- b. Solve the simultaneous equations using by Gauss – Jordan (Row operation)

$$x + y + z = 5$$

$$2x + 2y - z = 7$$

$$X - y + 2z = 2$$

(10 marks)

- c. Find the coefficient of x^3 in the expansion of $(4 - 5x)^8$

(5 marks)

(Total 25 marks)

END OF EXAMINATION