

SOUTHEASTERN UNIVERSITY OF SRI LANKA

FIRST EXAMINATION IN BACHELOR OF SCIENCE IN MANAGEMENT AND
INFORMATION TECHNOLOGY- 2008/2009, SEMESTER – I, JUNE 2010

MIT 1153 – MATHEMATICS FOR COMPUTING

Answer All Questions

Time: 03 Hours

01.

a) Define the following terms:

- i) Proposition
- ii) Tautology
- iii) Contradiction

b) Prove the following using truth tables:

- i) $\sim(p \vee q) \equiv \sim p \wedge \sim q$
- ii) $(p \Rightarrow q) \equiv \sim p \vee q$
- iii) $(\sim p \vee q) \wedge (\sim q \vee p) \equiv (p \Leftrightarrow q)$

c) i) Show that $[(p \Rightarrow q) \wedge (q \Rightarrow r)] \Rightarrow (p \Rightarrow r)$ is a tautology.ii) if x and y are odd numbers then prove the following:

- a. $(x + y)$ is an even number
- b. xy is an odd number

(20 Marks)

02.

a) Let R be the set of real numbers and let the function $f : R \rightarrow R$ be defined by

$$f(x) = \begin{cases} 5x + 3 & \text{when } x > 3 \\ x^2 + 4 & \text{when } -4 < x \leq 3 \\ 3x - 2 & \text{when } x \leq -4 \end{cases}$$

find the following:

- i) $f(2)$
- ii) $f(-5)$
- iii) $f(7)$
- iv) $f(-2)$
- v) $f(0)$

b) Let $A = \{-2, -1, 0, 1\}$, $B = \{-1, 0, 1, 2\}$ and $f : A \rightarrow B$ be defined by $f(x) = x + 1$ show that f is bijective.

- c) Let R be the set of real numbers and let $f: R \rightarrow R$ and $g: R \rightarrow R$ be two functions defined by $f(x) = x^2 - x + 3$ and $g(x) = 3x + 1$.

find the following:

i) $f(g(1))$ ii) $g(f(-1))$ iii) $f(g(0))$ iv) $g(f(2))$

- d) Let R be the set of real numbers and let $f: R \rightarrow R$ be a function defined by $f(x) = x^2 - 2$.

find the following:

i) $f^{-1}(2)$ ii) $f^{-1}(14)$ iii) $f^{-1}(0)$ iv) $f^{-1}(1)$

(20 Marks)

03.

- a) Let $A = \{a, b, c\}$ and $B = \{1, 2, 3\}$. A relation R from A to B is defined as $R = \{(a, 1), (c, 2), (a, 3), (b, 1), (c, 3)\}$

Find R^{-1} and the domain and range of R^{-1} .

- b) Let $M = \{1, 2, 3, 4\}$ and let $R = \{(1, 2), (2, 4), (1, 4), (4, 1), (4, 2), (2, 1), (3, 3)\}$ be a relation on M .

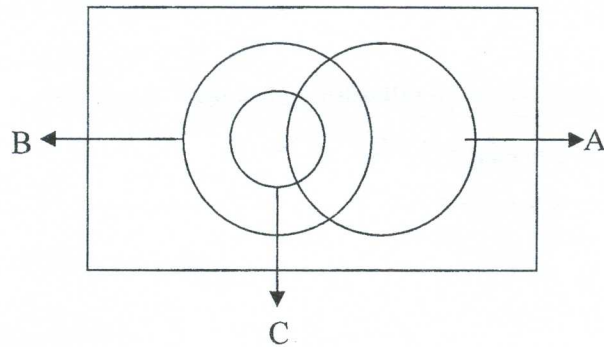
Draw the directed graph of R .

(10 Marks)

04.

- a) Define the following terms:
- i) Universal set
 - ii) Complement of a set
 - iii) Intersection of two sets

b) Draw Venn diagram for the following:



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

(10 Marks)

05.

a) If $2^x = 4^y = 8^z$ and $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{8z} = \frac{22}{7}$ then find the values of x, y and z .

b) Simplify $\text{Log}_a\left(\frac{1}{256}\right) - \text{Log}_a\left(\frac{125}{4}\right) - 3\text{Log}_a\left(\frac{1}{20}\right)$; (Where $a \neq 0$)

c) Without using the logarithm table, find the values

$$2\text{Log}_{10}^{30} + 4\text{Log}_{10}^2 - 2\text{Log}_{10}^{12}$$

d) Find the values of x .

$$\text{Log}x = \frac{1}{2}(\text{Log}25 + \text{Log}8 - \text{Log}2)$$

e) Solve : $\text{Log}_x(8x-3) - \text{Log}_x 4 = 2$

(20 Marks)

06.

a) Given $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 0 \\ 3 & 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \\ 4 & 1 & 2 \end{bmatrix}$

Show that $(A \times B)' = B' \times A'$

b) If

$$A = \begin{bmatrix} 1 & 2 & 4 \\ 3 & 1 & -1 \\ 2 & 1 & 2 \end{bmatrix}$$

then find A^{-1} (inverse of A)

c) Solve the following equation using matrix method.

$$3p + 2q = 5$$

$$4p + q = 3$$

(20 Marks)