SOUTHEASTERN UNIVERSITY OF SRI LANKA

FIRST (REPEAT) EXAMINATION IN BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY FOR MANAGEMENT STUDIES - 2008/2009, SEMESTER – I, JUNE 2010

ITMS 1153R – 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. Answer the following:

a) Let $\boldsymbol{R}$ be the set of real numbers and let the function $f : R \to R$ 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) A coin and die are thrown together. Draw a possibility space diagram and find the probability of obtaining.

i) a head
ii) a number greater than 4
iii) a head and a number greater than 4
iv) a head or a number greater than 4

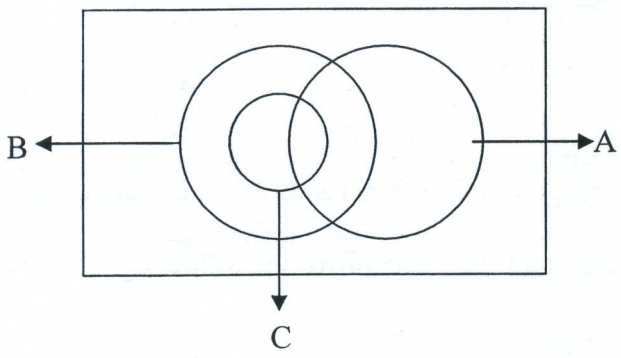
(20 Marks)

03.

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) $(C' \cap A) \cap B$

c) Draw the venn diagram for the following set, universal set (E)

$E = \{0,1,2,3,4,5,6,7,8,9\}$

$A = \{0,2,5,6,7\}$

$B = \{0,2,6\}$

$C = \{3,4,5,6,8\}$

(20 Marks)

04.

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 $Log_a\left(\frac{1}{256}\right) - Log_a\left(\frac{125}{4}\right) - 3Log_a\left(\frac{1}{20}\right)$; (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*.

$$Logx = \frac{1}{2}(Log25 + Log8 - Log2)$$

e) Solve : $Log_x(8x-3) - Log_x 4 = 2$

(20 Marks)

05.

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)