**EASTERN UNIVERSITY, SRI LANKA**
DEPARTMENT OF MATHEMATICS
EXTERNAL DEGREE EXAMINATION IN SCIENCE – 2007/2008 & 2008/2009
FIRST YEAR, SECOND SEMESTER (Jun./Sept., 2015)
EXTCS 106 – COMPUTER ORGANIZATION AND ARCHITECTURE

Answer all questions   **Time allowed: 02 hours**

a) Briefly explain the following terms:
   i.   *Computer Architecture*;

   ii. *Computer Organization*.

b) State what are the major structural components of CPU.

c) Explain the functional view of a computer with the aid of diagrams.

d) Convert the following octal numbers to binary numbers:
   i.   457;

   ii. 72.

e) Convert the following hexadecimal numbers to decimal numbers:
   i.   83FA;

   ii. 12B.

a) Explain the Von- Neumann architecture.

b) Briefly describe the basic instruction cycle with the aid of diagrams.

c) State and Prove the *De Morgan's* laws.

d) Draw a circuit diagram corresponding to the following Boolean expressions:

   i. $(AB + C) D$;

   ii. $\bar{A}B + \overline{(B+C)}$.

**e)** Show the behavior of the following circuit with a truth table:

03.
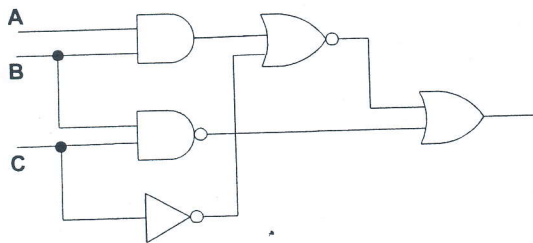
a) What are the three common ways of representing signed numbers?

b) Briefly explain the function of a half adder.

c) Draw the logic circuit for a half adder and write down the Boolean expression with respect to the circuit.

d) Draw the logic circuit for a full adder using two half adders.

e) Perform the following calculations in binary using 8 bit two's complement representation:

    i. $12 + (-69)$;
    ii. $(+8) - (+5)$.

04.

a) What is meant by "*K-Map*" (Karnaugh Map)?

b) Briefly explain the advantages of K-Map.

c) Consider the following combinational logic circuit:
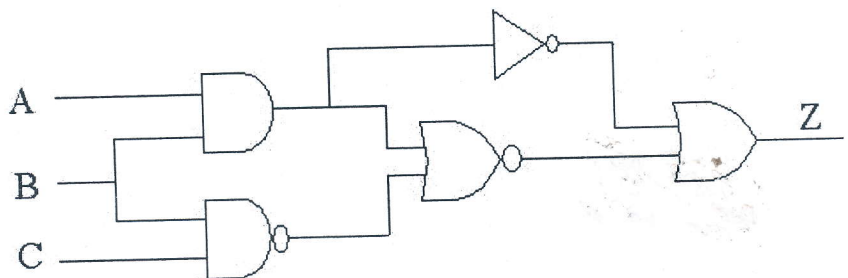
d) Derive the truth table and draw a K-Map for the above circuit.

e) Derive a reduced Boolean expression for the output Z.