EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF MATHEMATICS
FIRST YEAR EXAMINATION IN SCIENCE 2012/2013
SECOND SEMESTER (August, 2015)
CS 106 – COMPUTER ORGANIZATION AND ARCHITECTURE
(Proper & Repeat)

nswer all questions   Time allowed: 02 hours

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omputer Architecture describes the design of the computer at hardware or software interface.

a) How the computer architecture differs from *Computer organization*? Briefly explain.

b) What are the major structural components of CPU?

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

d) Discuss the Memory Hierarchy of a computer.

e) Convert the following hexadecimal numbers to binary numbers:
   i.   A408F;
   ii. 8AE.

logic gate is an elementary building block of a digital circuit.

a) State and prove the *De Morgan's* laws.

b) Show the behavior of the following circuit with a truth table:
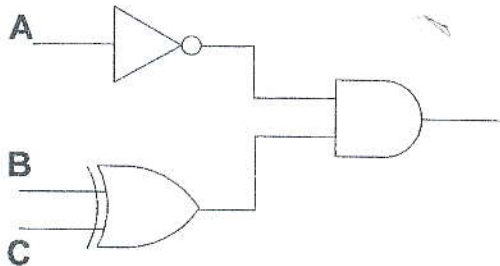
c) Differentiate between a half adder and a full adder.

d) Standardization makes the evaluations and implementation of Boolean expression much more systematic and easier.

    i. What is meant by the term *"Standard SOP forms"* (Standard Sum of Product form)?

    ii. Write down the rules which can be used for the conversion from SOP to Standard SOP.

e) Convert the following Boolean expression into standard SOP form :

$$A\overline{D} + AB\overline{C} + \overline{A}BCD + A\overline{B}D$$

03.

a) A signed number is a number that is preceded by either a plus or minus sign.
    i. What are the three common ways of representing signed numbers?
    ii. Explain any two of which you have mentioned in part **a (i)** with examples.

b) What do you mean by *"K- Map"* (Karnaugh Map)? Discuss the rules of Simplification in K-Map.

c) Briefly explain the advantages of K-Map.

d) Convert the following Boolean expression into Minimized SOP form using K-Map.

$$\overline{ABCD} + \overline{ABC}D + \overline{AB}C\overline{D} + \overline{A}BC\overline{D} + AB\overline{C}\,\overline{D} + A\overline{B}\,\overline{C}D + A\overline{B}C\overline{D}$$

04. Pipelining is a technique used in advanced micro processors.

a) Suppose there are five instructions need to be executed. How would be the pipelined execution works?

b) Describe briefly the *Instruction-Execution cycle* with five stages.

c) What is *RISC* architecture? Briefly explain its features.

d) Compare the *Superscalar Architecture* with simple pipelined architecture.