

EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE 2001/2002 (Repeat)

FIRST SEMESTER (April, 2002)

CS 206 - Computer Architecture

Answer All Questions

Time: 2 hours

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26 SEP 2002

University, Sri Lanka

Q1

(i) Simplify the following Boolean Expressions:

(a) $(X+Y+Z)(\bar{X}+Y+Z)(\bar{X}+Y+\bar{Z})$

(b) $\bar{W}XZ+WZ+XY\bar{Z}+\bar{W}XY$

(ii) Show that

(a) $X+\bar{Y}+\bar{X}Y+(X+\bar{Y})\bar{X}Y=1$

(b) $(W+X+YZ)(\bar{W}+X)(\bar{X}+Y)=XY+\bar{W}YZ$

(c) $(X+Y)(\bar{X}+Z)(Y+Z)=(X+Y)(\bar{X}+\bar{Z})$, using De Morgan's theorem.

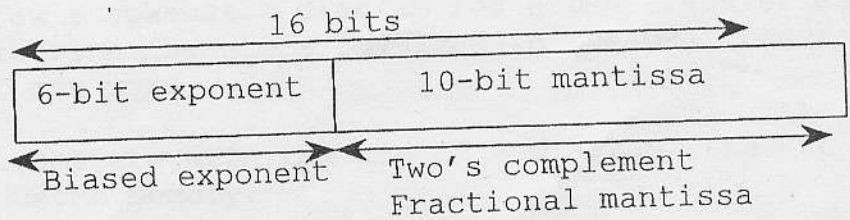
(iii) A Circuit has four inputs P, Q, R, S representing the binary numbers 0000=0 to 1111=15. P is the most significant bit. The circuit has one output, X, which is true if the number represented by the input is divisible by three (Regard zero as being indivisible by three).

Design a truth table for this circuit and hence obtain an expression for X in terms of P, Q, R, and S. Give the circuit diagram of an arrangement of AND, OR, and NOT gates to implement this circuit.

Q2

- (i) Describe with the aid of examples, the properties of 2's complement numbers. How to detect overflow.
- (ii) Draw a flow chart for the addition of two floating-point numbers.

Add together 10.125 and 32.1 using floating-point arithmetic with the format below. In each case, show how the number would be stored in the computer:



Q3

- (i) Describe the functions of the following registers in a computer:
- (a) MAR
 - (b) MBR
 - (c) PC
 - (d) ACC
 - (e) IR
- (ii) Explain the steps involved in instruction execution.
- (iii) Describe the Pipelining technique in the instruction execution of a Computer. Illustrate with an example.

Q4

What are the purposes of the following Buses

- (i) Data Bus
- (ii) Address Bus
- (iii) Control Bus



- (a) Describe the steps involved in interrupt servicing procedure to each to the I/O requirement.
- (b) Draw a schematic diagram for a DMA transfer and describe the steps involved in the DMA transfer of one word.
- (c) Illustrate with the aid of a diagram, the use of a Cache memory.