Introduction to Computer Science: Mid-Term Exam

November 16, 2012

Name: ____________________________
Student ID: ________________________

Question 1
If the hardware of a computer is analog to the body of a human being, which of the following is the best description of the software.

(a) Language
(b) Blood
(c) Mind
(d) Neuron

Question 2
What was the original use of computers?

(a) For playing game.
(b) For data storage.
(c) Computation.
(d) Factory automation.

Question 3
Which of the following electronic technologies is the key technology for making the first generation electronic computer?

(a) Transistor
(b) Integrated circuit
(c) Vacuum tube
(d) Dual Core CPU

Question 4
During World War II, which of the following country did not have an electronic computer?

(a) France
(b) Germany
(c) England
(d) USA

Question 5
What is the name of the first commercial computer in US?

(a) IBM System/360
(b) UNIVAC
(c) Macintosh
(d) ENIAC

Question 6
What is the contribution of Xerox in the evolution of computer?

(a) Window
(b) Mouse
(c) A4 paper
(d) Touch screen

Question 7
Information is a set of data that have been shaped into a form that is ______.

(a) meaningless and useless to human being
(b) meaningful and useful to human being
(c) meaningless and useless to information systems
(d) meaningful and useful to information systems

**Question 8**
Data is a stream of ______ representing events occurring in organization.
(a) raw fact
(b) meaningful information
(c) information
(d) numbers

**Question 9**
An information system is a set of interrelated components that ______, ______, ______ and distribute information to ______ in an organization.
*Which of the following should NOT be put in the blanks?*
(a) collect
(b) process
(c) store
(d) make decision

**Question 10**
The mission of an information system is to improve the performance of ______ through the use of information technology.
(a) computers in organizations
(b) people in organizations
(c) computer network
(d) people network

**Question 11**
Which of the following items are part of information technologies?
(i) Digital camera
(ii) Mobile phone
(iii) Internet
*Answer:
(a) (i) & (ii)
(b) (ii) & (iii)
(c) (i) & (iii)
(d) (i), (ii) and (iii)

**Question 12**
In terms of management level, how can the following information systems are ranked (from high level to low level)?
(1) Transaction processing systems
(2) Executive information systems
(3) Management information systems
(4) Decision support systems
*Answer:
(a) 1, 2, 3, 4
(b) 2, 3, 4, 1
(c) 2, 4, 1, 3
(d) 2, 4, 3, 1

**Question 13**
Which of the following operation(s) a computer is(are) able to perform?
(i) Arithmetic operation.
(ii) Logic operation.
*Answer:
(a) (i) only
(b) (ii) only
(c) (i) & (ii)
(d) None of them
Diagram for Questions 14-18

The following schematic diagram is for Question 14 to Question 18. It is a circuit consisting of two logic gates.

Question 14

What are the output values $X$ and $Y$ if $A$ is an XOR gate and $B$ is an AND gate.

(a) $X = 0, Y = 0$.

(b) $X = 0, Y = 1$.

(c) $X = 1, Y = 0$.

(d) $X = 1, Y = 1$.

Question 15

What are the output values $X$ and $Y$ if $A$ is an OR gate and $B$ is an OR gate.

(a) $X = 0, Y = 0$.

(b) $X = 0, Y = 1$.

(c) $X = 1, Y = 0$.

(d) $X = 1, Y = 1$.

Question 16

What are the output values $X$ and $Y$ if $A$ is an AND gate and $B$ is an XOR gate.

(a) $X = 0, Y = 0$.

(b) $X = 0, Y = 1$.

(c) $X = 1, Y = 0$.

(d) $X = 1, Y = 1$.

Question 17

What are the output values $X$ and $Y$ if $A$ is an OR gate and $B$ is an NAND gate.

(a) $X = 0, Y = 0$.

(b) $X = 0, Y = 1$.

(c) $X = 1, Y = 0$.

(d) $X = 1, Y = 1$.

Question 18

What are the output values $X$ and $Y$ if $A$ is an NAND gate and $B$ is an NAND gate.

(a) $X = 0, Y = 0$.

(b) $X = 0, Y = 1$.

(c) $X = 1, Y = 0$.

(d) $X = 1, Y = 1$.

Question 19

Convert $20_{10}$ in 8-bit 2’S complement format.

(a) $10010100_2$

(b) $00010100_2$

(c) $10001010_2$

(d) $00001010_2$

Question 20

Convert $-20_{10}$ in 8-bit 2’S complement format.

(a) $10010100_2$

(b) $00010100_2$

(c) $11101011_2$

(d) $11101100_2$

Question 21

Convert $20_{10}$ in 16-bit 2’S complement format.

(a) $1000000010010100_2$

(b) $000000000010100_2$

(c) $100000000001010_2$

(d) $000000000001010_2$
Question 22
Convert \(-20\) in 16-bit 2’S complement format.
(a) 1000000000010100
(b) 000000000010100
(c) 100000000010011
(d) 111111111101100

Question 23
\(x\) and \(y\) are two binary numbers which are in 4-bit 2’s complement format, where
\(x = 0010\) and \(y = 1101\).
Clearly, \(y\) is a negative number. What is the result of \(x + y\) in decimal format?
(a) 1
(b) \(-11\)
(c) 0
(d) \(-7\)

Question 24
\(x\) and \(y\) are two binary numbers which are in 4-bit 2’s complement format, where
\(x = 0010\) and \(y = 0001\).
Clearly, both of them are positive. What is the result of \(x + y\) in decimal format?
(a) 1
(b) \(-1\)
(c) \(3\)
(d) \(-3\)

Question 25
The truth table of an half adder is shown below.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

The implementation of this half adder can be done by two logic gates, say \(X\) and \(Y\). Logic gate \(X\) is with \(A\) and \(B\) as input and \(C\) as output, while logic gate \(Y\) is with \(A\) and \(B\) as input and \(D\) as output. What should logic gates \(X\) and \(Y\) are?
(a) \(X\) is a OR gate, while \(Y\) is an AND gate.
(b) \(X\) is a XOR gate, while \(Y\) is an AND gate.
(c) \(X\) is a AND gate, while \(Y\) is an OR gate.
(d) \(X\) is a AND gate, while \(Y\) is an XOR gate.

Question 26
The following is the truth table of a full adder. What are the values \(X\) and \(Y\)?

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>D</th>
<th>C</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<td>1</td>
<td>0</td>
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<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>X</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Y</td>
</tr>
</tbody>
</table>

(a) \(X = 0, Y = 0\).
(b) \(X = 0, Y = 1\).
(c) \(X = 1, Y = 0\).
(d) \(X = 1, Y = 1\).

Question 27
Which of the following items are part of information technologies?
(i) Programming language
(ii) Operating system
(iii) Database

Answer:
(a) (i) & (ii)
(b) (ii) & (iii)
(c) (i) & (iii)
(d) (i), (ii) and (iii)
Question 28
To execute an instruction, the CPU will first decode the instruction into a sequence of electrical signals controlling the connections amongst the logic gates. Which of the following unit is responsible for generating such signals?
(a) Register
(b) Control unit
(c) ALU
(d) Cache

Question 29
What does MBytes stand for?
(a) $10^9$ Bytes (or $2^{10}$ Bytes)
(b) $10^3$ Bytes (or $2^{10}$ Bytes)
(c) $10^6$ Bytes (or $2^{20}$ Bytes)
(d) $10^9$ Bytes (or $2^{30}$ Bytes)

Question 30
C Programming language is ______ for writing software.
(a) a communication scheme
(b) a coding scheme
(c) a Visual Basic interface
(d) a .NET interface

Question 31
To convert a C program to machine code, we need to use a ______.
(a) DevC compiler
(b) Java Development Kit
(c) Visual Basic Compiler
(d) Dictionary

Question 32
#include<stdio.h>
#include<stdlib.h>

int main(void){
    printf("Hello world!
");
    system("PAUSE");
    return 0;
}

After compiling the above C program. What will you see on the computer screen?
(a) ”Hello world”
(b) ”Hello world!”
(c) Hello world
(d) Hello world!

Question 33
In the above program, the files stdio.h and stdlib.h are commonly called ______ files. They ______.
(a) help; help
(b) header; help
(c) help; define the operations of the functions like printf and system
(d) header; define the operations of the functions like printf and system

Diagram for Questions 34-35
Below is a simple circuit. It consists of a memory with 16 memory spaces (from M1 to M16), an ADD/SUB block, 2 input registers (IA and IB) and one output register (OUT). M1 to M16, IA, IB and OUT are all 4 bits long.
To control the above circuit, three commands (MOV, ADD and SUB) are provided. The syntax and the descriptions of these commands are depicted in the following table.

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOV X Y</td>
<td>Moving the content of Y to X</td>
</tr>
<tr>
<td>ADD X Y</td>
<td>OUT = X + Y</td>
</tr>
<tr>
<td>SUB X Y</td>
<td>OUT = X − Y</td>
</tr>
</tbody>
</table>

**Question 34**

MOV IA M1
MOV IB M2
ADD IA IB
MOV IA OUT
MOV IB M3
ADD IA IB
MOV M4 OUT

Suppose the initial contents of M1, M2, M3 and M4 are given by

\[ M_1 = 0010, M_2 = 0001, M_3 = 0010, M_4 = 0000. \]

What is the content of M4 once the program is finished?

(a) 0010
(b) 0011
(c) 0100
(d) 0101

**Question 35**

MOV IA M1
MOV IB M2
ADD IA IB
MOV IA OUT
MOV IB M3
SUB IA IB
MOV M4 OUT

Suppose the initial contents of M1, M2, M3 and M4 are given by

\[ M_1 = 0011, M_2 = 0010, M_3 = 0001, M_4 = 0000. \]

What is the content of M4 once the program is finished?

(a) 0010
(b) 0011
(c) 0100
(d) 0101

**Question 36**

Which of the following is the language for use in the first generation electronic computer?

(a) Natural language.
(b) High level language.
(c) C language
(d) Machine code.

**Question 37**

The logic function of the following truth table is given by

\[ Z = \overline{A}BC + ABC. \]

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<td>1</td>
<td>X</td>
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<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Y</td>
</tr>
</tbody>
</table>
What are the values of $X$ and $Y$?

(a) $X = 0, Y = 0$.
(b) $X = 0, Y = 1$.
(c) $X = 1, Y = 0$.
(d) $X = 1, Y = 1$.

**Question 38**

Which of the following statement(s) is(are) true?

(i) All logic circuits can be built by using NAND gates only.
(ii) All logic circuits can be built by using AND gates only.
(iii) All logic circuits can be built by using XOR gates only.

**Answer:**

(a) (i) only.
(b) (ii) only.
(c) (i) and (ii) only.
(d) None of them.

**Question 39**

For a binary number which is represented in 6-bit 2’s complement formate, what are the smallest and the largest numbers that can be represented?

(a) $-15$ to $15$.
(b) $-31$ to $31$.
(c) $-63$ to $63$.
(d) $0$ to $63$.

**Question 40**

Which of the following statement(s) is(are) true?

(i) Smartphone is able to connect to the Internet via 3G telecom network.
(ii) Smartphone is able to connect to the Internet via WiFi.
(iii) WiFi is another name for 3G telecom network.

**Answer:**

(a) (i) only.
(b) (ii) only.
(c) (i) and (ii) only.
(d) (i), (ii) and (iii).