

Introduction to Computer Science: Mid-Term Exam

November 15, 2013. 9:30 - 11:00

Name: _____

Student ID: _____

Instructions: This paper consists of fifty multiple choice questions. Each carries 2 marks. You have to answer all of them. For each question, there is only ONE correct answer. Please circle your answer by using either blue or black ball pen. Using dictionary and calculator during examination is allowed.

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) Telephone communication.
- (b) Data storage.
- (c) Computation.
- (d) Car production.

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

Which of the following electronic technologies is the key for making the spaceship's computer in the 1960s?

- (a) Transistor
- (b) Integrated circuit
- (c) Microprocessor
- (d) Nanotechnology

Question 5

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

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

Question 6

Which of the following is the contribution of Alan Turing in World War II?

- (a) Build one of the first electronic computer for military use
- (b) Write a program for the military computer
- (c) Develop an algorithm to break the German encrypted messages
- (d) Develop the first compiler for programming

Question 7

What is the name of the first commercial computer in UK?

- (a) ENAC
- (b) UNIVAC
- (c) LEO
- (d) ENIAC

Question 8

What is the contribution of Apple in the evolution of computer?

- (a) Develop the first Window-like environment for controlling the computer
- (b) Develop the first operating system for personal computer
- (c) Develop the first personal computer
- (d) Develop the first network card for personal computer

Question 9

Which of the following item(s) is(are) a computer?

- (i) iPhone
- (ii) Notebook
- (iii) iPad

Answer:

- (a) (ii) only
- (b) (i) & (ii) only
- (c) (i) & (iii) only
- (d) (i), (ii) & (iii)

Question 10

Which of the following key combination can launch the Windows "Task Manager"?

- (a) Ctrl + Alt + Del
- (b) Ctrl + Fn + Del
- (c) Fn + F9
- (d) Fn + F10

Question 11

Which of the following operating system is commonly used in building websites due to its stable characteristics and its open source code?

- (a) MS DOS
- (b) Linux
- (c) MS Window
- (d) Mac OS

Question 12

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 13

Data is a stream of _____ representing *events* occurring in organization.

- (a) raw fact
- (b) meaningful information
- (c) information
- (d) numbers

Question 14

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 15

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

Question 16

Which of the following statement is wrong?

- (a) All computers are digital systems.
- (b) All arithmetic operations can be implemented by logic gates.
- (c) Representing a negative number in 2's-complement formate can let addition/subtraction easily be done by using full adder.
- (d) All logic operations can be implemented by NAND gates.

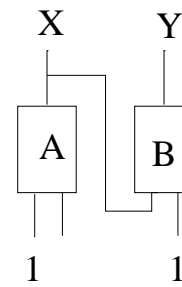
Question 17

For unsigned integer, what is the maximum number that can be represented by an 8 bits formate?

- (a) 2^7
- (b) 2^8
- (c) $2^7 - 1$
- (d) $2^8 - 1$

Diagram for Questions 18-22

The following schematic diagram is for Question 18 to Question 22. It is a circuit consisting of two logic gates.



Question 18

What are the output values X and Y if A is an XOR gate, B is an AND gate and the input (from left to right) is 111.

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

Question 19

What are the output values X and Y if A is an OR gate, B is an OR gate and the input (from left to right) is 101.

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

Question 20

What are the output values X and Y if A is an AND gate, B is an XOR gate and the input (from left to right) is 111.

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

Question 21

What are the output values X and Y if A is an OR gate, B is an NAND gate and the input (from left to right) is 101.

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

Question 22

What are the output values X and Y if A is an NAND gate and B is an NAND gate and the input (from left to right) is 101.

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

Question 23

Convert 20_{10} in **8-bit 2'S complement formate**.

- (a) 10010100_2
- (b) 00010100_2
- (c) 10001010_2
- (d) 00001010_2

Question 24

Convert -20_{10} in **8-bit 2'S complement formate**.

- (a) 10010100_2
- (b) 00010100_2
- (c) 11101011_2
- (d) 11101100_2

Question 25

Convert 148_{10} in **16-bit 2'S complement formate**.

- (a) 0000000010010100_2
- (b) 0000000100010100_2
- (c) 0000001010010100_2
- (d) 0000000101010100_2

Question 26

Convert -148_{10} in **16-bit 2'S complement formate**.

- (a) 1111111011101011_2
- (b) 1111111101101011_2
- (c) 1111111101101100_2
- (d) 1111111011101100_2

Question 27

x and y are two binary numbers which are in **4-bit 2's complement formate**, where

$$x = 0010_2 \text{ and } y = 1101_2.$$

Clearly, y is a negative number. What is the result of $x + y$ in decimal formate?

- (a) 1_{10}
- (b) -1_{10}
- (c) 0_{10}
- (d) -7_{10}

Question 28

x and y are two binary numbers which are in **4-bit 2's complement formate**, where

$$x = 0010_2 \text{ and } y = 0001_2.$$

Clearly, both of them are positive. What is the result of $x + y$ in decimal formate?

- (a) 1_{10}
- (b) -1_{10}
- (c) 3_{10}
- (d) -3_{10}

Question 29

The truth table of an half adder is shown below.

A	B	C	D
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

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 30

The following is the truth table of a full adder. What are the values X and Y ?

A	B	D	C	Z
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	X	0
1	1	0	1	0
1	1	1	1	Y

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

Question 31

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 32

What does MBytes stand for ?

- (a) 2^0 Bytes
- (b) 2^{10} Bytes
- (c) 2^{20} Bytes
- (d) 2^{30} Bytes

(Hint: $2^{10} \approx 1000$.)

Question 33

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 34

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 35

```
INPUT DATA A = [77, 64, 94, 32, 59];
DECLARE INTEGER VARIABLES i, P, F;
```

```
SET P = 0;
```

```
SET F = 5;
```

```
FOR i from 1 to 5,
```

```

    IF (A[i] > 59)
        P = P + 1;
        F = F - 1;
    ENDIF
ENDFOR

```

From the above pseudo code, what will be the resultant values of P and F ?

- (a) $P = 1$ and $F = 4$
- (b) $P = 2$ and $F = 3$
- (c) $P = 4$ and $F = 1$
- (d) $P = 3$ and $F = 2$

Question 36

```

INPUT DATA A = [77, 64, 94, 32, 59];
DECLARE INTEGER VARIABLES i, T;

FOR i from 1 to 4,
    IF (A[i] > A[i+1])
        T = A[i+1];
        A[i+1] = A[i];
        A[i] = T;
    ENDIF
ENDFOR

```

From the above pseudo code, what will be the resultant values in the array A ?

- (a) $A = [32, 59, 64, 77, 94]$
- (b) $A = [94, 77, 64, 59, 32]$
- (c) $A = [77, 94, 64, 59, 32]$
- (d) $A = [64, 77, 32, 59, 94]$

Question 37

```

INPUT DATA A = [77, 64, 94, 32, 59];
DECLARE INTEGER VARIABLES i, X;

SET i = 1;
SET X = 0;

WHILE ((i < 6) AND (X < 1))
    IF (A[i] < 70)
        X = 1;
    ENDIF
    i = i + 1;
ENDFOR

```

From the above pseudo code, what will be the resultant values of i and X ?

- (a) $i = 2$ and $X = 1$
- (b) $i = 3$ and $X = 1$
- (c) $i = 5$ and $X = 3$
- (d) $i = 6$ and $X = 3$

Question 38

```

DECLARE INTEGER VARIABLES i, j, X, Y;
SET X = 0;
SET Y = 0;

FOR i from 1 to 10,
    FOR j from 1 to 5,
        X = X + 1;
    ENDFOR
    Y = Y + 1;
ENDFOR

```

From the above pseudo code, what will be the resultant values of X and Y ?

- (a) $X = 10$ and $Y = 10$
- (b) $X = 10$ and $F = 50$
- (c) $X = 50$ and $F = 10$
- (d) $X = 50$ and $F = 50$

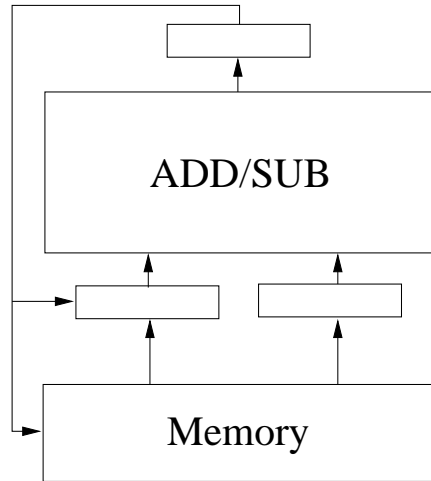
Question 39

Let A is an array of n integers, and the memory space for an integer is 1 byte. While Bubble sort is applied to sort this integer array, at maximum how many number of swap operations and how much memory space are required?

- (a) $n(n + 1)$ swaps and n bytes memory space
- (b) $\frac{n(n+1)}{2}$ swaps and n bytes memory space
- (c) $n(n - 1)$ swaps and $n + 1$ bytes memory space
- (d) $\frac{n(n-1)}{2}$ swaps and $n + 1$ bytes memory space

Diagram for Questions 40-41

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.

Syntax	Description
MOV X Y	Moving the content of Y to X
ADD X Y	$OUT = X + Y$
SUB X Y	$OUT = X - Y$

Question 40

```

-----
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

$M1 = 0011, M2 = 0010, M3 = 0001, M4 = 0000$.

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

- (a) 0010
- (b) 0011

(c) 0100

(d) 0101

Question 41

```

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

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

$M1 = 0011, M2 = 0010, M3 = 0001, M4 = 0000$.

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

- (a) 0010
- (b) 0011
- (c) 0100
- (d) 0000

Question 42

The logic function of the following truth table is given by

$$Z = \bar{A}BC + A\bar{B}\bar{C}.$$

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	X
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	Y

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 43

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) (iii) only.
- (d) None of them.

Question 44

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 45

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

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

Answer:

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

Question 46

To learn the following skills, students would need to have different level of knowledge.

- (i) Knowing how to use Window XP.
- (ii) Knowing how to build Window XP.
- (iii) Knowing how to use MS WORD.
- (iv) Knowing how to build MS WORD.

In accordance with knowledge level, which of the following rankings is correct?

- (a) $iii > iv > i > ii$
- (b) $iv > iii > ii > i$
- (c) $i > ii > iii > iv$
- (d) $ii > i > iv > iii$

(Note: $X > Y$ means that skill X requires more knowledge than skill Y .)

Question 47

The logic function of the following truth table is given by

$$Z = (A + B)(B + C)(C + A).$$

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	X
1	0	0	Y
1	0	1	1
1	1	0	1
1	1	1	1

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 48

One of the following component, if removed, does not affect the use of the MS OFFICE in your personal computer. What is it?

- (a) RAM
- (b) VGA display card
- (c) Keyboard
- (d) Network card

Question 49

If the operational staff and equipment of a firm are analogized to the hardware of a computer, the middle managers and the top managers should be analogized to the _____ and _____ of a computer. Customers of a firm should thus be analogized to the _____ of a computer.

- (a) complier, interpreter, mind
- (b) interpreter, mind, complier
- (c) operating system, application software, user
- (d) source code, complier, machine code

Question 50

Suppose the operational staff is analogized to the hardware of a computer. It means that he/she would need detail procedure for doing his/her job. The detail procedure can thus be analogized to _____. In such case, the instruction placed by the top managers could be analogized to _____ and the function of the middle managers could be analogized to _____.

- (a) complier, interpreter, machine code
- (b) interpreter, mind, complier
- (c) operating system, high level language, complier
- (d) machine code, source code, complier