



Benha University

1st Term (2013/2014) Final Exam

Class: 1st Year Students

Subject: **Introduction to computers**



Faculty of Computers & Informatics

Date: **29 /12 /2013**

Time: **3 hours**

Examiner: Dr. **Walid Osamy**

ANSWER THE FOLLOWING QUESTIONS:

Question no.1 Multiple choice [30 points]

- 1-This computer component holds processed information before it is output.
a) **RAM** b) ROM c) bus d) ports
- 2-___refers to the physical or logical arrangement of a network.
a) Data flow b) Mode of operation c) **Topology** d) Architecture e) None of them
- 3-A television broadcast is an example of _____ transmission.
a)**simplex** b)half-duplex c)full-duplex d)automatic
- 4-Converting $(153)_{10}$ to base 8 yields which of the following results?
a)107 b)132 c)701 **d)231** e)153
- 5-Converting $(1010111)_2$ to base 8 yields which of the following results?
a)531 b)721 c)44 d)135 **e)127**
- 6-10111 is the two's complement representation of
a)-23 **b)-9** c)-7 d)+22 e)+7
- 7-An intranet is a public network and an extranet is a private network.
a)True **b) False**
- 8-Secondary storage is another name for memory
a)True **b) False**
- 9-These computers are arranged from least powerful to most powerful: microcomputer, midrange computer, mainframe, and supercomputer.
a)**True** b) False
- 10-What is the process of allocating main memory to programs and keeping the programs in memory separate from one another called?
a)memory adjustment b)virtual storage c) **memory management** d)real storage
- 11-What is the technique in shared systems that avoids mixing printout from several programs called?
a)Paging b) Slicing c)Queuing **d)Spooling**
- 12-The shared resources that the operating system manages include the CPU, memory, storage device, and the printer.
a)**True** b) False
- 13-Multiprocessing is concurrent processing of several programs by a single CPU.
a)True **b) False**
- 14-The result of the operation $\text{NOT } ((97)_{16} \text{ XOR } (AC)_{16})$ is
a) **$(323)_4$** b) $(2B)_{16}$ c) $(63)_8$ d) $(111001)_2$ e) none of them
- 15-An input device that reads printed text and graphics and transfers them to a computer in digital form.
a) digital camera **b)scanner** c) MICR d) RFID readers

- 16- A device that enables a computer to communicate over telephone lines.
 a) Repeater b) **Modem** c) Switch d) Wireless access point
- 17-Which of the following is/are not part of the CPU?
 a)Control unit b)ALU c) Registers **d) Primary Storage**
- 18- This coding system is designed to support international languages like Chinese and Japanese.
 a) ASCII b) **Unicode** c) EBCDIC d) ANSI
- 19-A letter, digit, or special character is represented by a code in a
 a) bit b) **byte** c) kilobyte d) megabyte
- 20-A laser printer uses nonimpact technology to produce characters
 a)**True** b) False
- 21-..... is a duplicate copy of data or other computer content for use in the event that the original version is destroyed.
 a) spooling b) buffering c) virtual memory d) **backup**
- 22-A memory-management technique that uses hard drive space as additional RAM.
 a)Virtual private network b) **Virtual memory** c) Virtual Machine d) None of them
- 23- are the four general operations that are performed in each machine cycle.
 a) fetch, execute, store and decode b) decode, execute, store and fetch
 c) decode, fetch, store and execute **d) fetch, decode, execute and store**
- 24-The sum of 11101 + 10111 equals_____.
 a)110011 b)100001 c)**110100** d)100100
- 25- The time required to position a disk driver's access arm over a particular track is known as
 a)data transfer time b) direct time **c)seek time** d) rotational delay
- 26- A computer network must contain at least this number of computers.
 a) ten b) a few c) twenty d) hundreds e) **two**
- 27- The representation of positive numbers in sign-and-magnitude, one's complement, and two's complement are all identical.
 a)**True** b) False
- 28- A programming error that occurs when running a program produces incorrect results.
 a)**logic error** b)syntax error c)run time error d)linker error
- 29- Freeware software is copyrighted software that is distributed on the honor system; consumers should either pay for it or uninstall it after the trial period.
 a)True b) **False**
- 30- This computer term is used to describe the number of bits that a CPU accessed at one time.
 a) Nibble b) **word** c) byte d) character

Question no.2 [30 points]

1. Provide an example for a hardware associated with each operation of the five basic computer operations. Name and describe briefly three strategies that can be used for speeding up the operations of a computer.

- **Input devices**

- Used to input data into the computer

- Keyboards, mice, scanners, cameras, microphones, joysticks, touch pads, touch screens, fingerprint readers, etc.

- **Processing devices**

- Perform calculations and control computer's operation

- Central processing unit (CPU) and memory
- Output devices
 - Present results to the user
 - Monitors, printers, speakers, projectors, etc.
- Storage devices
 - Used to store data on or access data from storage media
 - Hard drives, CD/DVD discs and drives, USB flash drives, etc.
- Communications devices
 - Allow users to communicate with others and to electronically access remote information
 - Modems, network adapters, etc.
- **Multiprocessing** The capability to use multiple processors or multiple processing core in a single computer , usually to process multiple jobs at one time faster than could be performed with single processor.
 - **where each processor or core typically works on a different job**
- **Parallel processing** A processing technique that uses multiple processors or multiple processing cores simultaneously, usually to process a single job as fast as possible.
 - **where multiple processors or cores work together to make one single job finish sooner**
- Pipelining: Allows multiple instructions to be processed at one time

2. What is an operating system? What are the main functions of an operating system? Provide examples of operating systems.

A collection of programs that manage and coordinate the activities taking place within a computer system

Definition: A set of programs that lies between applications software (i.e., user) and the hardware.

We said that OS is a set of programs. The most important program in OS is the Kernel

Functions:-

User Interface

Booting the computer

Kernel is loaded into memory

Processes are started

Configuring devices

Device drivers are often needed; can be reinstalled if needed

Plug and Play devices are recognized automatically

Program Execution

Managing resources and jobs

Makes resources available to devices

Monitors for problems

Scheduling routines

File management

Create, rename, delete, and move files and folders

Security

Passwords

Examples: windows7 windows server 2013 window xp

3. Explain what is meant by disk-scheduling? Name and describe briefly three disk-scheduling algorithms.

Disk-scheduling algorithms determine the order in which pending disk requests are processed. First-come, first-served disk scheduling takes all requests in order, but is not very efficient. Shortest-seek-time-first disk scheduling is more efficient, but could suffer from starvation. SCAN disk scheduling employs the same strategy as an elevator, sweeping from one end of the disk to the other.

4. What is data compression and why data compression is important? What is the difference between lossless and lossy data compression?

A compression problem involves finding an efficient algorithm to remove various redundancy from a certain type of data.

The *solutions to the compression problems* would then be the **compression algorithms** that will derive an alternative sequence of symbols which contains *fewer number of bits in total, plus the decompression algorithms* to recover the original string.

The goal of **data compression** is to represent a source in digital form (such as text, image, sound or any combination of all these types such as video.) with as few bits as possible while meeting the minimum requirement of reconstruction of the original.

As computer file size increases and data becomes more complex, more storage space is required for archiving and backing up. Data compress overcome physical size limitations of storage devices

Lossless data compression	Lossy data compression
<ul style="list-style-type: none"> • A compression approach is lossless only if it is possible to exactly reconstruct the original data from the compressed version. • There is no loss of any information during the compression process. • Lossless compression is called <i>reversible compression</i> since the original data may be recovered perfectly by decompression. 	<ul style="list-style-type: none"> • A compression method is lossy if it is not possible to reconstruct the original exactly from the compressed version. • There are some insignificant details that may get lost during the process of compression. • The word insignificant here implies certain requirements to the quality of the reconstructed data.

5. Write in your own words about Multimedia data representation inside computers.

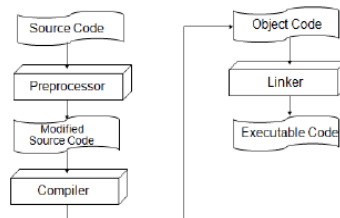
Computers are multimedia devices that manipulate data varying in form from numbers to graphics to video. Because a computer can only manipulate binary values, all forms of data must be represented in binary form.

Data is classified as being continuous (analog) or discrete (digital). Integer values are represented by their binary equivalent, using one of several techniques for representing negative numbers, such as sign magnitude or one's complement. Real numbers are represented by a triple made up of the sign, the digits in the number, and an exponent that specifies the radix point. A character set is a list of alphanumeric characters and the codes that represent each one. The most common character set is Unicode (16 bits for each character), which has ASCII as a subset. The 8-bit ASCII set is sufficient for English but not for other (or multiple) languages. There are various ways for compressing text so that it takes less space to store it or less time to transmit it from one machine to another.

Audio information is represented as digitized sound waves. Color is represented by three values that represent the contribution of each of red, blue, and green. There are two basic techniques for representing pictures, bitmaps and vector graphics. Video is broken up into a series of still images, each of which is represented as a picture

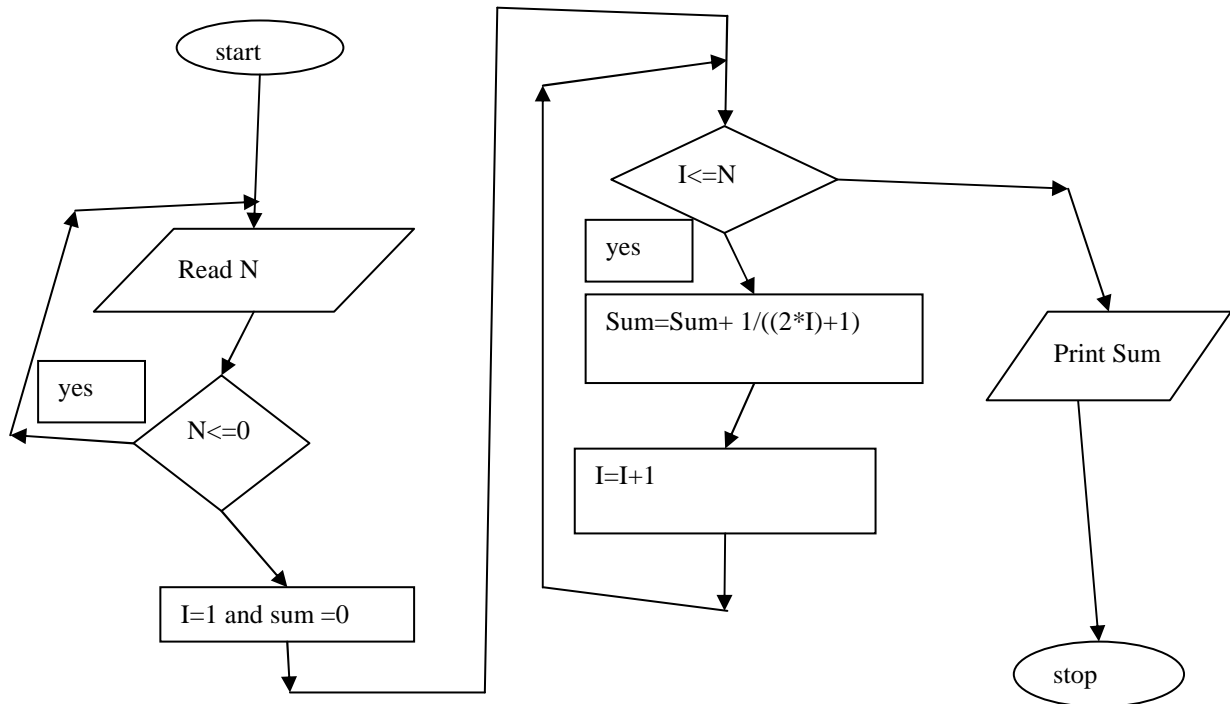
Question no.3 [45 points]

1- Draw a diagram that illustrates the process of translating a C++ source file into an executable file.



2- Draw a flowchart for a program which reads (inputs) a positive integer N and calculates the following sum.

$$sum = 1 + \frac{1}{3} + \frac{1}{5} + \dots + \frac{1}{2N+1}$$



3-What is the output of the following code?

A.

```

int num = 12;
while (num >= 0)
{
  if (num % 5 == 0)
    break;
  cout << num << " ";
  num = num - 2;
}
cout << endl;
  
```

12

B.

```

int num = 12;
while (num >= 0)
{
  if (num % 5 == 0)
  {
    num++;
    continue;
  }
  cout << num << " ";
  num = num - 2;
}
cout << endl;
  
```

12 11 9 7 6 4 2 1

4- What is the value of *alpha* after the following C++ code executes?

A.

```

int alpha=5;
switch (alpha)
{
  case 1:
  case 2:
    alpha = alpha + 2;
    break;
  }
  
```

B.

```

int i = 10, j = 20, k = 4, d = 8, alpha=5;
double e = 1.0;
double f = k + d++ * 2;
double h = j - --i + k + f; alpha += h * e;
cout << alpha << endl;

alpha=41
  
```

```

        case 4:
            alpha++;
        case 5:
            alpha = 2 * alpha;
        case 6:
            alpha = alpha + 5;
            break;
        default:
            alpha--;
    }

```

Alpha=15

5-

A- Convert the following conditional expression into an if/else statement.

$$q = (x < y) ? (a + b) : (x * 2);$$

```

if(x<y)
    q=a+b;
else q=x*2;

```

B- Which values should be assigned to the variables *a*, *b* and *c* in order for the following program to display the string *Hello, World!?*

```

bool a=.....false....., b=.....false....., c=.....false.....;
if(a)
{
    if(b&&!c){ cout<<"Goodbye "<<endl;
    }else if(!b&&!c){ cout<<"Nothing Here"<<endl;
    }
} else { if(!b){
        if(!a &&(!b &&!c)){cout<<"Hello, world!"<<endl;}
        else {cout<<"Not quite."<<endl;}
    }
}

```

6-Given the following program segment:

```

j = 2;
for (i = 1; i <= 5; i++);
{
    cout << setw(4) << j;
    j = j + 5;
}
cout << endl;

```

Ans.

```

i=1;j=2;
while(i<=5)
{
    cout << setw(4) << j;
    j = j + 5;
}
i++;

```

```
}
```

```
j=2;i=1;  
do  
{  
  
    cout << setw(4) << j;  
    j = j + 5;  
    i++;  
}while(i<=5)
```

write a while loop and a do. . .while loop that have the same output.

7-Write a program that read three numbers from a file named *input.dat* and write the sum of the numbers to a file named *output.dat*. (Also, include the statements to close the files and *be sure* to display an error message if the input file cannot be opened.)

```
#include<iostream>  
#include<fstream>  
using namespace std;  
int main(){  
    ofstream outputfile;  
    ifstream inputfile;  
    int n1,n2,n3;  
        outputfile.open("input.dat ");  
        inputfile.open("output.dat ");  
        inputfile>>n1>>> n2>>n3;  
    int sum=n1+n2+n3;  
        outputfile<<sum<<endl;  
    outputfile.close();  
    inputfile.close();  
    return 0;}
```

8-In a right triangle, the square of the length of one side is equal to the sum of the squares of the lengths of the other two sides. Write a program that prompts the user to enter the lengths of three sides of a triangle and then outputs a message indicating whether the triangle is a right triangle.

```
#include <iostream>  
using namespace std;  
  
//input: lengths of a triangle  
//output: wether it is a righth triangle or not  
int main(void)  
{  
    double a, b, c;  
    cout <<"Enter the 3 sides of the triangle: ";  
    cout <<"\na: ";  
    cin >> a;  
    cout <<"\rb: ";  
    cin >> b;  
    cout <<"\rc: ";
```



```

cin>> c;
cout <<endl;

if(c*c == (a*a + b*b))
    cout <<"thats a right triangle.\n";
else
    cout <<"thats not a right triangle.\n";
return 0;
}

```

9-Write a program that uses a nested loop to display a table consisting of 3 rows and 11 columns. The first column should contain the numbers 1 through 3. The second and subsequent columns should contain the result of raising the number in the first column by the numbers 0 through 9. The table will look similar to the following chart.

1	1	1	1	1	1	1	1	1	1	1	1
2	1	2	4	8	16	32	64	128	256	512	
3	1	3	9	27	81	243	729	2187	6561	19683	

```

#include<iostream>
#include<cmath>
using namespace std;

int main()
{
for(int i=1;i<=3;i++)
{
    cout<<i<<"\t";

    for(int j=0;j<10;j++)
    {
        cout<<pow((double)i,j)<<"\t";
    }
    cout<<endl;
}
return 0;
}

```

Good Luck,