

SECTION A

Don't write in this margin.

① a) $103_{10} = 1100111_2$ 2

b) $270_{10} = 100001110_2$ 2

4 marks

② a) $10111_2 = 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$
 $= 16 + 4 + 2 + 1 = 23_{10}$ 1 2

b) $1111111_2 = 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$
 $= 64 + 32 + 16 + 8 + 4 + 2 + 1$
 $= 127_{10}$ 1 2

4 marks

③ The 3 main parts of computer:

* System unit 0.5

A box (container, housing) which contains all internal components of the computer 0.5

* Input peripherals (devices) 0.5

they are used to enter data and commands into the computer 0.5

* Output peripherals (devices) 0.5

they are used to send out the result. 0.5

3 marks

④ (a) Computer architecture: description of functional parts of a computer and their interconnections 1 1/2

(b) Computer configuration: adopted organization for assembling and functioning the hardware installation of the computer. 1/2

c) Computer system :

* Set of Software and Hardware necessary to facilitate the user to manipulate a computer. 1/2

* A system able to receive (read) data, process them and produce useful information to the user. 1/2

* A system that allows to exchange information by using computers. 1/2

6 marks

5

a) Active memory : - read and write memory
- is volatile
- working field of the processor
- is a memory which stores data and instructions under processing 1

b) Dead memory : is read only memory 1

c) Main memory : Active memory 1

d) Permanent memory : is a non volatile memory 1

4 marks

6 Importance of an ALU of a CPU
- the Arithmetic Logic Unit
- It can perform arithmetic and logic operations.
- or to perform calculations 2

2 marks

7 Explain why the MS Access is used as database application software.

* Is used as db application software because
- It is a relational database model the user can create table, query, form, report,

and macros

- uses close relationship between tables
- user can store without redundancy
- sharing data field between users
- Data security
- compilation or centralization administration.

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5 pts

⑧ Four types of instructions:

- Input instructions,
- output instructions,
- Processing instructions,
- Declarative instructions,
- Assignment instructions,
- Control instructions
- Conditional instructions;

4 marks

⑨ The elements of numerical expressions:

- Variables
- Constants
- Numeric output
- Braces
- parenthesis
- Operands,
- Brackets,

5 marks

⑩ The steps of solving programming problem:

- Clarifying programming needs,
- Analyse the problem
- Design the problem
- Code the problem
- Test the program
- Document and maintain the program

- Identify and understand the problem
- split problem into subproblem

- Designing the problem ¹
- Coding ¹
- Compiling and debugging program ¹
- Execution of the program ¹
- Testing the program. ¹ ¹ ¹

5 marks

(11) the logical operators used:

AND (&&) ¹

OR (||) ¹

NOT (!) ¹

3 marks

(12) the structure of C or C++

- Header files (preprocessor) ¹
- Function prototypes / declaration function ¹
- The main function ¹
- Brackets } ¹
- Body of program ¹ ^{beginning} / statements / instructions ¹
- Function definition ¹

5 marks

(13) examples of errors ¹

- compiler errors ¹
- Runtime errors ¹
- logical errors ¹
- syntax errors ¹
- Grammatical / lexical errors ¹
- semantic errors ¹
- link errors ¹

5 marks

SECTION B

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```
(14) #include <stdio.h>
int main()
{
    int a, b, c, product;
    printf("Enter values of a, b and c");
    scanf("%d %d %d", &a, &b, &c);
    product = a * b * c;
    printf("The product %d", product);
}
```

10 marks

(15) Algorithm

Variables num: integer

start

Read (num)

if num mod 2 = 0 then

write num "is even"

else

write num "is odd"

end if

end

1/5

Program

```
#include <iostream.h>
```

```
void main()
```

```
{
    int num;
```

```
    cout << "Enter number";
```

```
    cin >> num;
```

```
    if (num % 2 == 0)
```

```
        cout << num << " is even";
```

```
    else
```

```
        cout << num << " is odd";
```

```
}
```

2010

10 marks

16

Functions of memory management

- Provide memory space for each process 2
- Protect processes among each other 2
- Allow memory sharing if necessary 2
- Manage process swapping in the memory partition. 2
- Virtual memory management
- Memory paging 2
- Memory Segmentation 2

marks

17

a) Characteristics of Memory

- Address 1
- Capacity 1
- Access time 1
- Access type 1
- Memory cycle 1
- Bandwidth 1
- Latency 1
- Volatility 1
- Physical size 1
- Cost of information stored 1

16

b) Access types

- Sequential access : To access to information you must pass through all the previous ones
- Direct Access : Each information has its own address which allows to locate it directly 1
- ~~Direct~~ Semi sequential Access
is a combination between direct access and sequential access 1
- Access by content
Each information is identified by a search key 1

Random access
the time for accessing any information of the memory is the same

1 14

marks

(13) the elements of command unit

- Program counter 2
- Timer (system clock) 2
- Instruction decoder 2
- Bus unit 2
- Instruction register 2
- State register 2
- Accumulator 2

marks

SECTION C

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(19) X^{th} of good program.

* Implementation is free of errors. ²
The programmer must resort to methods, such as testing to establish the correctness of a program i.e. program error free. ¹

* The program is well documented.

It is important that computer program be well documented. Documentation exists to assist in the understanding or use of a program. This can be of great value not only to those charged with maintaining or modifying a program but also to the programmer themselves. ² ¹

Details of particular programs or particular pieces of programs, are easily forgotten or confused without suitable documentation.

* The program is maintainable ²

Programs require a continuing process maintenance and modification to keep pace with changing requirements and implementation technologies.

Maintainability and modifiability are essential characteristics of real programs.

A program's ability to be read and understood is an important prerequisite to its maintainability and modifiability. ¹

* The program must respect the syntax ²

* Header file name: is a file which contains all elements that need by the program for its execution. ² ¹

* Variable declaration ²
the variables to be used must be declared before hand. ¹

* Comments: are the explanations of the program ² ¹

* the functions / procedure are the principal elements, allow the execution of these instructions ² ¹

* they must be corrected with errors. ² ¹

* Portability (it must be portable) able to be run very well on the big number of machine with different architecture ² ¹

* Comprehensible: must be understood by every one. ² ¹

(20) Algorithm

Variable i, fact: integer 0.1

start 0.1

fact ← 1 0.1

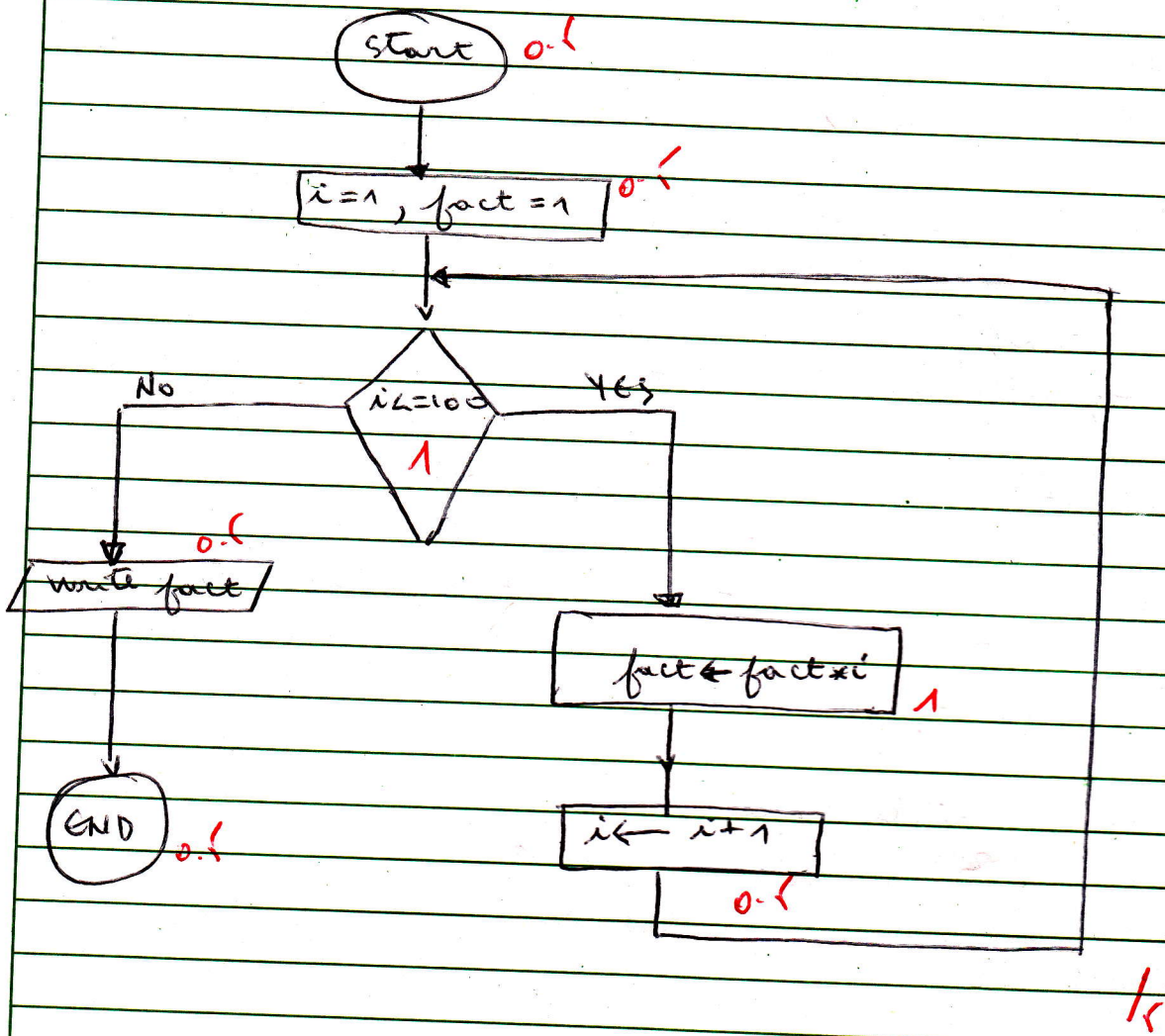
For i = 1 To 100 1

fact ← fact * i 1

~~i~~ i ← i + 1 0.1

write "factorial is fact" 0.1 1/5

End 0.1



```
(i) #include <stdio.h>
void main()
{
    int i, fact=1;
    for (i=1; i<=100; i++)
        fact = fact * i;
    printf ("The factorial is %d", fact);
}
```

ASandy