



## EXAMEN SESSION PRINCIPALE

<b>A.U:</b>	2021/2022	<b>Cycle:</b>	Engineering
<b>Module:</b>	Softwares Engineering I	<b>Level:</b>	2 <sup>ND</sup> Level
<b>Time:</b>	09H.00 - 11H.00	<b>Field</b>	ILSI
<b>Date</b>	11/01/2022	<b>Duration:</b>	2h
<b>Documents:</b>	Not Authorized	<b>N° pages:</b>	3

<i>Exercise</i>	<i>1(5pts)</i>	<i>2(5pts)</i>	<i>3(5pts)</i>	<i>4(5pts)</i>
<i>C.L.Os Assesment</i>	K2, K2,S2	K2, K2,S2	V3	K2, S2,V3

### Exercice1 :

Company A specializes in air transport. At its central airport, ground staff manage aircraft arrivals and departures. There are approximately 100 departing flights and 100 arriving flights per day.

Each plane arrival generates a task: during the half hour following the arrival of the plane, an agent checks that the passengers leave the plane and go to their luggage.

A plane departure generates three check-in tasks and one boarding task: three agents check in the passengers during the two hours preceding the flight and one agent boards the passengers during the half-hour preceding the departure. If an unaccompanied child or a disabled person takes (or leaves) the plane, a task is created: an agent takes care of this person during the time they are at the airport.

Every day, more than 500 tasks are carried out by the ground staff of the airport. The number of agents, full-time or part-time, necessary for the smooth running of a day is calculated one month in advance by an operational research department of company A. Provisional schedules are drawn up.

The same day, the scheduled agents arrive at the airport and make themselves available to dispatcher R. The latter is responsible for assigning the agents present at the airport to the tasks created by the flights and dealing with hazards or last-minute contingencies. The contingencies are plane delays, additional flights, unaccompanied children, disabled people, absent agents, prolonged tasks, etc. R plays a crucial role in the smooth running of a day at the airport. For this, R uses a paper schedule that he modifies in pencil. Agents come to consult this schedule to find out what their next task is.

With the volume of flights increasing year on year, R finds it increasingly difficult to plan and change schedules in real time.

The rest of the exercise describes the development of the software L which will help R to fulfill its role.

In L, the people involved are:

- R, the regulator,
- Agents Aj (j ranging from 1 to approximately 100),
- U, the representative of the users of the L software (R and the Aj),

- I, the person in charge of existing IT,
- P, the project manager,
- Di developers (i ranging from 0 to 4).

### **Required work :**

#### **1. Pre-study**

- a- What are the problems that led to the birth of the L project?
- b- What can R do, given his problematic situation?
- c- What do U, R and I do?

#### **2. The requirements specification phase**

- a- Who are the actors in this phase?
- b- What is the role of U during this phase?
- c- What is the role of P during this phase?
- d- What are the developers for in this phase?
- e- How does this phase end?

#### **3. The overall design phase**

- a- Who is the main actor during this phase?
- b- How does this phase end?

#### **4. Coding and testing phases**

- a- Who are the phase actors?
- b- What do they do during this phase?

#### **5. The installation phase**

- a- What happens if R and Aj find that L does not meet their needs?
- b- What happens if R and Aj find that L meets their needs?

### **Exercice2 :**

Consider the following program P1 :

```
readln(b, c, x) ;
if b<c
then begin
    d :=2*b ;
    f :=3*c
    if x>=0
    then begin
        y := x ;
        e := c ;
        if (y=0)
        then begin
            a :=f-e ;
            if d<a
            then begin
                writeln(a)
            end
        else begin
            writeln(d)
        end
    end
end
```

end

end

- 1- Give the control graph  $G(P1)$  associated with the program  $P1$ .
- 2- Give 3 control paths and 2 paths which are not control paths of the graph  $G(P1)$ .
- 3- Give the expression of the control paths of  $G(P1)$ .
- 4-  $DT1 = \{b=1, c=2, x=2\}$ . Give the path sensitized by  $DT1$ .

### **Exercise 3:**

- 1- Consider the program below. Rewrite the program, number the lines then find the definitions and uses of the variables:

```
cin >> a >> b;
if (b>a){
    x=b;
    if (b>20)
        x=x+9;
    else
        x=x+1;
}
else {
    x=a;
    if (a>20)
        x=x+15;
        x=x-5;
}
if (b>a+20)
    x=20;
cout << x;
```

### **Exercise 4:**

- 1- What is the difference between the black box test and the white box test?
- 2- Given a program calculating the sum of two positive integers entered in the form of a character string on the keyboard, what are the equivalence classes to test it.