

**SPECIAL MOCK GCE EXAMINATIONS**

DECEMBER 2013

ADVANCED LEVEL

Subject/Code:	Computer Science 795
Paper N°	Paper 2
Examiner	DZEUGANG Placide

**TIME ALLOWED: 2 hours**

***INSTRUCTIONS***

1. This Question Booklet is your question paper. Do not write anything therein apart from your name and candidate number
2. *This Question Booklet contains nine questions. Answer any **SIX** questions.*
3. All questions carry 20 marks each. For your guidance, the approximate mark for each part of a question is indicated in brackets.
4. You are reminded of the necessity for good English and orderly presentation in your answer.
5. In calculations, you are advised to show all the steps in your working, giving your answer at each stage.
6. Clip board, log tables, slide rules, programmable calculator, cellular phone, pager and electronic gadgets in any form are not allowed.
7. Noiseless and cordless electronic calculators may be used.
8. The Answer Sheet must be handed over to the invigilator before leaving the examination hall .

**TURN OVER**

### Question 1

1. For each type of software, copy the correct description along with two examples:  
(1.5 x 10 marks)

<b>Application Software</b>	<b>Example Applications</b>	
1. Word processors	- Internet Explorer	- MS Outlook Express
2. Spreadsheets	- Real Player	- Windows Media Player
3. Databases	- Adobe PageMaker	- Lotus 123
4. Desktop publishing programs	- Firefox	- MS PowerPoint
5. Presentation applications	- Word Perfect	- MS Messenger
6. Web design applications	- MySQL	- MS Word
7. Graphics programs	- CorelDraw	- MS FrontPage
8. Multimedia display programs	- MS Publisher	- DreamWeaver
9. Web browsing applications	- MS Excel	- MS Access
10. Communications software	- Macromedia Director	- Paint Shop Pro

**Descriptions**

- Used to combine and control graphics and text in a single document
- Used to perform calculations on rows and columns of data
- Allow you to create pictures and edit photographs
- Used to send messages and emails
- Enable you to write, edit and print letters, articles and reports.
- Used to design and edit pages of information for the internet
- Allow you to view videos and animations with sound
- Use to organise and search through collections of data
- Used to view websites on the internet
- Allow you to present information to an audience

2. Describe how bespoke software is different from the normal software packages purchased in shops. (2 marks)
3. Give a short description (or definition) of the following words or expressions (*no more than 2 lines per word*) (3 marks)  
*Loader, Crippleware, Open source software*

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### Question 2

1. A variable x is declared as integer. Is the assignment  $x \leftarrow 2.08$  possible? Why or why not? If instead of the above the assignment  $x \leftarrow a$  is done where a is declared to be a character variable. Is this appropriate? Explain your answer (6 marks)
2. What is the advantage of a programming language like Pascal which has a Boolean data type over C which does not have a proper Boolean data type? (3 marks)

3. (a) How many bits make up a byte? **(1 mark)**  
(b) If a character is represented by 7 bits, how many bytes can be used in representing a chain of 28 characters? **(2 marks)**
4. Given that an integer is represented in 16 bits and a character in 8 bits, a structure is defined to store information about each worker of a certain company as follow.
- Name (20 characters)
  - Date of birth (3 integers and 2 characters) i.e. (Date-Month-Year) or D/M/Y
  - Date of recruitment (same as date of birth)
  - Salary (integer)
- (a) How many bytes are needed to hold information of a worker in this company? **(5 marks)**
- (b) If the company has 300,000 workers, how many megabytes of disk space are necessary to hold information on all the workers of the company? **(3 marks)**  
(Assume 1 Megabyte =  $2^{20}$  bytes)
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### Question 3

1. What is computer architecture? Differentiate computer architecture and computer organization **(3 marks)**
2. What is the von Neumann bottleneck? Explain how this can be solved by the use of bus architecture **(3 marks)**
3. What is a register? What is its role in a computer? Name three examples of register and the function of each **(5 marks)**
4. What is a cache? What can be a problem of a computer which is not having a cache? **(3 marks)**
5. Explain the influence of the following concept on the performance of a computer **(6 marks)**
- Processor speed
  - RAM capacity
  - Width of the data bus
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### Question 4

- 1- Find the following differences using 2's complement arithmetic.  $3.125 - 6.5$  **(5 marks)**
- 2- Knowing that the ASCII decimal code of "A" is 65, code the following word using ASCII decimal: "Placide" **(5 marks)**
- 3- A certain computer uses 11-bits words for storing a floating point number:
- 1 bit represent the sign, S; 0 for positive and 1 for negative
  - The exponent, E, is a 4-bits value, stored in 2's complement form

- The mantissa, M, is a 6-bits normalized value, with the binary point assumed to be just in front of the leftmost bit.
- a) What are the largest and the smallest positive value which may be represented? **(4 marks)**
- b) Give the representation of: -7.3 and 6.375, stating the error in each representation. **(6 marks)**

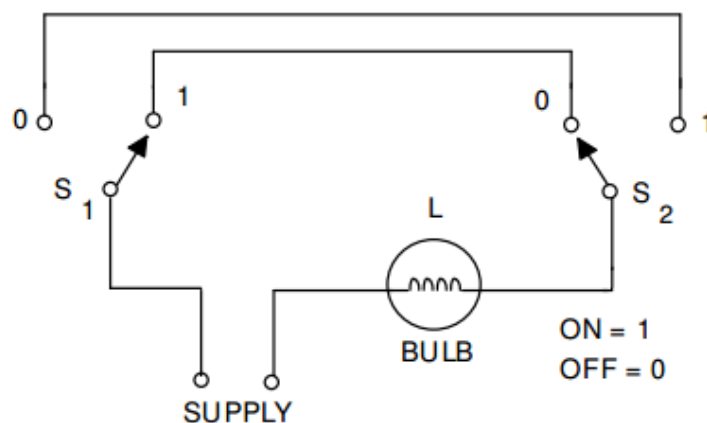
### Question 5

- 1- What is an operating system? Present the operating system of a computer as **(6 marks)**
  - A virtual machine
  - Resource manager
- 2- Why command line interface is still useful in our day despite the advantages offering by the graphical user interface? **(2 marks)**
- 3- What is a deadlock? Describe an example of deadlock in our daily life **(4 marks)**
- 4- By the use of a diagram, state and explain the three main states of a process, and when the transition between those states occurred **(8 marks)**

### Question 6

- 1- Four of the following Boolean equations are incorrect. Identify them and write their correct forms. (4 marks)
 

(a) $A + \bar{A}B = A + \bar{B}$	(c) $A+0=A$	(e) $A+AB=A$	(g) $A(\overline{A+B}) = A$
(b) $A\bar{A} = 1$	(d) $A+A=A$	(f) $\overline{AB} = \bar{A}\bar{B}$	(h) $\overline{A+B} = \bar{A} + \bar{B}$
- 2- For  $F = A\bar{B}\bar{C} + \bar{A}BC + A\bar{B}C + ABC + AB\bar{C}$ , Simplify using Karnaugh map and realize the corresponding logic circuit. (8 marks)
- 3- A staircase light is controlled by two switches S1 and S2, one at the top of the stairs and another at the bottom of the stairs. The circuit diagram of the system is shown in the figure below.



- a) Make a truth table for this system. (4 marks)
- b) Write the logic equation in sum of product form. (2 marks)
- c) Realize the circuit using AND and OR gates. (2 marks)

### Question 7

Suppose that a programming language is defined as being able to perform only the following actions:

	<i><b>ACTION</b></i>	<i><b>MEANING</b></i>
1	$x \leftarrow a;$	Assign $a$ to $x$
2	$\text{if}(a < b) \text{ goto } L;$	Jump to instruction which label $L$ if $a$ is less than $b$
3	$\text{if}(a = b) \text{ goto } L;$	Jump to instruction which label $L$ if $a = b$
4	$x \leftarrow a + 1;$	Assign $a + 1$ to $x$
5	$x \leftarrow a + b;$	Assign $a + b$ to $x$
6	$x \leftarrow a - b;$	Assign $a - b$ to $x$
7	$\text{read}(a);$	Read a value from the keyboard and store it in variable $a$
8	$\text{goto } L;$	Unconditionally jump to instruction with label $L$
9	$x \leftarrow 0;$	Assign 0 to $x$
10	$\text{write}(x);$	Print the value of $x$ on the screen

- 1- Let's consider the following algorithm using only the language features defined above.

```

read(a);
read(b);
c ← 0;
count ← 0;
L: c ← c + a;
count ← count + 1;
if (count < b) goto L;
write(c);

```

- a) Execute manually the algorithm in the case where 6 and 4 are read as the values of  $a$  and  $b$  respectively during the execution. Do the same if 4 and 6 are read instead as the value of  $a$  and  $b$ . **(6 marks)**
  - b) What does the algorithm do? Justify your answer. **(3 marks)**
  - c) Design a flowchart corresponding to the following algorithm **(3 marks)**
- 2- Write an algorithm that calculate the division of two positive integers  $a$  and  $b$  ( $a \div b$ ), store the quotient in a variable  $q$  and the remainder in a variable  $r$ ; and then print both  $q$  and  $r$ . ( $a$  and  $b$  are input from the keyboard). **(8 marks)**

(Note: The division can be done here by subtracting successively the second number (b) from the first one (a) until the subtraction becomes impossible. The quotient is then the number of subtractions done and the remainder is the ...)

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### Question 8

1. Explain RR and SJF as far as process scheduling is concern, give the limit of each algorithm (4 marks)
2. Consider following process, with the CPU burst time given in milliseconds.

Process	Burst time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

Processes are arrived in p1, p2, p3, p4, p5 order of all at time 0.

- a) Draw Gantt charts to show execution using FCFS, SJF, nonpreemptive priority (*small priority number implies higher priority*) and RR (quantum = 1) scheduling. (8 marks)
- b) Also calculate turnaround time for each scheduling algorithms. (4 marks)
- c) What is the waiting time of each process for each one of the above scheduling algorithm? (4 mark)

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### Question 9:

- 1- Let's consider the following c-program

```
#include<stdio.h>
int main(void)
{
    int start, stop, step;
    int i;
    printf("Enter the first, the last and the increment: ");
    scanf("%d%d%d",&start, &stop, &step);
    for(i=start;i<=stop;i+=step)
        printf("%d ",i);
    return 0;
}
```

- a) What should be printed on the screen as outputs if the following inputs are entered: 2, 12 and 3 in that order? (4 marks)
- b) Draw the flowchart corresponding to the program. (4 marks)
- c) Recopy the program by replacing the “for loop” by a “while loop”. (4 marks)

2- Let's consider the following code fragment in C.

```
char car1, car2;  
car1 = 'B';  
car2 = car1 + 32;
```

What are the values printed by the following statements? Explain for each case.

(8 marks)

- a) `printf("%c", car1);`
- b) `printf("%d", car1);`
- c) `printf("%c", car2);`
- d) `printf("%d", car2);`

*I proclaim your success in Jesus name!!!*

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*for the solution*

**PLACIDE'S PERSONAL BLOG**

This block is a space where I share everything concerning my school activities (Lesson notes, questions and solution, leaning tools, ...). Above all everything concerning faith and "true love" in Jesus Christ, for my philosophy is based on the principle that our life is meaningless without Jesus Christ. "Put your life in the hands of the Lord; have faith in him and he will do it." (Ps 37:4)

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