Computer Science 2
0795

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

JUNE 2019 **ADVANCED LEVEL**

Subject Title	**Computer Science**
Paper No./Title	**2**
Subject Code No	**0795**

Two and a half Hours

Answer any SIX questions.

All questions carry 17 marks each. For your guidance, the appropriate mark for each part of a question is indicated in brackets.

You are reminded of the necessity for good English and orderly presentation in your answers.

In calculations, you are advised to show all the steps in your working, giving your answer at each stage/

1. (i) (a) Briefly explain the following giving one practical application of each: EEPROM, RAM **(4 marks)**
   (b) With respect to computer organization, explain briefly why address mapping is important **(2 marks)**

   (ii) (a) State what a cache memory is, and briefly describes how it works, **(3 marks)**
   (b) Briefly justify the needs for caching in memory hierarchies **(4 marks)**

   (iii) (a) Draw a process state diagram and explain the transitions in it. **(4 marks)**
   (b) What causes a new process to be created? **(1 marks)**
   (c) using appropriate computing terms explain what can cause a running process to halt. **(2 marks)**

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2. (i) Suppose X is a register whose current contents:

1	0	0	0	0	1	1	1

   What is the denary equivalent of register X if:
   (a) It represents unsigned binary integer. **(1 mark)**
   (b) It is a Binary Coded Decimal. **(2 marks)**
   (c) It stores a two's complement binary integer. **(2 marks)**

   (ii) Convert the following octal numbers to binary numbers: **(4 marks)**
   (a) 214_8 (b) $17F6_{16}$ **(4 marks)**

   (iii) From the truth table below:
   (a) Consider the corresponding logic gate. **(4 marks)**
   (b) Deduce the Boolean expressions for sum and remainder. **(4 marks)**

A	B	Sum	Remainder
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

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3. (i) Why are databases very important today? **(2 marks)**
   (ii) Define the following terms as far as databases is concerned
   (a) Foreign Key
   (b) Entity **(2 marks)**

   (iii) A school database has two tables TEACHERS and SUBJECT, with primary keys Teacher ID and Subject Code respectively. Study the tables below and answer the questions that follow.

   TEACHER

TEACHER_ID*	Teacher Name	DOB	Phone	Subject Code

   SUBJECT: table

Subject Code*	Title	Hours_per_Week

   (a) Define the term referential integrity as used in databases. How does it affect the records in a database table? Explain your answer using this database. **(3 marks)**

(b) Present exactly ONE row of sample data for the database entity TEACHER, and exactly TWO rows for the entity SUBJECTS. **(4 marks)**

(c) The relationship "Teaches" exists between the TEACHER table and SUBJECT table. What in the cardinality of this relationship? Explain what this cardinality means. **(2 marks)**

(d) Draw an entity relationship diagram that shows how these tables are related. Primary key and cardinality should be clearly shown. **(4 marks)**

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4. (i) (a) What does deadlock mean in process management? **(1 marks)**

(b) Draw a resources allocation diagram with three processes (P_1 P_2 and P_3) and three resources (R_1 R_2 and R_3), each having one instance, where the three processes are deadlocked. In your diagram, P_1 should be holding the resources R_2 and requesting for R_1. **(3 marks)**

(c) How could an operating system recover from a deadlock situation? **(3 marks)**

(ii) Jobs P1, P2, P3 need 6, 4 and 3 units of execution time respectively. They arrive at time units 1, 4 and 7.

(a) Which job is completed last if each executes for at most 2 time units at a time? **(2 marks)**

(b) Draw a Gantt chart for job execution if a Round Robin scheduling algorithm is used with a time quantum of 2 time units **(4 marks)**

(c) Calculate the average turnaround time for each of the processes **(4 marks)**

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5. (i) The World Wide Web is supported by a network infrastructure

(a) What is a computer network? **(1 mark)**

(b) Describe the tasks carried out by: a router and a web server. **(4 marks)**

(ii) EnohMakia is won a contract to network a university campus that has story buildings spread out in a large campus. The campus is situated in a geographical region where the is plenty of rainfall and thunder storms. Besides having a campus-wide network, each story buildings has to be networked, and computers must be locally connected if they are found within a given room (such as an office or teaching laboratory). EnohMakia can only network the university with one or more of twisted pair, coaxial and fiber optic cables.

(a) State which kind of cabling is best suited for each of campus-wide, story building and room networking justify your answer from properties associated with each network transmission medium. **(6 marks)**

(b) State and justify a network topology you would use to connect campus buildings. **(2 marks)**

(iii) Briefly explain why protocols and standards are vital for the operation of the internet. **(4 marks)**

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6. (i) State what you understand by the term System Development Life Cycle. **(1 mark)**

(ii) A school has expanded rapidly. A system analyst is employed to plan the introduction of a computer system which will store student records and details of student marks. For two distinct areas describe what the system analysts should report on during feasibility study. (4 marks)

(iii) After determining the information requirements of users of an organization, briefly discuss four main phases or activities involved in information systems development, from analyzing systems need to testing and maintaining the system, for each phase or activity, your answer should describe its activities, the deliverables expected, and EITHER benefits OR challenges expected. **(12 marks)**

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7. (i) (a) State what a subroutine is. **(1 mark)**

(b) Why is subroutine important in programming? **(2 marks)**

(c) During compilation, briefly explain what happens when a subroutine is called from a main program**. (4 marks)**

(ii) Describe the following algorithms designed techniques:

(a) Divide-and-conquer. **(2 marks)**
(b) Bottom-up-design **(2 marks)**

(iii) (a) Many problems can be solved bottom-up, such as the assembly of equipment's. Describe, in words only a simple problem of your choice that could be solved bottom-up **(3 marks)**

(c) Briefly outline how your bottom-up design technique in ii(b) could be applied to solve your problem in iii(a). **(3 marks)**

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8. (i) figure 3a shows a flow chart of the algorithm in figure 3b.

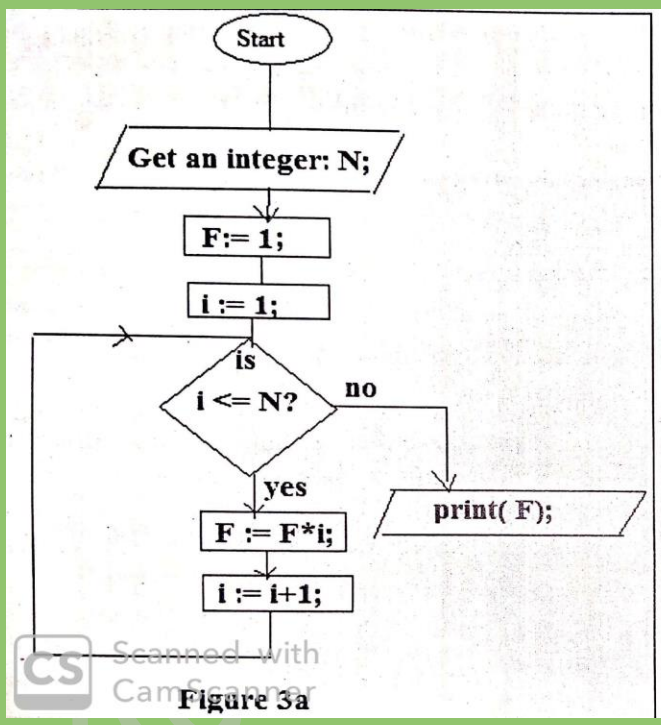

Figure 3a

```
1.   Algorithm  WhatAmIDoing;
2.   var F, N, i:integer;
3.   start
4.   write("enter an integer");
5.   read(N);
6.   i:= 1;
7.    F:= 1;
8.    while (i<= N) do
9.   F:= F*i;
10.   i:= i+1;
11.  Endwhile;
12.   write ("the value of F is", F);
13.  stop.
```

Figure 3b

(a) Distinguish between a pseudocode and a flowchart. (2 marks)
(b) What name is generally given to the code segment from line 8 to line 11? (1 mark)
(c) Write the output of the algorithm when N takes the following values.
(1) 4 **(2 mark)**
(2) 6 **(2 mark)**
(d) Bearing in mind your opinion in i(c), state in one sentence what this algorithm does. **(1 mark)**
(e) Write an equivalent algorithm using recursion **(5 marks)**

(ii) (a) Explain informally how the bubble sort algorithm for elements of an array works. **(2 marks)**

(b) Show how bubble sort sorts the following array, by writing out its content after each pass (also called scan) of the array.

4	15	1	16	10