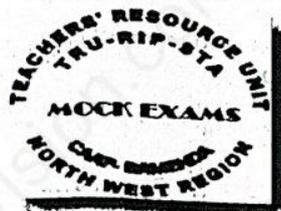


REPUBLIQUE DU CAMEROUN  
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# A ATVE

MARCH 2022

<b>The Teachers' Resource Unit and the Regional Inspectorate of Pedagogy, in collaboration with COSTA</b>	<b>SUBJECT CODE NUMBER</b> <b>0795</b>	<b>PAPER NUMBER</b> <b>3</b>
<b>GENERAL CERTIFICATE OF EDUCATION AND INTERMEDIATE TECHNICAL AND VOCATIONAL EDUCATION REGIONAL MOCK EXAMINATION</b>	<b>SUBJECT TITLE</b> <b>COMPUTER SCIENCE</b>	
<b>ADVANCED LEVEL</b>		

Time Allowed: **TWO HOURS**  
**INSTRUCTIONS TO CANDIDATES**

Mobile phones are **NOT ALLOWED** in the examination room.

- Carry out **ALL** the tasks given. For your guidance, the approximate mark for each part of a task is indicated in brackets.
- **Great importance** is attached to accuracy, layout and labeling of drawings and computer-generated outputs.
- You are reminded of the necessity for **good English and orderly presentation** of your answers.
- **Write algorithms in the answer booklet provided.** Also record in your answer booklet any information requested or that you believe would make it easier to understand how you carried out tasks or answered questions.
- You are expected to print out a single copy of relevant fragments of your program at different times. Please notify the instructor of any required printout that was not done.
- When an imperative programming language (PL) is required to write program code, either **Standard [ISO] Pascal** or the **[ANSI] C or C11** programming language Standards may be used.
- If need be, supervisors will assist you in recording details of intermediate work carried out on the computer.
- **Do not** write on the first page of your answer booklet. It is reserved for administrative purposes.
- Where information is provided as **soft copy**, notify the instructor if it is not found in your machine or has not been made available to you.

**SECTION A: Problem Solving (Programming)****(24 marks)**

Problem: A school is developing an Electronic report card that will calculate student's averages and rank them automatically. The program is able to carry out various calculations, but cannot sort students rank in either Ascending or descending order. You are expected to solve this problem by implementing a subroutine that will sort the rank. Your computer science teacher has provided to you the "Bubble Sort" Algorithm below to help you implement the solution.

```

void bubble_sort (int Array [], int size)
for i ← 0 to size-1
  for j ← 0 to size-1
    if (Array[j]>list[j+1])
      t ← Array[j]
      Array[j] ← Array[j+1]
      Array[j+1] ← t
    endif
  Next i
Next j

```

The best way to store students rank is to use an **integer Array** data structure.

**Task 1**

- a) In your answer booklet, give a declaration of the data structure i.e **array of 100 elements (rank of 100 students)** in either C or PASCAL **(1 mark)**
- b) Write an algorithm in your answer booklet for a procedure (**InputRank**) that will allow the rank of **n** students to be entered. It should have as parameters the Array of marks and size of the array **(3 marks)**

**Task 2**

Using an appropriate Integrated Development Environment (IDE), do the following

- a) Write a Programming language (PL) implementation of the algorithm in b) of Task 1 above. **(3 marks)**
- b) Write the programming language (PL) implementation of the procedure, or function, called **bubble\_sort**, that sorts the rank of the students in Ascending Order. **(4 marks)**
- c) Write a modified programming language (PL) implementation of the procedure, or function in b) above, called **bubble\_sort\_Desc**, that sorts the rank of the students in Descending Order **(3 marks)**
- d) Write a main function (**int main()**) and within its body
- Declare an Array to store the Rank of 10 students and call the "InputRank" function to populate it. **(3 marks)**
  - Call the procedure, or function **bubble\_sort** that sorts the ranks in Ascending order **(2 marks)**
  - Call the modified procedure, or function **bubble\_sort\_Desc** that sorts the ranks in Descending order **(2 marks)**
- e) Run the program, Enter the rank of 10 students in an unsorted manner. The procedures in d-ii and iii above should sort and display the sorted ranks in Ascending and Descending Order Respectively. Do a screen capture and save your work as "mock2022". **(3marks)**

**SECTION B: Data Base Design and Implementation****(26 marks)**

A Council in 2018 set up a scheme to award its registered members "certificates" for any recognized efforts they made to improve the lives of people in the community. Previously, the council registered these rewards manually. This year, they have decided to design and implement an electronic database named "COUNCIL".

Below is a "Flat File" of current awards for registered members.

Member Id	Name	Phone	Date Assessed	Activity Code	Description	Assessor Name	Email
012010	Ngwa Emile	673453632	21/02/2021	CU0011	Culture	Sue	sue@gmail.com
			14/04/2021	CR0001	Book Binding	Mohammed	moh@gmail.com
131092	Ngch Tohnain	678529888	15/04/2021	CR0001	Book Binding	Mohammed	moh@gmail.com
132099	Shola Nyuyen	655523476	01/03/2021	DG0302	Digital	George	geo@gmail.com
			14/09/2021	CR0001	Photography	Mohammed	moh@gmail.com
			21/10/2021	SC0112	Public Speaking	Jay	jay@gmail.com
			11/04/2021	DG0201	Animal Welfare	Sue	sue@gmail.com
145543	Nsai Polycap	654228286	12/02/2021	CU0011	Culture	Sue	sue@gmail.com
			02/06/2021	SC0112	Public Speaking	Jay	jay@gmail.com
			11/07/2021	SP8701	Tree Planting	Sarah	sarah@gmail.com

**NOTE:** From observation, we notice that the table above is not in 1NF, because the Name field is not atomic and there are repeating groups of attributes (date assessed, Activity code, Description, fee, Assessor Name, and Email).

The above table can be decomposed to two tables in 1NF and represented in standard notation as shown below:

**Member** (MemberID, Firstname, Lastname, phone)

**Certificate** (MemberId, ActivityCode, AssessmentDate, Description, AssessorName, AssessorEmail)

- Write SQL code to create the "COUNCIL" Database **(1 mark)**
  - Write SQL code to create the Member and Certificate Tables identifying the primary key of each **(3, 3 marks)**
  - Draw an Entity Relationship (ER) diagram that shows the relationship ("Awarded") between the Member and Certificate tables. **(4 marks)**
- A new member (MemberID=154551, FirstName=Shu, LastName = Paul, Phone=674589346) has been awarded a certificate. Write SQL code that will add the member in the Member table above. **(4 marks)**
- The Member and Certificate tables above are in 1NF. Evaluate the tables and decompose them to their Second and Third Normal forms (2NF & 3NF). Include any useful explanations. **(3, 3 marks)**
- Using an appropriate DBMS, implement a relational database for the tables obtained in 4 above **(3 marks)**
- Implement the relationship graph between Entities in 4 above and Print a copy **(2 marks)**

**END**