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REPUBLIQUE DU CAMEROUN
Paix-Travail-Patrie

MINISTERE DES ENSEIGNEMENTS SECONDAIRES

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TEACHERS' RESOURCE UNIT TRU-RIP-STA
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CAMP-BAMENDA NORTH WEST REGION

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MARCH 2025

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

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 labelling 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.

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SECTION A: Problem Solving (Programming) **(30 marks)**

Problem: A "**Njangi Group**" in a certain community has decided to automate their financial processes, as a result of the rapid increase in membership making manual processing of financial transactions difficult. Financial transactions include: Checking members balance, Checking Eligibility for a Loan, Calculating Interests, and setting deadlines for payments.

The management has decided to make life easy to both members and financial officers by developing a **Cash Dispenser Machine**. Members can use this machine to check their balance, withdraw funds, check their eligibility for a loan and so on.

"**Aigen Tech**", an IT startup company in which you work as a software developer has been given the Job to develop a program for the Cash Dispenser System.

The System analysts have already done their Job by analyzing the requirements of the system and documenting them in a Systems Requirements Specification Document.

As the lead Software Developer, your role is to coordinate the development of the required program for the system. Each component of the software has to be implemented as described in the Software Requirements Specification Document.

Go through the Work Breakdown Structure of the software Requirements Specification outlined below in the form of tasks which you and your team are to carry out to complete the project.

Sample Data: Figure one below shows how each member in the "Njangi" has their first name and balance stored separately with a **matching unique PIN** code known only by them. The *figure 1* below shows a sample of how information about a few members is stored. The PIN Codes are shown in the figure as the "**indices**".

NB: 101 - 105 are Unique PIN codes assigned Each Member

Member	Talla	Nelly	Bekog	Jid	Penn
	101	102	103	104	105
Balance	10000	50000	25000	55655	1566785
	101	102	103	104	105

Figure 1

The Array "**Balance**" has the corresponding account balance for each member as indicated with the PIN.

The following Algorithms may be required for some parts of your solution.

Algorithm 1

```
Function Authenticate(Array, PIN, Name)
  Boolean p = -1//assumed not authentic
  For i ← 101 to 105 Do
    IF Array[i] = Name THEN
      IF i = PIN  THEN
        P = 1// authentic
        break
      End If
    End IF
  End For
  Return p
End Procedure
```

Algorithm 2

```
Variables: Balance[ ], Member[ ], PIN, Amount,
loanAmount, Name, Option, K.
//Inside your main program, do the following
*  Add program statements that prompt and allow a user
   to enter their PIN and Name
*  A ← Return value from Authentic function
IF (A = 1)  {
   REPEAT
*  Display Cash Dispenser Menu Options, i.e
     1. Check Balance
     2. Cash Withdrawal
     3. Loan
*  Prompt and allow user to enter an option
*  SWITCH (option){
   Case of Check Balance
     Function call
     Break
   Case of Widthrawal
     Prompt & allow user enter withdrawal Amount
```


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```
        Function call
        Break
    Case of Loan
        Prompt & allow user to enter loan amount
        Function Call
        Break
    Default:
        Display "Invalid Option Entered"
    End SWITCH
*   Display " Do you want to Quit? Y/N(y/n): "
*   Input K // variable to store Y or N
  UNTIL K = 'N'
}
else{
Display "You are not Eligible for this Operation"
}
```

Figure 2

TASKS

Implement a Program for the System by answering the questions that follow

i) (a) What name is given to the data structure "Balance" in figure 1 above?

_____ **(1mark)**

(b) State the Programming Language & Integrated Development Environment respectively, that you will use to develop this program.

_____ **(2 mark)**

ii) (a) Implement a procedure Initialize (Array1, Array2), that takes as parameter two arrays **Member** and **Balance** and allow a user to store in them the values shown in figure 1. Indexing should match the PINs. **(4 marks)**

(b) Implement a function Authenticate (Array, name, PIN) by making use of Algorithm1 in figure 2, that allows a member to enter their name and PIN as arguments. A member passes the authenticity test if their name is in the members List and the PIN they entered matches the PIN associated with their name in the Members List. To implement this function, two things are necessary

- First search through the "Members" List and find a match to the name entered (Use Algorithm 1).
- Next, compare the PIN entered to that where the name was found, if both match, then the user in question is an authentic member and should proceed with other transactions. A *Boolean* variable to indicate whether a member is authentic (*when the value is 1*) or not (*when the value is -1*) should be returned from the function. **(3 marks)**

iii) (a) Implement a procedure "CheckBalance(Array, PIN)", that takes as argument the array "Balance", and a members PIN. The Procedure then checks the user's balance and displays it to them on the screen. However, the check is only done if the PIN is within the valid PIN range 101 to 105. If the PIN is valid display the message "Your Account Balance is: X", otherwise display "Invalid PIN". NOTE X is the amount from the Balance Array for the entered PIN. **(3 marks)**

(b) Implement a procedure "Cashwidthdrawal (Array, Amount, PIN)" that allows members to withdraw funds. The function checks if the members balance is sufficient. If it is sufficient, the withdrawal is done. The message "**You have successfully withdrawn X frs, \nyour new balance is Y**" should be displayed.

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The members new balance is then updated in the Balance Array. If the balance is insufficient, the message **"Your Balance is Insufficient is displayed"**.
NOTE: X and Y are values that indicate the withdrawn amount and balance respectively.

(4 marks)

(c) Implement a Procedure "Loan(Array, loanAmount, PIN)" that allows users to automatically take a loan or borrow money using the Cash Dispenser. A member is Eligible for a loan if and only if they are authentic, and their balance is 50000 and above and the requested loan amount must be greater than 200000 and less than or equal to 500000. If these criteria are met, then they are granted the loan and their balance is updated in the Balance Array. The message **"You have been granted a loan of X and your new balance is Y"** is then displayed. If the criteria is not met, then the message **"Sorry you do not meet the loan criteria"** is displayed. **(2 marks)**

iv) (a) Implement a main program using algorithm2 in figure 2 above in other to run your program. In the algorithm, include the appropriate function calls at the correct places. Declare all variables as global variables. **(8 marks)**

(b) Execute your program and carryout tests to confirm that your program is working correctly.
- A sample run for a non-authentic member (i.e name not in member list or PIN not found), print the output.
- A sample run for "Bekog" with successful withdrawal of 20000, print the output.
- Print your entire code. **(3 marks)**

HINT:
- Go through the main function to have an understanding of how the Authenticate function is used.
- For each function or Procedure call, be mindful of which array(Balance or Member) you are to pass as argument.

SECTION B: Database Design and Implementation **(20 marks)**

A lending library uses a relational database to record details of books, book loans and borrowers.
- A unique International Standard Book Number (ISBN) is assigned to each book title such as "Easy Coding".
- The library assigns a unique Access Code to each copy of a book in the library.
- The library assigns a unique Borrower Code to each borrower.

The relational database uses four tables **Book**, **BookCopy**, **BookLoan** and **Borrower** with attributes (primary keys underlined) as follows:

Book(ISBN, AuthorName, Title, NumberOfCopies)
BookCopy(AccessCode, ISBN, DateAcquired)
BookLoan(AccessCode, BorrowerCode, DateDueBack)
Borrower(BorrowerCode, Surname, Address)

Sample data for the database is shown in the figure below

Book	101	J. Duncan	Easy Coding	40
BookCopy	AC01	101	21/10/2024	
BookLoan	AC01	B01	21/12/2024	
Borrower	B01	Pascal	Street1-Bankii	

Figure 2

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1. Draw in the space provided below an Entity Relationship Diagram for the database. Your diagram must include attributes and Cardinalities. **(3 marks)**

2. Write the SQL statements you would use to create your Database. The database is called "**Library**". **(1 mark)**

3. Write the SQL statements that will create the various relations. **(4 marks)**

Book	BookCopy
BookLoan	Borrower

4. Populate your tables with 4 rows of sample data each by adding 3 more records to the ones shown in figure 3. **Two** of the 3 records you have added in "BookLoan" **must have** the BorrowerCode "**B01**". Then write down **ONLY** the SQL statement you have used to insert the records shown in figure 3 in the spaces provided below. Print a copy of your populated tables. **(6 marks)**

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Book:
BookCopy:
BookLoan:
Borrower:

5. Write an SQL statement to query the database that will display A Book's Author, the Borrowdate, the date to return the book, the Borrowers Code and address for a borrower whose Borrow code is B01. Copy the SQL code in the space provided and print the Result Set after running the query. Save the query as "RetrievdInfo" **(3 marks)**

6. Write an SQL statement to obtain the total number of books borrowed by the borrower with BorrowCode B01. This column should be named as "NumberOfBooks". Group the result by the book title. Write the SQL code in the space provided and print the output obtained. **(3 marks)**

END

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