

# NCC INTERNATIONAL DIPLOMA IN COMPUTER STUDIES



Programming Methods.

December 2007

Duration : 2 hours.

**Instructions to Candidates:**

- Answer **section A question 1** (compulsory) and **any 3**(three)from section B.
- Clearly Indicate the questions attempted from this paper on your answer booklet.

Candidates attempting to gain an unfair advantage or colluding in anyway whatsoever, are liable to be disqualified.

## Compulsory section A

**All candidates must answer this question.**

### **Question 1** [General knowledge]

- a) Briefly define stepwise refinement [3]
- b) Briefly describe the action of CASE statement giving a typical example usage in computing. [3]
- c) Show a dry run for the following pseudo code:

Begin:

Use Variables x , total OF TYPE Integer;

x:=0;

total := 0;

while(x <=6)

{

    Total := total + x;

    x:=x +3;

}

DISPLAY total;

DISPLAY x;

End.

- d) Draw a flowchart for the above pseudo code. [6]
- e) Give 2 (two) advantages and 1(one) disadvantage of the Unified Modeling Language (UML). [3]
- f) Define a software lifecycle, giving 2 (two) example models. [4]

[25 marks]

**Optional section B**  
**Answer any 3 questions from this section.**

**Question 2**      **[Jackson Structured Programming]**

A student file is being kept, containing student details after an examination. The details kept include: fullname (first name and surname), and mark. A student mark is graded as pass (if mark is above or equal to 40), or fail (if mark is below 40). A program is required to list and find the number of students who have obtained a pass.

Using Jackson Structured Programming (JSP), produce diagram for the following ;

- (a) A data Structured diagram for the input file. [5]
- b) A data Structured diagram for the report. [8]
- c) Design a program Structured diagram for an algorithm that produces the report. [12]

[25 marks]

**Question 3** **[Software Testing]**

- a) Briefly Explain Unit and Integration testing. [2]
- b) Give and explain at least 2 (two) methods/approaches often used during Unit testing and at least 2 (two) methods often used during Integration testing. [8]
- c) A system can be tested for the following;
  - Volume
  - Performance
  - User Interface/ease of interaction
  - SecurityWrite brief notes on each of the above with regards to system testing. [8]
- d) It is not recommended that programmers should desk check their own programs. Give reasons. [2]
- e) Describe the actions of the following:
  - i. Trace package [2]
  - ii. Debugger package [2]

[25 marks]

**Question 4 [Unified Modeling Language (UML)]**

An ATM accepts a cash card, interacts with the user, and communicates with the central computer to process transactions. Typical bank transactions include withdrawals, deposits, transfer of funds from accounts and checking balance of accounts.

- a) Give least 3 (three ) use cases that are related to the (making a transaction) use case. [3]
- b) Draw a use case diagram to illustrate the relationships in (a). [8]
- c) Given the following classes from the system:
- Customer
  - Account
  - Transaction
  - ATM

Draw a complete class diagram for the above system showing all relationships between the prescribed classes. [9]

[25 marks]

**Question 5 [Sorting and Searching]**

- a) Write the pseudo code for a program which accepts 6 numbers from the keyboard, stores them in an array (called ‘numbers’), sorts them using a straight selection sort and then displays them in ascending order. Decompose the tasks :(getting input, sorting, displaying results) into 3 procedures. [15]
- b) Explain the action of a binary search (How it works). [10]

[25 marks]

**Question 6 [Pseudocode]**

- a) List five valid keywords used in pseudocode [5]
- b) Using pseudocode, construct a loop which executes exactly 6 times [4]
- c) Describe the main difference between a function and a procedure. [4]
- d) Describe THREE advantages of using procedures and functions [3]
- e) Describe the difference between “local” variables and “global” variables [4]
- f) Explain the term “flowchart” and describe when they are used. [5]

[25 marks]