

NCC EDUCATION

**INTERNATIONAL DIPLOMA
IN
COMPUTER STUDIES**

STRUCTURED PROGRAMMING METHODS

September 2008 – Local Exam

SECTION A

Answer all questions from this section.

SECTION B

Answer any 2 questions from this section.

Time: 2 hours

Clearly cross out surplus answers.

Failure to do this in Section B will result in only the first two answers being marked.

Any reference material brought into the examination room must be handed to the invigilator before the start of the examination.

SECTION A

ANSWER ALL QUESTIONS IN THIS SECTION

Marks

QUESTION 1 **4**

Explain the differences between First Generation Languages and Fourth Generation Languages.

QUESTION 2 **4**

Based on the following table, identify the applicable data type for variables Staff ID, Name, Salary and Taxable respectively.

Staff ID	Name	Salary (\$)	Taxable
3929	John Martin	4500.00	Yes
3204	Ruth Danny	2530.50	No

QUESTION 3 **4**

Briefly describe the main features of Object-oriented languages.

QUESTION 4 **4**

List the basic four data types which you use in pseudocode. Give examples for each type.

QUESTION 5 **4**

Clearly define the differences between an **Array** and a **Linked List**.

QUESTION 6 **4**

List FOUR attributes of good documentation.

QUESTION 7 **4**

What are the reasons for using Functions/Procedures?

QUESTION 8 **4**

List the basic four types of loop which you use in pseudocode. Write down the syntax for any two types of loop.

QUESTION 9 **4**

Explain the difference between a **class** and an **object**.

QUESTION 10 **4**

What is formal parameter & actual parameter?

Total 40 Marks

QUESTIONS CONTINUE ON NEXT PAGE

SECTION B

ANSWER ANY TWO QUESTIONS

Marks

QUESTION 11

- A.** Write the pseudocode to solve the following problem: **6**
Input two decimal numbers and calculate and print the sum and product of the two numbers. Provide text prompts for the input data and text descriptions of the output provided. Remember to identify variable names and type.
- B.** Write the pseudocode for a program to calculate the wages of a salesman according to the following rules:
The wage is calculated at a rate of 15% of sales. If the salesman has been with the company more than three years, he receives a loyalty bonus of 10% of his calculated wage. **10**
- C.** What type of loop construct would you use to do the following? Write the code of loop. **10**
- a) Perform a series of calculations 10 times.
 - b) Input a series of numbers terminated by 999999.
 - c) Calculate the answer to the formula $y := x^2 + 2 * x$, for x in the range 100 to 199.
 - d) Only accept numbers via the keyboard which are positive, terminating the procedure when a number is encountered outside this range.
 - e) Calculate the answer to the formula $y := x^2 + 2 * x$, for even numbers in the range 100 to 199.
- D.** Write the pseudocode to define the record data structure and array for the personnel data concerning jobs and grades shown in Figure given below: **4**

Field Names				
	First Name	Last Name	Grade	Job Type
Records	John	Chang	a1	Engineer
	Eric	Teo	a5	Computing
	David	Smith	a4	Admin
	Peter	Lee	a4	Writer

Total 30 Marks

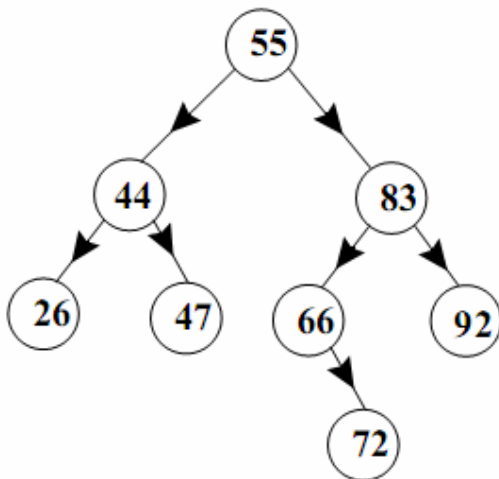
QUESTIONS CONTINUE ON NEXT PAGE

QUESTION 12

- A. Binary search is a method to significantly reduce search times when dealing with larger arrays. Given the following incomplete binary search pseudo-code, kindly provide the missing statements: 8

```
Use variables start, end, middle OF TYPE Integer
found OF TYPE Boolean
key_required OF TYPE String
key_name(10): ARRAY OF String
start:=1
end:=10
found:=false
REPEAT
    missing statement 1
    IF key_required = key_name[middle] THEN
        found := TRUE
    ELSE IF key_required < key_name[middle] THEN
        missing statement 2
    ELSE missing statement 3
    ENDIF
UNTIL missing statement 4
```

- B. Using test data of 56, 34, 23, 45, 89, 78, create a table showing the elements of the array during the processing of an exchange selection (bubble) sort. 10
- C. Redraw the binary tree given below if we delete 83 from the tree. 4



- D. A stack contains the numbers 34, 78, 43, 12 with 12 being the last one to be added to the stack. Draw a diagram to represent a stack which is stored in an array of 6 items. Show the changes which occur when the numbers 12 and 43 are removed from the stack and then 26, 56 and 43 are added to the stack. 8

Total 30 Marks

QUESTIONS CONTINUE ON NEXT PAGE

QUESTION 13

A. Draw the Jackson Structured Programming (JSP) diagrams for following programming constructs: **6**

- I. Sequence
- II. Selection
- III. Iteration

B. Name and briefly explain FIVE types of UML diagrams. **10**

C. A system was developed to store name, ID, salary and date of birth of members of staff. This system allows staff records to be updated, searched, deleted and added. Draw a class diagram for the staff member class. **5**

D. Why may:

- underestimation by programmers;
- poorly documented code;
- changing requirements;

Lead to error prone software programs? Write down why these are causes of software error. **9**

Total 30 Marks

END OF PAPER