1. (a) Explain **two** ways in which arrays could be used in programming. (4 marks)

(b) Distinguish between a *compiler* and a *linker* as used in programming. (4 marks)

(c) With the aid of a diagram in each case, describe the following Pascal control structures:

(i) Repeat …until; (3 marks)

(ii) While…do. (3 marks)

(d) Table 1 shows the Tax and NHIF computations used by Jazzy Company Ltd. Use it to answer the question that follow.

Table 1

Income Tax computation		NHIF Computation	
pay range	Rate as % of basic pay	pay range	Rate as % of basic pay
0 - 1000	0	0 - 2500	2.4%
1001 - 2000	1%	2501 and above	3%
2001 - 3000	2%		
3000 and above	4%		

Write a Pascal program that would:

(i) accept the basic pay of an employee;

(ii) compute the income tax, NHIF and net pay;

(iii) output the computed results to two decimal places.

Hint : netpay = basicpay – (income tax + NHIF)

(6 marks)

2. (a) Outline **four** disadvantages of low level programming languages. (4 marks)

(b) Explain the circumstances under which each of the following statements would be used in a program:

(i) break; (2 marks)

(ii) continue. (2 marks)

(c) (i) With the aid of an example, describe *null pointer* as used in programming. (4 marks)

(ii) Write a Pascal program that would copy information from a file named *file_1* to a file named *file_2*. (4 marks)

(d) Distinguish between *algorithm* and *pseudo code* as used in programming. (4 marks)

3. (a) With the aid of an example in each case, explain the function of each of the following as used in Pascal;

(i) strlen() (2 marks)

(ii) strcpy() (2 marks)

(b) (i) Outline **two** advantage of *stepwise refinement* as used in programming. (2 marks)

(ii) Explain **three** disadvantages of using *flow charts* in designing programs. (6 marks)

(c) Figure 1 shows an extract of a C++ program tools. Use it to answer the question that follows:

Fig. 1

Explain the function of each of the features labelled (i) and (ii). (4 marks)

(d) Write a Pascal program that would be used to rename a file named *mylast* as *myfast*. (4 marks)

4. (a) Explain each of the following file extensions as used in Pascal:

(i) .dat (2 marks)

(ii) .txt (2 marks)

(b) (i) Write a C++ program that would delete a file named *delo* from the computer memory and output the appropriate message. (4 marks)

(ii) Write a C++ program that would determine and output the sum of the cubes of even numbers between 2 and 10. Use a for loop structure. (6 marks)

(c) Outline **two** reasons for involving users in program development. (2 marks)

(d) The following is a C++ program segment. Identify **four** errors in the program.

```
// rememb-o-matic
#include  iostream
#include <new>
using namespace std;
int main ()
        {
        int i,function;
        int * p;
                cout >>"How many numbers would you like to type? ";
                cin >> i;
                p= new (nothrow) int[i];
                    if (p == 0)
                      cout << "Error: memory could not be allocated";
                          else
                              {
                      for (n=0, n<i; n++)
                              {
                              cout << "Enter number: ";
                              cin  p[n];
                              }
                              cout << "You have entered: ";
                      for (n=0  n<i; n++)
                              cout << p[n] << ", ";
                              delete[] p;
                      }
                      return 0;
                      }
```


(4 marks)

5. (a) Outline **two** advantages of *black box* testing as used in programming. (2 marks)

(b) With the aid of a diagram, describe a *circular-linked-list* as used in programming. (4 marks)

(c) (i) Distinguish between *Call-by-Value* and *Call-by-Reference* as used in programming. (4 marks)

(ii) Write a C++ program that accepts the scores of five students. The program should then determine and output the deviation of each student's score from the highest score. (8 marks)

(d) Evaluate the following C ++ statement. (2 marks)

Y = ((x+y) % z+2)/k – x+z%x

Given that x= 4, z = x/y,y = 2 and k = 14

6. (a) Explain each of the following terms as used in programming:

(i) test development; (2 marks)

(ii) test execution. (2 marks)

(b) Outline **two** characteristics of stack data types as used in programming. (4 marks)

(c) (i) Explain the most appropriate file access method that an online booking company would use justifying your answer. (2 marks)

(ii) Josses prefer to use functions while developing his programs. Explain **three** reasons that could have led to his preference. (6 marks)

(d) Distinguish between *logical* and *run time* errors as used in programming. (4 marks)

7. (a) Define each of the following terms as used in programming:

(i) alpha testing; (2 marks)

(ii) beta testing. (2 marks)

(b) Write a Pascal program that would generate the following output. Use while loop structure. (6 marks)

```
3 4 5 6 7
3 4 5 6
3 4 5
3 4
3
```

(c) Distinguish between *normal* and *extreme* data as used in testing. (4 marks)

(d) Kinderu College applies the following conditions to calculate the end of semester final mark for each student:

- each of the students must take three Continuous Assessment Tests (CATs) and a final exam;
- the CATs are averaged and contributes to 30% of the student's final score;
- the final examination which is marked out of 100% contributes to 70% of the student's final score.

Write a C++ program that would accept the CATs and final examination marks for a student. The program should then calculate the total final score for the student through the use a function and output it. (6 marks)

8. (a) State the function of each of the following file commands as used in Pascal programs:

(i) truncate; (1 mark)

(ii) reset. (1 mark)

(b) Explain each of the following terms as used in programming:

(i) function declaration; (2 marks)

(ii) function definition. (2 marks)

(iii) type casting (2 marks)

(c) Table 2 represents the data collected by an analyst from 10 respondents within Narvon area. Use it to answer the questions that follow:

Table 2

12	32	7	95	56	21	12	13	13	90

(i) Using the binary search technique, write a C++ program that would be used to search element 56 from the list. (6 marks)

(ii) Outline the steps that could be used to sort the data in the array in descending order using the bubble sorting algorithm. (4 marks)

(d) Write C++ expressions that would be used to represent each of the following:

(i) declare *marks* to hold 90.345. (1 mark)

(ii) declare *pi* as a constant to hold 3.14. (1 mark)