1. (a) (i) Outline **two** disadvantages of using machine language when writing a program.
(2 marks)

(ii) Explain **two** similarities between *third* and *fourth* generations programming languages.
(4 marks)

(b) (i) Explain the term *stepwise refinement* as used in programming. (2 marks)

(ii) Jane, a computer programmer, prefers to create a program using modular design. Outline **three** reasons for her preference.
(3 marks)

(c) A student created the following C program during a practical lesson. Use it to answer the question that follows:

```
#include<stdio.h >
main()
{
int num1,num2;
num1 = 25;
num2 = num1 - (3*4) + 6 * (2+3) + (1+5);
printf ("num2 = %d \ n" , num2);
return 0;
}
```

Write the output produced when the program is executed. (4 marks)

(d) Tegemeo SACCO registers an applicant upon payment of registration fee. A registered member may apply for a loan after making monthly contributions for at least six consecutive months.

Draw a flow chart to represent this logic. (5 marks)

2. (a) (i) Outline **four** simple data types in Pascal programming language. (2 marks)

(ii) Popular Bank stores customer details: *CustomerID, CustomerName, AccountNumber* and *AccountType(Saving, Current)*. Declare a record that could be used to store these details in Pascal programming language. (4 marks)

(b) (i) Explain each of the following types of data structures as used in programming.

(I) list;

(II) pointer. (4 marks)

(ii) Distinguish between *bubble* and *selection* sort techniques. (4 marks)

(c) Table 1 shows the criteria used by a county government to award bursaries to applicants. Use it to answer the question that follows:

Overall Rating	Amount Allocated
1	Ksh. 20,000
2	Ksh. 15,000
3	Ksh. 10,000
Other	Ksh. 0

Table 1

Write a program in C language that would prompt a user to enter the overall rating of an applicant. The program then displays the amount allocated. Use *nested if* statement.
(6 marks)

3. (a) (i) Explain the term *algorithm* as used in programming. (2 marks)

   (ii) Write a pseudocode that could be used to implement the merge sort technique.
   (6 marks)

   (b) (i) Write the function of each of the following escape sequences in C programming language. (3 marks)

      (I) \t

      (II) \v

      (III) \"

   (ii) A student used each of the following statements in a Pascal program:
   a:= sqr(b);
   c:= e % f;
   z:= x < > y;

   Write the values of a, c and z when the statements are executed, given that
   $b = 2, e = 10, f = 4, x = 9$ and $y = 5$ (3 marks)

   (c) Write a program in Pascal language that prompts a user to enter the dimensions of a triangle. The program then computes the area through a function. The area is then displayed through the program. (6 marks)

4. (a) Explain the term *parameter passing* as used in programming. (2 marks)

   (b) James, a computer programmer, included a file in a Pascal program. Outline **four** file operations that he could use. (4 marks)

   (c) Write a program in C language that stores five elements in an array. The program initializes the value of each element to be the product of its index and 5. The program then outputs the elements in reverse order of initialization. (6 marks)

   (d) (i) Outline **two** circumstances that would necessitate inclusion of comments in a program. (2 marks)

   (ii) Write a program in C language that would prompt a user to enter a positive integer. The program then determines whether the integer is a prime number and displays an appropriate statement. (6 marks)

5. (a) Outline the use of each of the following C programming language file functions.

   (i) fputc( )

   (ii) fgets( ) (4 marks)

   (b) (i) Describe a *global variable* as used in programming. (2 marks)

   (ii) State **two** differences between *sequential* and *random* files as used programming. (4 marks)

   (c) Write an algorithm that could be used to search for an item in a list using binary search technique. (4 marks)

   (d) Write a program in C language that could be used to generate the following output.

   10   15   20
   10   15
   10   (6 marks)

6.   (a)   Outline **two** documents that could be created after the program design process.

             (2 marks)

   (b)   (i)   Outline **two** inbuilt functions used to manipulate strings in C programming language.   (2 marks)

         (ii)   Distinguish between *strlen( )* and *strcpy( )* functions as used in C programming language.   (4 marks)

   (c)   Given the data items: 56, 64, 48, 70, 39, 60 and 52.

         (i)   Construct a binary tree;   (3 marks)

         (ii)   Write the output generated when the tree constructed in (i) is traversed using the *postorder* strategy.   (3 marks)

   (d)   Write a program in Pascal language that could be used to define an enumerated data type Weekday consisting of Monday, Tuesday, Wednesday, Thursday and Friday. The program then displays the second working day of the week, use succ() function.

             (6 marks)

7.   (a)   Outline **four** rules applied when naming variables in structured programming.

             (4 marks)

   (b)   Distinguish between *calloc* and *malloc* functions as used in C programming language.

             (4 marks)

   (c)   (i)   Define *queue* data structure.   (2 marks)

         (ii)   Write an algorithm to add an item in a *queue*.   (4 marks)

   (d)   Table 2 shows the criteria used to register vehicles in Kenya. Use it to answer the question that follows.

First letter	Type of ownership
K	Private
G	Government
U	United Nations
	Other

Table 2

Write a program in Pascal language that would prompt a user to enter the first letter of a vehicle's registration number. The program then displays the corresponding type of ownership. Use *case* statement.   (6 marks)

8.   (a)   Outline **two** ways through which a programmer could incorporate comments in C programming language.   (2 marks)

   (b)   A student created a structured program. When he executed the program he observed the following:

         (i)   A non-terminating loop;

         (ii)   Erroneous result;

         (iii)   The program terminated prematurely.

        Explain the type of error that could have led to each of these observations.   (6 marks)

   (c)   With the aid of a flow chart segment, distinguish between *while* and *do..while* loop statements as used in C programming language.   (6 marks)

   (d)   Write a program in Pascal language that would prompt a user to enter final marks for five students in a subject. The program then computes and displays the average mark for the subject correct to two decimal places. Use a *while...do* loop.   (6 marks)