1. (a) Explain the term branching as used in programming. (2 marks)

(b) Differentiate between *machine* and *assembly* languages. (4 marks)

(c) (i) With aid of an example, describe logical errors as used in programming. (3marks)

(ii) The following C program was created by a student during a practical lesson but it could not compile due to errors.

```
#include <stdio.n>
int Main()
      {
      char Name[10];
      int Age;
      Printf('Enter the name');
      scanf("%d",name)
      printf('Enter the age');
      scanf("%d",age);
      }
```

Rewrite the program correctly. (5 marks)

(d) Write a program in Pascal language that prompts a user to enter two numbers. The program then through a procedure determines and displays the larger of the two numbers. (6 marks)

2. (a) Outline the function of each of the following characters as used in C programming.

(i) %

(ii) ;

(iii) [ ]

(iv) { }

(4 marks)

(b) (i) Explain the term ternary operator as used in C programming, giving an example. (2 marks)

(ii) Evaluate the following Pascal expression. Show the order of precedence.

3*6+15 mod 4 – (30/5) (4 marks)

(c) The following C program was executed by a student. Use it to answer the question that follows.

```
#include "stdio.h"
void main()
      {
      int a=12, b=24,c;
      int*p;
      p=&a;
      c=*p;
      a=b/c;
      printf("a=%d,b=%d", a,b);
      }
```

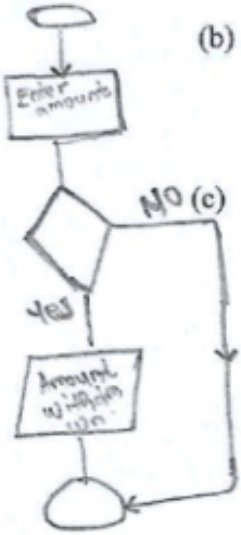
Trace through the program and state the output generated. (4 marks)

(d) Write a program in Pascal language that stores the following values in an array: *28.6, 44.5, 34.7, 39.2, 18.5, 64.2*. The program then computes and outputs the average of the values. (6 marks)

3. (a) Describe each of the following data structures:

(i) Stack;

(ii) Singly linked list. (4 marks)



(b) A bank allows a customer to withdraw money from an account. The transaction will be executed when the amount to withdraw is less than the account balance. Otherwise, a message 'insufficient funds' is displayed. Draw a program flowchart to represent this logic. (4 marks)

(c) Table 1 shows a price list of beverages in a hotel. Use it to answer the question that follows.

Beverage No.	Beverage type	Price (Kshs)
1	Tea in a mug	30
2	Porridge	50
3	Soda	30
4	Milk	40

Table1

Write a program in C language that prompts the user to enter the beverage number. The program then prompts for the quantity of the selected beverage, computes and displays the total cost. Use switch statement. (6 marks)

(d) Write a program in Pascal language that would display even numbers between 2 and 10. The program should stop if the number is greater than 5. (6 marks)

4. (a) Explain **two** rules observed when using parameters in a program function. (4 marks)

(b) Differentiate between *pre -test* and *post-test* loops. (4 marks)

(c) Figure 1 shows a binary tree. Use it to answer the questions that follow.

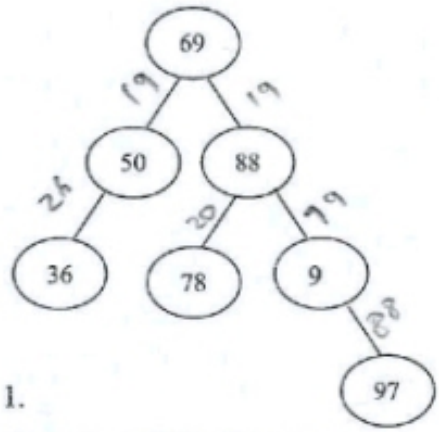


Figure 1.

(i) State the height of the tree. (1 mark)

(ii) State the level of node 78. (1 mark)

(iii) Write the output generated when the tree is traversed using each of the following strategies:

(I) pre-order;

(II) post-order. (4 marks)

(c) Write a program in C language that prompts a user to enter the radius of a circle in metres and compute the area of the circle. The program then uses a function to convert the area into square kilometres. The program displays area in km^2. (6 marks)
Hint: $1km^2=1000000m^2$

5. (a) Describe each of the following terms as used in subprograms:

(i) prototype;

(ii) recursion. (4 marks)

(b) Distinguish between *merge sort* and *selection sort* as used in programming. (4 marks)

(c) Write a program in C language that prompts a user to enter a character. The program then checks whether the character entered is a vowel or not and displays an appropriate message. (6 marks)

(d) The following is the criteria used to recruit a person to the army: height 5.5 feet, weight 60 kg and good health. Draw a limited entry decision table to represent this logic. (6 marks)

6. (a) Outline **three** advantages of using functions when writing programs. (3 marks)

(b) (i) Write a linear search algorithm. (4 marks)

(ii) Differentiate between *coupling* and *cohesion* as used in a program. (4 marks)

(c) Interpret the following C program segment. (3 marks)

```
FILE *ptr;
ptr= fopen("D:/mydoc/Prog.txt", "r+");
f (close);
```

(d) Write a program in Pascal language that would generate the following output. Use for...do loop. (6 marks)

	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16

7. (a) State **four** stages of program development life cycle where flowchart could be used. (4 marks)

(b) Explain **two** reasons for writing technical program documents. (4 marks)

(c) Write a program in C language that prompts a user to enter a number. The program checks the validity of the number and then computes and outputs the square root of the number. (6 marks)

(d) Write a program in Pascal language that would create a text file and store the following records. (6 marks)

Name	Age	Course
Jack	19	ICT
Jean	18	Plumbing

8. (a) Explain each of the following methods of accessing data in a Pascal program record:

(i) dot notation;

(ii) with statement. (4 marks)

(b) Distinguish between *EOF()* and *EOLN()* as used in Pascal programming. (4 marks)

(c) Write a program in Pascal language to display digits that are multiples of 3 between 1 and 12. Use *repeat...until* loop. (6 marks)

(d) Figure 2 shows a section of a garden. Use it to answer the question that follows.

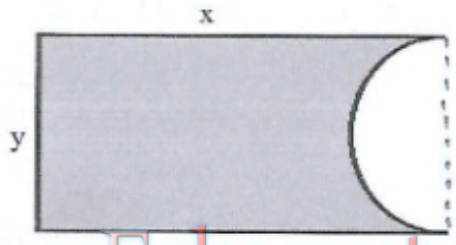


Figure 2

Write a program in C language that prompts a user to enter values of x and y. The program then computes and outputs the area of the section. (6 marks)

```
#include <stdio.h>
using namespace std;
int main()
{
  float x;
  float y;
  float area;
  cout<<"\nEnter value of x: ";
  cin>>x;
  cout<<"\nEnter value of y: ";
  cin>>y;
  area =
  cout<<"Enter the area"<<area;
  return 0
}
```

THIS IS THE LAST PRINTED PAGE.