5. (a) State **four** characteristics of a good program. (2 marks)

(b) (i) Identify a type of an error which could arise from each of the following scenarios in Pascal programming:

I. a missing semicolon; (1 mark)

II. erroneous output; (1 marks)

III. program terminated prematurely due to wrong input; (1 mark)

IV. error due to certain combinations of data. (1 mark)

(ii) For each of the errors identified in (i). State the stage in which the error is encountered. (2 marks)

(c) (i) Differentiate between *dummy* and *exceptional test data* as used in programming. (4 marks)

(ii) Specify the function of each of the following delimiters as used in C programming:

I. ( ) (1 mark)

II. [ ] (1 mark)

III. { } (1mark)

(d) Write an algorithm that could be used to represent binary search logic. (5 marks)

6. (a) Define the term *identifier* as used in programming. (2 marks)

(b) With the aid of an example in each case, differentiate between *DIV* and *MOD* operators as used in Pascal programming. (4 marks)

(c) (i) I. Declare a record in Pascal named *class* with a variable name *classrecord* that contains the following items; student number, name, and a list of five test scores. (2 marks)

II. Explain the use of *with statement* as used in Pascal programming. (2 marks)

(ii) The following list of scores was read into a structured program as it appears: 56, 37, 75, 22, 10. Trace the passes and steps that would be followed to sort the list in ascending order using bubble sort method. (4 marks)

(d) (i) Define a *pointer* as used in programming. (2 marks)

(ii) Distinguish between *inorder* and *post order* tree traversals. (4 marks)

7. (a) Write the conversion specification of each of the following as used in C programming:

(i) Octal numbers; (1 mark)

(ii) Hexadecimal numbers; (1 mark)

(iii) Single character. (1 mark)

(b) With the aid of an example in each case, describe each of the following data types as used in Pascal programming:

(i) subrange; (2 marks)

(ii) enumerated. (2 marks)

(c) (i) Outline the feature that makes *low level* language inconvenient to use. (2 marks)

(ii) Outline **four** characteristics of a *high level* programming language. (4 marks)

(d) Table 1 shows the water billing criteria in a certain town. Use it to answer the question that follows.

	Units used	Price per unit (Ksh)
1.	70 and above	120
2.	60 < units < 69	80
3.	40 < units < 59	60
4.	0 < units < 39	30

Table 1

Write a Pascal program that accepts the current and previous meter readings, the program then computes and outputs amount payable by a client.

Note: A standing charge of Ksh.120 is chargeable for all customers regardless of units used.

(7 marks)

8. (a) Outline the use of each of the following Pascal functions:

(i) CHR; (1 mark)

(ii) SUCC. (1 mark)

(b) (i) Outline **two** properties of a linear data structure.

(ii) Mary was given a task to create a program for a certain college. She noted that the college is made up of several departments with distinct functionalities.

I. State the most appropriate programming approach she could use. (1 mark)

II. Outline **three** advantages of the approach stated in I. (3 marks)

(c) Write a Pascal program to read twelve integers in an array named Q in row wise order of four elements per row. The program then outputs the resultant array. (4 marks)

(d) (i) Name **three** predefined mathematical functions used in Pascal programming. (3 marks)

(ii) Write a logical statement for each of the following as used in C programming:

I. Medical allowance is more than 2250 for the staff whose job group is not K. (1 mark)

II. Stock below 200 for itemno_100 or in shop A. (1 mark)

(iii) The following is a segment of a C program created by a student. Use it to answer the question that follows.

```
main ()
{
int i;
for(i=1;i<=50;i++)
if(i%7==0)
printf("%d",i)\n;
}
```

Write the output generated when the program segment is executed. (3 marks)