Programming and Turbo Pascal

CHAPTER 13:

PASTPAPERS

N.B. These pastpapers may rely on the knowledge gained from the **previous chapters**.

1 SEC '94-PAPER 1 Q7

a. Briefly explain the importance of user documentation (user manual) and program documentation:

User documentation_____

_____

[2]

Program documentation _____

_____

[2]

b. Mention TWO main sections you might expect to find in:

User documentation_____

_____

[2]

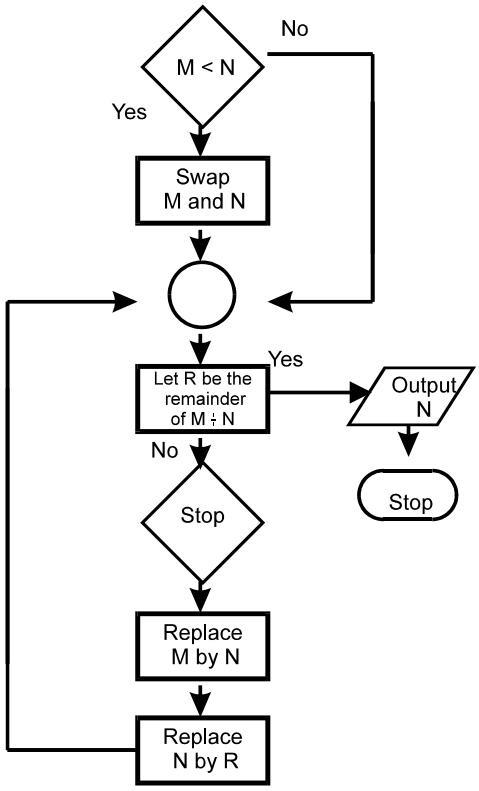
Program documentation _____

_____

[2]

2 SEC'94-PAPER 2A-Q3 (CONSULT CH 12)

The flowchart describes an algorithm which takes two integer numbers, M and N as input neither of which must be 0.



a. Copy the following table, and fill in the OUTPUT column to show the output of the algorithm for each pair of input values of M and N:

M	N	Output
6	9	
7	3	
8	4	
12	8	

[5]

b. What does this algorithm do? **[3]**

c. What is meant by ***SWAP M AND M***? Using any high Level language of your choice, write statement to swap M and N. **[4]**

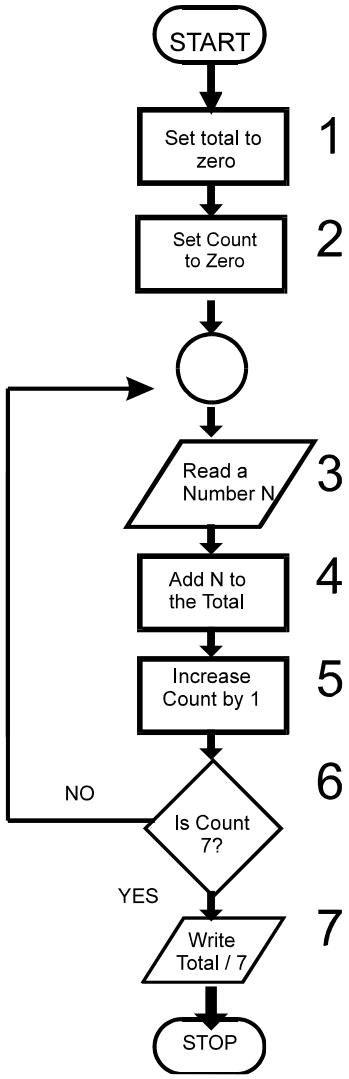
d. Using any high-level language of your choice, show how R, the remainder of M ÷ N, can be calculated **[4]**

e. The algorithm only works if neither M nor N is 0 What would happen if one of them was 0? **[4]**

Writing Space for Previous Question

3 SEC'94-PAPER 2B-Q3 (CONSULT CHs 4,5,7 & 12)

The flowchart alongside describes a simple algorithm. The main steps have been numbered.



a. What is an algorithm? **[2]**
b. What does this algorithm do? **[2]**
c. What does the flowchart symbol used in steps 3 and 7 represent? **[2]**
d. What does the flowchart symbol used in step 6 represent? **[2]**
e. List all the variables used in this algorithm. **[2]**
f. Which steps perform initialisation? **[2]**
g. Which steps form a loop? **[2]**
h. Using any high-level language of your choice, write a program to perform this algorithm. **[6]**

Briefly explain between:

a. RAM and ROM. **[3]**
b. MAIN STORAGE and BACKING STORAGE. **[3]**
c. A PRINTER and a PLOTTER **[3]**
d. DECIMAL and BINARY **[3]**
e. A TRACK and a SECTOR **[3]**
f. SEQUENTIAL and DIRECT ACCESS. **[3]**
g. A LIGHT PEN and a BARCODE READER. **[3]**

Writing Space for Previous Question

4 SEC'95-PAPER 1-Q11

(a) Once a program is ready it should undergo testing. Give two reasons why testing at this stage is important.

reason 1 _____

_____ **[2]**

reason 2 _____

_____ **[2]**

(b) Name a typical programming error which occurs when a programming is running. _____ **[1]**

(c) Give an example of such an error.

_____

_____

_____ **[2]**

(e) How would you test for such an error?

_____

_____

_____ **[2]**

5 SEC'95-PAPER 2A-Q2 (CONSULT CH 12)

The algorithm shown in flowchart from the right processes an array A of 7 integer numbers, from A(1) to A(7). The steps of the algorithm have been numbered for reference.

a. Given the following array of seven numbers:

A(1)	A(2)	A(3)	A(4)	A(5)	A(6)	A(1)
9	-3	75	0	-7	1	11

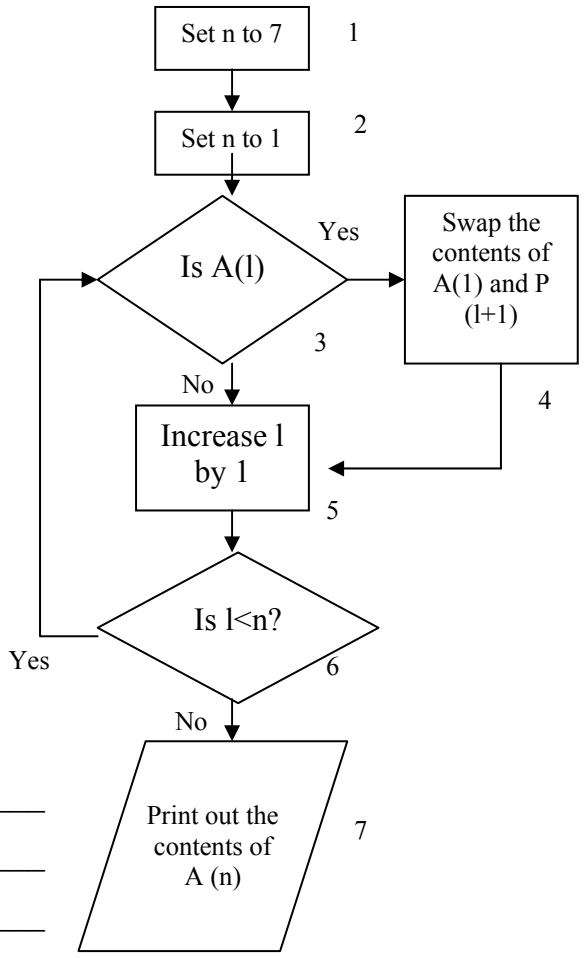
What will be printed in step 7 of the algorithm? **[4]**

b. What does this algorithm do? **[3]**

c. Using a high level of language with which you are familiar, write the program corresponding to this algorithm **[8]**

d. What would happen if steps 2 to 6 were rejected TWICE on the same array ? **[3]**

e. Therefore, what would the outcome be if steps 2 to 6 are repeated N-1 times on an array of N numbers? **[2]**



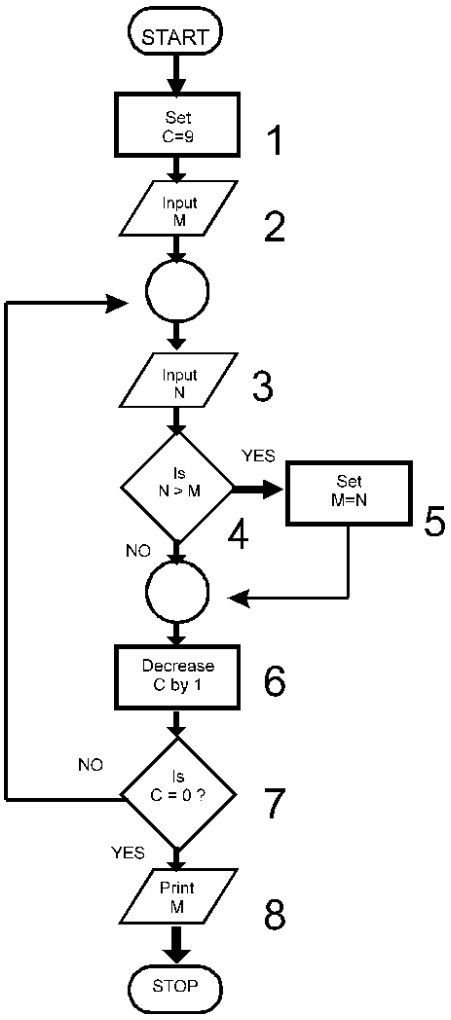
Writing Space for Previous Question

6 SEC'95-PAPER 2B-Q1 (CONSULT CH 12)

The flowchart on the right describes a simple algorithm which requires the user to enter a list of numbers

The main steps of the algorithm have been numbered for reference.

a. In which variables is the first number entered by the user, stored? **[2]**
b. In which variable are the other numbers entered by the user, stored? **[2]**
c. For what purpose is the variable C used in this algorithm? **[2]**
d. How many times are steps 3, 4 and 6 of this algorithm repeated? **[2]**
e. How many numbers in all, is the user required to input? **[2]**
f. Briefly explain what happens in steps 4 and 5 of this algorithm. **[2]**
g. Briefly explain what this algorithm does. **[2]**
h. Using any high-level language of your choice, write a program which implements this algorithm. **[6]**



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Writing Space for Previous Question

7 SEC'95-PAPER 2B-Q3

Using any **high-level** language of your choice, write one or more statements to do each of the following:

a. Multiply the contents of a variable called A by 4. **[2]**
b. Print out the 5^{th} element of a single-dimensional array called B **[4]**
c. Print out all integer numbers from 1 to 100 **[4]**
d. Print out either the message POSITIVE or the message NEGATIVE, depending on whether the contents of a variable called C are positive or not (you may consider 0 to be positive). **[5]**
e. Input from the user a number into a variable called D, and check that it is from 1 to 10. If it isn't, ask the user to input the number again, until it is within the acceptable range. **[5]**

Writing Space for Previous Question

8 SEC'96-PAPER2A-Q5iii (CONSULT CH 11)

iii. Using any high-level language of your choice, write down a **single** high level language statement equivalent to the assembly language instructions below. A semicolon indicates a comment.

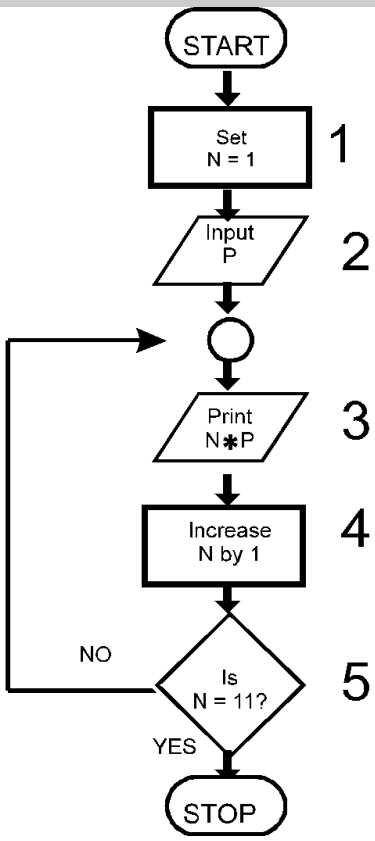
```
LDA     ; load x into the accumulator
MUL y   ; multiply the accumulator by the contents of y
STA temp ; store the contents of the accumulator to temp
LDA z   ; load z into the accumulator
ADD w   ; add w to the contents of the accumulator
SUB temp ; subtract temp from the contents of the accumulator
STA y   ; store the contents of the accumulator to r
```

[3]

9 SEC'96-PAPER 2B-Q1 (CONSULT CH 12)

The flowchart on the right describes a simple algorithm which requires the user to enter one number.

The main steps of the algorithm have been numbered for reference.



a. In which variable is the number entered by the user stored? **[1]**
b. What does the flowchart symbol used in step 5 represent? **[1]**
c. What does the flowchart symbol used in steps 2 and 3 represent? **[1]**
d. What arithmetic operation is being performed in step 3? **[2]**
e. How many times are steps 3, 4 and 5 of this algorithm repeated? **[2]**
f. If the user enters the number 5, what will be the output of this algorithm? **[2]**
g. Briefly explain what this algorithm does. **[2]**
h. Using high-level language of your choice, write a program which implements this algorithm. **[6]**

Writing Space for Previous Question

10 SEC'96-PAPER 2B-Q3

Using any high-level language of your choice, write one or more statements to do each of the following:

a. Increase the value of a variable A by 1 **[2]**
b. Display on the screen the value of A divided by B **[2]**
c. Store the word HELLO in a string variable. **[2]**
d. Compare two numbers N1 and N2, and place the larger of them in variable MAX. **[2]**
e. Print out all the numbers held in locations 1 to 30 of an array called MARKS. **[2]**
f. Ask the user to enter a positive number, and tell the user whether the number entered is ODD or EVEN. **[2]**

Writing Space for Previous Question

11 SEC '97-PAPER 1 Q1

Briefly describe these forms of program DOCUMENTATION:

a. A user manual _____

_____

_____ **[2]**

b. A technical manual _____

_____

_____ **[2]**

c. Inline documentation _____

_____

_____ **[2]**

d. Online help _____

_____

_____ **[2]**

12 SEC'97-PAPER 2A-Q4 (CONSULT CH 2)

A	B	…	Z	…	A	B	…	z
65	**66**	**…**	**90**	**…**	**97**	**98**	**…**	**122**

a. What is an **ASCII** code? **[1]**

b. What is meant by the terms **UPPERCASE** letter and **LOWERCASE** letter? Give an example of each. **[2]**

c. If **C1** and **C2** are two character variables, when is the comparison **C1>C2** true? **[2]**

d. Using a high-level language you are familiar with, show how a character can be converted into its ASCII code, and how an ASCII code can be converted into the corresponding character. **[4]**

e. Given a character variable **CH**, write some statements in a high-level programming language to print out the message 'A LETTER' or ' NOT A LETTER' depending on whether the variable **CH** is a letter or not. **[4]**

f. Given a character variable **CH**, write some statements in a high-level programming language to convert a LOWERCASE letter into an UPPERCASE letter. **[4]**

Writing Space for Previous Question

13 SEC'97-PAPER 2A-Q5 (CONSULT CH 11)

a. Explain the difference between **machine code, assembly language** and **high level languages**. **[3]**

Consider the following section of an assembly language program:

```
        LDA  X          : load X into the accumulator
        CMP  Y          : compare the accumulator with Y
        JGE  lab 1      : jump to LAB 1 if accumulator is greater than Y
        MOV  Z.ACC      : copy accumulator to Z
        LDA  Y          : load Y into the accumulator
        MOV  X.ACC      : copy accumulator to X
        LDA  Z          : load Z into the accumulator
        MOV  Y.ACC      : copy accumulator to Y
Lab 1:  HLT             : stop
```

b. What is the function of this section of code? **[4]**

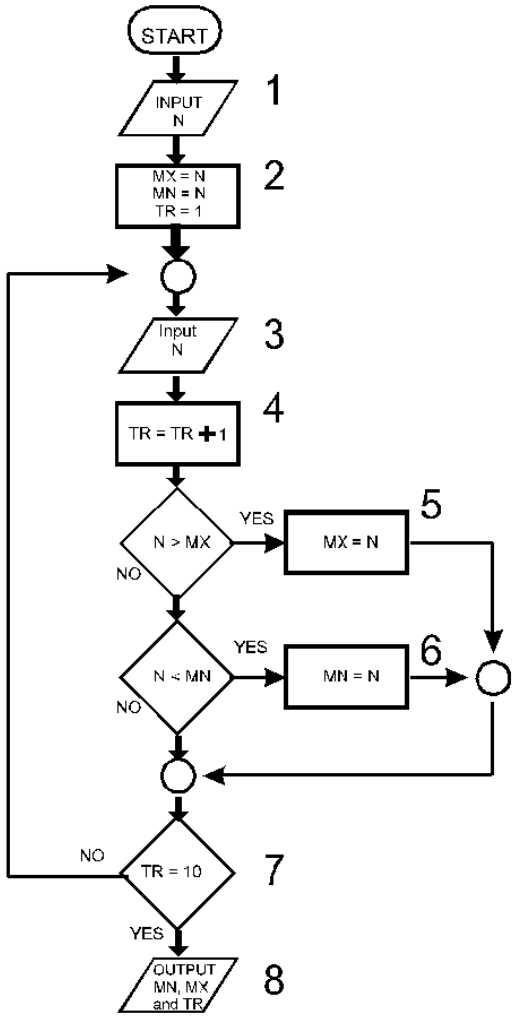
c. Write the equivalent code in a named high level language of your choice **[4]**

d. Distinguish between an **assembler** an **interpreter** and a **compiler**, stating where one type of translator would be more suited than another. **[6]**

Writing Space for Previous Question

14 SEC'97-PAPER 2B-Q1 (CONSULT CH 12)

The flowchart shown alongside describes an algorithm which processes a sequence of integer numbers entered by the user. The main steps of the algorithm have been numbered for reference.



a. In which steps does the user enter a number? **[1]**

b. What is the purpose of step 2? **[1]**

c. What is the purpose of step 5? **[1]**

d. What is the purpose of step 6? **[1]**

e. What does the flowchart symbol in step7 represent? **[1]**

f. How many numbers does the user have to enter? **[1]**

g. What value will the variable TR contain in step 8? **[1]**

h. What will the variable MN contain in step 8? **[1]**

i. What will the variable MX contain in step 8? **[2]**

j. Using any high-level programming language you are familiar with, write a program to implement this algorithm. **[6]**

Writing Space for Previous Question

15 SEC'97-PAPER 2B-Q2

Write one or more high-level language statements that perform the following tasks:

a. Store 22 ÷ 7 in a variable called **P1**. **[2]**

b. Store the average of variables **A, B** and **C** in **AV**, and display the value of the average. **[2]**

c. Display the **absolute difference** between variables **X** and **Y**. **[2]**

d. Check whether the number **Z** is zero, and if so, display the message 'ZERO'. **[2]**

e. Ask the user to enter an integer **N**. The program should then display the message 'OK' if N is from 1 to 30. Otherwise the program would display the message 'OUTSIDE RANGE'. **[3]**

f. Display on the screen the simulation of throwing two dice, together with their total. **[6]**

Writing Space for Previous Question

16 SEC '98-PAPER 1-Q1

For any programming language you are familiar with, briefly explain what each of the following means and give an example of its use.

a. A variable:

_____ **[2]**

_____

_____

_____

[2]

b. An inline comment:

_____

_____

_____

_____

c. An assignment statement: **[2]**

_____

_____

_____

_____

d. A string: **[2]**

_____

_____

_____

_____

17 SEC '98-PAPER 1-Q12 (CONSULT CHs 4, 19 & 11)

Name TWO of each of the following:

a. High-level languages other than BASIC and PASCAL.

1_____ 2_____ **[2]**

b. Types of impact printer.

1_____ 2_____ **[2]**

c. Registers commonly found in the CPU.

1_____ 2_____ **[2]**

d. Types of input data validation.

1_____ 2_____ **[2]**

18 SEC'98-PAPER 2A-Q4B (CONSULT CH 11)

a. Consider the following routine written in assembly language. A semicolon indicates a comment:

```
        LDA   1      ; load 1 into the accumulator
        STA   N      ; store the contents of the accumulator in location N
        LDA   5      ; load 5 into the accumulator
        STA   C      ; store the contents of the accumulator in location C
Loop:   LDA   N      ; load the contents of location N into the accumulator
        MUL   C      ; multiply the contents of the accumulator by the contents of location C
        STA   N      ; store the contents of the accumulator in location N
        LDA   C      ; load the contents of location C into the accumulator
        DEC          ; decrement of the contents of the accumulator
        STA   C      ; store the contents of the accumulator in location C
        JNZ   loop   ; jump to LOOP if the contents of the accumulator are not zero
        RET          ; zero
```

i. From the assembly language routine shown above, identify one **label**, one **mnemonic** and one **operand** **[3]**

ii. What values are left in N and C after execution of this routine? **[4]**

iii. Write a short program in a named high level language of your choice to do the same job as this assembly language routine. **[4]**

Writing Space for Previous Question

19 SEC'98-PAPER 2b-Q2 (CONSULT CH 5 & 12)

The algorithm shown in the flowchart alongside finds the biggest of a set of integers entered by the user

a. How many numbers must the user input? **[2]**

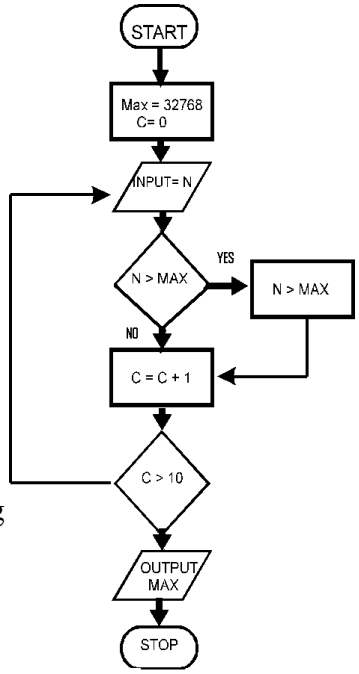
b. Briefly explain how the algorithm finds the maximum number entered. **[2]**

c. Given that the programming language used for implementing this algorithm uses 16-bit two's complement integers, explain why the variable MAX is initialised to the number –32768 **[2]**

d. Under what circumstances would the algorithm fail if MAX were to be initialise to 0 instead? **[2]**

e. Modify the flowchart so that it finds the MINIMUM of the numbers entered by the user. **[7]**

f. In a high level language of your choice, write source code statements to implement the algorithm for finding the maximum number entered.



Writing Space for Previous Question

20 SEC'98-PAPER 2B-Q5

Using any high-level programming language of your choice, write one or more statements that perform each of the following:

a. Decrease the value of variable Y by 2.
b. Input the *length* and *breadth* of a rectangle in variables L and B respectively. Then work out and display the perimeter P of the rectangle. (The perimeter of a rectangle is twice the sum of its length and breadth.) **[1]**
c. Compare two numbers **NUM1** and **NUM2** and print the smallest of the two. **[2]**
d. Write a statement that stores the value of L / g in variable **T**. **[3]**
e. Print out the manipulation table of 5 from **1x5=5** to **12x5=60.** **[3]**
f. Declare an array **M** that can store 10 integers. Then initialise all cells of the array **M** to 0. **[4]**
[4]

Writing Space for Previous Question

21 SEC'99-PAPER 2A-Q1 (CONSULT CH 12)

The algorithm shown in the flowchart reads in a list of marks obtained by candidates sitting for an examination, and outputs the number of passes (P) and the number of fails (F). A pass mark of 45 is assumed.

a. What's the difference between a *flowchart* and a *pseudo code*? **[1]**

b. Variables F, P and M are numeric variables, but F and P are of type *integer*, while M is of type *real*. What's the difference between an *integer* and a *real* number? **[1]**

c. Why doesn't the variable M need to be initialised to)? **[1]**

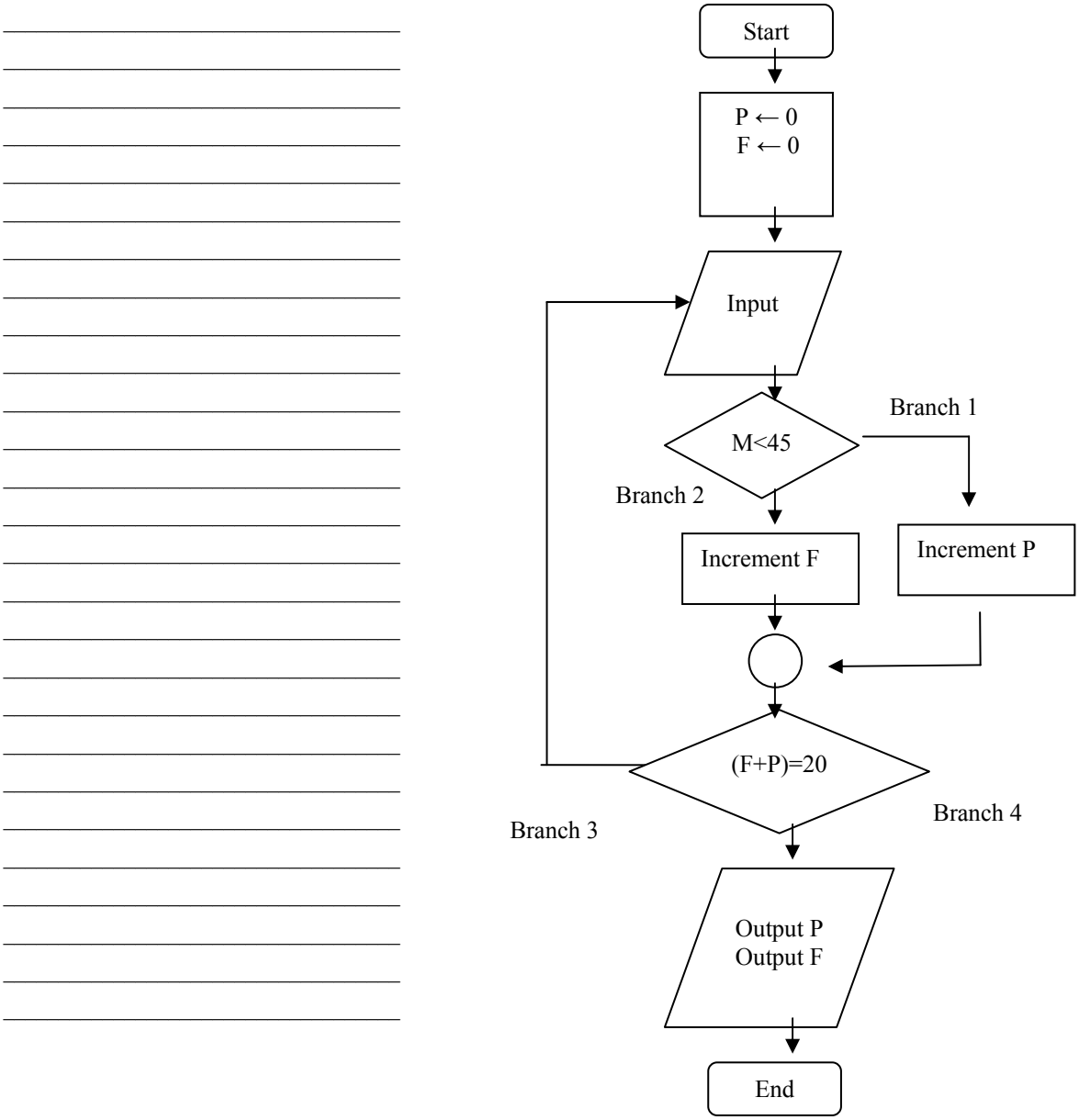
d. If P is the number of students who pas the examination and F the number who failed, what does F + P represent? **[1]**

e. How many marks are read in by the algorithm? **[2]**

f. What is meant by the terms *increment* and *decrement* ?

g. For each of the 4 labelled branches (Branch 1 to Branch 4), specify whether the branch is followed when the condition is *true* or when it is *false*. **[4]**

h. Using a named high level language of your choice, write a program for the algorithm shown in the flowchart. **[6]**



Writing Space for Previous Question

22 SEC'99-PAPER 2A-Q4 (CONSULT CH 11)

Consider the following routine written in assembly language. A semicolon indicates a comment:

```
        LDA   0      ; load 0 into the accumulator
        STA   x      ; store contents of accumulator into location X
        LDA   5      ; load 5 into accumulator
Loop:   STA   C      ; store contents of accumulator into location C
        LDA   X      ; load contents of location X into accumulator
        ADD   C      ; add contents of location C to accumulator
        STA   X      ; store contents of accumulator into location X
        LDA   C      ; load contents of location C into accumulator
        DEC          ; decrement contents of accumulator
        JNZ   Loop   ; jump to LOOP if accumulator is not zero
        HLT          ; stop
```

i. What is the function of the label **Loop:** in the above assembly language routine? **[3]**

ii. To what values are locations C and X initialised? **[3]**

iii. What values are left in locations C and X when this routine finishes? **[4]**

iv. Write a short program in a named high level language of your choice which does the same task as the above assembly language routine. **[4]**

Writing Space for Previous Question

23 SEC'99-PAPER 2A-Q5 (CONSULT CHs 11 & 12)

a. Large programs are usually broken down into modules.

i. What is this design method called? **[1]**

ii. Give **two** advantages of developing programs in such modular form. **[2]**

b. Distinguish between a **compiler** and an **interpreter**, giving one suitable application for each. **[4]**

c. A program may not work because it contains **syntax errors, logical errors** or **run time errors.**

i. What type of errors does a **compiler** detect? **[1]**

ii. How does a compiler help the user in correcting these errors? **[1]**

iii. Name a software utility which helps identify errors which the compiler does not detect. **[1]**

d. i. What is meant by **test data**? **[2]**

ii. For the following pseudocode routine, identify appropriate test data one would use. **[3]**

```
Program inputYorN
Repeat
   Read Character
Until (character = 'Y') or (character = 'N')
Display message "Valid character inputted'
End
```

iii. What changes need to be made to the above pseudocode to accept both **up percase** and **lowercase** input? **[2]**

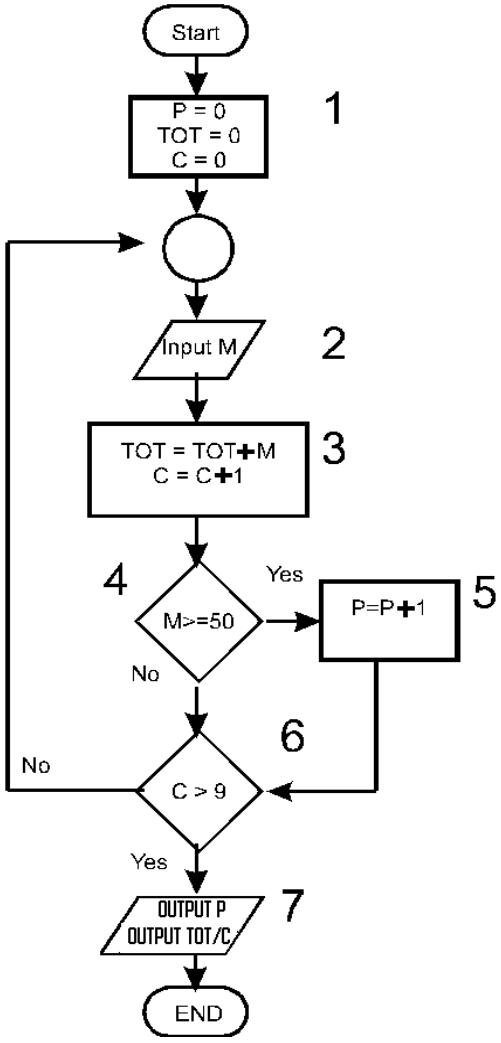
Writing Space for Previous Question

24 SEC'99-PAPER 2B-Q1 (CONSULT CH 12)

The flowchart represents an algorithm which reads in a list of examination marks, and at the end displays some statistics. The pass mark of the examination is set at 50.

The steps of the algorithm are numbered for reference.

a. In which step does **data entry** occur? **[1]**
b. Name a step in which a **comparison** is made. **[1]**
c. Name a step in which an **increment operation** is performed. What is an increment?. **[1]**
d. In which step are variables being **initialised**? **[1]**
e. How many marks are processed by the algorithm? **[2]**
f. What is the purpose of variable **P**? **[2]**
g. What is the purpose of variable **TOT**? **[2]**
h. State briefly what the algorithm does. **[4]**
i. Using a high-level programming language, write a program for the algorithm shown in the flowchart. **[2]**
j. How would you alter the programming in part (I) to print also the number of failures?



Writing Space for Previous Question

25 SEC'99-PAPER 2B-Q3

Using any programming language of your choice, write one or more statements that perform each of the following:

a. Store twice the value of integer variable X in integer variable Y. **[1]**
b. Print the value of (A+B) x (C÷D). **[2]**
c. Compare two numeric variables X and Y. Print **equal** if variable X and Y are equal, otherwise print **not equal.** **[3]**
d. Write a statement that stores the value of (a + b) in variable H. **[3]**
e. Declare a string array X that can store up to 5 names. Read in and store 5 names in array X. **[4]**
f. **Swap** the values of variables X and Y. (i.e. in X store the value of Y and in Y store the value of X.) **[4]**

Writing Space for Previous Question

26 **SEC '00-PAPER 1-Q12**

The following program, shown **both** in a version of BASIC and in PASCAL, requires the user to enter a few numbers before it produces an output.

Basic version

```
PRINT "How many students?"
INPUT NS
LET Total = 0
FOR I = 1 TO NS
    INPUT Mark
    Total = Total + Mark
NEXT I
PRINT "The average mark is", Total / NS
END
```

Pascal version

```
VAR Total, I, NS, Mark : Integer;
BEGIN
  WRITE ('How many students?');
  READLIN (NS)
  Total :=0
  FOR I := 1 TO NS DO
  BEGIN
     READLN (Mark)
     Total := Total + Mark
  END;
  WRITELN ('The average mark is ',Total / NS);
  END
```

a. Briefly describe what the program does: _____ **[1]**

_____

b. Briefly describe the use of each of these three variables in the program:

NS _____ **[1]**

Total _____ **[1]**

I _____ **[1]**

c. What is the output of this program if the user enters the four numbers **3, 20, 30** and **40**?

_____ **[2]**

d. What type of error occurs if the first number entered by the user is a **zero**?

_____ **[1]**

e. From the program, identify the following constructs:

An assignment statement_____ **[1]**

A prompt _____ **[1]**

An output statement _____ **[1]**

_____

27 SEC '00-PAPER 1-Q13

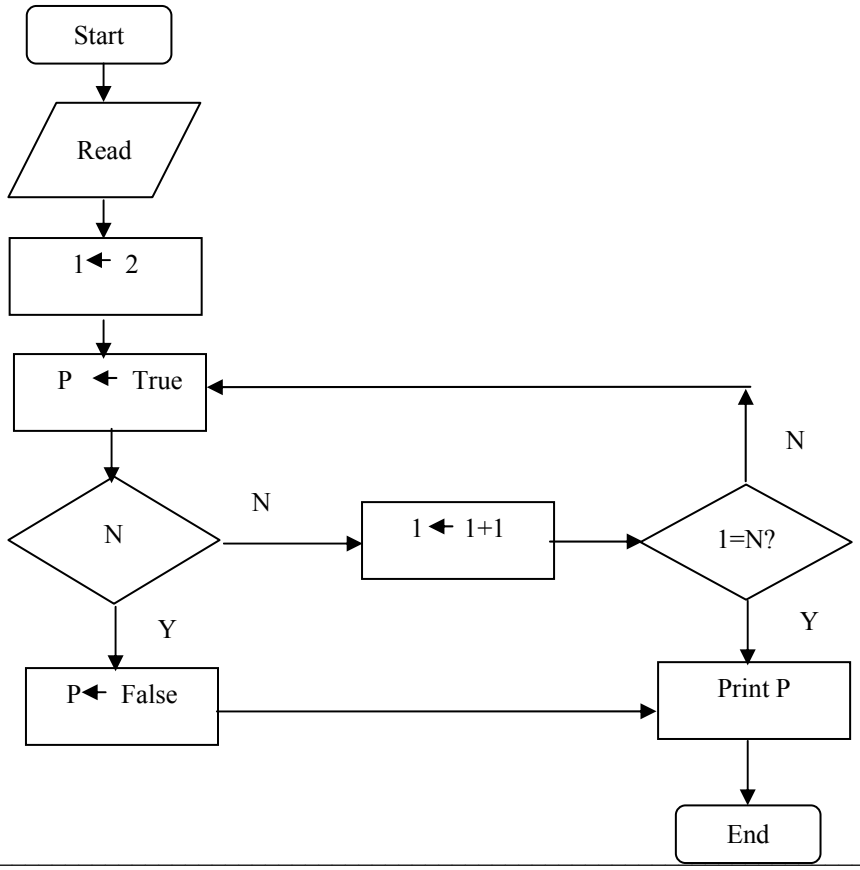
Using any high-level programming language you know, write a short program to input **THIRTY** different examination marks (the range of marks is 0 to 100), store the marks in an array, and then print the total number of passes. The pass mark is 50. **[10]**

28 SEC '00-PAPER 2A-Q1

(a) What is an algorithm? **[1]**
(b) Trace through the flowchart below with inputs N=3, N=4. **[4]**
(c) What is the function of the MOD operator? **[1]**
(d) When is P set to 'false'? **[1]**
(e) Why is I initially set to 2? **[2]**
(f) What is the task of this algorithm? **[1]**
(g) Use high level language to code this algorithm. **[4]**
(h) Given the availability of the following functions

SQRT(x) returns the square root of the number x
TRUNC(x) returns the integer part of the given number x

How can the program be modified to shorten the execution of this routine? **[3]**



Writing Space for Previous Question

29 **SEC '00-PAPER 2A-Q4B**

(ii) A teacher uses a program written in a high-level language to store the marks for English, Mathematics and Maltese obtained by 25 students.

(a) Name a data structure that best suits the storage of this data. **[2]**

(b) Using a high level language of your choice, write a statement to declare the variable MARKS used to store the students marks. **[3]**

The teacher is finding the program very limited in processing students' marks.

(c) Suggest an alternative solution to the teacher's problem. Identify any advantages your suggestion would have over the present set-up. **[3]**

30 SEC '00-PAPER 2A-Q6 (CONSULT CHs 7, 10 & 11)

(i) (a) What is a computer program? **[1]**

(b) Where would a program be stored when being used? **[1]**

(c) Briefly describe the sequence of events carried out during the fetch-execute cycle indicating the use of the program counter and the instruction register. **[3]**

(ii) A program written in a high level language has to be translated into machine code before being executed.
Name two types of such translators identifying differences between them. **[4]**

(iii) Consider the following section of assembly language program:

```
        LDA X          ; load X into the accumulator
        CMP Y          ; compare the accumulator with Y
        JLE moveon     ; jump to moveon if accumulator is less than or equal to Y
        MOV Z, ACC     ; copy accumulator to Z
        LDA Y          ; load Y into accumulator
        MOV X, ACC     ; copy accumulator to X
        LDA Z          ; load Z into accumulator
        MOV Y, ACC     ; copy accumulator to Y
moveon: HLT            ; stop
```

(a) From the assembly code given above, identify a LABEL and explain its use. **[2]**

(b) What would be the resultant values of X and Y after execution of the above code given initial values X = 1 and Y = 2? **[2]**

(c) Write the equivalent code in a high level language of your choice. **[4]**

_____

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Writing Space for Previous Question

31 SEC '00-PAPER 2B-Q3 (CONSULT CH 2, 10 & 11)

(a) Draw the hardware block diagram of a computer system. **[6]**

(b) Given the following simple program written in generic assembly language,

```
      IN NO1   ; expect user input and put in location NO1
Inp:  IN NO2   ; expect user input and put in location NO2
      LDA NO2  ; load accumulator with entry NO2
      JNZ:cont ; if accumulator <> zero then goto cont
      JMP:inp  ; goto label inp
Cont: LDA NO1  ; load accumulator with entry NO1
      DIV NO2  ; divide accumulator contents by entry NO2
      STO RES  ; store accumulator contents to location RES
      OUT RES  ; output contents of location RES
```

(i) List the test data that you might use to ensure the correct operation of the program. **[8]**

(ii) Illustrate the *high-level* operation of the fetch-decode-execute cycle by listing the contents of the accumulator, instruction register, next instruction register and memory as the above program is running. Your answer should cater for the two possible path executions. **[3]**

Writing Space for Previous Question

32 SEC '00-PAPER 2B-Q4 (CONSULT CH 11)

(a) Distinguish between assemblers, compilers and interpreters. **[9]**

(b) A particular language requires the size of arrays to be known at translation stage. Why would the following pair of pseudo code instructions be correct in this language if it were interpreted but not compiled? **[2]**

```
GET array_size
DECLARE name_array (array_size)
```

(c) What type of programming errors do you expect to find at translation stage? Give an example of an error that would NOT be trapped at translation stage. How would you debug this error? **[6]**

Writing Space for Previous Question

33 SEC '00-PAPER 2B-Q5

Write a short program in either BASIC or PASCAL that asks the user to enter ten student names (non-blank, alphabetic) and marks (non-blank, numeric, 0-100) scored in a particular mathematics session. The program should then calculate the average mark and display those students whose mark is below average?

Assume the following mark/grading structure: 80-100 A; 70-79 B; 60-69 C; 50-59 D; 0-49 F. How would you extend the program to display the student grades (NOT marks) when listing students whose score is below average?

Hint. Your program should first prompt the user to input the ten student name/mark pairs and store them in two arrays, one for the names and the other for the marks. The average mark can then be calculated. Another loop might be used to go through the mark array, identify those students whose mark is below average and print the student name corresponding to the mark. **[17]**

34 SEC '01-PAPER 1-Q4 (CONSULT CHs 4 &15)

Provide ONE reason to explain the following statements:

(a) Hardware resources for a Graphical User Interface are greater than those for a Command Line Interface.

[2]

_____

(b) A logical error is more difficult to detect than a syntax error.

[2]

_____

(c) A multimedia application requires a large amount of storage space.

[2]

_____

(d) The product information stored in a barcode does not include the price.

[2]

_____

(e) A debugger is a diagnostic tool.

[2]

_____

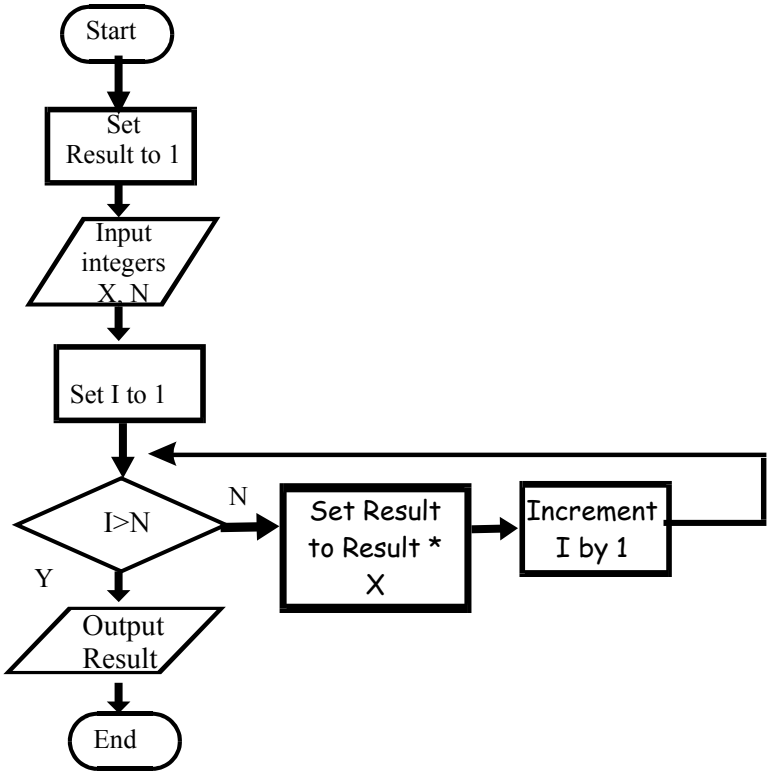
35 SEC '01-PAPER 1-Q12

Using any high level language which you know, write a program which asks the user to input 30 positive numbers and then prints out the SMALLEST number entered. A breakdown of allocated marks is shown on the right.

[Correct Syntax 1]
[User friendliness 1]
[Logical and neat presentation 1]
[Correct coding 5]
[Working program 2]

36 SEC '01-PAPER 2A-Q1 (CONSULT CH 12)

Consider the following algorithm



Assume that the high level language of your choice has no in-built language feature that implements the above algorithm function.

(a) What is the function of this algorithm? **[2]**

(b) Using a high level language of your choice write language statements for the above algorithm. **[4]**

A powerful feature of high-level language is the provision for subprograms.

(c) What do you understand by a procedure/function (subroutine)? **[2]**

(d) Distinguish between a built-in procedure/function (subroutine) and a user-defined procedure/function (subroutine)? **[2]**

(e) Why are procedures/functions (subroutines) useful? **[2]**

(f) Write a program that inputs two integer numbers and calls a user-defined subprogram implementing the above algorithm. **[5]**

Writing Space for Previous Question

37 SEC '01-PAPER 2B-Q1 (CONSULT CH 12)

The flowchart represents an algorithm which processes ten integers.

(a) Using the numbered steps, state where in the flowchart:

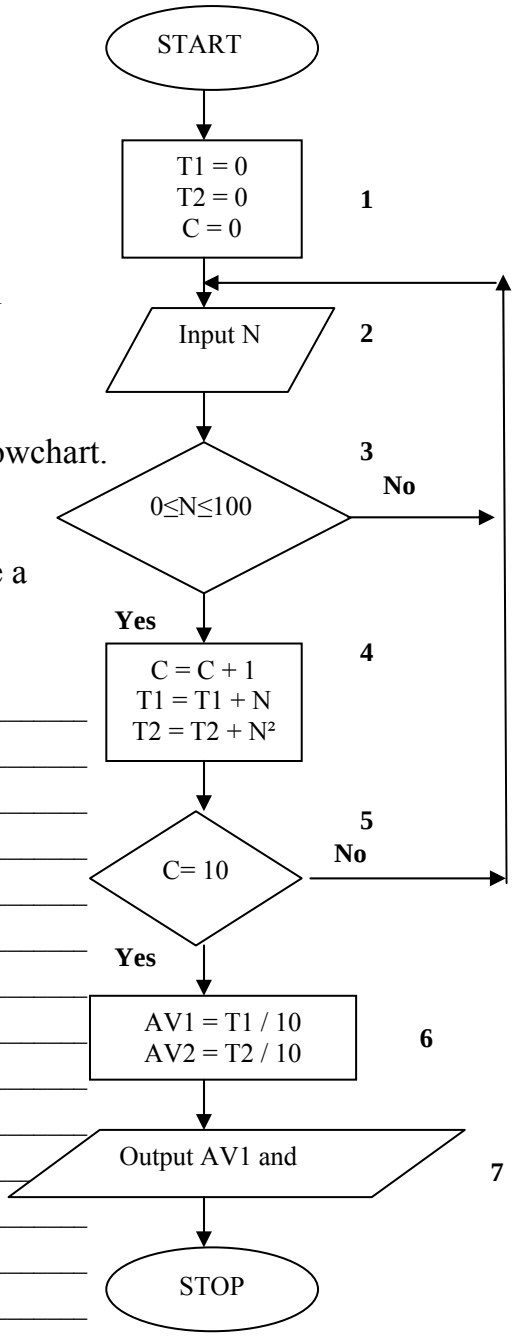
(i) variable T2 is initialised **[1]**
(ii) variable C is incremented **[1]**
(iii) there is a validation test **[2]**

(b) (i) Define the terms *loop* and *nested loops* **[2]**

(ii) State the steps between which loops are nested. **[2]**

(c) Describe briefly in not more than three sentences the purpose of the flowchart. **[2]**

(d) Using any high level programming language you are familiar with, write a program for this algorithm. **[7]**



Writing Space for Previous Question

38 SEC '01-PAPER 2B-Q3

Write one or more high-level statements that perform the following tasks:

(a) Assign to real variable **X** the value of half the integer variable **Y**. **[1]**

(b) If $\mathbf{b^2 - 4ac}$ is greater than or equal to zero, work out and store in real variable **X** the value of **[3]**

$$\frac{-\sqrt{B^2 - 4ac}}{2a}$$

Otherwise, i.e. if $\mathbf{b^2 - 4ac}$ is less than zero, display the message "No Answer!"

(c) Enter any TWO names in string variables **A** and **B**. the program then writes the stored values in **A** and **B** in alphabetical order. **[3]**

(d) Declare array **N** which contains 20 cells of integer type and prompt user to read in 20 integers. Program then displays all integers entered, together with their total. **[5]**

(e) Program displays randomly generated integer numbers whose values vary between 1 and 20 inclusive, until a 10 shows up. **[5]**

Writing Space for Previous Question

39 SEC '02-PAPER 1-Q12

Using any High-Level-Language which you know, write a program to calculate a bill. For FOUR different items bought, the program asks the user to enter the description, quantity and price of each item. At the end the program should display the bill with the total amount due.

[Correct Syntax 1]

[User friendliness 2]

[Logic and neat presentation 1]

[Correct coding 4]

[Working program 2]

40 SEC '02-PAPER 2B-Q6 (CONSULT CH 12)

(a) What are flowcharts? **[1]**

(b) Draw a simple flowchart example that includes processing input / output and decision **[3]**

(c) Distinguish between syntax, logical and run-time errors. **[3]**

Consider a simple game where Player A inputs a number that must be between 1 and 100. Player B then tries to guess what number Player A has typed in. If the difference between the number that Player B inputs and that of Player A is less than 10 then B wins, otherwise A wins.

You have been asked to test the program that is being written to implement the game above. Devise suitable test data that might be used to check that the program would work.

NOTE: You should not write the program. **[10]**

Writing Space for Previous Question

41 SEC '02-PAPER 2B-Q7

Write one or more high-level statements that perform the following tasks:

(a) Assign an integer variable A twice the value of the integer variable B **[2]**

(b) Ask the user to input a number. If the number is less than 0 or more than 100 the user is asked to re-enter number. **[3]**

(c) Declare an array N which contains 30 cells of integer type and prompt the user to read in 30 integers between 0 and 100 and store these integers in the array N. **[4]**

(d) Enter a real number in variable X. Enter a real number in variable Y. The program should then swap the values of the two variables (Example if X=3 and Y=5, the result of the swap would be X=5 and Y = 3) and display the result. **[8]**

Writing Space for Previous Question

42 SEC '03-PAPER 1 Q9 (CONSULT CH 12)

The following high level language program attempts to output the largest of 10 input positive numbers.

Pascal Version	**BASIC Version**

Program Q9;
Var I,max :integer;
Begin
  max:=0;
  writeln (`enter 10 positive numbers`);
  for I:= 1 to 10 do
  begin
  readln (list[I]);
  if list [I]>max then max :=list [I];
  end;
  writeln (`Largest input number is max`);
end.
	Dim List (10)
	Let max =0
	Print "enter 10 positive numbers:"
	For I = 1 to 10
	  Input (list (I))
	  If list (I) > max then max=list (I)
	  Endif
	Next I
	Print "Largest input is max"
	end

a. With reference to the above program, give an example of:
i) an array

……..……..… **[1]**

ii) a conditional statement

…..……..… **[1]**

iii) a loop

…..……..… **[1]**

b. The program does not produce the intended result. Why?

…..……..… **[2]**

c. What is such an error called?

…..……..… **[2]**

43 SEC '03-PAPER 1 Q10

Mention TWO items of information you would typically find in the following types of documentation:

a. user documentation

……..……..… **[2]**

b. technical documentation

…..……..… **[2]**

c. program documentation

…..……..… **[2]**

44 SEC '03-PAPER 1 Q13

Using a high level language of your choice, write a program which asks the user to input a number between 2 and 10 and outputs the corresponding multiplication table. For example, if the input number is 3, the output multiplication table will be:

```
1  x  3  =  3
2  x  3  =  6
3  x  3  =  9
      ...
10 x  3  =  30
```

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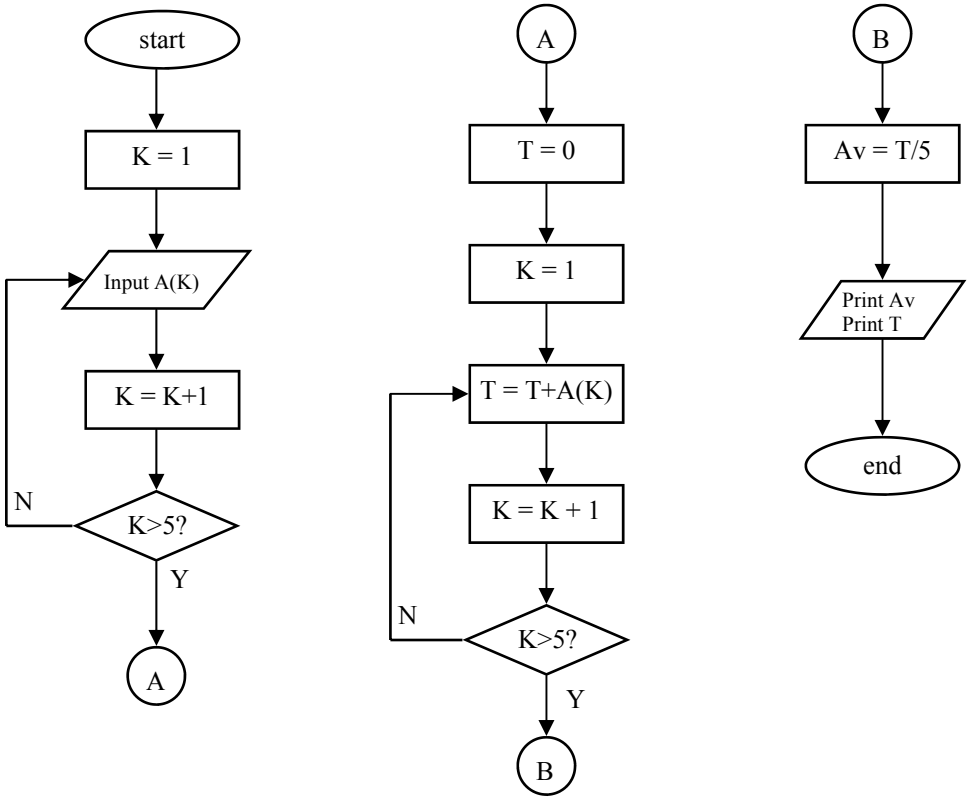
…… **[10]**

45 SEC '03-PAPER 2A Q3 (CONSULT CH 12)



(a) What is the function of the above algorithm? **[2]**

(b) Using a high level language of your choice write the corresponding code to the above algorithm. **[9]**

(c) Mention THREE data types commonly found in a programming language, and for each give an example of what it may be used for. **[6]**

Writing Space for Previous Question

46 SEC '03-PAPER 2A Q7 (CONSULT CHs 10 & 11))

(a) How does the width of the address bus relate to the size of the address space? Explain your answer by giving an example. **[3]**

(b) Which type of language uses mnemonics? **[1]**

(c) Why do programs written in a high level language need to be translated before being executed? **[2]**

(d) Mention TWO types of translators used to translate high level languages and highlight 2 differences between them. **[6]**

(e) Which type of errors are detected during the translation process? **[1]**

(f) Describe two other types of errors which can occur during testing of a program, and for each explain how it may be detected. **[4]**

Writing Space for Previous Question

47 SEC '03-PAPER 2B Q8

(c) It is required to store the exam marks for Mathematics of 30 students and to find their total and average. **[1]**

i. Declare an array MARKS containing 30 cells each of type integer.
ii. Declare TWO variables of the appropriate type in which to store the total and average. State which of these two variables must be initialized before being used and show how this can be done. **[2]**
iii. Ask the user to enter 30 marks and store them in an array. **[2]**
iv. Show how to calculate and display the total. **[2]**
v. Show how to calculate and display the average mark. **[2]**

Writing Space for Previous Question

48 SEC '04-PAPER 1 Q11

Pascal Code:

```
Program Numbers ;
var
    a, b, c, total   :   integer ;

Begin
   write1n ('Enter three numbers') ;
   read1n  (a, b, c)
   total   := a  +  b  -  c ;
   write1n  ('The total of the three
        numbers is  ', total ) ;
   average   : =  total  /  0
   write1n  ('The average is ',  average) ;
end
```

Basic Code:

```
PRINT  "ENTER THREE NUMBERS : "
INPUT  =  A,  B  C
TOTAL  =  A  +  B  -  C
PRINT "THE TOTAL OF THE TREE
NUMBERS  IS   :  "; TOTAL
AVERAGE  =  TOTAL  /  0
PRINT  "THE AVERAGE IS  " AVERAGE
END
```

Select **ONE** of the codes given above, and identify:

a. a syntax error;

……..…

b. a logical error;

……..…

c. a programming error which will eventually lead to a run-time error.

……..… **[6]**

49 SEC '04-PAPER 1 Q12

12. Write a program, in a high level language of your choice, which initially displays the following menu.

Menu

1. Add
2. Subtract
3. Multiply
4. Divide
5. Exit

The user is then required to enter two integer numbers, choose an option from the menu, and the appropriate result is displayed. This procedure should be repeated until the user decides to quit the program by choosing option 5 from the menu.

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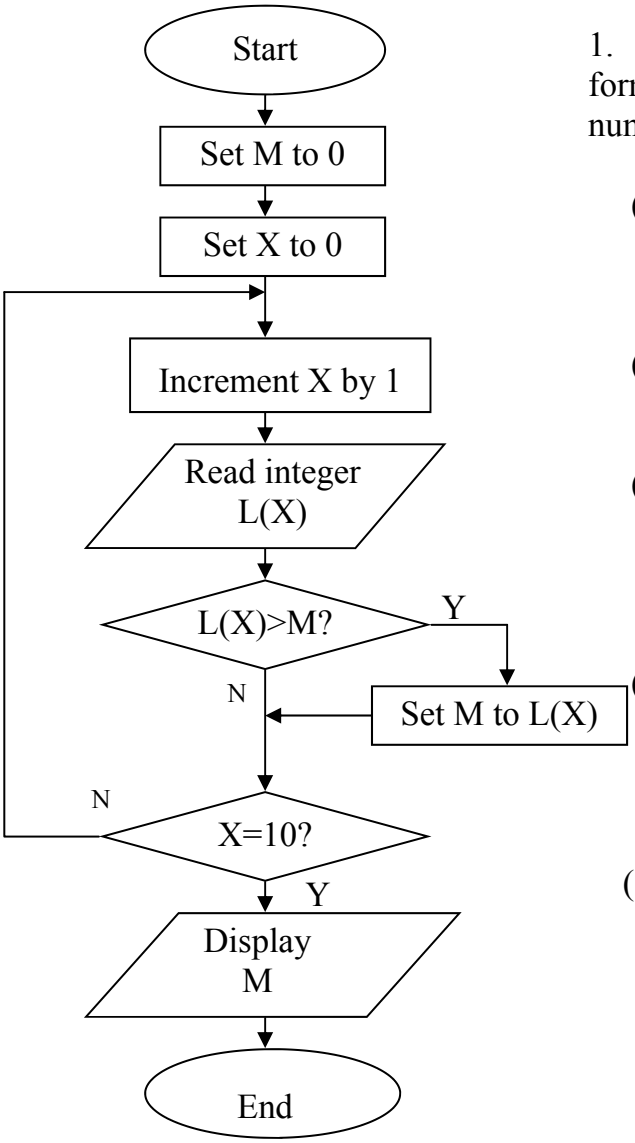
……..… **[10]**

50 SEC '04-PAPER 2A Q1 (CONSULT CH 12)



1. The algorithm shown in flowchart form processes ten input *positive integer* numbers.

(a) What data type would be best suited to store the ten input numbers? **[1]**

(b) What is the expected output? **[2]**

(c) Using a high level language of your choice write the program corresponding to this algorithm. **[8]**

(d) Write down the required code lines to **additionally** output the list of the ten numbers entered by the user. **[3]**

(e) What will be the output if all the numbers inputted are negative? **[3]**

Writing Space for Previous Question

51 SEC '04-PAPER 2B Q8

(a) Select **ONE** of the codes given (Pascal or BASIC) and answer the questions given. A program works out bills in a supermarket. BILL is a variable that holds the amount of money to be paid.

(i) What does the following line of code represent?

```
BILL := PRICE1 + PRICE2 + PRICE3;        (Pascal)
BILL  = PRICE1 + PRICE2 + PRICE3         (BASIC)
```

[1]

(ii) Describe what the following statement does.

```
BILL := BILL + 10;        (Pascal)
BILL  = BILL + 10         (BASIC)
```

[2]

(iii) What does the following piece of code do?

[4]

Code in Pascal	Code in BASIC

BILL : = 0;
For I : = 1 to 5 do
Begin
Write ('Enter Price : ') ;
Read1n (PRICE)
BILL : = BILL + PRICE;
End;
	BILL = 0
	FOR I = 1 TO 5
	PRINT "ENTER PRICE : "
	INPUT PRICE
	BILL = BILL + PRICE
	NEXT I

(b) Write **ONE** or **MORE** high-level statements that perform the following tasks:

(i) Assign to integer variable **Y** one third of integer variable **X**. **[1]**

(ii) Enter any two integer values in variables **A** and **B**. The program then displays the larger of **A** and **B**. **[2]**

(iii) Display all even numbers between 1 and 50. **[3]**

(iv) Declare array **N** which contains 50 cells of integer type. The program generates 50 random numbers, the values of which vary between 1 and 100 inclusive, and stores these numbers in **N**. The program then displays all numbers generated. **[4]**

Writing Space for Previous Question

52 SEC '05-PAPER 1 Q13

Using a named high level language of your choice, write a program which accepts as input the marked sale price of an object, works out the VAT (where the VAT is fixed at 15%) and displays the actual selling price.
The program stops when the user enters character 'N' or 'n' for another try, otherwise it prompts the user for another sale price to be inputed.

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…… **[9]**

53 SEC '05-PAPER 2A Q5

(a) What will the output of the following programs be? Choose either Pascal or BASIC code.

(i)

```
{Pascal Version}
program twodim;
Var
 arr:array [1..2,1..3] of integer;
  row, column : integer;
  begin
     for row  := 1 to 2 do
       for column  := 1 to 3 do
         arr [row, column] := row+column;
    for column  := 1 to 3 do
       begin
    for row := 1 to 2 do
       write (arr [row,column] :2);
    writeln;
   end;
end.
```

```
REM BASIC Version
100 DIM ARR (2,3)
110 FOR ROW = 1 TO 2
120  FOR COLUMN = 1 TO 3
130    ARR (ROW,COLUMN)= ROW + COLUMN
140 NEXT COLUMN
150 NEXT ROW
160 FOR COLUMN = 1 TO 3
170   FOR ROW = 1 TO 2
180     PRINT ARR (ROW, COLUMN)
190   NEXT ROW
200   PRINT
210 NEXT COLUMN
220 END
```

[5]

(ii)

```
Program Strings;
var
 s,str : string;
begin
  str := 'Hello World';
    S:= copy (str, 7,3);
    Writeln (s);
end.
```

```
10 STŚ = "Hello World"
20 SŚ=MIDŚ (STŚ, 7,3)
30 PRINT SŚ
40 END
```

[3]

(b) Write a program in a high level language of your choice, which calculates the rate of inflation of a particular year. The user is required to enter the name of a product and its price for last year and this year. The rate of inflation is then calculated by dividing the difference in prices by last year's price. The output should include the name of the product together with the rate of inflation. **[9]**

Writing Space for Previous Question

54 SEC '05-PAPER 2B Q2 (CONSULT CHs 9 & 11)

(a) Copy and complete the following statements with the most suitable with the most, in the context of language translation.

After writing the code of a program using an _____, the program is _____ to check for _____ errors. _____ errors which are more difficult to trace are located using a _____ or a _____. **[6]**

(b) Give ONE example of ***each*** type of error mentioned in the statement above. **[2]**

(c) Name, explain and give ONE example of another type of error which one might come across when debugging programs. **[3]**

(d) Mention TWO characteristics which make a program more readable. **[2]**

(e) Explain the terms ***e-commerce*** and ***e-mail***. **[4]**

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Writing Space for Previous Question

55 SEC '05-PAPER 2B Q8C

(c) A program repeatedly asks the user to enter an integer until the user chooses to enter the value zero, at which point the program terminates and displays the total and average of all numbers entered (excluding the zero).

Example:

```
Enter an integer 0 to terminate
5

Enter an integer 0 to terminate
6

Enter an integer 0 to terminate
0

Total is 11
Average is 5.5
```

(i) Name the variables to be used in the above program. State the purpose of each variable used. **[2]**

(ii) Which of the variables mentioned in (i) need to be initialized? **[2]**

(iii) Can a ***For do*** loop be used in the program to ask the user to enter the numbers? Why? **[1]**

(iv) Write down the statement used to calculate the average. Where in the program would such a statement be placed? **[1]**

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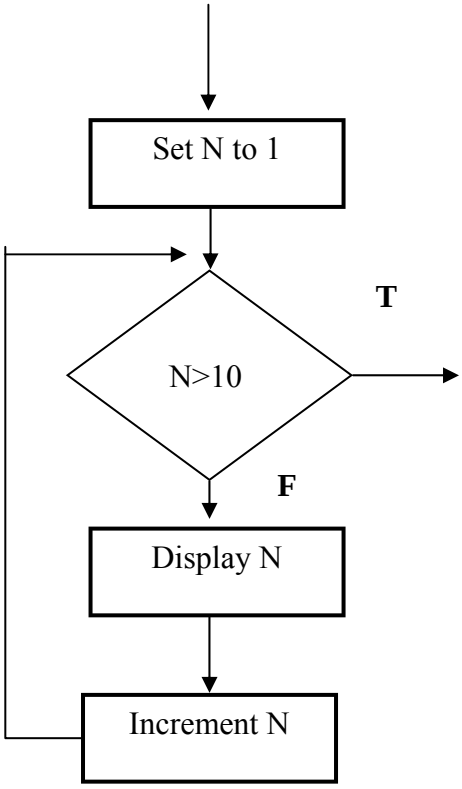
Writing Space for Previous Question

56 SEC '06-PAPER 1 Q6

(a) Using a high level language of your choice write corresponding code lines to the following algorithmic steps.



[3]

(b) What is the programming construct called?

[1]

(c) What does this simple algorithm do?

[2]

57 SEC '06-PAPER 1 Q8 (CONSULT CHs11 & 12)

Differentiate between the following pairs

(a) *Source code* and *Executable code* **[2]**

_____

_____

(b) *Assembler* and *Compiler* **[2]**

_____

_____

(c) *Logic error* and *Run-time error* **[2]**

_____

_____

(d) *Extreme (Critical)* and *Invalid (Abnormal) test data* **[2]**

_____

_____

(e) *Pseudo-coding* and *Flowcharting* **[2]**

_____

_____

58 SEC '06-PAPER 1 Q12

Using a high level language of your own choice, write a program which accepts the input of *five* positive integers (a_1, a_2, a_3, a_4, a_5) and outputs the resultant sum (X) of squares of these five inputted numbers.

[8]

$$X = a_1^2 + a_2^2 + a_3^2 + a_4^2 + a_5^2$$

59 SEC '06-PAPER 2A Q6 (CONSULT CH 12)

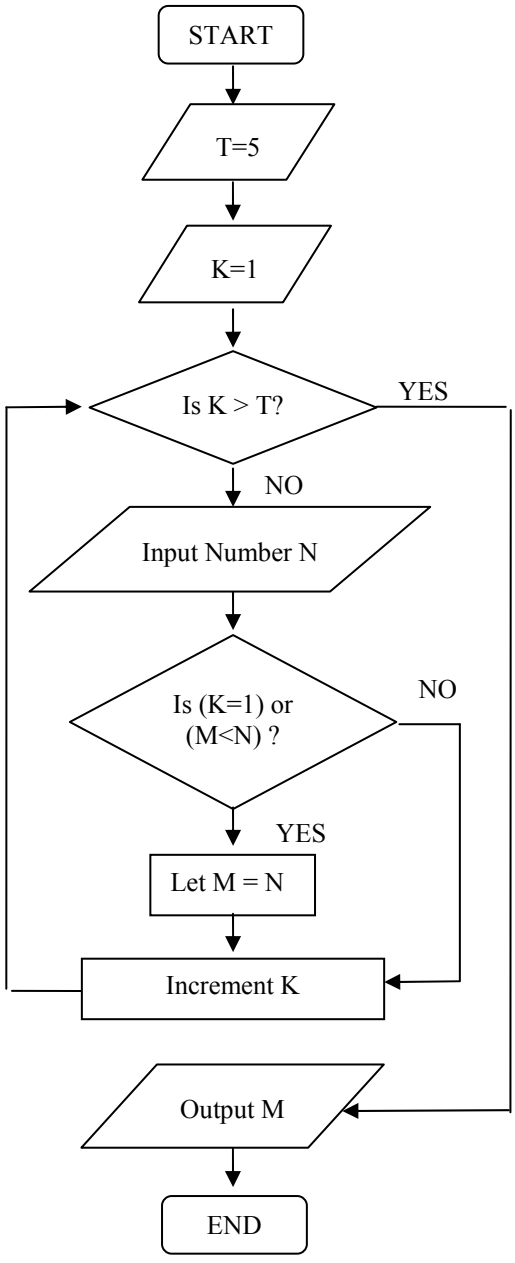
a) What is the function of this algorithm? **[4]**

b) What datatype would be suitable to store the FIVE input numbers? **[2]**

c) What would the output be if the following numbers were entered for N; 5,7,9,4,8? **[2]**

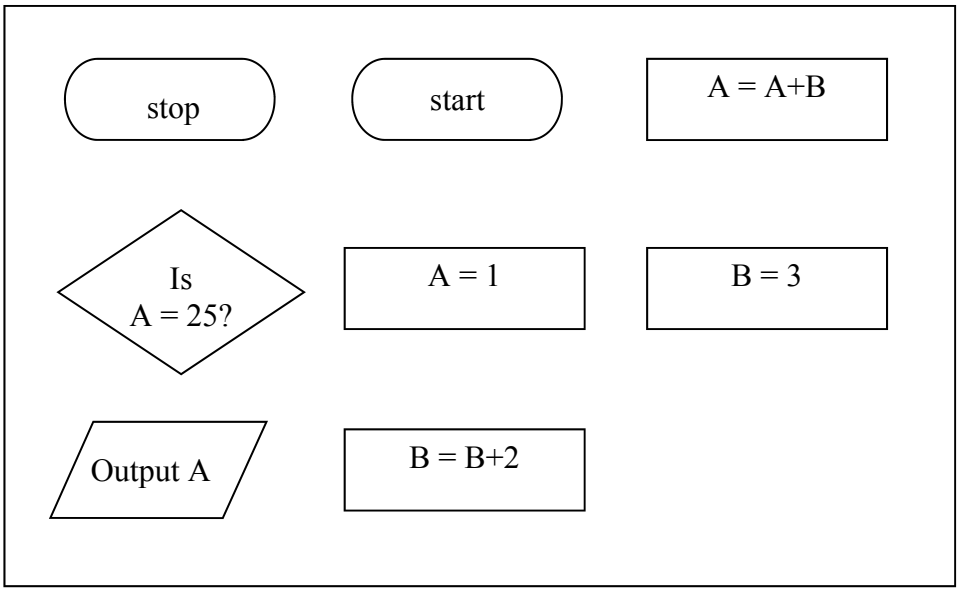
d) What is the value of K when the program terminates? **[1]**

e) Using a high level language of your choice, write a program corresponding to this algorithm. **[8]**



Writing Space for Previous Question

60 SEC '06-PAPER 2B Q1 (CONSULT CH 12)



A) Reaarrange all the flowchart symbol and draw connecting lines with arrows to build a flowchart that will produce the following outputs; 1,4,9,16,25. **[8]**

B) Dry run the flowchart with the output A at the following values: 1,4,9,16,25 and complete the following table.

B	Output A

[5]

C) Identify ONE loop from the flowchart. **[4]**

Writing Space for Previous Question

61 SEC '07-PAPER 1 Q1 (CONSULT CHs 4 & 8)

State whether each of these is **TRUE** or **FALSE**

a) A source code program written in Pascal or Basic needs to be translated before it is executed. **[1]**

_____

b) The random access memory (RAM) used for the Immediate Access Store (IAS) of a computer is called an optical type of storage medium. **[1]**

_____

c) To run a multimedia application you need an Internet connection. **[1]**

_____

d) When using a bank's Automatic Teller Machine (ATM) to withdraw cash, you are somehow accessing the bank's computer. **[1]**

_____

62 SEC '07-PAPER 1 Q13

Using a named high level language of your choice, write a program which converts a user-inputted amount of money specified in Malta Lira to Euros. Assume the exchange rate of 0.43 euros per one Maltese Lira. **[9]**

63 SEC '07-PAPER 2A Q6 (CONSULT CHs 11 & 12)

a) Differentiate between the terms *Interpreter* and *Compiler* as used in computer programming. **[4]**

b) How are 4GL's (4^{th} Generation Languages) different from 3GL's (3^{rd} Generation Languages)? **[4]**

c) Name ***ONE*** 4^{th} Generation programming language. **[1]**

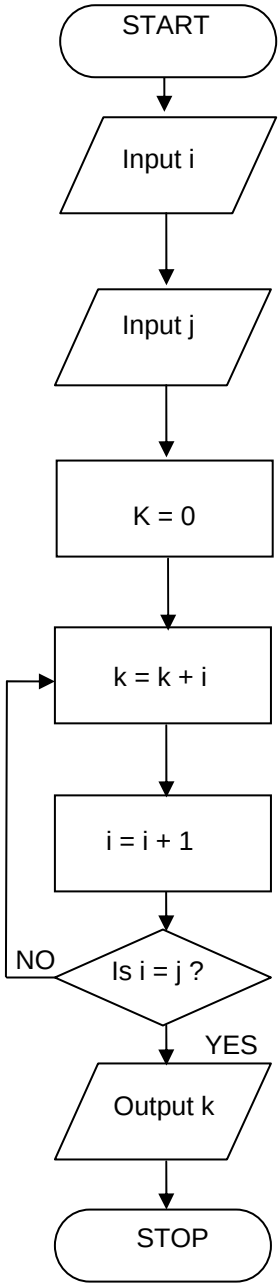
d) Define the following types of errors and give an example of each: **[6]**

i. syntax error;
ii. logical error;
iii. run-time error.

e) What is *pseudo-code*? What is it used for? **[2]**

Writing Space for Previous Question

64 SEC '07-PAPER 2A Q8 (CONSULT CH 12)



a) What is the function of this algorithm? **[4]**

b) What happens to the execution of the program if the user enters a number for **i** bigger than the number for **j**. **[2]**

c) Under what condition does the algorithm stop? **[1]**

d) Explain the term *Dry Run*. Why is dry-running an algorithm important? **[2]**

e) Using a high-level language program of your choice implement the algorithm represented in the flowchart. **[8]**

Writing Space for Previous Question

65 SEC '07-PAPER 2B Q8 (CONSULT CH 12)

Consider the program below (choose either the Pascal version or the Basic version)

Pascal	Basic

var a : array[1..10] of integer;
  i : integer;
begin
  Writeln('Enter 10 numbers');
  for i := 1 to 10 do
  readln(a[i]);
  Writeln('The Result is: ');
  for i := 1 to 10 do
  writeln(a[i] div 2);
  readln;
End.
	DIM a(10)
	PRINT "Enter 10 numbers"
	FOR i = 1 TO 10
	 INPUT a(i)
	NEXT i
	PRINT "The Result is: "
	FOR i = 1 TO 10
	 PRINT a(i) / 2
	NEXT i

a) What is an *array*? Write the name given to the array used in the program. How many different numbers is this array supposed to hold? **[4]**

b) What is a *loop* structure? Name THREE different types of loops available in the programming language of your choice. Which of these loops is used in the program? **[5]**

c) What do the following symbols from a flow chart represent? **[2]**

d) Copy and label the symbols above, by using a statement from the given program. **[2]**

e) Describe the effects observed when replacing:

Pascal	Basic
for i := 1 to 10 do writeln(a [i] div 2);	FOR i = 1 TO 10 PRINT a (i) / 2
with	with
for i := 1 to **5** do writeln(a [i] div 2);	FOR i = 1 TO **5** PRINT a (i) / 2

[4]

Writing Space for Previous Question