

Algorithm

An algorithm is a finite set of instructions to solve a desire problem.

Every algorithm must be clear, finite and effective.

Step form algorithm

Step form algorithm is a type of algorithm. It is a simplest form numbered steps (Finite steps). Step form logarithm is just like a to do list.

Program

A set of instruction given to a computer to solve a desired problem program. These instructions must be given in a particular computer language.

Flow chart

A pictorial representation of an logarithm is called flow chart. It represents of data, operations perform in the system and sequence of all instructions. Every flow chart is designed according to defined rules and symbols.

Desk Checking

A process to observe a working of an algorithm for testing on Paper desk checking. For desk checking we use different inputs to examine output.

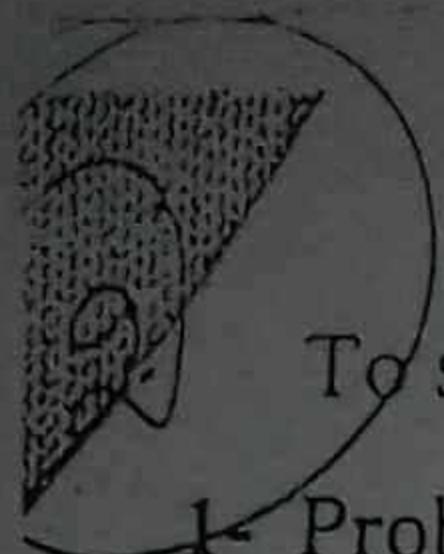
Syntax

The grammatical rules of a programming language to write programs known as syntax of that programming language.

Q.1-What do you mean by problem solving? Briefly describe the problem process?

Ans. Problem solving

Problem Solving is a skill to solve any problem in computer science. Problem is done by programming. If any body is a good programmer then it means he can solve any problem. For problem solving programmers use the software development n



To solve any kind of problem following step are followed

#### 1 Problem identification

- 2- Analyze the problem
- 3- Specify Requirements
- 4- Design algorithm and draw flow chart
- 5- Write the program ( coding)
- 6- Test and Debug the program
- 7- Implement the program
- 8- Maintain and update the program
- 9- Document the program

#### Problem Identification

First of all the problem should be observed carefully. The major areas concerned are identified and irrelevant information is filtered out, e.g If we want to develop simple calculator then our major concern is how basic arithmetic operations are performed what should be our input and what output should be displayed?

#### Specify Requirements.

Most of the users can not explain their exact software requirements. This stage involves the formation of a requirement document which describes the features to provide restrictions under which it must operate and an abstract description of the software which provides a basis for design and implementation.

#### Analyze the problem

In this step problem is decompose into sub problems. Now We try to solve each problem separately, it will give us a simple solution. This method is known as Top down. It is also called Divide and conquer rule.

In this step we will analyze that how much solution are possible? Which one is a best solution? Is problem solvable on computer? What are inputs and outputs? How the problem is divided into Sub Problems?

#### Design Algorithm and Draw Flow Chat

In this step we design algorithm. Algorithm is finite and clear set of instructions.

Algorithm by the help of desk checking we will carefully observe the working of algorithm by Testing it for a different set of inputs.

Now we will represent our algorithm in a graphical form which is called flowchart.

### Write the program (Coding)

In this step we convert our algorithm into a computer program in a particular language according to the syntax.

A process of converting algorithm into a computer program in some computer language is called Coding.

### Test and Debug the program

In this step we will run the program several times and if it gives correct result it means our program is accurate. If in the process of testing we will find any type of error those errors must be debug.

### Implement the program

After the successful testing of the program we will execute it for our requirement which is needed this is called implementation of a program.

### Maintain and Update the program

When our program is ready for implementation we have must maintain it and update, Updating or Upgrading of program is required for hardware and software requirement. Sometimes improvement is needed in our program so we have to update our program time to time.

### Documentation

Documentation is description of program for its proper use. A documentation about software requirement, algorithm, program, design, testing, modification and manual.

Q.No.2-What is debugging? How many types of errors can occur in a Program? Describe briefly?

Debugging is the process of finding and removing errors in the program.

There can be three types of programming errors:

- 1- Syntax error
- 2- Execution error
- 3- Logical error

### Syntax Errors

A syntax error occurs when the program violates one or more grammatical rules of programming language. These errors are detected at compile time. For example if we execute a wrong statement or command such as typing `pint` instead of `print` statement.

### Runtime Error

A run time error occurs when the program directs the computer to perform an operation such as dividing a number by Zero. Runtime errors are detected and displayed by the computer during the execution of a program when a runtime error occurs, the computer will stop execution of the program.

### Logical Error

Logic errors occur when a program follows a wrong logic. These are the most difficult errors to locate. Logical errors can be identified by just looking at wrong output of the program.

## **Educational**

- Q.No.3- Write step form algorithm for making a telephone call to your friend?**
- To begin, pick up the receiver and dial the number of friend.
  - If there is no tone of call ringing then place down the receiver. If the bell is ringing on other side but if it is busy tone then drop down the receiver and wait for a while.
  - Again pick up the receiver and dial the number. If ringing tone is heard then wait until someone receives your call.
  - If receiver is your friend then talk with him. But if receiver is any family member of yours then convey him message.

**Q.4- Write an algorithm to calculate the area of a circle when the radius is given.**

$$(\text{area} = 3.14 * \text{radius} * \text{radius})$$

- To begin input the value of radius of a circle
- For processing give formula,  $A = 3.14 * r * r$

Now you can get output by printing value of A which will area of circle.

Q.No.5- What are the advantages of flow chart? Discuss limitation of flow chart

Advantages of flow chart:-

- 1- With the help of a flow chart , the logic of an algorithm can be described effectively
- 2- Maintenance of operational programs becomes easy
- 3- The flow charts act as a guide for the program development

Limitations of flow chart:-

- 1- It is difficult to draw flow chart for complex problems.
- 2- If alterations are required then flow chart is to be redrawn.

Q.NO.6- What method should be adopted to solve complex problems? Discuss b

Complex problems are easy to solve if we decomposed it into sub problems, to solve each sub problem separately. It gives us a simple solution. This technique top down design or divide and conquer rule.

Q.NO.7- What do you mean by syntax of programming language? Is it necessary to know the syntax for solving problems on computer?

The grammatical rules of a programming language to write programs are referred as syntax of that programming language.

It is necessary to know the syntax of programming language to solve the problem, computer can not understand instructions without syntax and it gives syntax error.

Q.No.8- Why documents is considered vital in problem solving process?

Ans. Documentation described every thing in detail it gives description about alg design , coding , testing and proper use. Documentation is very helpful for a new user to use any program.

It is necessary for an algorithm to solve a problem in finite number of steps.  
Why?

Yes, it is necessary for an algorithm to solve a problem in a finite set. Because it will be more effective and clear. If there are large number of steps then program becomes complicated and it will difficult to solve it.

#### 10- Different between runtime error and syntax error?

##### Runtime error

Runtime error occur when there is illegal operation in a program.

Runtime errors are detected by computer

Computer stop the execution of a program due to runtime error

Runtime error are displayed by computers

##### Logical error

1- Logical error occurs when a programs follows wrong logic.

2- Logical error are difficult to locate.

3- Logical errors give wrong output.

4- Logic errors are only found by examine the output.

#### Compare flow chart and algorithm?

##### Flow chart

Flow chart is a pictorial representation of an algorithm

Flow chart is a base of program

There are special symbols having special purposes to draw flow chart

Flow chart give a picture of flow of operations.

##### Algorithm

1- A sequence of instructions to solve any problem

2- Algorithm is a base of flow chart

3- There are no special rules for writing an algorithm

4- Algorithm behaves like a simple to do list

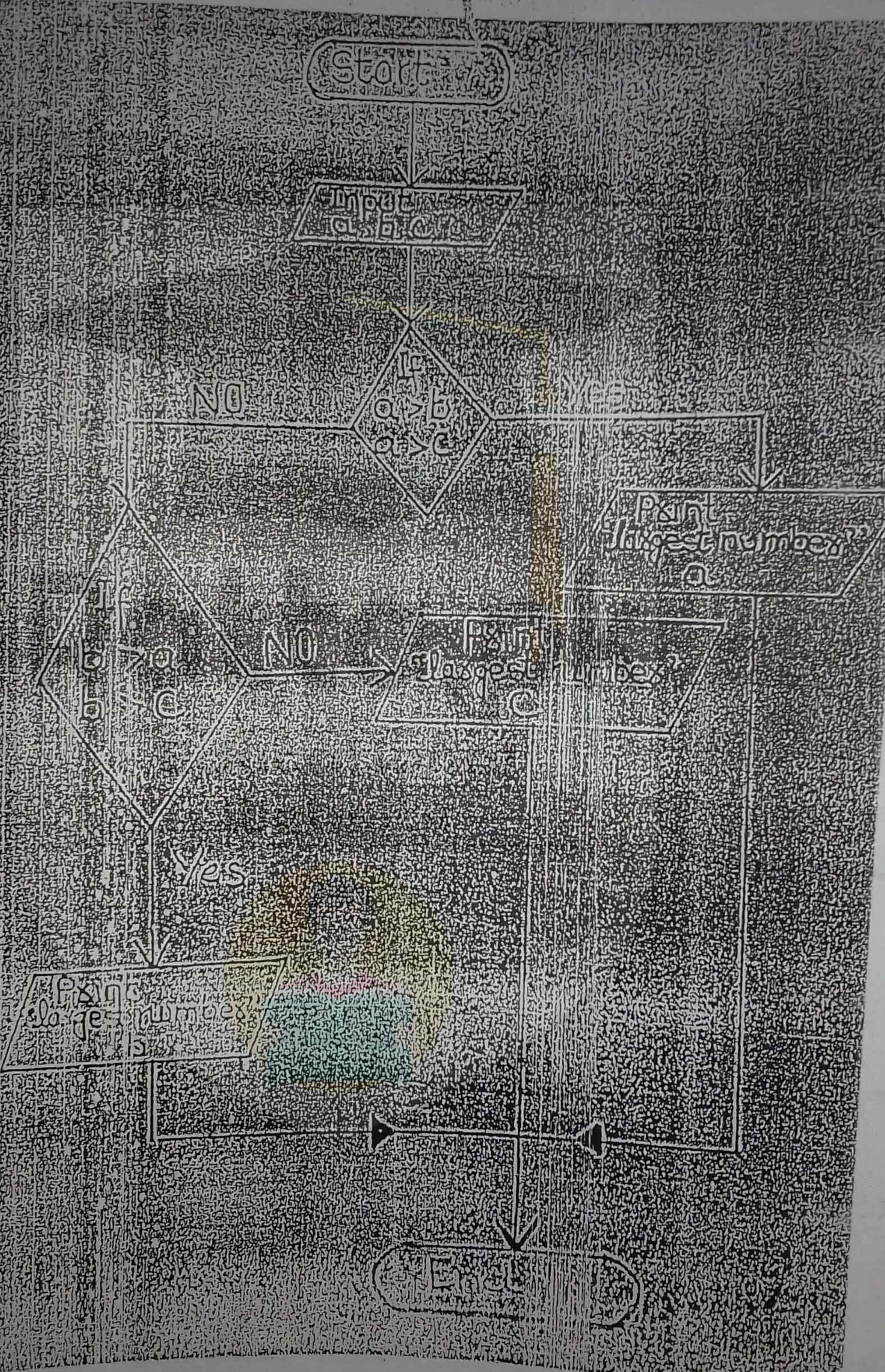
Q2- What are different symbols uses in flow chart?

Symbol	Purpose
	Start / End of a flow chart
	Processing
	Input / Out put
	Decision Making and branching
	Connect
	Flow lines
	Pre defined process (functions / sub
	Remarks
	Off page / On page connector

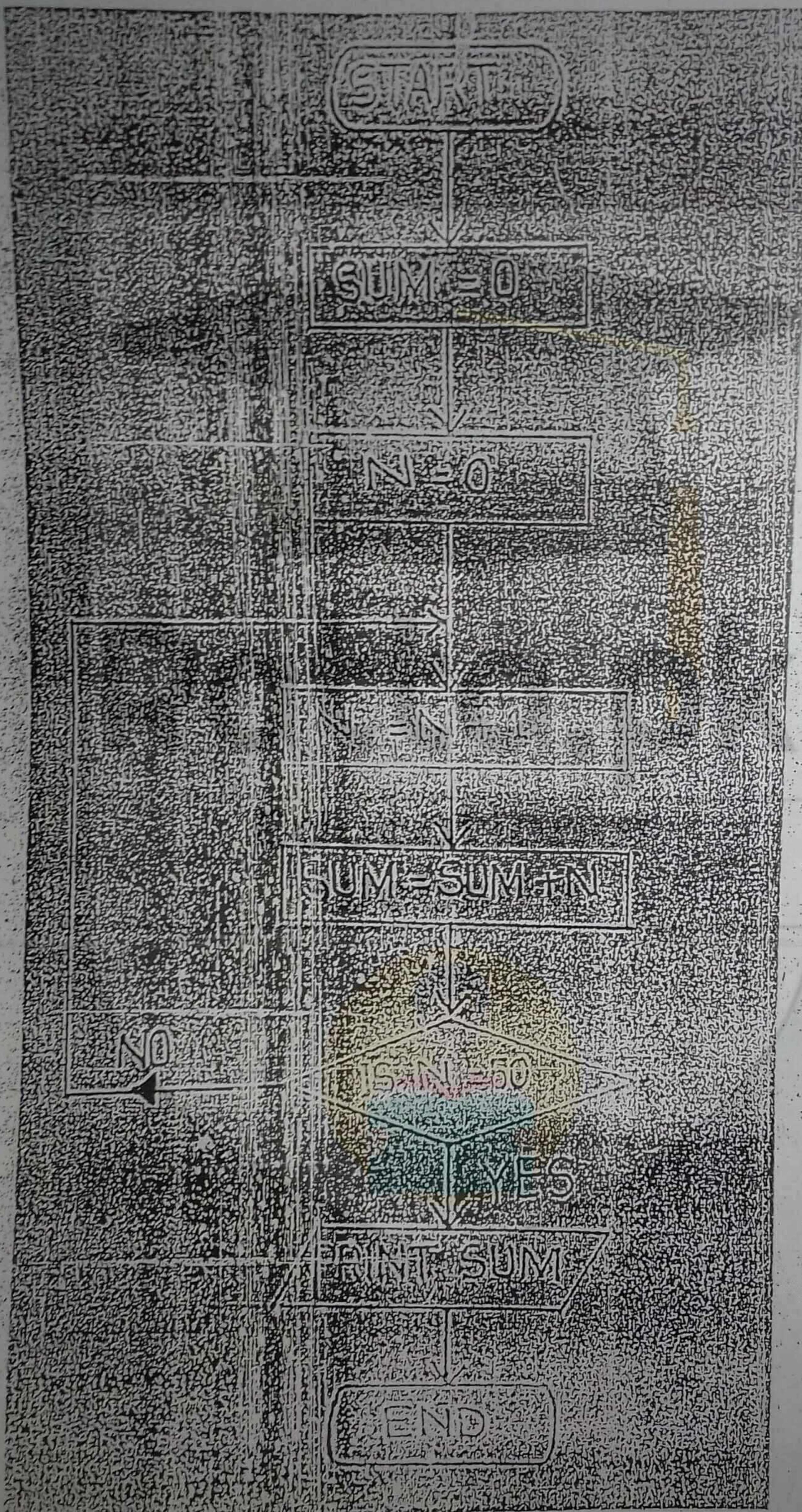
Q.NO13- Draw a flow chart to find the largest of three number?



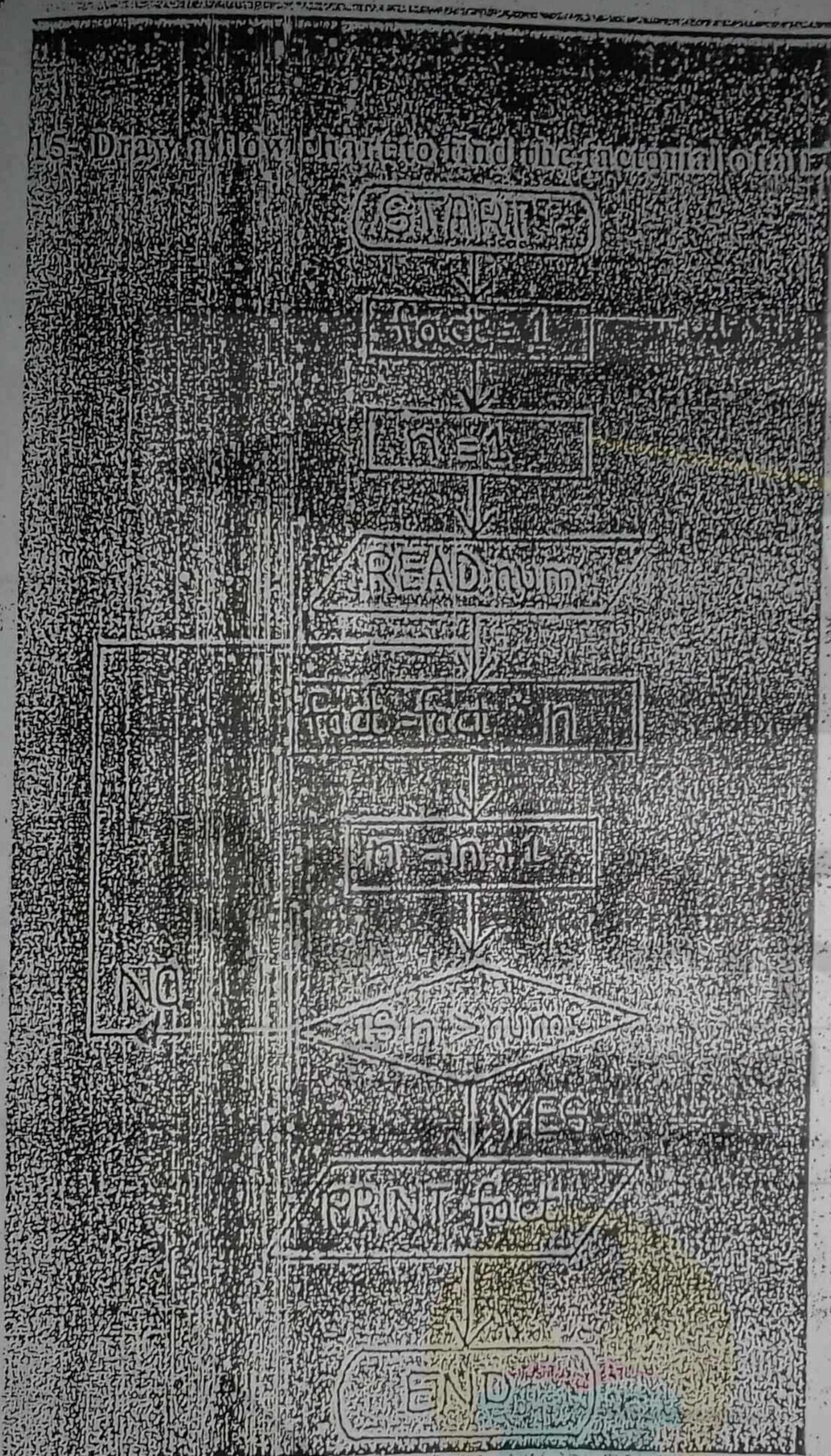
Q.NO13- Draw a flow chart to find the largest of three number?



Q.No.14- Draw a flow chart to fine sum of first 50 natural numbers?



Q.No.15- Draw a flow chart to find the factorial of a no?



Q.No.16-Write an algorithm to calculate distance covered by a car in average speed of  $v \text{ ms}^{-1}$  in time  $t$ . the program should input average speed 'v'

1- To begin input the value of speed (v)

2- Input the value of time ( t )

3- Processing  $S = vt$

4- To get out put print S