

3. PRINCIPLES OF PROGRAMMING AND PROBLEM SOLVING

1. What is the role of computer in problem solving?

Computer can carry out tasks efficiently and accurately if we give correct instructions. Computer is an obedient servant without any common sense. So the computer can be used to solve problems by giving step by step instruction to solve it.

2. What are the Approaches in problem solving?

There are two approaches for problem solving.

Top down –Breaking the overall procedure in to modules and sub divide them until lowest level reached.

Bottom up - Starts from lowest level to the highest level.

3. What are Phases in Programming?

- a). **Problem Identification** : To identify the data involved in processing, its types, formula to be used, activities involve and the output to be obtained.
- b). **Preparing of Algorithms and flowchart**: to develop a step by step procedure for problem solving.
- c). **Coding**: writing of actual program in computer language.
- d) **Translation**: Conversion of high level language program to machine language.
- e). **Debugging** : Finding and correcting of errors in the program
- f). **Execution and testing** : Running of the program and testing for correctness.
- g). **Documentation**: It will help to understand the program for proper usage and modification. Two types of documentations.

1) **Internal documentation** : Adding comments in program code etc..

2) **External Documentation**: Writing manuals about the program for user help.

4. What is a computer program?

Computer program is a group of instructions written in a computer language in a particular order to solve a problem.

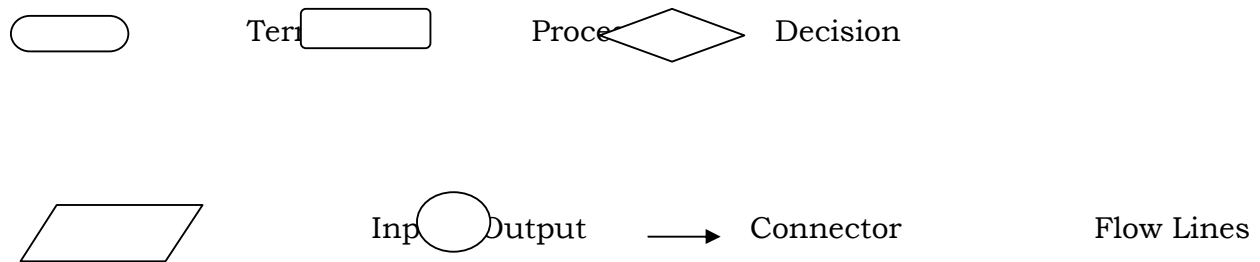
5. What is an algorithm? How it help to write computer program?

Algorithm is a finite sequence of instructions to solve a problem. It is a step by step procedure to solve a problem. It may contain input, processing , conditions and

output statements. It follows the logical flow of the program. So writing of program is easy with the help of flowchart.

6. What is a flowchart?

Flowchart is the pictorial representation of an algorithm with specific symbols for instruction. Here the details of the elements in the programming language is not concerned. The symbols used in flowchart are,



7. What are the characteristics of flowchart?

- It will begin with instructions to accept inputs.
- Uses variables to refer data.
- Each instruction should be precise and clear.
- Instructions should be simple.
- The total time taken to carry out all steps should be finite.
- After performing the instructions, the desired output must be obtained.

8. What are the advantages of flowchart?

- Better communication:** By using symbols, it is easy to convey ideas to other programmers.
- Effective analysis:** Because it clearly specifies the flow of steps in the program.
- Effective synthesis:** Program can be divided into small modules and its solution can represent separately and can finally be placed together.
- Efficient Coding:** The flow chart acts as a road map through which the programmer can develop program without omission of important steps.

9. What are the limitations of a flowchart?

- Very **time consuming** to draw.

- b). **Changing** in logic is **difficult**.
- c). **No standard** about amount of details including .

10. What are the Criteria for selecting an algorithm?

The algorithm which will be executed faster with minimum amount of memory space is considered a best algorithm.

11. What is a computer Program?

A finite sequence of instructions to solve a problem written in a computer language.

12. What are different types of errors in computer programs?

- a). **Syntax error**: Due to not following rules(syntax) of the programming language
- b). **Logical error**: Due to improper planning of the programming logic
- c). **Runtime error**: Due to improper inputting of data etc.

13. What is mean by coding?

Writing of program instructions in a computer language to solve a problem is known as coding.

14. What is Source code?

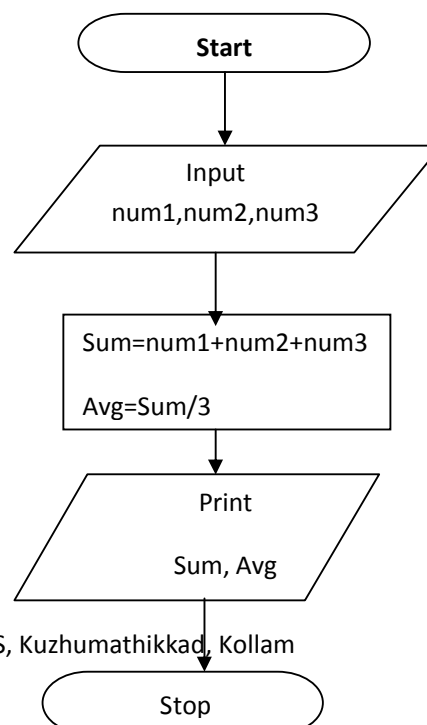
Program written in any High Level Computer Language is known as Source Code.

15. What is object code?

The version of the source code get after translation is known as Object Code.

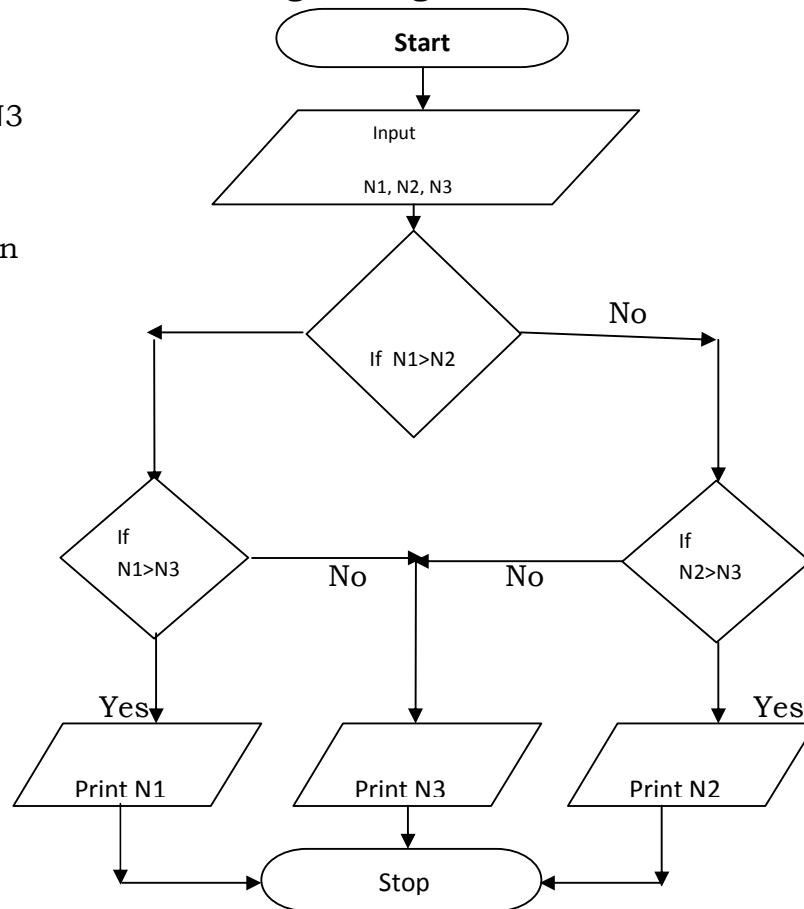
16. Write algorithm and flowchart to find sum and average of given 3 numbers.

- Step 1. Start
- Step 2. Input num1, num2, num3
- Step 3. $\text{sum} = \text{num1} + \text{num2} + \text{num3}$
- Step 4. $\text{Avg} = \text{sum} / 3$
- Step 5. Print sum, Avg
- Step 6. Stop.



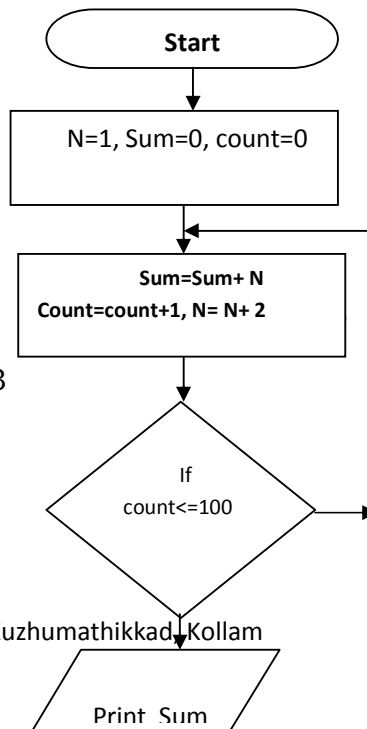
16. Write algorithm and flowchart to find largest of given 3 numbers.

- Step 1. Start
- Step 2. Input N1, N2, N3
- Step 3. If $N1 > N2$
 If $N1 > N3$ then
 print N1
 else
 print N3
 else
 If $N2 > N3$ then
 print N2
 else
 print N3
- Step 10. Stop.



17. Write algorithm and flowchart to find sum of first 100 odd numbers.

- Step 1. Start
- Step 2. $N=1$, $\text{Sum} = 0$, $\text{count}=0$
- Step 3. $\text{Sum} = \text{Sum} + N$
- Step 4. $\text{count} = \text{count} + 1$
- Step 5. $N = N + 2$
- Step 6. if $\text{count} \leq 100$ then go to Step 3
- Step 8. print Sum
- Step 9. Stop



18. Write algorithm and flowchart to find whether a given number is odd or even.

Step 1.

Step 2. Input N

Step 3 $R = N \text{ Mod } 2$

Step 4 If $R = 0$ then

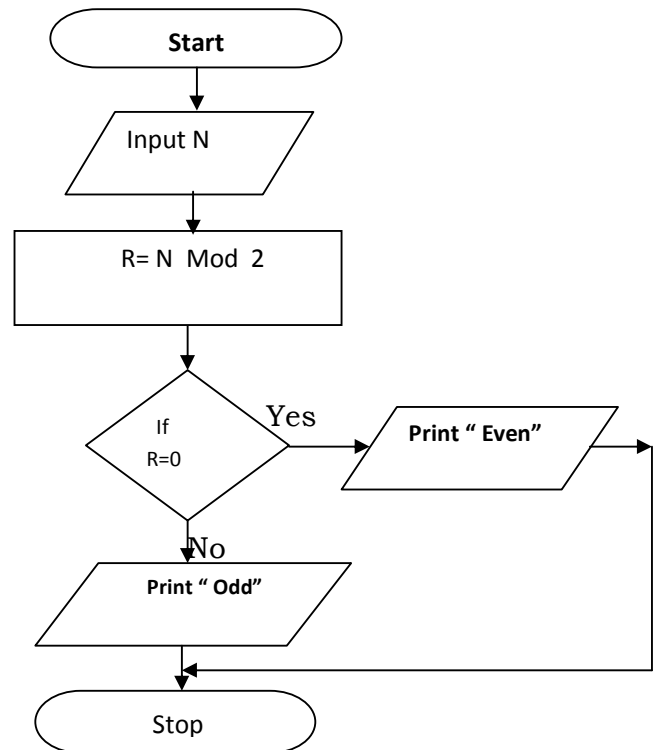
Step 5 print "The Given number is even"

Step 6 else

Step 8 print "The Given number is odd"

Step 9 end if

Step 10



19. What is the quality of a best algorithm?

An algorithm which take minimum time to execute and less memory space is considered as best algorithm.

Previous Questions:

1. Fill the blank

Source Code ----> -> Object Code (1)

2. The process of converting source code into object code is called..... (1)

2. In a flowchart, the terminal symbol(ellipse) is used to indicate and (1)

3. . . . is the step by step procedure to solve problem. (1).

Observe the following statements.

a)Internal documentation consists of procedure for installing and using the program.

b) Flowchart are pictorial representation of algorithms.

Choose the most appropriate answer from the options given below.

- i) Statement a) is correct ii) Statement b) is correct iii) Both statements are correct
iv) Both statements are correct. (1)

4. Which of the following is not a part of program documentation?

- a). Writing comments in the source code. b). Detecting and correcting errors.
c). preparation of system Manual. d). Preparation of user manual. (1)

5. While writing a C++ program, a student forgot to put semicolon at the end of the declaration statement. What type of error can he expect during compilation? (1)

6. Write short notes on the following :

a). Coding (1)

b). Debugging (1)

7. Briefly explain the phases in programming. (3)

8. Draw a flowchart to print the first 100 natural numbers (3)

9. The flowchart to find the sum and average of three given numbers. (3)

10. What are the characteristics of an algorithm. (3)

11. Draw a flowchart for the following

Step 1: Start

Step 2: Input Max

Step 3: Num = 5

Step 4: Repeat steps 5 and 6 while Num ≤ Max

Step 5: Output Num

Step 6: Num = Num + 5

Step 7: Stop (3)

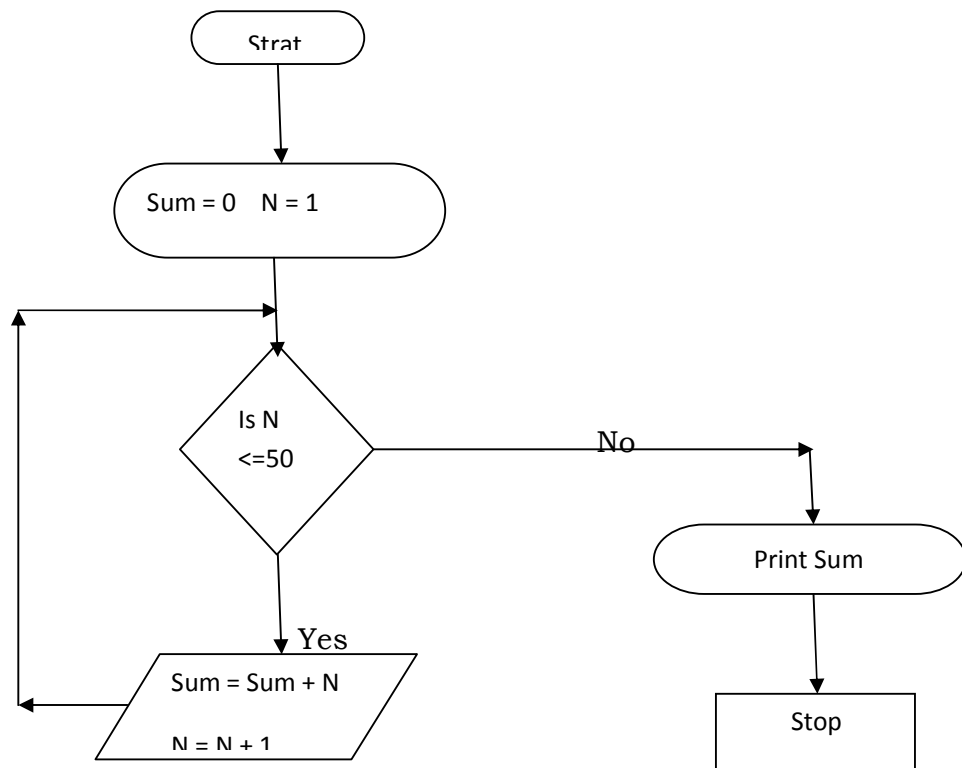
12. Draw a flowchart to find the sum and average of even numbers between 1 and 99. (3)

13. Write a short note on the importance of internal documentation. (3)

14. Draw any six flow chart symbols and specify their standardized meanings. (3)

15. Write algorithm to print first 100 natural numbers. (3)

16. Explain the different types of errors that may occur in a program. (3)
17. Draw the flowchart to find the sum and average of three given numbers. (3)
18. Explain two types of documentation in programming. (3)
19. List the different stages in programming. (3)
20. Errors may occur in two stages of programming.
 a) Name these two stages. Explain the nature of errors in these stages. (3)
 b) The process of correcting these errors is known as (1)
21. Following is a flowchart to find the sum of the first 50 natural numbers.



- a) Correct the flowchart if there are errors. (2)
- b) Redraw the flowchart to find the sum of even numbers between 1 and 50. (1)
22. An algorithm is a finite sequence of instructions to solve a problem.
- a) What are the characteristics of an algorithm? (3)
- b) Pictorial representation of an algorithm is called (1)