**INTRODUCTION**

Intelligence is one of the key characteristics which differentiate a human being from other living creatures on the earth. Basic intelligence covers day to day problem solving and making strategies to handle different situations which keep arising in day to day life. One person goes Bank to withdraw money. After knowing the balance in his/her account, he/she decides to with draw the entire amount from his account but he/she has to leave minimum balance in his account. Here deciding about how much amount he/she may withdraw from the account is one of the examples of the basic intelligence. During the process of solving any problem, one tries to find the necessary steps to be taken in a sequence. In this context we will develop our understanding about problem solving and approaches.

**PROBLEM SOLVING**

Can we think of a day in our life which goes without problem solving? Answer to this question is of course, No. In our life we are bound to solve problems. In our day to day activity such as purchasing something from a general store and making payments, depositing fee in school, or withdrawing money from bank account. All these activities involve some kind of problem solving. It can be said that whatever activity a human being or machine do for achieving a specified objective comes under problem solving. To make it clearer, let us see some other examples.

Example1: If we are watching a news channel on TV and we want to change it to a sports channel, we need to do something i.e. move to that channel by pressing that channel number on the remote. This is a kind of problem solving.

Example 2: One Monday morning, a student is ready to go to school but yet he/she has not picked up those books and copies which are required as per timetable. So here picking up books and copies as per timetable is a kind of problem solving.

Example 3: If someone asks to us, what is time now? So, seeing time in the watch and telling him/her is also a kind of problem solving.

Example 4: Some students in a class plan to go on picnic and decide to share the expenses among them. So, calculating total expenses and the amount an individual have to give for picnic is also a kind of problem solving.

Now, broadly we can say that problem is a kind of barrier to achieve something and problem solving is a process to get that barrier removed by performing some sequence of activities.

Here it is necessary to mention that all the problems in the world cannot be solved. There are some problems which have no solution and these problems are called Open Problems.

If we can solve a given problem then we can also write the required steps to solve the given problem. So, Programming logic is a fundamental construct that is applied to computer science in a variety of comprehensive ways. Programming logic involves logical operations on hard data that works according to logical principles and quantifiable results. The different tools used for programming logics are –

* Algorithm
* Flowchart
* Pseudo code etc

**Algorithm**

Algorithm can be defined as “A sequence of activities to be processed for getting desired output from a given input.”

Webopedia defines an algorithm as: “A formula or set of steps for solving a particular problem. To be an algorithm, a set of rules must be unambiguous and have a clear stopping point”. There may be more than one way to solve a problem, so there may be more than one algorithm for a problem.

Now, if we take definition of algorithm as: “A sequence of activities to be processed for getting desired output from a given input.” Then we can say that:

1. Getting specified output is essential after algorithm is executed.

2. One will get output only if algorithm stops after finite time.

3. Activities in an algorithm to be clearly defined in other words for it to be unambiguous.

Before writing an algorithm for a problem, one should find out what is/are the inputs to the algorithm and what is/are expected output after running the algorithm. While writing algorithms we will use following symbol for different operations:

‘+’ for Addition

‘-’ for Subtraction

‘\*’ for Multiplication

‘/’ for Division and

‘= ’ for assignment. For example A= X\*3 means A will have a value of X\*3.

**Properties of algorithm**

Donald Ervin Knuth has given a list of five properties for an algorithm. These properties are:

1. Finiteness: An algorithm must always terminate after a finite number of steps. It means after every step one reach closer to solution of the problem and after a finite number of steps algorithm reaches to an end point.
2. Definiteness: Each step of an algorithm must be precisely defined. It is done by well thought actions to be performed at each step of the algorithm. Also the actions are defined unambiguously for each activity in the algorithm.
3. Input: Any operation you perform need some beginning value/quantities associated with different activities in the operation. So the value/quantities are given to the algorithm before it begins.
4. Output: One always expects output/result (expected value/quantities) in terms of output from an algorithm. The result may be obtained at different stages of the algorithm. If some result is from the intermediate stage of the operation then it is known as intermediate result and result obtained at the end of algorithm is known as end result. The output is expected value/quantities always have a specified relation to the inputs
5. Effectiveness: Algorithms to be developed/written using basic operations. Actually operations should be basic, so that even they can in principle be done exactly and in a finite amount of time by a person, by using paper and pencil only.

**FLOWCHART**

The flowchart is a diagram which visually presents the flow of data through processing systems. This means by seeing a flow chart one can know the operations performed and the sequence of these operations in a system. Algorithms are nothing but sequence of steps for solving problems. So a flow chart can be used for representing an algorithm. A flowchart, will describe the operations (and in what sequence) are required to solve a given problem. We can see a flow chart as a blueprint of a design that we have made for solving a problem.

For example suppose we are going for a picnic with our friends then we plan for the activities we will do there. If we have a plan of activities then we know clearly when we will do what activity. Similarly when we have a problem to solve using computer or in other word we need to write a computer program for a problem then it will be good to draw a flowchart prior to writing a computer program. Flowchart is drawn according to defined rules.

Flowchart Symbols

There are 6 basic symbols commonly used in flowcharting of assembly language Programs: Terminal, Process, input/output, Decision, Connector

(Follow your class note for symbols and their description)

**General Rules for flowcharting**

1. All boxes of the flowchart are connected with Arrows. (Not lines)
2. Flowchart symbols have an entry point on the top of the symbol with no other entry points. The exit point for all flowchart symbols is on the bottom except for the Decision symbol.
3. The Decision symbol has two exit points; these can be on the sides or the bottom and one side.
4. Generally a flowchart will flow from top to bottom. However, an upward flow can be shown as long as it does not exceed 3 symbols.
5. Connectors are used to connect breaks in the flowchart. Examples are:

• From one page to another page.

• From the bottom of the page to the top of the same page.

• An upward flow of more then 3 symbols

1. Subroutines and Interrupt programs have their own and independent flowcharts
2. All flow charts start with a Terminal or Predefined Process (for interrupt programs or subroutines) symbol.
3. All flowcharts end with a terminal.

Flowcharting uses symbols that have been in use for a number of years to represent the type of operations and/or processes being performed. The standardised format provides a common method for people to visualise ALGORITHM AND FLOW CHART.