SNS COLLEGE OF TECHNOLOGY

Coimbatore-35.

An Autonomous Institution

COURSE NAME : 19ITB201 DESIGN AND ANALYSIS OF ALGORITHMS

II YEAR/ IV SEMESTER

UNIT – I INTRODUCTION

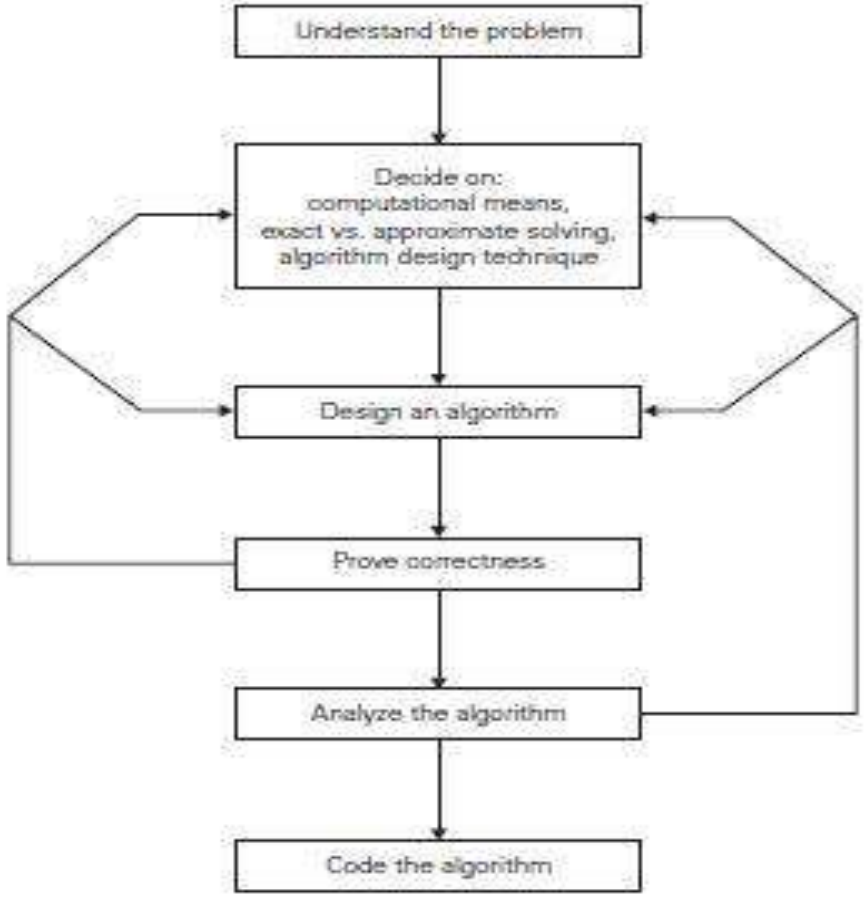
1.2 FUNDAMENTALS OF ALGORITHMIC PROBLEM SOLVING

FUNDAMENTALS OF ALGORITHIMIC PROBLEM SOLVING

Sequence of steps in designing and analyzing an algorithm :

1. Understand the problem
2. Decision making
3. Design an algorithm
4. Proving correctness of an algorithm
5. Analyze the algorithm
6. Coding and implementation of an algorithm

FUNDAMENTALS OF ALGORITHIMIC PROBLEM SOLVING



Understanding the Problem

- Understanding the problem statement
- Necessary inputs for solving the problem
- Deciding the range of inputs.

Decision making

a) Computational means

b) Exact vs Approximate solving

c) Data Structures

d) Algorithm design technique

Decision making

a) Computational means :

To check the computational capabilities of devices on which algorithm will be running.

2 types :

Sequential alg – runs on a machine in which instructions are executed one after the other

Parallel alg – executed one at a time on different processing devices and then put back together again at the end to get the result.

Decision making

b) Exact vs Approximate solving :

i. Exact algorithm – for problems which need exact solutions

ii. Approximation algorithm – for complex problems

ex: travelling sales person problem

Decision making

c) Data Structures :

- Data structure and alg are interdependent.
- Proper choice of data structure is needed for an alg.

Decision making

d) Algorithm design technique :

- For solving problems

Alg techniques :

1. Brute force
2. Divide and Conquer
3. Decrease and Conquer
4. Transform and Conquer
5. Dynamic Programming
6. Greedy Technique

Specification of Algorithm

3 ways of specifications are:

- Using Natural language
- Pseudo code
- Flow chart

Proving correctness of an algorithm

- Once an algorithm has been specified then its correctness must be proved.
- An algorithm must produce a required result for every valid input in a finite amount of time.

Analyze the algorithm

- Efficiency is the most important in an alg.
- Factors to be considered while analyzing an alg :

a) Time efficiency: indicates how fast the algorithm runs
b) Space efficiency: indicates how much extra memory the algorithm needs
c) Simplicity
d) Generality

Coding and implementation of an algorithm

- The coding / implementation of an algorithm is done by a suitable programming language like C, C++, JAVA ,etc.