

Unit : 1 : Fundamentals of Algorithms and Mathematics.

* Explain Algorithm with its Characteristics.

=> Algorithm :

Algorithm is a step by step solution of a any problem.

Algorithm is a set of finite rules to solve the any problem.

Using Algorithm, we can solve any problem in a finite instruction.

For Any Problem solution, first we have to create Algorithm, After that we can create any program for Problem.

-> Characteristics of Algorithm :

1 Clear : Each of the steps should be clear in all aspects.

- 2 Input : Algorithm should work one or more than possible input.
- 3 Output : Algorithm should give at least one output.
- 4 Finiteness : Step of Algorithm should be finite means countable.
- 5 Effectiveness : Every step of Algorithm ~~shd~~ should be gives one meaning to solve the Problem.
- 6 Feasible : Every step of algorithm must be simple, generic and Practical.
- 7 Definiteness : Any of the step in an Algorithm one can clearly understand what is to be done.

* Define the following Terms:

a Set : Set is called collection of number or collection of an Objects,

b Finite Set : In Finite Set, All the element of set is countable.

c Infinite set : In Infinite Set, All the element of set is uncountable.

d Subset : If each member of set ~~one~~ one is also a member of set two

$$\text{set one} \subseteq \text{set two}$$

e Power Set : Power Set is called all the possible sub set of a set.

f Cardinality of Set : Number of elements in a set.

g Complement : Number of element which are not present in set but present in Universal Set.

h Union of Set : The Union of two set is containt all the element in two set.

i Intersection of Set: The intersection of two set is containt only Comman element in two set.

J Set Difference : The set difference $A - B$ of two sets A and B is the set of elements that are in A but not in B .

K Symmetric Difference:

$$A \ominus B = (A - B) \cup (B - A)$$

L Cartesian Product:

$$A \times B = \{ (a, b) \mid a \in A \text{ and } b \in B \}$$

m Relation : A Relation defines the relationship between values of sets.

n Reflexive : Let A be a set and R be a Relation so, aRa

O Symmetric: Let A be a set and R be a Relation so, $aRb \Rightarrow bRa$

P Transitive: Let A be a set and R be a Relation so,

$$aRb, bRc \rightarrow aRc$$

Q Equivalence Relation: If Relation satisfies all three properties reflexive, symmetric and transitive then it is called Equivalence relation.

R Inequalities: The term inequalities is applied to any statement involving one of the symbols $<$, $>$, \leq , \geq .

Ex. $x + y > 1$