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 :

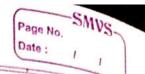1 Clear : Each of the steps should be clear in all aspects.

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 ~~shol~~ should be gives one meaning to slove 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 ~~debe~~ 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

  set one $\subseteq$ set two

e Power Set : Power Set is called all the possiable 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. $x + y \geq 1$