SNS COLLEGE OF TECHNOLOGY, COIMBATORE –35

P, NP and NP Complete Problems

P Problem

P:

→ Solvable in polynomial time

→ solved in time $O(n^2)$

n → size of input

k → Constant

Eg:

$X \leftarrow A$

$TC = O(n^2)$

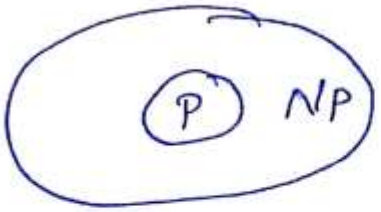
A → alg - time complexity solve 'X'

X → i/p

NP Problem

NP - Problems

→ Verifiable in polynomial time



X - Problem
S - solution
A - Algorithm

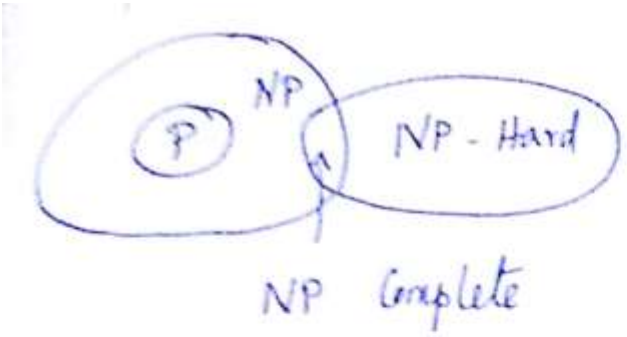
X S

A

NP - Hard Problem

→ There is no known polynomial time solution

NP Complete Problem



NP Complete

→ Not solvable in polynomial time

→ solution can be verified / verifiyable.

Subset sumpblm:

'S' is a set of integers find a subset of 'S' such that sum of elements of that subset is N

NP Complete Problem

$S = \{-1, 2, 7, 10, 6, 2, 1\}$

$N = 5$

$A = \{-1, 6\}$, $B = \{2, 6\}$

→ It is solvable in polynomial time, so it comes under NP-Hard

→ If solution is given, it could be verified.

→ Subset $A = \{-1, 6\}$ it is in 'S' so it is solvable in polynomial time

→ $B = \{2, 6\}$, verify with polynomial time