# 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:

$x \leftarrow A$

$TC = O(n^2)$

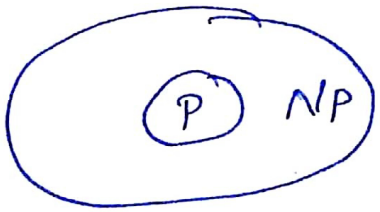
A → alg - time complexity solve 'x'

x → i/p

# NP Problem

NP - Problems

→ Verifiable in polynomial time




X - Problem
S - solution
A - Algorithm

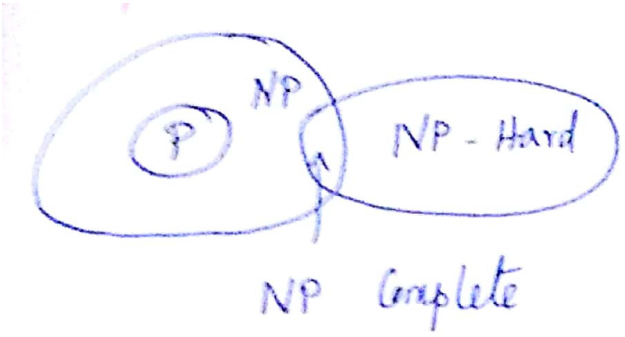
X S

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