Sec-A

1. Differentiate between fifo and LIFO Branch of Bound.

ans • FIFO (First-In-First-Out) uses a queue. It explores nodes in the order they were added - useful for breadth-first search.

• LIFO (Least-In-First Out) uses a stack. It explores the most recently added nodes first - useful for depth-first search.

2. Define Vertex Cover Problem.

ans A Vertex Cover of a graph is a set of vertices such that every edge in the graph is incident to at least one vertex from this set. The Problem is to find the minimum such set.

3. What is the need of Approximation Algorithm?

ans Approximation algorithms are needed for NP-hard problems where finding an exact solution is computationally infeasible. They provide near-optimal solutions in polynomial time.

4. What is a n-Queen's Problem?

ans The n-Queen's Problem involves placing n queens on an n×n chessboard such that no two queens threaten each other (i.e,

no two queens shaure the same row, column, or diagonal).

1. Write Robin-kourp String matching algorithm.

ans The Robin harp algorithm uses hashing to find any one of a set of pattern strings in a text.

- Calculate the hash value of the Pattern and the first window of text;

- Slide the window over the text, rehashing and comparing.

- If hash matches, verify actual Substring to avoid false Positives.

- Time complexity: Average and Best case $O(n+m)$, worst case $O(nm)$.

2. Define the class P, NP, NPC and NP-hard Problems.

- P: Problems ~~here~~ solvable in Polynomial time.

- NP: Problems verifiable in Polynomial time.

- NPc: (NP - Complete): Problems that are both in NP and as hard as any NP Problem.

- NP- Hard: At least as hard as the hardest Problems in NP, but not necessarily in NP.

1. Subset - Sum Problem:

Ans   Given set $W = \{5, 10, 12, 13, 15, 18\}$
and $m = 30$.

find Subset such that the Sum is 30:

One example solution: $\{12, 13, 5\}$.

The State space tree would include
decisions at each level to include or
exclude each number.

2. Short notes:

@ Branch & Bound:
    A Problem-solving strategy that
systematically considers branches and Prunes
them based on bounds to avoid the
unnecessary work. Used in optimization
Problems.

(b) Backtracking:
    A recursive method to build
solution incrementally and backtrack when
a constraint is violated. Used in Problems
like n-Queen, Sudoku, etc.