



**NUTAN COLLEGE OF ENGINEERING &  
RESEARCH (NCER)** Department of B-Tech Final Year  
Computer Science and Engineering

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**Artificial Intelligence Lab (BTCOL 706)**

**Experiment No – 05**

**Aim: Write a Program to solve any problem using Breadth First Search.**

**Theory:**

Breadth-First Search (BFS) is a graph traversal algorithm that explores all the vertices of a graph in breadth ward motion, visiting all the neighbors of a vertex before moving on to their neighbors. BFS is often used for finding the shortest path in unweighted graphs and can also be used to explore a graph systematically.

Here is an outline of the BFS algorithm and its key components::

**Algorithm:**

1. Start with an initial node (usually the source node).
2. Create an empty queue and enqueue the initial node into it.
3. Create a set or array to keep track of visited nodes.
4. While the queue is not empty:
  - a. Dequeue a node from the queue.
  - b. Mark it as visited.
  - c. Process the node (e.g., record it as part of the traversal or perform any desired operation).
  - d. Enqueue all the unvisited neighbors of the node.
5. Repeat step 4 until the queue is empty.

**Key Concepts:**

- **Queue:** BFS uses a queue data structure to maintain the order in which nodes are explored. The "first in, first out" (FIFO) property ensures that nodes are explored in a breadthward manner.



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- **Visited Set:** To avoid revisiting nodes and to prevent infinite loops in graphs with cycles, a set or array is used to keep track of visited nodes.
- **Exploration Order:** BFS explores nodes in a level-order traversal fashion, meaning all nodes at the same level are explored before moving to the next level. This property makes it suitable for finding the shortest path.

**Program: Write a following program and take print with output and attached**

1. Write a Program in Prolog to solve any problem using Breadth First Search.
2. Write a Program in Python to solve any problem using Breadth First Search.

**Questions:**

1. Explain Breadth First Search Technique with example.
2. State Application of Breadth First Search.
3. Explain Application of Breadth First Search Technique

**(Subject In-charge)**

**(Prof.S.B.Mehta)**

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