* Experiment - 8 (Posthalu):-

Q.1) List all the methods which could be used to solve the tower of Hanoi problem.

Ans:- i) Recursive Method:- This is the most common and straightforward approach to solve the Tower of Hanoi. The problem is broken down into smaller problems of moving stacks of discs, except the largest disc, to a temporary pole before moving the largest disc to the target pole and finally transferring the stack from the temporary to the target pole.

ii) Iterative Method:- This approach uses loops instead of recursion to solve the problem. It follows a specific sequence of moves and can be more efficient in terms of memory usage since it avoids the overhead of recursive calls.

iii) Non-Recursive, Non-Iterative Algorithm:- These are less common but can involve mathematical formulations or table look-up strategies to determine the sequence of moves based on the disk count and move number directly.

iv) Dynamic Programming:- Although not typically necessary for the Tower of Hanoi, dynamic programming could theoretically be used by breaking the problem into subproblems and solving it from the bottom up.

Q2) Which is the best approach and why?

Ans:- The Recursive Method is generally considered the best approach for solving the Tower of Hanoi problem for several reasons.

i) Simplicity:- The recursive solution mirrors the actual logic of the problem very closely, making it intuitive and straightforward to understand and implement.

ii) Efficiency:- Although recursion has overhead the nature of the problem (exponential in the number of moves) means that the additional memory usage of recursion does not significantly impact the overall efficiency for a reasonable number of discs.

iii) Educational Value:- The recursive approach provides a clear example of how complex problems can be broken down into simpler subproblems, a fundamental concept in computer science.

Q.3) What are the applications of the Tower of Hanoi?

Ans:- Applications of Tower of Hanoi:-

i) Algorithmic Teaching and Analysis :- It is used extensively in computer science education to teach recursion, problem-solving, and the efficiency of algorithms.

ii) Psychological Studies:- The problem is used in cognitive psychology experiments to study problem-solving skills and the human decision-making process.

iii) Computer Systems:- It serves as a model for certain types of data structures and algorithms, particularly those involving recursive processes and stack management.

iv) Robotic Movements:- Algorithms developed for solving the Tower of Hanoi can be applied in robotics for tasks that involve sequential movement or stacking of items.

v) Game Theory and Puzzles:- The Tower of Hanoi principles are used in designing and analyzing games and puzzles, enhancing understanding of mathematical strategies in recreational mathematics.