

## DAA Assignment 6

\* Aim : Write a program to solve TSP & to print path and cost using branch & bound.

\* Theory :

i) What is branch & bound?

Ans: i) Branch & bound is an algorithm design paradigm for discrete & combinatorial optimization. It consists of systematic enumeration of candidate solutions by means of state space search.

ii) The set of candidate solutions is thought of as forming a rooted tree with a set of roots. Algorithm explores branches of this tree which represent subsets of solution set.

iii) Before enumerating candidate solutions of a branch, it is ~~also~~ checked against upper & lower estimated bounds on the optimal solution. A branch is discarded if it cannot produce a better solution than best one found by algorithm.

2) Explain FIFO, LIFO & LC branch & bound.

Ans: i) FIFO branch and bound : It is a breadth first search. Ch



of the live nodes are inserted in the queue. Implementation of list live nodes as a queue,  $\text{least}()$  removes head of queue and add adds node to top of stack.

ii) LIFO branch & bound : It is a depth first search. Children of live nodes are inserted in a stack.  $\text{least}()$  pops from stack & add pushes onto stack.

iii) LC branch & bound : The selection rule for next live node in the branch FIFO or LIFO and linked is sometimes blind, i.e. no preference is given to a node that has a good chance of quickly finding a response node. It can be speeded up by using intelligent ranking function or approximate cost function.

3) Time Complexity of TSP

Ans. Dynamic programming approach breaks the problem into  $2^n$  subproblems. Each subproblem takes  $n$  time so total time complexity is  $O(2^n n^2)$ .

\* Conclusion : Thus the travelling salesman problem has been successfully understood & implemented.