* Experiment - 10 (Postlab)

Q.1) How to overcome combinatorial explosion in TSP?

Ans:- Combinatorial explosion in the Travelling Salesman Problem (TSP) refers to the exponential growth in the number of possible routes as the number of cities increases. Overcoming this explosion is crucial for solving larger instances of TSP efficiently. To manage combinatorial explosion in the TSP, the following strategies can be used:-

i) Approximation Algorithms :- Eg, Christofides' algorithm, which gives a route no more than 1.5 times the optimal length.

ii) Heuristic Methods :- Such as the greedy algorithm, genetic algorithms, simulated annealing, and Ant Colony Optimization, which seek near-optimal solutions more quickly.

iii) Branch and Bound :- Limits the search area based on the current best solutions.

iv) Dynamic Programming :- The Held-Karp algorithm is effective but scales exponentially with the number of cities.

v) Integer Linear Programming :- Solves TSP using optimization software, applying advanced techniques like cutting planes.

Q2) What is learning from travelling salesperson problem?

Ans :- i) Optimization Techniques :- Developing solutions for TSP enhances skills in both exact and approximate algorithm design.

ii) Computational Complexity :- TSP, an NP-hard problem, is a classic case to study the limits and capabilities of algorithmic solutions.

iii) Algorithm Benchmarking :- TSP is used to compare and evaluate the efficiency of different algorithms and heuristics.

iv) Interdisciplinary methods :- TSP solutions borrow from multiple fields, inspiring creative and effective approaches to problem-solving.

v) Practical Applications :- Lessons from TSP apply to real-world logistics, routing, and scheduling challenges, improving efficiency in various systems.