**Problem Statement 9**

**Explain the PEAS and Task Environment of the agent .**

PEAS (Performance measure, Environment, Actuators, Sensors):

* **Performance Measure:** The shortest path that covers all roads without repetition, minimizing the travel distance or time.
* **Environment:** The rural area map represented as a graph with vertices (landmarks) and edges (roads).
* **Actuators:** The robot’s movement mechanism that allows it to travel from one vertex to another.
* **Sensors:** The robot's ability to recognize landmarks, identify edges (roads), and track its current position on the map.

Task Environment:

* **Observable:** Fully observable, as the robot can perceive the entire map.
* **Deterministic:** The environment is deterministic since the outcome of each action (moving to a connected vertex) is predictable.
* **Static:** The environment is static, meaning it does not change while the robot is planning or executing its path.
* **Discrete:** The environment is discrete, represented by distinct landmarks and roads.
* **Single-agent:** The robot is the only agent in the environment.

**Heuristic Function**

**Inputs from problem statement**

* A node can be visited many times
* End goal is to visit all nodes with shortest path(not to reach a specific node)
* We might need to revisit a node multiple times to cover all nodes

**Quality of a node:**

* A node is better if we can visit many nodes from this node
* A node is better is all nearby nodes are at a closer distance
* A node is not as good if all nodes are very far from given node.

**Heuristic function=h(n)**

* H(n) is inversely proportional to number of nodes we can visit from a node
* H(n) is directly proportional to sum of distances to all connected nodes.
* As these 2 values are can be at a very different scale, we need to normalize them before comparing with each other.
* We can use sigmoid to normalize values.
* As we have to use it with cost function, we need to ensure the final value is at same scale as distance among various nodes.

Formulae: