Tutorial 2: To understand state space problem formulation.

Aim: To understand State Space based problem formulation of AI problems so that problem solving Agent can be applied.

Theory: first we understeind the problem solving Agent. Algorithm shown in figure 3 show Agent program for problem solving agent. Agent first formulates goal and problem, then determines or rather searches an action sequence after which it returns the next action to be executed in a sequencial manner.

```
function SIMPLE PROBLEM-SOLVING-AGENT (percept)
                                    returns an action.
static: seq, an action sequence, initially empty
  State, some description of the current world state
goal, a goal, initially null
problem, a problem formulation.
State ← UPDATE-STATE (State, percept)
if seq is empty then do
   goal ← FORMULATE-GOAL (State)
   problem ← FORMULATE-PROBLEM (state, goal)
   seq ← SEARCH (problem)
action ← FIRST (seq)
seq ← REST (seq)
return action.
```

Problem Solving Agent Architecture.

Defining the problem is referred to as problem formulation. It involves defining following five things:

Initial State - It is the starting state that the problem is in.

Actions - It defines all possible actions available to the agent, given it is in some state currently. It is function Action(s) that returns list of all possible actions.

Transition Model also known as successor function which define which state is the system tend to move to when a particular action is executed by the agent.

Goal Test - this act as a stopping condition when the state passed to this function is goal state it will return true and searching would stop.

Path cost It is accumulated cost of performing certain sequence of actions. This can help in determinning weather the action sequence under consideration is optioneel.

Thus a problem can formally specified by identifying initial state, actions, transition model, goal test and path cost. In term of problem solving agent solution is the path from initial state to a goal state. Optimal solution is the lowest path cost of all solutions. Process of finding a solution is called search.