TUTORIAL 2: To understand State Space problem formulation.

Page No.
Date

AIM: To understand state Space based problem so that problem Solving Agent can be applied.

THEORY: First we understand the problem solving agent. Algorithm shown in figure 3 shows agent program for problem solving agent. Agent first formulates goal and problem, then determines or rather searches an action sequence after which it return the next action to be executed in sequential manner

```
function SIMPLE-PROBLEM SOLVING-
AGENT (percept) returns an action
static : seq; an action sequence, initially empty
         state, some description of the current worldstate
         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.
```

Figure 3: Problem Solving Agent Architecture.

Page No.
Date

Defining the problem is referred to as a problem formulation. It involves define following 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 a function Action (s) that returns (s) of all possible actions.

Transition model also known as successor function which define which state(s) the system tend to move to when a particular action is executed by the agent. Successive application of transition model gives rise to what is known as State space

Path Cost It is accummulated cost of performing certain sequence of actions. This can help in determining weather the action sequence under consideration is optimal.

In term of-

Thus a problem can formally specified by identifying initial state, actions (operator), transition model (successor function), goal test & path cost. optimal solution is lowest path cost of all soln. Process of finding a solution is called search.

WORKING: Based on understanding of problem. (There are three missionaries and three ✗) formulate, students need to formulate Problems.

They will clearly show state space up to depth level 3 or till goal node which ever is shallowest.

Page No.
Date

→ Navigate to KACE workshop from HOD IT cabin with minimum number of moves (moves can be climbing or alighting staircase, turning left, right, walking etc.

- 8 puzzle problem
- The missionaries and cannibals problem. There are three missionaries and 3 cannibals who must cross a river by boat carries two people. If there are missionaries present on the bank, they can't be outnumbered by cannibals. If they were, the cannibals would eat the missionaries. boat can't cross river by itself with no person on
- Two room vaccum cleaner world
- Water Jug problem