Tut 3 solution

1. An agent is anything that can be viewed as perceiving its environment through sensors and acting upon the environment through effectors.
   For each possible percept sequence, an ideal rational agent should do whatever action is expected to maximize its performance measure on the basis of the evidence provided by the percept sequence & whatever built-in knowledge that the agent has.

2. Agent program is a function that implements the agents mapping from percept to actions. List the various type of agent program.
   Simple reflex agent program.
   Agent that keep track of the world.
   Goal based agent program.
   Utility based agent program.

3. **Accessible Vs Inaccessible:** If an agent's sensing apparatus give it access to the complete state of the environment then we can say the environment is accessible to he agent.
   Deterministic Vs Non deterministic: If the next state of the environment is completely determined by the current state and the actions selected by the agent, then the environment is deterministic.
   Episodic Vs Non episodic: In this, agent's experience is divided into episodes. Each episodes consists of agents perceiving and then acting. The quality of the action depends on the episode itself because subsequent episode do not depend on what action occur in previous experience.
   Discrete Vs Continuous: If there is a limited no. of distinct clearly defined percepts & action we say that the environment is discrete.

4. The three phases are: Problem formulation, Search solution, Execution.

5. A problem is really a collection of information that the agent will use to decide what to do. Different types of problems are: Single state problem, Multiple state problem, Contingency problem, Exploration problem. Basic elements that are included in the problem definition are: Initial state, operator, successor function, state space, path, goal test, path cost.

Tut 4 solutions:

1. There are 4 criteria: Completeness, time complexity, space complexity, optimality.

2. Blind search has no information about the no. of steps or the path cost from the current state to the goal, they can distinguish a goal state from non-goal state. Heuristic search-knowledge given. Problem specification solution is best.

3. List the various search strategies.
   BFS
   Uniform cost search
   DFS
   Depth limited search
   Iterative deepening search
   Bidirectional search

4. List the various informed search strategy.
   Best first search –greedy search ,A* search
   Memory bounded search-Iterative deepening A*search -simplified memory bounded A*search
   Iterative improvement search –hill climbing -simulated annealing

5. BFS means breath wise search. Space complexity is more. Do not give optimal solution Queuing function is same as that of queue operator.
   DFS means depth wise search. Space complexity is less. Gives optimal solution Queuing function is somewhat different from queue operator.

6. Time complexity =O (b^d) , b-branching factor, d-depth of tree
   Space complexity=O (bl)

7. The drawback of DFS is that it can get stuck going down the wrong path. Many problems have very deep or even infinite search tree. So DFS will never be able to recover from an unlucky choice at one of the nodes near the top of the tree. So DFS should be avoided for search trees with large or infinite maximum depths.

8. The idea behind bidirectional search is to simultaneously search both forward from the initial state & backward from the goal & stop when the two searches meet in the middle.

9. Depth limited avoids the pitfalls of DFS by imposing a cut off of the maximum depth of a path. This cutoff can be implemented by special depth limited search algorithm or by using the general search algorithm with operators that keep track of the depth.

10. Minimize f(n)=g(n)+h(n) combines the advantage of uniform cost search + greedy search A* is complete, optimal.
    It's space complexity is still prohibitive.
    Iterative improvement algorithms keep only a single state in memory, but can get stuck on local maxima. In this algorithm, each iteration is a DFS just as in regular iterative deepening.

The depth first search is modified to use an f-cost limit rather than a depth limit. Thus, each iteration expands all nodes inside the contour for the current f-cost.

11.

It will utilize whatever memory is made available to it.
It avoids repeated states as for as its memory allow.
It is complete if the available memory is sufficient to store the shallowest path.
It is optimal if enough memory is available to store the shallowest optimal solution path.
Otherwise it returns the best solution that can be reached with the available memory.
When enough memory is available for entire search tree, the search is optimally efficient.
Hill climbing.
Simulated annealing

12.

Local maxima: A local maxima as opposed to a goal maximum is a peak that is lower that the highest peak in the state space. Once a local maxima is reached the algorithm will halt even though the solution may be far from satisfactory.
Plateaux: A plateaux is an area of the state space where the evaluation fn is essentially flat. The search will conduct a random walk.