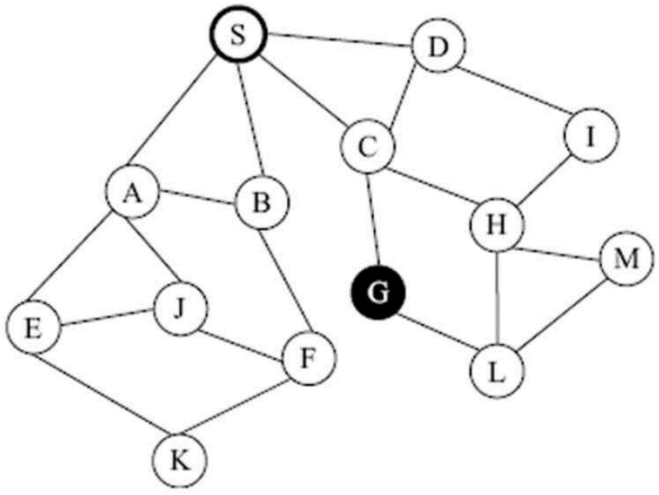
MC 312 ARTIFICIAL INTELLIGENCE

ASSIGNMENT 1

Q.1. Compare the time and space complexity of BFS and DFS algorithms in state space search.

Q.2. Consider N-Queens problem with the value of N=5. Can this problem be represented in the form of state space search ? Why or why not ? If it can be posed in the form of state space search, explain how can the N-Queens problem (with N=5) be solved by DFID algorithm.

Q.3. Given the following graph with S as the start node and G as the goal node.



Suppose we apply DBDFS algorithm on the graph with depth bound = 5. Will the algorithm find the solution in this case ? At each iteration of the DBDFS algorithm, show the contents of OPEN and CLOSED list.

Q.4. Differentiate between Hill Climbing and Beam Search techniques. Which of them is complete ?

Q.5. Given the following SAT problem with 5 clauses.

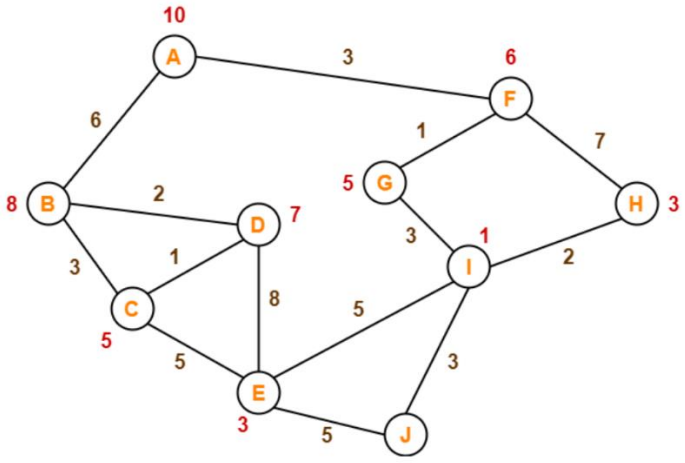
$$(a' \vee d) \wedge (c \vee b) \wedge (c' \vee d) \wedge (d' \vee b') \wedge (a \vee d')$$

Let the initial solution vector (a b c d) be (0 0 0 0). Show three expansions of the tabu search, assuming tabu tenure = 2.

Q.6. Explain with an example how Genetic Algorithms can be used to solve any 3-SAT problem.

Q.7. Explain the algorithms, i.e., DCFS and SMGS, for pruning the closed list.

Q.8. Given the following graph, where the numbers written on the edges represent the actual distance between the nodes and numbers written on the nodes represent the heuristic value. Find the optimal path with A* algorithm if start node is A and goal node is J.



Q.9. Consider the following AND OR graph. The terminal nodes (marked by double line) are completely solved and have zero cost. The arcs represent the cost of transforming. Values written inside the nodes are the heuristic values of solving that node. Run the AO* algorithm on the graph and determine the cost of solving the problem.