Page No. ____
Date: / /

Assignment no -02

Q1 Analyze GPS Navigation system using appropriate search method stepwise diagram

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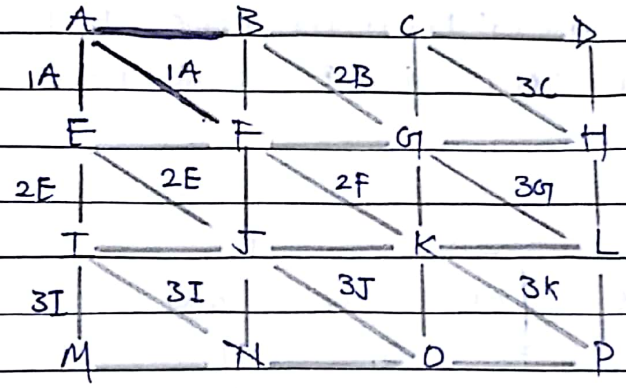
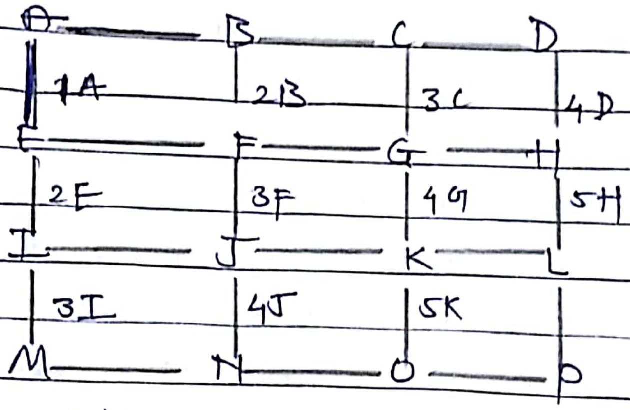
GPS using Breadth First Search (BFS) —

BFS is an algorithm for traversing or searching or graph data structures. It starts at the root and explores the neighbour nodes first, before moving to next level neighbours.



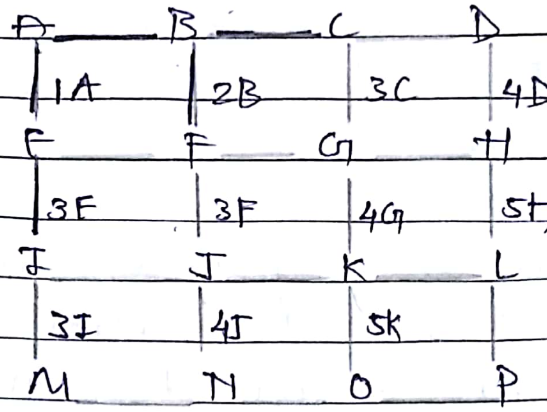
In the real world, you can't always move diagonally. Most of the portions in betn the intersection are occupied by the houses, shops, malls and metro stations. So how does BFS work in such circumstances? Let's understand it with the same grid world example, but in this case, the algorithm is not allowed to move or visit a node diagonally.

Step1 — consider node A as source and visit all neighbouring nodes of A, which are B(1A) and E (1A). mark A as visited.



Step 2- visit all neighbouring nodes of B, node C (2B) and node F(2B), and mark B as visited.

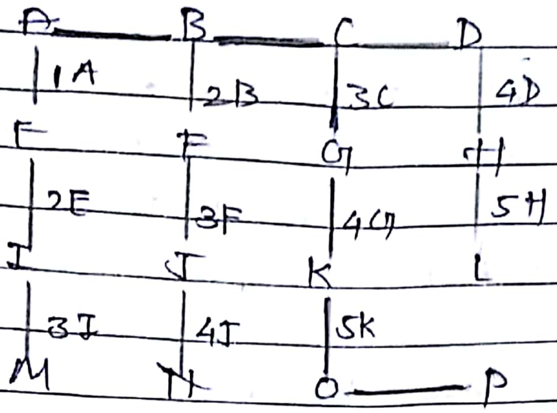
Step 3 — visit neighbouring nodes to E, since F, is already visited by B, visit node I (2E) and mark E as



Step 4— Repeat the nodes for all nodes until each of them has been visited at least once. Mark nodes you considered visited.

Step 5 — Remove all the unconnected / unweighted vertices, and convert the graph into a min^m spanning tree connecting each node at least once.

Highlight the nodes connecting source node A to node P, which has distance 6 and is the shortest path betn 2 nodes.



For a GPS, distance is not the only factor in choosing a route, rather elapsed time, the speed limit on a route, like traffic update, the roof stop all has to be taken into consideration. That's why you would find your GPS occasionally suggesting winding state highways to travel instead of the usual national highways.

Q.2 Identify and describe components of state space search in detail.

→ Components and description of components are as follows of state space search.

(1) State – s the set of all possible states.

(2) Initial state – s the set of possible action, not related to perform in a certain state

(4) goal state – s the function that return the state reached performing action in state

(5) path cost – set of real paths that are sol^r real in the world.

Suppose take an example of queens
(1) State –
Any arrangement of n<=8 queens or arrangement of n<=8 queens in leftmost n columns, 1 per column, such that no queen attacks any other.
(2) Initial state –
No queens on the board.
(3) Actions –
Add any queens to an empty squares or add queen to leftmost empty such that it is not attacked by other queens.
(4) Goal state –
8 queens on the board without attacked.
(5) Path cost –
1 per move.

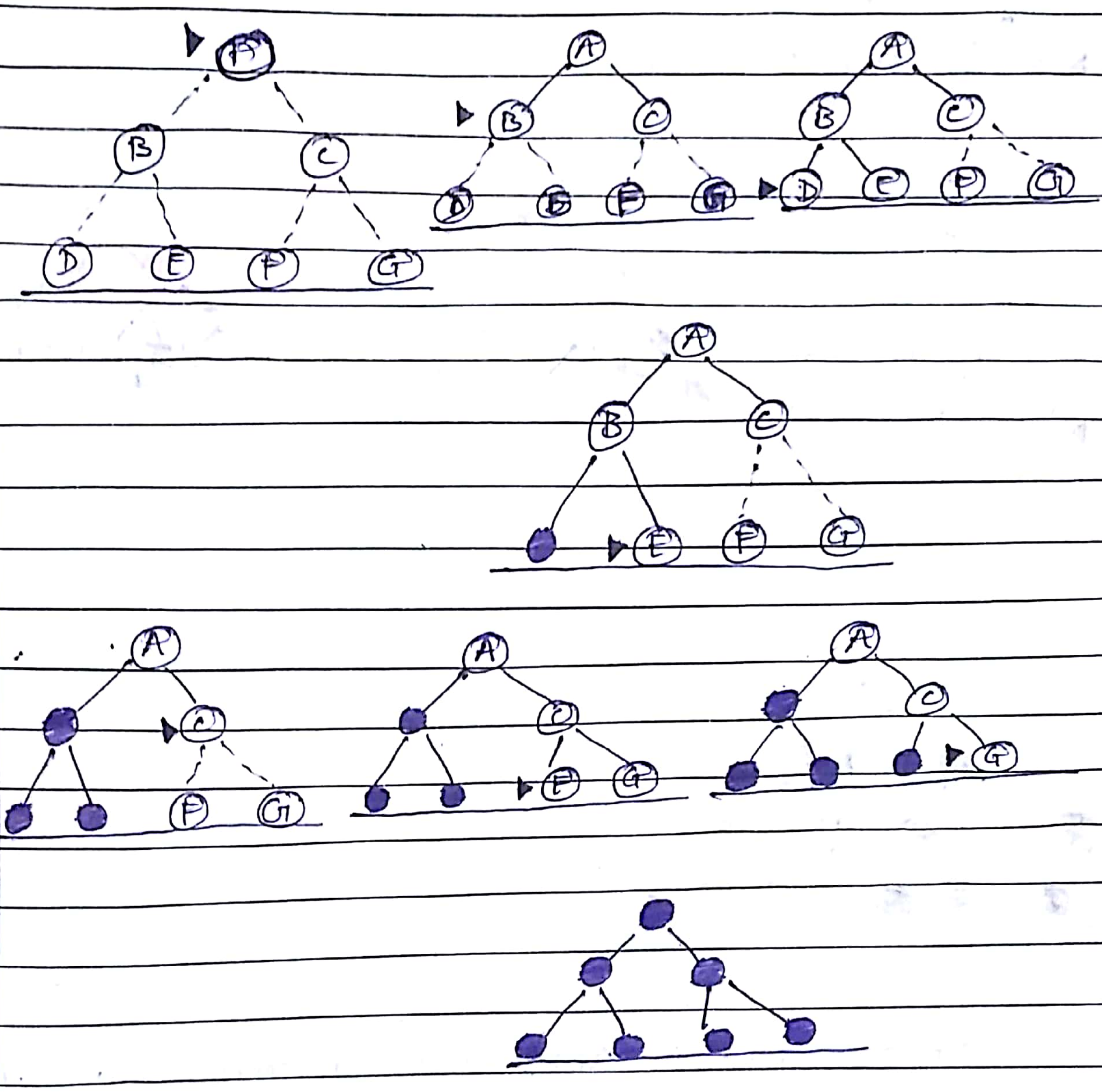
Q.3 Explain the steps involve in the iterative deepening search with diagram.

→

Iterative deepening search –
The problem with depth limited search on a suitable depth parameter.
This search tries all the possible depth limits first 0, then 1, then 2 etc until a soln found.
For large search space where is the depth of soln is not unknown then it is normally preferred.
Iterative deepening search L=0
limit=0

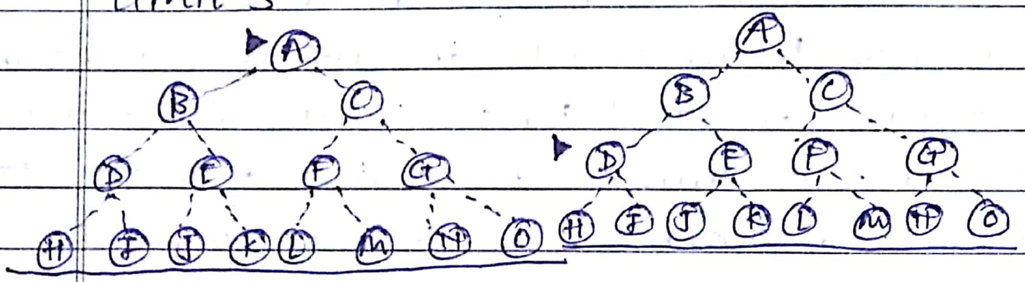
Iterative Deepening Search L=2

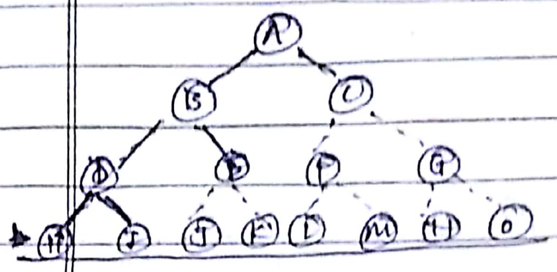
Limit = 2

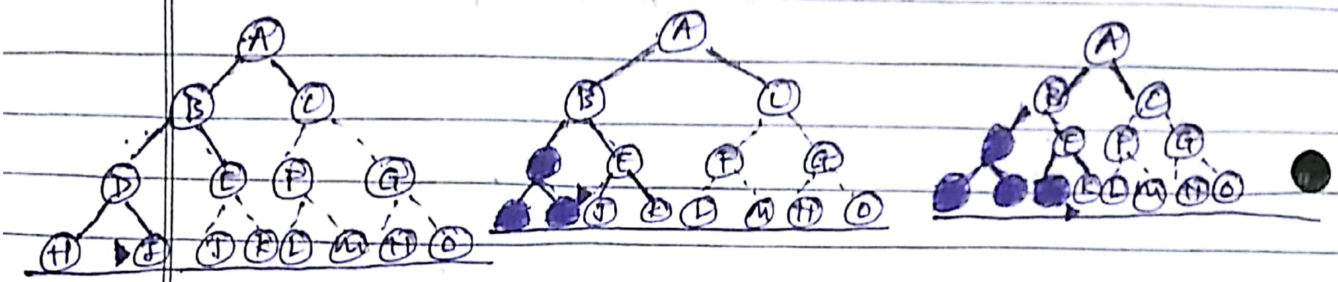


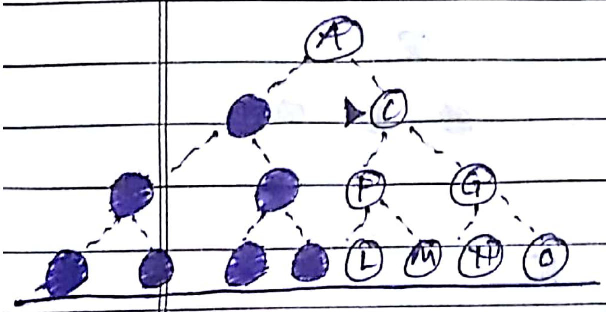
Iterative Deepening search L=3

Limit 3 :









Q. 4] Relate genetic algorithm methodology with a real time instance and specify its functionality in details.

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A genetic algorithm is a variant of stochastic beam search in which successor states are generated by combining two parent states, rather than by modifying a single state.
Genetic algorithms are a randomized heuristic search strategy.

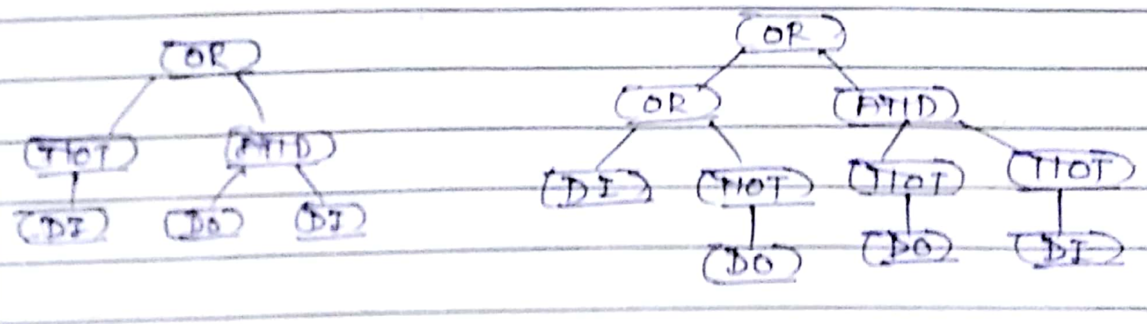
Ex- crossover (recombination) opera^{n} for genetic programming.

The crossover oper^{n} for the genetic programming paradigm creates variation in the popul^{n} by producing offspring's that combine traits from parents.

- Two parental programs are selected from the popul^{n} based on fitness.
- A crossover point is randomly chosen in the 1st and 2nd parent.
- The sub tree rooted at the crossover point of the 1st, or receiving, parent is deleted and replaced by the sub tree from the 2nd, or contributing, parent.

ex-

consider the 2 parental LISP S-expressions below.



In terms of LISP S-expressions, the two parents are (OR (NOT D1)) (AND D0 D1)) and (OR (OR D1 (NOT D0)) (AND (NOT D0) (NOT D1)))

ie (v(~D1)^D0*D1) and (v(vD1)~D0)