Assignment-1

Due by October 15, 2024 (Before class)

Q.1. State space representation of a problem helps us search for the solution(s) using known search algorithms. Represent the following problems as state-space.

i) Missionaries and cannibals

ii) Tower of Hanoi

iii) Bridges of Konigsberg

iv) Traveling salesperson

v) Knapsack

Q.2. A variety of search techniques can be used to search for a problem solution. Explain the following algorithms giving their pseudocode representation.

i) Beam search

ii) Iterative deepening A* search

iii) Bidirectional search

iv) Simulated Annealing search

Q.3. Consider the search problem shown in Figure 1, which requires us to find the best (shortest) route from city 'A' to city 'F'. Assuming 'A' is the start city, answer the following:

a) What path would the following search algorithms return for the problem: breadth first search, uniform cost search (Dijkstra's algorithm), depth first search, and A*. Note: break ties alphabetically among nodes and ONLY output paths for the solution as a list of nodes. Use h(n)=0 for A*.

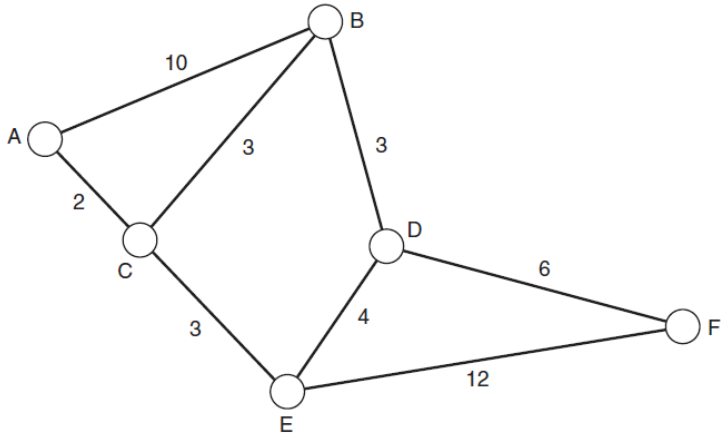

Figure 1: Search problem for Q.3.

b) If 'h_1' and 'h_2' are heuristics for this problem as shown in Table 1 below, state and justify whether the heuristics are admissible and monotone?

State	h_1	h_2
A	12	15
B	8	9
C	10	14
D	5	5
E	9	10
F	0	0

Table 1: Heuristic estimates for the search problem in Q.3.

Important Note:

Submit a hardcopy of your assignment by the deadline through CR.