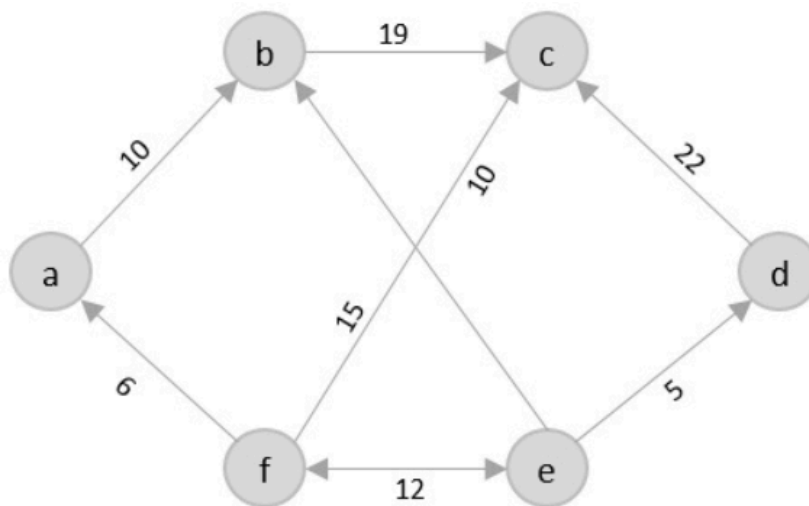**BRAC UNIVERSITY**
Department of Computer Science and Engineering
CSE 422: Artificial Intelligence
Assignment -02

Question-01
A. What is Elitism in Genetic Algorithm and what could be the impact on the algorithm?
B. What is a Single Point Crossover and Two-point crossover? Demonstrate with an example
C. What are some stopping conditions Genetic Algo may implement?
D. Importance of Mutation in Genetic Algo?
E. Importance of Crossover in Genetic Algorithms?

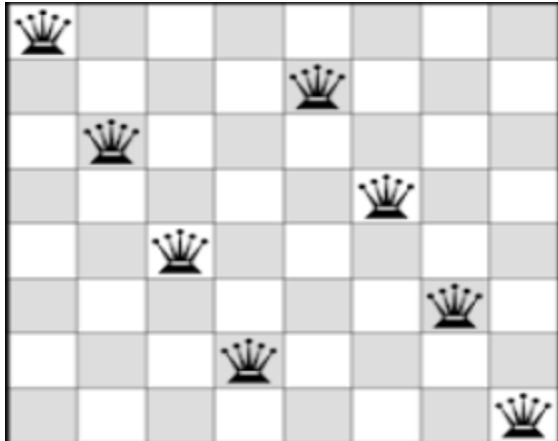**Question-02 (for this problem, assume the edges to be bidirectional)**
The Traveling Salesman Problem (TSP) is a classic optimization problem.Where the goal is to find the shortest possible route that visits each city exactly once and returns to the starting city given a set of cities(a,b,c,d,e and f) and their path cost.

a). Construct a population of 4 chromosomes, define fitness function.
b). Select the best two chromosomes using the **Roulette Wheel Selection** or **RankBased** method.
c). Now perform **Uniform Cross Over** and **Two-point Crossover** to create a total of 4 children.
d). Perform mutation making sure the chromosomes are still eligible
e). Calculate their fitness

(Note: for any invalid chromosome discard them and create another in their stead to continue the algorithm)
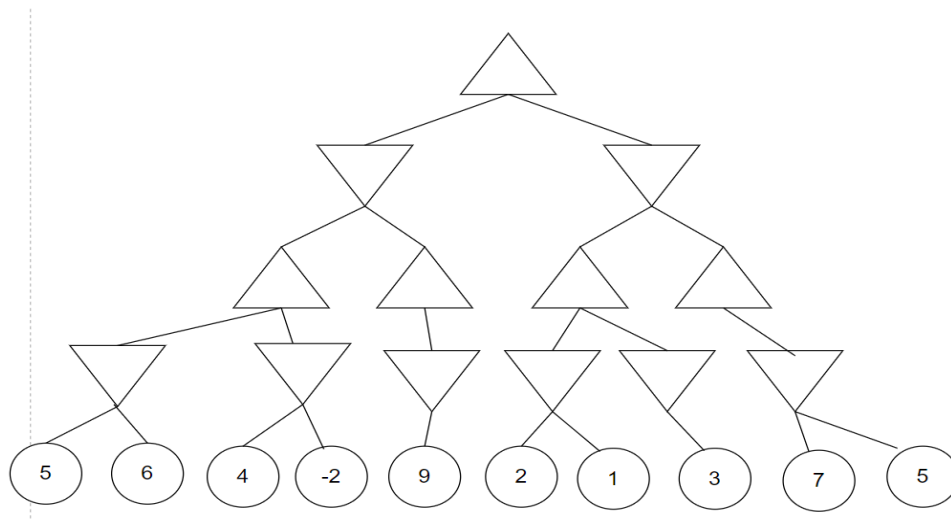
Question-03

Following is 8-Queen board, now simulate Genetic Algorithm for the 8-Queen board.

a). Construct a population of 4 chromosomes, define fitness function.

b). Select two chromosomes for crossover using natural selection

c). Now perform a **Single Point Crossover** to create a total of 4 children.

d). Perform mutation

e). Calculate their fitness

Question-04

Perform Alpha-Beta Pruning on the following state space tree, and find the state value,alpha and beta values for all the nodes.

Question-05

1. Is alpha beta pruning a Depth first search or Breadth First Search?
2. Does ordering of the leaf nodes change the outcome of MiniMax Algorithm?
3. Is it possible that MiniMax and Alpha Beta pruning will end up giving the same results?