

# Quiz-3 (ADA-2024) Set-1, Full Marks-10

March 27, 2024

**Roll Number:**

**Section:**

1. In the DFS tree algorithm, what is the relationship between the start and finish of a cross edge  $u \rightarrow v$ ? Consider  $start(u)$  as the **pre-number** of  $u$  and  $finish(u)$  as the **post-number** of  $u$ .

- (A)  $start(u) < start(v) < finish(v) < finish(u)$
- (B)  $start(u) < finish(u) < start(v) < finish(v)$
- (C)  $start(v) < finish(v) < start(u) < finish(u)$
- (D)  $start(v) < start(u) < finish(u) < finish(v)$

**Answer: C**

2. Consider a directed graph with one cycle such that there is an edge in the cycle with a negative weight. Let  $s$  and  $t$  be two nodes of the cycle such that there is no edge  $s \rightarrow t$  or  $t \rightarrow s$ . Is the shortest path from  $s$  to  $t$  always undefined?

- (A) Yes.
- (B) No.
- (C) Cannot say.

**Answer: B**

3. Consider a directed graph  $G$  with distinct edge weights. Let  $T$  be the minimum spanning tree of  $G$ . Let  $m$  be the edge with minimum edge weight and  $M$  be the edge with maximum edge weight. Which of the following statements is false?

- (A) No minimum spanning tree contains  $M$
- (B)  $T$  is a unique minimum spanning tree.
- (C) If  $M$  is in  $T$  then removing  $M$  will disconnect  $G$ .
- (D) Every minimum spanning tree contains  $m$ .

**Answer: A**

4. Let  $G$  be any connected, weighted, undirected graph.

(I)  $G$  has a unique minimum spanning tree if no two edges of  $G$  have the same weight.

(II)  $G$  has a unique minimum spanning tree; for every edge that disconnects  $G$ , it is a unique minimum-weight edge crossing the two components.

Which of the above statements is/are TRUE?

(A) I

(B) II

(C) Both I and II

(D) Neither I or II

**Answer: C**

5. If a vertex is deleted from connected graph  $G$  with  $n$  vertices, then what is the maximum number of connected components possible in the resultant graph?

(A) 1

(B) 2

(C)  $n-1$

(D)  $n$

**Answer: C**