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MCA (Sem.-1)

**ADVANCED DATA STRUCTURES**

Subject Code : PGCA-1952 M.Code : 79037

Date of Examination : 14-01-2023

Time : 3 Hrs.

Max. Marks : 70

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

**SECTION-A**

1. Answer briefly :
  - a) Write the time complexity of merge sort algorithm.
  - b) Explain the advantage of bucket sort.
  - c) What are the disadvantages of open addressing?
  - d) Explain the properties of Red-black tree.
  - e) Explain string concatenation with the help of an example.
  - f) What do you mean by single source shortest path algorithm?
  - g) What do you mean by graph? Explain.
  - h) What are the applications of disjoint set data structure?
  - i) Explain Fibonacci heaps.
  - j) List the applications of Minimum Spanning Tree (MST).

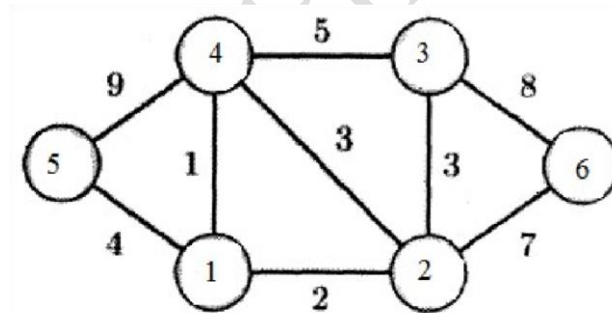
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### SECTION-B

2. Discuss the best case, worst case, average case and amortized time complexity of an algorithm.
3. Sort the following sequence of numbers in descending order using heap sort  
42, 34, 75, 23, 21, 18, 90, 67, 78
4. a) What do you mean by a hash function? Give the properties of a good hash function.  
b) What is collision? Explain the various techniques to resolve a collision with an example to each.
5. Consider the following sequence of keys (5, 16, 22, 45, 2, 10, 18, 30, 50, 12, 1). Construct the red-black tree T (initially tree is empty) by inserting the sequence of keys as above.

### SECTION-C

6. Solve minimum spanning tree of the following graph using Kruskal's algorithm



7. How are graphs represented inside a computer's memory? Which method do you prefer and why? Explain in detail.
8. Explain Boyer-Moore algorithm along with an example.
9. How does Knuth Morris-Pratt (KMP) algorithm works? Explain along with an example.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.