RANI RASHMONI GREEN UNIVERSITY
Post Graduate Department of Computer Science

M.Sc. Semester-I Examination 2024
Subject: Computer Science
Paper: MSCCS102 (Advanced Data Structures and Algorithms)

Time: 2 Hours **Full Marks: 40**

The figures in the margin indicate full marks
Candidate are required to give their answer in their own words as far as practicable

Group- A

1. Answer any five (5) questions. **5 x 2 =10**

i) Define Hamiltonian cycle.

ii) What is the difference between *big-oh* and *small-oh* notations in connection to the asymptomatic growth of an algorithm?

iii) What is the fundamental strategy of branch and bound algorithm?

iv) Define vertex cover with suitable example.

v) Give two examples of backtracking algorithms.

vi) Define *Max-heap*.

vii) Explain spanning trees of a graph with illustration.

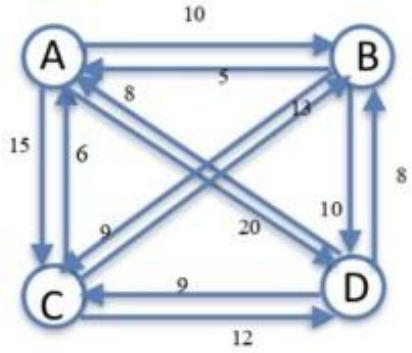
Group- B

[Answer any five (5) questions.]

5 x 6=30

2. What is the time complexity of bubble sort algorithm for a sorted array? Write the algorithm of Shell sort. **2+4**

3. Define Travelling Salesman Problem.



Solve the travelling salesman problem for the above graph using dynamic programming technique. **2+4**

4. Demonstrate Floyd-Warshall's all pair shortest path algorithm with suitable example. **6**

5. Can Depth First Search technique be used to find the number of components of a graph? Explain. **6**

6. Show the steps of building a heap tree for the following numbers:

23, 56, 2, 67, 89, 34, 12 **4+2**

Compute the time complexity of ***build_heap*** algorithm.

7. How do you select the pivot element in quick sort? How does pivot selection affect the performance of the sorting algorithm? Compute the worst case time complexity of quick sort. **(2+1) + 3**

8. Explain a dynamic programming based algorithm to solve the Longest Common Subsequence (LCS) problem. Name a usefulness of LCS algorithm. **4+2**