



B. Tech V Semester Supplementary Examinations, June/July 2023
Design and Analysis of Algorithms
(INFORMATION TECHNOLOGY)

Maximum Marks: 70

Date: 01.07.2023 Duration: 3 hours

- Note:
1. Question paper contains two parts A and B.
 2. Answer all questions in Part A, Each question carries 2 mark.
 3. Answer 5 questions in Part B out of 10 questions. Each question carries 10 marks.

Part-A

Answer all the following questions

(10x2M=20 Marks)

- 1 What are the characteristics of an algorithm?
- 2 Write the Control abstraction for Divide-and conquer
- 3 What is spanning tree?
- 4 What is articulation point?
- 5 What is Knapsack problem?
- 6 Write the control abstraction for greedy method.
- 7 Define overlapping subproblems.
- 8 What is matrix chain multiplication?
- 9 What is the relation between NP-hard and NP- complete?
- 10 What is LC branch & bound method?

Part-B

Answer all the questions.

(5X10M=50Marks)

- 11 Write an algorithm for merge sort using recursive method and sort the following elements?
Write the recurrence relation for merge sort? Calculate the time complexity? [10]
9, 3, 7, 5, 6, 4, 8, 2.

OR

- 12 Find the recurrence relation and tree for the following: [10]

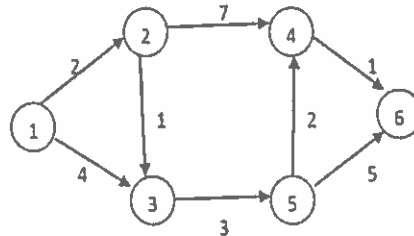
$$T(n) = \begin{cases} 1, & n = 0 \\ 2T(n-1) + 1, & n > 0 \end{cases}$$

- 13 Explain connected and Bi-connected components with suitable example. [10]

OR

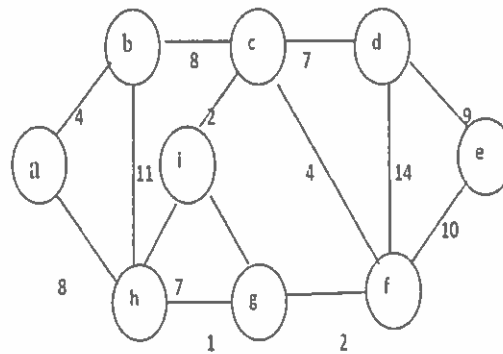
- 14 Write an algorithm of DFS. Explain DFS with a suitable example. [10]

- 15 Using Dijkstra's algorithms find the shortest path from vertex 1 vertex 6 for the following graph. [10]



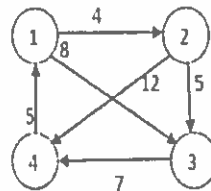
OR

- 16 Define spanning tree. Write kruskal's algorithm for finding minimum cost spanning tree. Describe how kruskal's algorithm is different from prim's algorithm for finding minimum cost spanning tree. [10]
- 17 Explain Prim's algorithm and compute minimum cost spanning tree for the graph using prim's algorithm. [10]



OR

- 18 Describe Floyd's algorithm for all pairs shortest path problem. Apply the same to the following weight matrix and discuss its time efficiency. [10]



- 19 a) Give the 0/1 Knapsack LCBB algorithm. [5]
b) Differentiate between deterministic and non deterministic algorithm. [5]
- OR
- 20 a) Explain the strategy to prove that a problem is NP hard. [5]
b) Explain the non-deterministic sorting problem. [5]