Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH

END SEMESTER EXAMINATIONS

NOVEMBER 2019

SUBJECT: Algorithmic Thinking [CRA 4016]

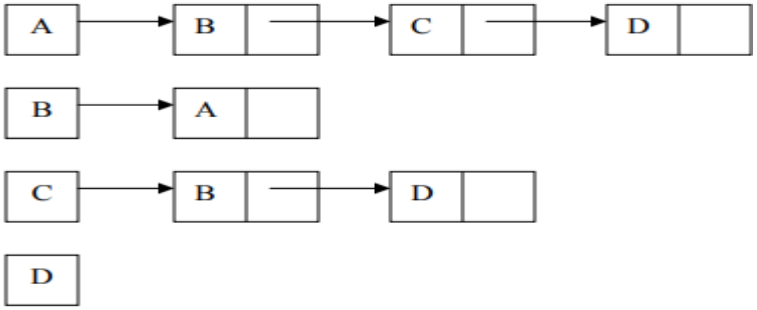
REVISED CREDIT SYSTEM

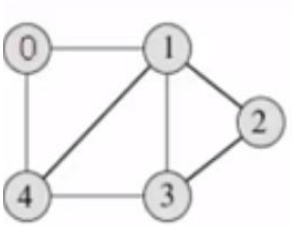
(28/11/2019)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL FIVE** questions.
- Missing data may be suitably assumed.

1A.	Explain the hierarchical and k means clustering algorithm. Analyze their efficiency.	**5**
1B.	Can you use binary search on a list that is sorted in descending order? Justify.	**3**
1C.	Differentiate between in-place sorting and out-of-place sorting algorithms. Give an example for each.	**2**
2A.	Explain the method of sorting a list using merge sort algorithm. Name the algorithm design technique used in merge sort. Illustrate the same for the following set of numbers: 34, 56, 67,23, 89,25,19.	**5**
2B.	What does it mean when we say that an algorithm X is asymptotically more efficient than Y?	**3**
2C.	Differentiate between following: in-degree, out-degree, and degree of node.	**2**
3A.	With suitable example, explain steps of algorithmic thinking.	**5**
3B.	Here is an adjacency list representation of a directed graph  Draw a picture of the directed graph that has the above adjacency list representation. Another way to represent a graph is an adjacency matrix. Draw the adjacency matrix for this graph.	**3**
3C.	What is Pseudocode? Give an example.	**2**

4A.	A famous problem is figuring out whether an undirected graph contains an Eulerian path. Such a path contains all of the edges in the graph exactly once, but may pass through any of the vertices in the graph as many times as desired. This problem can be formulated as the Eulerian path problem by treating each of the bridges as an undirected edge in a graph, and the parts of the city as the vertices. Here is the crucial fact: A graph contains an Eulerian path if 1. It consists of just one connected component (meaning that all vertices can be reached from any other vertex), and 2. It contains no more than two vertices of odd degree. Write an algorithm to find whether Eulerian Path exist in given graph or not. If yes algorithm should return true else false.	**5**
4B.	Explain the adjacency list representation of an unweighted graph. Write the adjacency list for the following graph: 	**3**
4C.	Write two pros and cons for adjacency matrix method of graph representation.	**2**
5A.	What is the use of asymptotic notations? Explain the meaning and significance of bigoh (O) and omega (Ω) notations. Give an example for each.	**5**
5B.	What do you mean by time complexity of an algorithm? What are its two components? Explain.	**3**
5C.	What do you mean by a strongly connected graph? Explain with an example.	**2**