



Time: 3 Hours

Manipal Institute of Technology, Manipal



(A Constituent Institute of Manipal University)

II SEMESTER M.TECH (CSE/CSIS) DEGREE

END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: ADVANCED DATA STRUCTURES AND ALGORITHMS [CSE-540]

REVISED CREDIT SYSTEM

DATE: 10-05-2016

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL the questions.
- Missing data may be suitable assumed.

1A. Define amortized analysis and list all the techniques used in it. Find the amortized cost per operation for a sequence of n decrement operations (which subtracts 1 from a binary number) on a counter containing all k bits equal to 1. Display also the counter value and total cost up to 16 decrement operations. 4

1B Discuss potential method and use the same for discovering amortized cost for PUSH, POP and MULTIPOP operations.

1C Show the results of inserting the keys C, V, W and P in order, into an initial tree B-Tree, given in Fig Q.1C with minimum degree 3. 2



2A. Write a B-Tree insert non-full algorithm and also find the total CPU time for executing the same. 3

2B. Write a decrease key algorithm in Binomial Heap. Find the total time for its execution.

2C. Delete a node with key value 5 from the Binomial heap given in the Fig Q.2C by indicating all the steps involved in this process. 5



Fig Q.2C.

3A. Show the Fibonacci heap that results after extracting the minimum from the Fibonacci heap given in the Fig Q.3A. 5



Fig Q.3A

3B. Discuss the algorithm for finding connected component of a graph. How do you represent it in the memory? 3

3C. Find the running time of an algorithm which uses weighted union heuristic to find the union of n objects. 2

4A Find the minimum spanning tree from the source vertex S by applying Prim's Algorithm on the undirected graph given in the Fig Q.4A. Indicate all the steps involved in this procedure. 5



4B What do you mean by topological sorting?. Execute the same on the graph given in the Fig. Q.4B.



Fig. Q.4B

4C. What is shortest path estimate? Discuss the concept of relaxation and also write Belman Ford's Algorithm.

5A. Explain the concept of repeated squaring method for finding all pairs shortest paths and also write its algorithm and running time. 5

5B. Execute Floyd – Warshall's Algorithm on the graph given in the Fig Q.5B.



6A.Write an algorithm for finding the transitive closure of a graph G and find the same for the graph given in Fig. Q.6A 5



6B. Define flow and flow of network and write Ford–Fulkerson Algorithm.6C. Discuss the concept of maximum flow network problem.2
