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B TECH
(SEM III) THEORY EXAMINATION 2017-18
DATA STRUCTURES USING C

Time: 3Hours**Max. Marks: 100****Note:** Attempt all Sections. Assume missing data, if any.**SECTION A****1. Attempt all questions in brief. 10x2=20**

- a. List out the areas in which data structures are applied extensively?
- b. What data structure is used to perform recursion?
- c. What are the methods available in storing sequential files?
- d. What are the advantages of B⁺ tree over B- tree?
- e. Define graph. How a graph is different from a tree?
- f. Define space complexity and time complexity.
- g. How a pointer to a function is declared in C?
- h. Define priority queue.
- i. What is binary tree? Explain.
- j. Define garbage collection.

SECTION B**2. Attempt any three of the following: 10 x 3 = 30**

- a. Write a program in C for implementation of a queue. Your program should at least contain ADD, CREATE, DELETE, FULL and EMPTY functions.
- b. If an array is defined as int a[10] [20] in C, devise a formula to calculate the address of an any variable say a[i] [j], for any valid value of i and j.
- c. Write a program to implement STACK using linked list.
- d. Write an algorithm to multiply two matrices and determine complexity of the algorithm.
- e. What is binary search tree? Write the important applications of binary search tree. Write algorithm to delete a node from a binary search tree.

SECTION C**3. Attempt any one part of the following: 10 x 1 = 10**

- (a) What do you mean by hashing and collision? Discuss the advantages and disadvantages of hashing over other searching techniques.
- (b) Write short notes on following
 - i.) B-Tree
 - ii.) Minimum cost spanning tree

4. Attempt any one part of the following: 10 x 1 = 10

- (a) Write a program to implement tree traversals using linked list.
- (b) Describe a procedure to convert a recursive algorithm to a non recursive Algorithm.

- 5. Attempt any *one* part of the following: **10 x 1 = 10****
- (a) What is a doubly linked list? How is it different from the single linked list?
 - (b) What is a sparse matrix? How sparse matrix can be represented efficiently in memory?
- 6. Attempt any *one* part of the following: **10 x 1 = 10****
- (a) Discuss Huffman algorithm and its significance.
 - (b) Write Dijkstra algorithm for finding the shortest path from a source vertex.
- 7. Attempt any *one* part of the following: **10 x 1 = 10****
- (a) What are the various asymptotic notations? Explain with example.
 - (b) If the Tower of Hanoi is operated on $n=10$ disks, calculate the total number of moves.