

B.Tech I Year II Semester (R15) Supplementary Examinations November 2017

DATA STRUCTURES

(Common to CSE and IT)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

1 Answer the following: (10 X 02 = 20 Marks)

- (a) Consider the function $f(n) = \sum_{i=1}^n i$. Express $f(n)$ in terms of Big-O notation.
- (b) Differentiate singly linked list and doubly linked list.
- (c) State the applications of stack.
- (d) Define priority queue with diagram and give the operations.
- (e) Define Threaded Binary tree.
- (f) Define Topological sort. What is the running time for topological sort?
- (g) Write worst case and best case time complexity of the bubble sort algorithm.
- (h) State the algorithmic technique used in merge sort. Define it.
- (i) What are the two broad classes of collision resolution techniques?
- (j) Write the time complexity of linear search and binary search techniques.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) Briefly discuss about various asymptotic notations with an example.
- (b) Write an algorithm for determining transpose of a matrix using multi dimensional array.

OR

- 3 Explain the following operations in a doubly linked list:
 - (a) Create an empty list.
 - (b) Insert the elements 10 and 20 at the front of the list.
 - (c) Insert the elements 30 at the middle of the list.
 - (d) Insert the elements 15, 45 at the end of the list.
 - (e) Delete the middle element from the list.

UNIT – II

- 4 (a) Construct an empty stack and perform PUSH operation for any five elements. Also perform POP operation for two elements and show the value on the top of stack.
- (b) What do you mean by stack overflow and stack underflow?

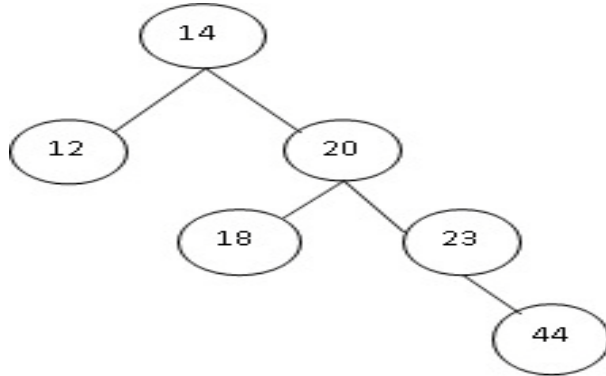
OR

- 5 Write an algorithm to implement insert and delete operations in Queue with array implementation for the following elements 88, 25, 67, 15, 56 with diagrammatic representations.

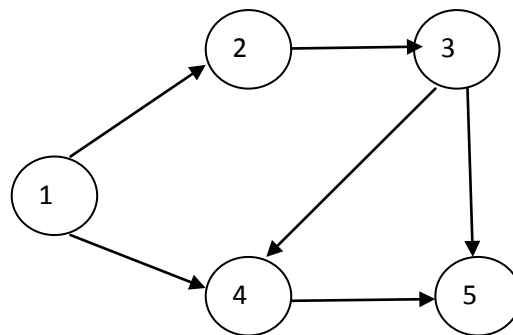
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UNIT – III

- 6 (a) Construct Binary Search Tree by inserting the following key elements:
10, 12, 5, 4, 20, 8, 7, 6, 15.
(b) Construct height balanced tree for the following after rotation.

**OR**

- 7 Draw the adjacency list representation for the following graph. Also perform topological sorting for the following graph.

**UNIT – IV**

- 8 Sort the following numbers using selection sort and insertion sort: 45, 25, 10, 2, 9, 85, 102, 1
OR
9 Write an algorithm to sort a set of 'N' numbers using Quick Sort. Trace the algorithm for the following set of numbers: 54, 26, 93, 17, 77, 31, 44, 55 and 20.

UNIT – V

- 10 (a) Compare binary search and linear search techniques.
(b) Find the number 77 from the following set of numbers using binary search:
6, 12, 17, 23, 38, 45, 77, 84, 90.
OR
11 Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(x) = x \pmod{10}$, show the resulting: (i) Open hash table using linear probing. (ii) Open hash table using quadratic probing. (iii) Open hash table using double hashing with second hash function $h_2(x) = 7 - (x \pmod{7})$.
