ANNA UNIVERSITY OF TECHNOLOGY, COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : NOV / DEC 2011

REGULATIONS : 2008

THIRD SEMSTER : CSE

080230007 - DATA STRUCTURES

Time : 3 Hours   Max. Marks : 100

PART - A

(10 x 2 = 20 Marks)

ANSWER ALL QUESTIONS

1. Define stack as an ADT.

2. List the characteristics of array as a data structure. What are its limitations?

3. Compare the worst case time complexities of linear search and binary search.

4. Show that in a binary tree of N nodes there are $(N + 1)$ NULL pointers.

5. Why do we need balanced search trees? List any two applications of such trees.

6. Consider the integer array 23, 17, 14, 6, 13, 10, 1, 5, 7, 2. Does this represent a heap?

7. What is extendible hashing?

8. Illustrate the mid square hash function.

9. Is the directed graph below strongly connected? List all its simple paths.
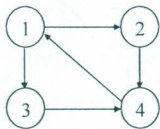
10. Define the minimum spanning tree of a weighted graph.

PART - B

(5 x 16 = 80 Marks)

ANSWER ALL QUESTIONS

11. a) i)   Develop an algorithm to do basic operations in a circular queue using array implementation.   8

        ii) Develop an algorithm for balancing symbols in a given C-program statement which possibly could contain the pairs of symbols: /* */, [ ], { } and ( ). The algorithm should indicate the probable cause in case of error situations.   8

(OR)

11. b) i)   Develop an algorithm to add two algebraic polynomials having single variable. Use linked list implementation.   8

        ii) Trace your algorithm for the following polynomials: 8

            $P(x) = 10x^{10} + 5x^4 + 1$

            $Q(x) = 3x^9 - 2x^4 + 11x + 5$

12. a) i)   Compare the array and linked list representations of a binary tree.   6

        ii) Develop an algorithm to convert an array representation of a binary to tree into a linked list representation.   10

(OR)

12. b) i)   Develop an algorithm to delete a node from a binary search tree. Illustrate your algorithm with suitable test cases.   10

        ii) Write a short note on threaded binary trees.   6

13. a) i)   Illustrate the various rotations involved in balancing a binary search tree.   8

        ii) Construct the AVL tree for the following set of elements: 8

            13, 5, 1, 7, 8, 98, 67, 26

(OR)

13 b) i) List the rules of B-tree.   8

        ii) Construct a B-tree for the following elements: 8

        1, 6, 8, 2, 9, 12, 15, 7 18, 3, 4, 20

14. a) Explain rehashing and extendible hashing with suitable illustrative examples.   8+8

(OR)

14 b) i) Write the advantages and disadvantages of various collision resolution   10

        techniques.

        ii) Write a short note on smart union algorithms.   6
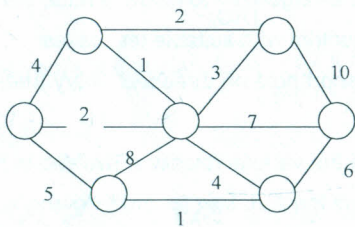
15. a) i) Write Kruskal's algorithm for finding the minimum spanning tree of a given   8

        weighted graph

        ii) Trace your algorithm for following graph: 8
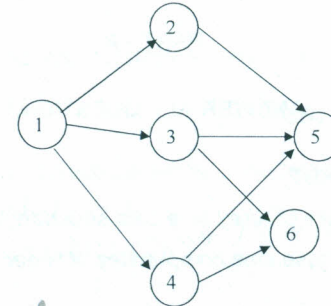

(OR)

15 b) i) Distinguish between Breadth-first and Depth-first search of a graph.   6

        ii) Find the topological sort ordering of the following graph: 10

*****THE END*****