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10CS35

Third Semester B.E. Degree Examination, Dec.2015/Jan.2016
Data Structures with C

Time: 3 hrs.

Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. Explain the functions supported by C to carry out dynamic memory allocation with example.
(06 Marks)

b. What is recursion? What are the various types of recursion? Write a recursive function to implement binary search.
(07 Marks)

c. Define the term "Space and time complexity". Determine the time complexity of an iterative and recursive functions that adds n elements of an array using tabular method.
(07 Marks)

2 a. Write a note on dynamically allocated array's with example.
(06 Marks)

b. How would you represent two sparse polynomials using array of structures and also write a function to add two polynomials and give the analysis of the function.
(10 Marks)

c. For the given sparse matrix A and its transpose, give the triplet representation 'A' is the given sparse matrix and 'B' will be its transpose.

$$\text{Sparse matrix } A = \begin{bmatrix} 25 & 0 & 0 & 11 & 0 & -10 \\ 0 & 12 & 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & 6 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 81 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -18 & 0 & 0 & 0 \end{bmatrix}.$$

(04 Marks)

3 a. Define stack. Implement push and pop functions for stacks using arrays.
(05 Marks)

b. Write the postfix form of the following expressions using stack:
i) $A\$B * C - D + E / F /(G + H)$
ii) $A - B /(C * D \$ E)$
(06 Marks)

c. What is the advantage of circular queue over linear queue? Write insert and delete functions for circular implementation of queues.
(05 Marks)

d. Evaluate the following postfix expression $6\ 2\ 3 + - 3\ 8\ 2\ / + * 2\ \$ 3 +$ using stack.
(04 Marks)

4 a. Write C functions to implement the insert and delete operations on a queue using linked list.
(08 Marks)

b. With the node structure show how would you store the given polynomials a and b in linked list? Write a C function for adding 2 polynomials using linked lists.
(08 Marks)

c. Write a note on doubly linked list. How is it different from single linked list?
(04 Marks)

PART – B

5 a. What is binary tree? State its properties. How it is represented using array and linked list? Give example.
(08 Marks)

b. Show the binary tree with the arithmetic expression $A / B * C * D + E$. Give the algorithm for inorder, preorder, postorder traversals and show the result of these traversals.
(08 Marks)

c. What is heap? Explain different types of heap.
(04 Marks)

6 a. Define binary search tree. Draw the binary search tree for the following input 14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17, 9, 14, 5 **(07 Marks)**

   b. Construct a binary tree having the following sequences:
   i) Preorder seq ABCDEFGHI
   ii) Inorder seq BCAEDGHFI **(05 Marks)**

   c. Write a iterative search routine for a binary search tree. **(05 Marks)**

   d. Define the following terms:
   i) Forests
   ii) Graphs
   iii) Winner trees. **(03 Marks)**

7 a. Briefly explain the following with examples:
   i) HBLT   ii) WBLT **(08 Marks)**

   b. Write short notes on:
   i) Priority queues   ii) Binomial heaps   iii) Priority heaps   iv) Fibonacci heaps. **(12 Marks)**

8 Write short notes on:
   a. AVL trees.
   b. Red-black trees.
   c. Optimal binary search trees.
   d. Splay trees. **(20 Marks)**

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