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10CS35

Third Semester B.E. Degree Examination, June/July 2014
Data Structures with C

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is pointer? How pointers are declared and initialized in C? **(03 Marks)**

b. What is dangling pointer reference and how to avoid it? **(04 Marks)**

c. Estimate the space complexity of a recursive function for summing a list of numbers. **(05 Marks)**

d. Define the term "space and time complexity". Apply program step counter method to estimate the time complexity of a function to add two matrices. **(08 Marks)**

2 a. With a suitable example, explain dynamic memory allocation for 2-d arrays. **(04 Marks)**

b. Define a structure for the employee with the following fields : Emp_Id(integer), Emp_Name(string), Emp_Basic(float), Emp_Dept(string) and Emp_Age(integer). Write the following functions to process the employee data :
i) Function to read an employee record
ii) Function to print an employee record. **(08 Marks)**

c. Write the "fast transpose" algorithm of a sparse matrix. Why the name "fast transpose"? **(08 Marks)**

3 a. What is the advantage of circular queue over linear queue? Write the insert and delete functions for circular implementation of queues. **(08 Marks)**

b. Explain infix to postfix expression algorithm and trace it for an expression "a * (b + c) * d". **(08 Marks)**

c. How multiple stacks implemented using one dimensional array? Explain with a suitable example. **(04 Marks)**

4 a. Write the following functions for singly linked list :
i) Reverse the list ii) Concatenate two lists. **(08 Marks)**

b. Write the node structure for linked representation of polynomial. Explain the algorithm to add two polynomials represented using linked lists. **(08 Marks)**

c. What is the advantage of doubly linked list over singly linked list? Illustrate with an example. **(04 Marks)**

PART – B

5 a. Illustrate with a suitable example define :
i) Binary tree
ii) Degree of a binary tree
iii) Level of a binary tree
iv) Sibling. **(08 Marks)**

b. For any nonempty binary tree, T, if n_0 is the number of leaf nodes and n_2 the number of nodes of degree 2, then prove that $n_0 = n_2 + 1$. **(04 Marks)**

c. What is the advantage of threaded binary tree over binary tree? Explain threaded binary tree construction with a suitable example. **(08 Marks)**

6 a. What is binary search tree? Write a recursive search routine for a binary search tree. **(08 Marks)**

b. Explain selection trees, with suitable example. **(06 Marks)**

c. What is a forest? With a suitable example illustrate how you transform a forest into a binary tree. **(06 Marks)**

7 a. Define priority queue. List the single – ended and double-ended priority queue operations. **(06 Marks)**

b. Define the following :
i) Leftist trees
ii) Min leftist trees and
iii) Weighted leftist trees. **(06 Marks)**

c. What is binomial heap? Explain the following associated with binomial heap :
i) Insertion into a binomial heap
ii) Melding two binomial heaps and
iii) Deletion of min element. **(08 Marks)**

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

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