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[4857]-204

S.E. (Computer) (First Semester) EXAMINATION, 2015

DATA STRUCTURES AND ALGORITHM

(2008 PATTERN)

Time : Three Hours   Maximum Marks : 100

N.B. :— (i) Answer *three* questions from Section I and *three* questions from Section II.

(ii) Answers to the two Sections should be written in separate answer-books.

(iii) Figures to the right indicate full marks.

(iv) Assume suitable data, if necessary.

SECTION I

1. (a) Write the following functions in C :

(i) Reverse the given string and

(ii) Decide string is palindrome or not

without using library function.   [8]

(b) Explain with example fread, fwrite, ftell and fseek functions for file handling in C.   [8]

Or

2. (a) Explain call by value and call by reference with example. [6]

(b) Write a recursive function for the following :

f(n) = n   if n=0,1

= f(n)*f(n/2)   otherwise

Explain it by taking n = 5.   [10]

P.T.O.

3. *(a)* What is the frequency count of the following :

int fact (int n)

{

    if(n == 1)

    {

        Return(1);

    }

    Else

        Return (n * fact(n–1));

}

Find out time complexity. [5]

(b) Write 'C' functions to display transpose of matrix. What is its time complexity ? [5]

(c) Explain different Asymptotic notations with example. [6]

Or

4. *(a)* What is Abstract Data Type ? Write an ADT for array. [8]

(b) Write an algorithm for matrix addition for $m \times n$ matrix and find out its time complexity by frequency count. [8]

5. *(a)* Explain how two-dimensional array A[1 : m, 1 : n] is represented in computer memory using Row Major & Column Major representation and obtain a formula using both methods for computing the address of any element A[i, j], where 1<=i <=m and 1<=j <=n. [8]

(b) Write a 'C' function to implement polynomial multiplication using array. Explain time complexity for above function. [10]

6. (*a*) What is sparse matrix ? Write an algorithm to find simple transpose of sparse matrix and find out its time complexity. [10]

(*b*) Write an ADT for polynomial. Write algorithm for polynomial evaluation. [8]

SECTION II

7. (*a*) Sort the following numbers step by step by using Merge sort. Also comment on time complexity of Shell sort :

20, 15, 21, 06, 08, 05, 29, 02, 14, 40. [12]

(*b*) Write a pseudocode to search element using linear search. Write time complexity of it. [4]

Or

8. (*a*) Write and explain bubble sort to sort list of numbers in ascending order. State its best case, average case and worst case time complexity. [6]

(*b*) Write an algorithm for Binary Search. Explain its best case, worst case and average case complexity with example. [10]

9. (*a*) Write pseudocode to merge two sorted lists of integers stored in singly linked list to form a third sorted list. Analyze time complexity of this code. [10]

(*b*) Show graphical representation for the follwoing GLL : [6]

(*a*, *b*, (*c*, (*e*, *f*), *g*, (*h*), (*j*, *k*), *l*), *m*).

Or

10. (*a*)   Write and explain a node structure to represent polynomial using GLL. What are the advantages of using GLL for polynomial representation ?   [8]

(*b*)   Write a function to perform addition of two polynomial using circular linked list. Explain time complexity of it.   [8]

11.   Write short notes on :   [18]

(*i*)   Josephus problem

(*ii*)   Stack Application

(*iii*)   Priority Queue.

Or

12. (*a*)   Write an algorithm to convert infix expression to prefix expression. Comment on its time complexity.   [8]

(*b*)   Convert the following infix expression to postfix expression and evaluate expression with the following values :   [10]

(a + (b * c)/e ^ f – (g * h))

A = 10 b = c = 4, e = 2, f = 3, g = 1 , h = 5.