



AUTUMN MID SEMESTER EXAMINATION-2018

School of Computer Engineering

Kalinga Institute of Industrial Technology Deemed to be University, Bhubaneswar-24

Data Structure and Algorithm CS-2001

Time: 1^{1/2} Hours

Full Mark: 20

Answer any four questions including question No.1 which is compulsory.

The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

Q.1. [5X1]

- (a) Write a function code whose upper bound time complexity is $O(m^2 + n \log m)$
- (b) An array, arr[-15.....10, 15.....40] requires four bytes of storage for each element. If the base address of arr is 2500, determine the address of arr[8][20] for row-major and column-major order.
- (c) Write a recursive function code to count the length of a given grounded header linked list.
- (d) Write a function code to delete the middle most item from the stack wherein push, pop and isEmpty and peek operations are given.

Example:

Input: Stack = [11, 22, 33, 44, 55]

Input: Stack = [10, 20, 30, 40, 50, 60]

Output: Stack = [11, 22, 44, 55]

Output: Stack = [10, 20, 40, 50, 60]

- (e) Explain head and tail recursion with suitable examples.

Q.2. [5]
Two arrays are given and write the function code/ pseudo code / algorithm to swap elements from each array such that after swapping sum of the both arrays is same.

Example:

Array 1: 3, 2, 10, 12

Array 2: 6, 4, 9, 10

After swapping 3 (from Array 1) with 4 (from Array 2)

Array1: 4, 2, 10, 12 Sum = 28

Array2: 6, 3, 9, 10 Sum = 28

Q.3. [2.5]

- (a) How to represent a polynomial using linked list? Write the algorithm / function code / pseudo code to add three polynomials.

- (b) Design a suitable data structure to efficiently represent a sparse matrix? Write an algorithm/ function code / pseudo code to add the original sparse matrix with the transpose of the same matrix. [2.5]

Q.4. [3]

(a) Demonstrate on how to implement a stack of integers in C using static array i.e. `int s[SIZE]` and structure. Write functions: push, pop, peek and isEmpty for this implementation. [2]

(b) Evaluate the postfix expression: $8\ 4\ /\ 5\ *\ 7\ 3\ -\ +$ with status of stack after execution of each operation.

Q.5. [5]

Let a single linked list consists of positive integers in such a way that the summation of node values in few continuous nodes matches to the value in the next node. For example, the linked list consists of values 2, 1, 3, 5, 3, 9, 17, 2, 4, 6, where $2+1=3$ {i.e. summation of 1st and 2nd node matches to 3rd node}, $5+3+9=17$ and so on. Here, no. of summation groups are 2 and values in each summation group are {2, 1}, {5, 3, 9}. Write an algorithm or pseudocode or function code to display the no. of summation groups and the values in each summation group.

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