University of Engineering & Management, Kolkata

1st Term Examination, September, 2019

Course: B.Tech (CSE) Semester: 3rd

Paper Name: Data Structure & Algorithm

Paper Code: PCCCS302

Full Marks: 70 Time: 3 hours

Group-A (10 marks)

Answer any 5. Each question is of 2 marks.

1. **A)** Differentiate between file and structure storage structure.
   B) What Do You Mean By Recursive Definition?
   C) What Are The Disadvantages Array Implementations Of Linked List?
   D) Suppose you are given an array s[1...n] and a procedure reverse(s,i,j) which reverses the order of elements in a between position i and j(both inclusive). What does the following sequence do where 1<=k<=n:

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reverse(s,1,k)
reverse(s,k+1,n);
reverse(s,1,n);
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   E) Let A be a 2D Array: A[2.....8][3.....15] of integer. Assuming each integer takes one memory locations the array is stored in a column major order and the first element is stored at location 8090, What is the address of the element A[i][j]?
   F) Write a recursive function to display a double circular linked list.
   G) What are the advantages of Binary search over linear search?
   H) What is the advantage of circular queue over linear queue?

Group-B (15 marks)

Answer any 3. Each question is of 5 marks.

2. How will you check the validity of an expression containing nested parentheses?
3. Which data structure is used to perform recursion and why?
4. How do you reference all the elements in a one-dimension array?
5. Write an algorithm to perform bubble sort using single linked list.
6. Explain the upper bound time complexity of $f(n)$.
7. Compare linked list with array in respect to the advantages and disadvantages with proper explanations.

Group-C (45 marks)

Answer any 3. Each question is of 15 marks.

8. You should implement a function that takes as argument a string representing a large number with NN digits. You should print the result of removing exactly KK digits such that the resulting number is as small as possible.
The output must contain all the numbers ranging from the first digit to the last digit.(Write a pseudo code for the above problem).
Constraints : 10<Number<10000
Use Stack to implement the problem.

Input	Output
4 1	234
1234	0
37	3456

15

9. Write an algorithm to show the postfix expression with the input given as : ((a+b)-(c+d)*e)^f? What are self-referential structures ? 10+5

10. Design an algorithm that takes two linked list, and returns true if the linked lists are disjoint, i.e. have no elements in common.What are the notation use to state the complexity of an algorithm? How upper bound and lower bound are are calculated and what are their importance? 8+2+5

11. Write a C program to calculate the factorial of a number' n' maintaining the following steps:
    - **A)** Use recursive function to calculate the factorial.
    - **B)** Recursive function will create a linked list of all the recursive calls including the base condition.
      e.g: factorial(5)
      head->5->4->3->2->1->NULL
    - **C)** Once the linked list is available try to evaluate that. Finally, the list will contain one node with the factorial of a given number n.
      e.g: Head->5->4->3->2->1->NULL
      Head->5->4->3->2->NULL
      Head->5->4->6->NULL
      Head->5->24>NULL
      Head->120->NULL
    - **D)** Display the factorial to the output.

3+5+5+2

12. What is circular queue? Give the array implementation of the circular queue having queue limit that will be provided by the user, implement the insertion and deletion of elements form the circular queue. 2+13

13. Write a code segment to represent the following polynomial: $7x^3y^2 + 8x^2y + 3xy - 11x - 4$
Convert and then evaluate the following infix expression to postfixusing stack.
2+3*3+7*5-3*3^2^3

7+8

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