Seat No.	

S.E. (Computer) (Semester – I) Examination, 2014
DATA STRUCTURES AND ALGORITHM
(2008 Course)

Time : 3 Hours   Max. Marks : 100

Instructions : 1) Answers to the **two** Sections should be written in **separate** answer books.
2) Answer **three** questions from **each** Section.
3) Neat diagrams must be drawn **wherever** necessary.
4) Figures to the **right** side indicate **full** marks.
5) **Use** of calculator is **allowed**.
6) Assume suitable data **if necessary**.

SECTION – I

1. a) Write a recursive function to print Fibonacci series. Explain it by taking value as 7.   **8**

   b) What do you mean by call by reference and call by value ? Explain with example.   **6**

   c) What are different modes of available in C to open binary/text file ?   **4**

                               OR

2. a) Write 'C' function to display total number of vowels, spaces, lines of given text file.   **6**

   b) What is recursive function ? How is stack used in recursive functions ? Explain with one example.   **6**

   c) Write 'C' recursive function to calculate the length of string.   **6**

3. a) What is the frequency count of the following :   **8**

   int fact (int n)

   {

   int ans = 1;

   while (n >=1)

   {

   ans = ans*n – 1;

   }

   Return (ans);

   }

   Find out time and space complexity.

b) State whether it is correct or incorrect. Justify your answer : **8**
   i) $33n^3 + 4n^4 = \Omega(n)$
   ii) $10n^2 + 9n^3 = O(n)$
   iii) $27n^2 + 6 = O(n^2)$
   iv) $43n + 6 = O(n)$

<div align="center">OR</div>

4. a) What is frequency count for the following : **10**

```
int i, j, k;
for (i = 1; i<= n; i++)
for (j = 1; j < n; j++)
{
c[i] [j] = 0;
for (k = 1; k< = n; k++)
c[i] [j] + a [i] [k]*b [k][j];
}
```

Find out its time and space complexity.

b) What are the different asymptotic notations ? Explain each with example. **6**

5. a) What is sparse matrix ? Write pseudo-code for fast transpose of sparse matrix. **8**

b) Write pseudo code for addition of two polynomials. What is its time and space complexity. **8**

<div align="center">OR</div>

6. a) What is an Abstract Data Type ? Write ADT for queue. **6**

b) Write a pseudo-code for sparse matrix addition. Write its time complexity. **6**

c) What is row major representation method of an array ? Derive the address calculation formula for two-dimensional array in row major representation. **4**

<div align="center">SECTION – II</div>

7. a) Write output of each pass of merge sort for the following list : 26, 5, 77, 1, 61, 11, 59, 15, 48, 19 **10**

b) Write pseudo-code for bubble sort and analyse the best case, worst case and average case complexity of the same. **6**

<div align="center">OR</div>

8. a) Write a Binary search algorithm and analyse the same to find out its worst case, average case and best case complexity. **10**

b) Write a pseudo-code for selection-sort to sort an array of n numbers. What is worst case and average case time complexity of quick-sort ? **6**

9. a) Write a pseudo-code to sort doubly linked list. **8**

   b) Represent the following using GLL : **8**

   (a, b, c, (d, (e, f), g), h, i)

OR

10. a) Write a pseudo 'C' code to insert given node in singly linked list **9**
    1) at start
    2) at end
    3) after given node.

    b) Write short note on garbage collection and compaction. **4**

    c) Explain mode structure to represent polynomial using GLL in C. **3**

11. a) Convert the following infix expression into prefix expression by showing the contents of stack for every iteration : **10**

    $((A / B \wedge C)(D * E)) - A * F)$

    b) List any four applications of stack and explain any one of them. **4**

    c) Explain Josephus problem. **4**

OR

12. a) Write short note on : **8**
    1) Priority queue
    2) Multistack

    b) Write a pseudo-code to convert infix expression to postfix expression. **10**

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