(28)

210244

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.

P.T.O.

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) $43n + 6 = O(n)$

OR

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

OR

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

SECTION – II

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

OR

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 ^ 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**
