Total No. of Questions—**12**]   [Total No. of Printed Pages—**4**

Seat
No.

[4757]-184

S.E. (Computer) (I Sem.) 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*) What is recursion ? Explain with example. What are its
advantages and disadvantages ?   [8]

(*b*) Explain with example primitive functions for file handling
in C.   [10]

Or

2. (*a*) 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
positions i and j (both inclusive). What will be the output
of the following sequence of stamen if s[100011]. Show step
by step change in s.   [4]

1.   while (1 < k <= n)

1.1   reverse (s, 1, k);

1.2   reverse (s, k + 1, n);

1.3   reverse (s, 1, n);

P.T.O.

(*b*) Write a recursive function for the following and show step by step function cal f(5) :

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

         = f(n − 1) + f(n − 2)   otherwise.   [8]

(*c*) Explain pass by value and pass by reference parameter passing to function with example.   [6]

3.   (*a*) State whether it is correct or incorrect. Justify your answer.

(1) $10n^2 + 9 = O(n)$

(2) $n! = O(n^n)$

(3) $3n + 6 = O(n)$.   [6]

(*b*) What is the frequency count of the following :

float sum(int a[10], int n)

{

int s = 0;

for(int i = 1; i <= n; i++)

      s += a[i];

return(s);

}

Find out time complexity.   [5]

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

Or

4.   (*a*) Write an algorithm for multiplication of two matrices and find out its time complexity and space complexity.   [10]

(*b*) Explain asymptotic notation.   [6]

5. (*a*) Write an ADT for sparse matrix. Write an algorithm for sparse matrix addition. [10]

(*b*) What is column major and row major representation methods of an array ? Derive the address calculation formula for both methods. [6]

Or

6. (*a*) What is sparse matrix ? Write an algorithm to find simple transpose of sparse matrix. Compare fast transpose and simple transpose method. [10]

(*b*) Write an ADT for polynomial. Write algorithm for polynomial evaluation. [6]

SECTION II

7. (*a*) Sort the following numbers step by step by using quick sort : Also comment on time complexity of quick sort in best case worst case and average case :

5, 3, 8, 9, 12, 7, 10, 2, –6, 1. [10]

(*b*) Write an algorithm for shell sort. [6]

Or

8. (*a*) Write and explain with an example algorithm for radix sort. What is time complexity of radix sort ? [6]

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

9. (*a*) Write pseudo code to reverse singly linked lists of string data. Analyze time complexity of this code. [8]

(*b*) Write a node structure for Generalized linked list. Show graphical representation for the following GLL : [8]

(a, b, (d, (e, f), g, (h, 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 : www.sppuonline.com

(1) Stack application

(2) Josephus problem

(3) Double ended queue and its primitive operations. [18]

Or

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

(*b*) Convert the following infix expression to postfix expression and evaluate the postfix 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.