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Total No. of Questions—12]

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[40621-212

S.E. (IT) (I Sem.) EXAMINATION, 2011

FUNDAMENTAL OF DATA STRUCTURE

(2008 PATTERN)

Time : Three Hours

Maximum Marks : 100

- N.B. :—**
- (i) Answer any *three* questions from each Section.
  - (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) Explain logical operators in C with example. [6]
  - (b) Differentiate between union and structure. [4]
  - (c) Define the following terms : [6]
    - (i) Constant
    - (ii) Variable
    - (iii) Precedence of operator.

Or

2.
  - (a) Write pseudo C algorithm to find length of a string. [4]
  - (b) Explain enumeration with example. [4]
  - (c) Describe auto, static, register and extern storage classes. [8]

P.T.O.

3. (a) Explain linear and non-linear data structures. [6]
- (b) Write characteristics of an algorithm. [4]
- (c) What is time complexity ? How is time complexity of an algorithm computed ? [6]

Or

4. (a) Explain Big-oh, omega, and theta notations. [6]
- (b) What is frequency count of a statement ? Analyze time complexity of the following code : [6]
- ```
(i) for(i = 1; i <= n; i++)  
    for(j = 1; j <= m; j++)  
        for(k = 1; k <= p; k++)  
            sum = sum + i;
```
- (ii) i = n;  
while(i ≥ 1)  
 {i--;}
- (c) Differentiate between primitive and non-primitive data structures. [4]

5. (a) Explain call by value and call by reference with suitable example. [8]



- (b) Write recursive functions for the following : [8]
- (i) To find factorial of a given positive no.
  - (ii) To find sum of digits of given positive no.

*Or*

6. (a) What is pointer ? Explain pointer to a function. [6]
- (b) Passing a structure to a function by reference is more efficient than passing it by value. Justify. [4]
- (c) Is it legal to return a point to local auto variable ? Explain your answer with suitable example. [6]

## SECTION II

7. (a) Write pseudo C algorithm for linear and binary search. [8]
- (b) Write pseudo C code to sort a list of integers using bubble sort. Show output of each pass for the following list :

10, 5, 4, 18, 17, 1, 2. [8]

*Or*

8. (a) Sort the following nos. using insertion sort. Show all passes :

50, 10, 78, 40, 30, 02, 04, 15. [4]

- (b) Sort the following elements in ascending order using bucket sort. Show all passes :  
 121, 235, 55, 973, 327, 179. [6]
- (c) Write pseudo C algorithm for selection sort. [6]
9. (a) Explain sequential and linked memory organization. [6]
- (b) Write pseudo C algorithm to find transpose of a sparse matrix using fast transpose algorithm. Analyze its time complexity. [10]

Or

10. (a) Explain row and column major representation of a matrix. [4]
- (b) Write data structure to represent sparse matrix. Write C function to add two sparse matrices. [8]
- (c) Represent the following polynomial using two-dimensional array : [4]
- (i)  $x^2 + xy + 2x^2y$
- (ii)  $3x^3 + 2y^2x + 5y^3x^3$ .

11. (a) What are advantages of linked list over array ? [4]



(b) Define node structure for SLL and perform the following operation on a SLL without header node (write C functions) : [14]

(i) Delete first node

(ii) Delete last node

(iii) Delete a node with a specified data value which is between the two nodes

(iv) Find sum of elements in the list

(v) Print list reverse recursively.

*Or*

12. (a) Write pseudo C code to add two ordered polynomials in a single variable represented by SLL. [8]

(b) What is generalized linked list ? Write its applications. [4]

(c) Write a C function to reverse SLL. [6]