

Total No. of Questions—12]

[Total No. of Printed Pages—4+1

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[4657]-82

S.E. (I.T.) (First Semester) EXAMINATION, 2014

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) Write different ways to represent constants in C language. [6]
- (b) What is structure in C ? Give its applications. [4]
- (c) What do you mean by precedence and associativity of operators ? [6]

P.T.O.

Or

2. (a) Explain macro and function with examples. [6]
(b) Explain scope of a variable with examples. [4]
(c) Write output of the following code segment : [6]

(i) `char s[10] = "abcde";`

`char *p = &s[2];`

`printf("%c %c %c", *p++,(*p)++,*p);`

(ii) `printf("%o %x %c", 65, 65, 65);`

3. (a) What is sequential file ? Explain with applications. [6]
(b) Explain call by value and call by reference with example. [8]
(c) Write a C function to find length of a string without using library functions. [4]

Or

4. (a) Is passing a structure to a function by value efficient ? Explain. [4]
(b) Write a C program to add and multiply two matrices. [8]
(c) What is recursion ? Write and explain recursive function to find Fibonacci series. [6]

5. (a) What is an abstract data type ? Explain with an example. [4]
(b) Explain linear and non-linear data structures. [6]
(c) What do you mean by time complexity of an algorithm ?
Explain any *one* notation to analyze time complexity. [6]

Or

6. (a) Write an algorithm to find the smallest element in an array of integers and analyze its time complexity. [8]
(b) Compare Big Oh, Omega and Theta notations used to analyze time complexity. [6]
(c) What is persistent data structure ? [2]

SECTION II

7. (a) Write non-recursive pseudo C code for linear and binary search. State their time complexities. [12]
(b) Trace the action of recursive merge sort for the given list : [6]

17, 20, 7, 10, 5, 2, 4, -11, 18.

Or

8. (a) Write pseudo C code for quick sort and sort the following list in ascending order. Show output after each pass for the following input : [10]

17, 8, -9, 2, 0, -5, 7, 20, 11, 16.

- (b) Explain similarities and differences between bubble and selection sort. Justify why selection sort is more efficient. [8]
9. (a) Write an algorithm to find transpose of a sparse matrix using fast transpose algorithm. Analyze its time complexity. [12]
- (b) What is sparse matrix ? List its applications. [4]

Or

10. (a) Explain column-major representation of a matrix with example. [6]
- (b) Represent the following polynomial using one-dimensional array. [4]
- (i) $x^3y^2 - 2xy + y^4x$
- (ii) $7x^3 + 4x^2y^2 + 6.$
- (c) Write an algorithm to find transpose of a sparse matrix using simple/slow transpose algorithm. [6]
11. (a) Write a function to add two decreasing ordered polynomials with positive exponents, represented using circular SLL with header node exponent field is set to -1. Analyze time complexity. [10]
- (b) Write a short note on GLL. [6]

Or

- 12.** (a) Give node structure to represent a list of integers using DLL and write C functions for the following operations : [8]
- (i) Display list forward
 - (ii) Display list reverse
 - (iii) Find greatest element in the list.
- (b) Why linked organization is preferred over sequential organization in list manipulation ? [4]
- (c) Write applications of linked lists. [4]