

UNIVERSITY OF PUNE
[4362]-214
S. E. (Computer) (First Semester) Examination 2013
DATA STRUCTURES AND ALGORITHM
(2008 Pattern)

[Total No. of Questions:12]

[Total No. of Printed pages :3]

[Time : 3 Hours]

[Max. Marks : 100]

Instructions :

- (1) Answer **any three** questions from each section.
- (2) Answers to the two Sections should be written in separate answer-books
- (3) Figures to right indicate full marks.
- (4) Assume suitable data, if necessary.

SECTION I

Q1a) Write a C function to compare two strings using pointer & [5]

without using library function.

b) Explain with example fread, fwrite, ftell & fseek functions for [8]
file handling in

c) Explain call by reference to function using example. [3]

OR

Q2.a) Explain different modes to open file in C. [6]

b) Write a recursive function for following [5]

$f(n)=n$ if $n =0,1$
 $=f(n)*f(n/2)$ otherwise

c) Write 'C' function to display , total number of line, spaces,[5]
vowels and alphabets of given text file.

Q3. a) What is the frequency count of the following: [5]

int fact (int n)

```
{  
if (n ==1)  
{  
Return (1);  
}
```

Else

Return (n * fact (n-1));

}

Find out time complexity.

- b) Write 'C' functions to display magic square matrix. What [5]
is its time complexity?
- c) Explain different Asymptotic notations with example. [6]

OR

Q4. a) What is Abstract Data Type? Write an ADT for rational [8]
number.

b) Write an algorithm for matrix multiplication for $n \times n$ matrix [8]
and find out its time complexity by frequency count.

Q5.a) Explain how two dimensional array $A[1 : m, 1 : n]$ is [10]
represented in computer memory using Row Major & Column
Major representation and obtain a formula using both methods
for computing the address of any element $A[i, j]$, where $1 \leq i$
 $\leq m$ and $1 \leq j \leq n$.

b) Write a 'C' function to implement polynomial multiplication [8]
using array. Explain time complexity for above function.

OR

Q6.a) What is sparse matrix? Write an ADT for sparse matrix. [12]
Write an algorithm to find simple transpose of sparse matrix and find
out its time complexity.

b) Write an ADT for multidimensional Array. [6]

SECTION II

Q7 a) Sort the following numbers step by step by using Shell sort:[10]
Also comment on time complexity of Shell sort. 20, 15, 21, 06, 08, 05,
29, 02, 14, 40.

b) Write a pseudocode to search element using Fibonacci search. [6]

OR

Q8 a) Write and explain worst case input for quick sort to sort list [6]
of numbers in ascending order. State worst case time complexity.

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

Q9.a) Write pseudocode to merge two sorted lists of integers [10]
stored in singly linked list to form a third sorted list, Analyze
time complexity of this code.

b) Show graphical representation for the following GLL: [6]
(a,b, (c,d,(e,f), g, (h, ()), ((j,k)),I),m)

OR

Q10.a) Write & explain a node structure to represent polynomial [8]
using GLL. What are the advantages of using GLL for polynomial
representation?

b) Write a function to perform addition of two polynomial using [8]
Circular linked list. Explain time complexity of it.

Q11.a) Write short note on [18]

- 1) Josephus problem
- 2) Multi-stack implementation
- 3) Priority Queue

OR

Q12a) Write an algorithm to convert prefix expression to [8]
infix expression. Comment on its time complexity

b) Convert following infix expression to postfix [10]
expression.& evaluate expression with following values