

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/ Backlog), April-May 2015

B. Tech in Computer Science Engineering, Semester VI

Roll No.....

CSE602: DESIGN & ANALYSIS OF ALGORITHMS

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

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- i. Which of the following is asymptotically larger? a) $n^{(\log n)}$; b) $n \log n$; c) Both are equal; d) cannot say
 - ii. Which of the following would be tightest bound for $56n + 56$?
a) n ; b) n^2 ; c) n^n ; d) 2^n
 - iii. Two main measures for the efficiency of an algorithm are a) Processor and memory ; b) Complexity and capacity; c) Time and space ; d) Data and space
 - iv. The space factor when determining the efficiency of algorithm is measured by
a) Counting the maximum memory needed by the algorithm ; b) Counting the minimum memory needed by the algorithm ; c) Counting the average memory needed by the algorithm ; d) Counting the maximum disk space needed by the algorithm
 - v. The Worst case occur in linear search algorithm when
a) Item is somewhere in the middle of the array ; b) Item is not in the array at all ;
c) Item is the last element in the array ; d) Item is the last element in the array or is not there at all
- Which of the following data structure is not linear data structure?
- vi. a) Arrays ; b) Linked lists; c) Both; d) None
 - vii. The operation of processing each element in the list is known as
a) Sorting ; b) Merging ; c) Inserting ; d) Traversal
 - viii. Which of the following tree traversal displays elements of Binary Search Tree in Descending order? Inorder; b) Preorder; c) Postorder; d) None of the mentioned



- ix. Which of the following data structures is utilized in Depth First Search Traversal? a) Stack; b) Queue; c) Linked List; d) None of the mentioned
- x. The complexity of linear search algorithm is
a) $O(n)$; b) $O(\log n)$; c) $O(n^2)$; d) $O(n \log n)$



Q.2 Short answer type questions (4 questions @ 2.5 marks)

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- i. Differentiate between Greedy approach and Dynamic Programming approach.
- ii. What are the advantages of Balanced Trees?
- iii. Recursion uses Stack. Explain giving an example.
- iv. Compare Radix sort and Counting Sort.

Q.3A Give an algorithm for insertion sort. If $C(n)$ denotes the number of times the algorithm is executed (n denotes input size), obtain an expression for $C(n)$. 05

Q.3B Explain the concept of asymptotic notations indicating the normally used notations. 05

Q.4A Suggest an algorithm to find whether the elements in an array are unique. Analyze its efficiency using the method suggested by you. 05

Q.4B Write an algorithm that uses adjacency list implementation for Graph. 05

Q.5A Compute Complexities for the following Loops. 05

i. A()
{
 $i=1$;
 for ($i=1; i \leq n; i++$)
 printf("Happy");
}

ii. A()
{
 while ($n > 1$)
 {
 $n = n/2$;
 }
}

iii. A()
{
 int i, j, k, n ;
 for ($i=1; i \leq n; i++$)
 {
 for ($j=1; j \leq i^2; j++$)
 {
 for ($k=1; k \leq n; k++$)
 {
 printf("Happy");
 }
 }
 }
}

iv. A()
{
 int i, j, k, n ;
 for ($i=n/2; i \leq n; i++$)
 {
 for ($j=1; j \leq n; j++$)
 {
 for ($k=1; k \leq n; k=k*2$)
 {
 printf("Happy");
 }
 }
 }
}

```

v.  A()
    {
        int i,j,k,n;
        for (i=1;i<=n;i++)
        {
            for (j=1;j<=i;j++)
            {
                for (k=1;k<=100;k++)
                {
                    printf("Happy");
                }
            }
        }
    }

```



Q.6A Explain the concept of hashing as a method of implementing dictionaries. What are the two main methods of resolving collisions? 05

Q.6B What do you understand by Percolation? Give Three real life applications of percolation. 05

OR

Q.6B Construct heap for the list 2,9,7,6,5,8. Explain procedure for adding new element in a heap. Explain in brief heap sort algorithm and obtain its complexity. 05

Q.7A Give the essential difference between the greedy method and dynamic programming. Explain it giving an example. 05

Q.7B An Election booth maintains record of persons voted on an election day. A report containing list of voters is required which is sorted age wise. Which sorting algorithm will you prefer and why? Write down the algorithm that displays, voter's name and his/her age. Use the step count method to analyze the time complexity. 05

OR

Q.7B Write Prim's algorithm to generate minimum cost spanning tree for a graph. Explain the above algorithm with an example. 05

Q.8A Describe an algorithm with example to compute Binomial Coefficient and derive its Time Complexity. 10

Q.9A Construct a Huffman code for the following data: 10

Character	A	B	C	D	E
Frequency	24	12	10	8	8

Encode the text ABACABAD using the above code. Decode the text whose encoding is 100010001000111110 using the above Huffman code.

Q.9B Write an algorithm to solve 0/1-Knapsack problem. Note: Use dynamic programming approach.

10

OR

Q.9B In the weighted digraph given below, determine the shortest paths from vertex 1 to 6. List the Assumptions utilized while applying algorithm.

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