Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **17CS2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DATA STRUCTURES AND ALGORITHMS I** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Describe the implementation of stack data structure using array with the algorithms for insertion and deletion. | CO2 | 10 |
| b. | Demonstrate the procedure for converting infix expression to postfix expression using stack data structure by converting the below-given infix expression:  ( A + B \* C ) ^ D / ( E – F ) | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Design an algorithm to apply stack data structure to evaluate a Postfix expression and apply the algorithm for evaluating the following postfix expression:  23 12 + 10 \* 20 15 + / 25 + | CO1 | 10 |
| b. | Explain how recursion works by applying stack data structure by implementing the solution for Towers of Hanoi problem and show the series of moves for moving 3 disks. | CO1 | 10 |
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| 3. | a. | Differentiate linear queue and circular queue. Write the algorithm to enqueue and dequeue elements into circular queue with suitable examples. | CO2 | 10 |
|  | b. | Write algorithm to insert value at the front, at the end and in any ith position of a singly linked list with demonstration. | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Compare and contrast singly and doubly linked list. Design algorithms to delete value from the front, from the end and from any ith position. | CO2 | 10 |
|  | b. | Illustrate the implementation of queue using linked list with algorithm and proper examples. | CO4 | 10 |
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| 5. | a. | Write a detailed note on asymptotic notations with appropriate examples for each notation. | CO5 | 10 |
|  | b. | Show how a non-recursive algorithm is to be analyzed for time complexity by analyzing the algorithm for multiplying two n x n matrices. | CO5 | 10 |
| (OR) | | | | |
| 6. | a. | Compute the number of times the basic operation is done in the algorithm for finding the number of digits in the binary representation of a positive decimal integer using *substitution method*. | CO5 | 10 |
|  | b. | Solve the below-given recurrence relation by constructing recursion tree and check the final solution using master’s theorem:  T(n) = 2 T(n/2) + 20 if n>1 and T(1) = 20 | CO5 | 10 |
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| 7. | a. | Give the algorithm for insertion sort. Show how the algorithm sorts the following list:  34, 67, 12, 43, 98, 69, 14, 84, 10 | CO3 | 10 |
|  | b. | Apply Brute Force technique to search a pattern of length ‘m’ in a text of length ‘n’. Analyze the algorithm for it’s best and worst case complexities. Give an example for the worst-case input. | CO3 | 10 |
| (OR) | | | | |
| 8. | a. | Show how the following list is sorted by radix sorting method:  123, 14, 35, 654, 12, 8, 4, 236, 97, 347, 47, 536 | CO3 | 10 |
|  | b. | Discuss the two popular ways to handle overflows in hashing. | CO4 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Apply divide and conquer technique to search an element in a list and state how it is better than linear search with complexity analysis. | CO6 | 10 |
|  | b. | Give the algorithm for merge sort and apply the method to sort the following list:  13, 17, 19, 15, 16, 12, 18, 14 | CO6 | 10 |