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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :17CA2010** |  | **Duration :** | **3hrs** |
| **Sub. Name : DATA STRUCTURES AND APPLICATIONS** |  | **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. | State the differences between:  i) array and structure ii) array and linked list . | CO1 | 5 |
| b. | Explain the following data structures with examples  i) Stack ii) Queue iii) Tree | CO1 | 15 |
| **(OR)** | | | | |
| 2. | a. | Define merging and describe how two arrays can be merged with example. | CO1 | 8 |
| b. | Develop a program to insert and delete an element from an array. | CO1 | 12 |
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| 3. | a. | Draw the stack structure in each case when the following operations are perfomed on an empty stack  i) Add A,B,C,D,E,F ii) Delete two letters iii) Add G  iv) Add H v) Delete four letters f) Add I | CO3 | 6 |
| b. | Evaluate the following postfix expression using stack  2 3 10 + \* 8 2 /- | CO3 | 4 |
| c. | Design a program in C++ that accepts the above postfix expression and evaluates the same using a stack. | CO3 | 10 |
| **(OR)** | | | | |
| 4. | a. | Discuss how a linked list is stored in memory. | CO4 | 5 |
| b. | Write algorithms to  i) create a linked list  ii) insert an element at the beginning in a linked list  iii) delete an element at the end from a linked list | CO4 | 15 |
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| 5. | a. | Explain how insertion and deletion takes place in a queue with an example. | CO3 | 8 |
| b. | Develop an algortithm to insert the elements{10,20,23,45,50} in a queue and then delete all the elements. Analyze when the conditions of overflow and underflow occur. | CO3 | 12 |
| **(OR)** | | | | |
| 6. | a. | Compare and contrast a queue with a priority queue. | CO5 | 10 |
| b. | Implement insertion and deletion in a priorityqueue. | CO5 | 10 |
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| 7. | a. | Contrast linear search algortithm with binary search algortithm. Analyze which searching algorithm is better. | CO2 | 10 |
| b. | Develop a program in C++ to search for an element in an array using binary search. | CO2 | 10 |
| **(OR)** | | | | |
| 8. | a. | Consider the array {30,52,29,87,63,27,19,54}. Depict the iterations to sort the above array in Ascending order using bubble sort. | CO2 | 10 |
| b. | Implement a program to sort the above set of elements using insertion sort. | CO2 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Consider the tree given below and list the following:  tree image.bmp    i) Identify the leaf nodes  ii) Identify the non-leaf nodes  iii) Identify the ancestors of node 5.  iv) Identify the descendants of node 2  v) Identify the sibling of node 8  vi) Find the height of the tree.  vii) Identify the root node  viii) Analyse if the above tree is a complete binary tree. | CO6 | 8 |
| b. | Perform the following traversals on the above tree.  i) in-order traversal ii) pre-order traversal iii) post order traversal. | CO6 | 12 |