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



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

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| **Code :** | **18CS3005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ADVANCED DATA STRUCTURES** | **Max. Marks :** | **100** |

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| **Q. No.** | **Sub Div.** | **Questions** | **Course Outcome** | **Marks** |
| **ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)** | | | | |
| 1. | a. | Traverse the following binary tree:   1. in preorder 2. in inorder 3. in postorder   Show the content of the traversal’s stack as the algorithm progresses. | CO1 | 10 |
| b. | Construct a Binary heap for the list 1, 8, 6, 5, 3, 7, 4 by bottom-up algorithm. | CO1 | 6 |
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| 2. | a. | For each of the following lists, construct an AVL tree by inserting their elements successively, starting with the empty tree.   1. 3, 6, 5, 1, 2, 4, 9. 2. 5, 6, 8, 3, 2, 4, 7. | CO1 | 10 |
| b. | Construct a B- tree of order 3 for the list 8, 6, 2, 5, 7, 10, 14, 21, 24, 11, 16, 17, 18, 1, 28, 25, 32, 44, 26. | CO1 | 6 |
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| 3. | a. | Apply the DFS-based algorithm to solve the topological sorting problem for the digraph. | CO5 | 10 |
| b. | Compare the main facts about Depth First Search and Breadth First Search. | CO5 | 6 |
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| 4. | a. | Let us consider the given files, f1, f2, f3, f4 and f5 with 20, 30, 10, 5 and 30 number of elements respectively. Find the optimal order to merge these files using greedy technique. | CO3 | 10 |
| b. | Construct the Huffman’s tree for the following data and obtain its Huffman’s code.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Character | A | B | C | D | E | | Probability | 0.5 | 0.3 | 0.1 | 0.07 | 0.03 | | CO2 | 6 |
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| 5. |  | Assume that we have a knapsack with max weight capacity, **W = 16.** Consider the following items with their associated weight and value.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Item** | **i1** | **i2** | **i3** | **i4** | **i5** | **i6** | | **Weight** | 6 | 10 | 3 | 5 | 1 | 3 | | **ValueC** | 6 | 2 | 1 | 8 | 3 | 5 |   Fill the knapsack with items such that the benefit (value or profit) is maximum.  **Note:** The item can be taken as a whole or part of it. | CO4 | 16 |
|  |  |  |  |  |
| 6. |  | Explain how dynamic programming is applied to solve Travelling sales person problem. | CO2 | 16 |
|  |  |  |  |  |
| 7. | a. | Apply Prim’s algorithm to find a minimum spanning tree of the graph. | CO5 | 10 |
| b. | Consider a set of given jobs as shown in the following table. Find a sequence of jobs and the maximum profit, which will be completed within their deadlines and will give maximum profit.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Jobs** | **J1** | **J2** | **J3** | **J4** | **J5** | **J6** | | **Deadlines** | 5 | 3 | 3 | 2 | 4 | 2 | | **Profits** | 200 | 180 | 190 | 300 | 120 | 100 | | CO2 | 6 |
| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. | a. | Discuss the approximation algorithm for NP hard problems. | CO6 | 10 |
| b. | Illustrate the backtracking solution for solving n-queen’s problem by giving solution to 4-queen’s problem. | CO3 | 10 |