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



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

|  |  |  |  |
| --- | --- | --- | --- |
| **Code :** | **17CS2006** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DATA STRUCTURES AND ALGORITHMS – II** | **Max. Marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Apply the various binary tree traversal for the below tree along with detailed algorithm.  insertEx | CO3 | 10 |
| b. | Construct B-Tree of order 5 by inserting the following keys one by one, A,G,F,B,K,D,H,M,J,E,S, I,R,X,C,L,N,T,UP and then delete the keys E,F,M in order**.** | CO3 | 10 |
| **(OR)** | | | | |
| 2. | a. | Construct an AVL tree by inserting following elements one by one starting with the empty tree.   1. 15, 20, 24, 10, 13, 7, 30, 36, 25 2. 14, 17, 11, 7, 53, 4, 13 | CO3 | 10 |
| b. | Given an array of 6 elements: 15, 19, 10, 7, 17, 16, sort it in ascending order using heap sort and also analyze its time complexity. | CO5 | 10 |
|  |  |  |  |  |
| 3. | a. | Find the shortest paths from vertex ‘A’ to all other vertices in the following graph using Dijkstra’s algorithm. | CO2 | 10 |
| b. | Apply Graph traversals for the following directed graph along with detailed algorithm.  graph1 | CO2 | 10 |
| **(OR)** | | | | |
| 4. | a. | Describe in detail the various ways to represent graph along with detailed notation and an example. | CO3 | 10 |
| b. | Construct the minimum spanning tree for the following graph using Prim’s algorithm.  tKGZFIJ | CO6 | 10 |
|  |  |  |  |  |
| 5. | a. | Consider the given files, f1, f2, f3, f4 f5 and f6 with 5, 3, 2, 7, 9, 13 number of elements respectively.Apply greedy technique to find the optimal merge pattern. | CO4 | 10 |
| b. | Write the Huffman’s algorithm. Construct the Huffman’s tree for the following data and obtain its Huffman’s code.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Character | A | B | C | D | E | - | | Probability | 0.5 | 0.35 | 0.5 | 0.1 | 0.4 | 0.2 | | CO6 | 10 |
| **(OR)** | | | | |
| 6. | a. | Solve the following instances of knapsack problem by greedy techniques.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Objects (0) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Profit (p) | 10 | 5 | 15 | 7 | 6 | 18 | 3 | | Weight (w) | 2 | 3 | 5 | 7 | 1 | 4 | 1 | | CO4 | 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** | | **Deadlines** | 2 | 1 | 3 | 2 | 1 | | **Profits** | 60 | 100 | 20 | 40 | 20 | | CO6 | 10 |
|  |  |  |  |  |
| 7. | a. | Solve the all-pairs shortest-path problem for the digraph with weight matrix. | CO1 | 10 |
| b. | Apply the bottom up dynamic programming algorithm to the following instances of the knapsack problem. (Capacity of Knapsack (W)) =15.   |  |  |  | | --- | --- | --- | | **item** | **weight** | **value** | | 1 | 3 | 25 | | 2 | 2 | 20 | | 3 | 1 | 15 | | 4 | 4 | 40 | | 5 | 5 | 50 | | CO5 | 10 |
| **(OR)** | | | | |
| 8. | a. | Construct an optimal binary search tree for probability table (Pi is the probabilty of key Ki) with detailed algorithm.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | i | 1 | 2 | 3 | 4 | 5 | | Ki | K1 | K2 | K3 | K4 | K5 | | Pi | 0.25 | 0.20 | 0.05 | 0.20 | 0.30 | | CO5 | 10 |
| b. | Find the longest common subsequence present in below strings using dynamic programming.  String A = "acbaed";  String B = "abcadf"; | CO1 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Describe the backtracking solution to solve 8-queen’s problem. | CO4 | 10 |
| b. | Discuss the approximation algorithm for NP hard problems. | CO5 | 10 |