Code No: **20CS3402**

**PVP20**

**PVP Siddhartha Institute OF TECHNOLOGY**

**(Autonomous)**

**ADVANCED DATA STRUCTURES**

**Duration: 3 Hours Max. Marks: 70**

Note:

1. This question paper contains 5 essay questions with an internal choice.
2. Each question carries 14 marks.
3. All parts of Question paper must be answered in one place

5 x 14 = 70 Marks

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | CO | Level | Max. Marks |
| **UNIT-I** | | | | | |
| 1 | (a) | Explain about the methods of collision resolving techniques in hashing. | CO1 | L2 | 7 |
| (b) | Apply quadratic probing hashing technique to insert the following elements 58, 48, 79, 46, 54, 32, 24, 19, 18 into an empty hash table with hash function f(x) = x % 17 | CO2 | L3 | 7 |
| **OR** | | | | | |
| 2 | (a) | Choose any collision resolution technique to the following input 4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199 where the hash function x mod 10. | CO2 | L3 | 8 |
| (b) | Justify your answer in choosing a specific collision resolution technique. | CO2 | L3 | 6 |
| **UNIT-II** | | | | | |
| 3 | (a) | Apply the sequence of steps in deleting the elements in a successive order from the following heap 18, 12, 14, 8, 7, 10, 9. | CO3 | L3 | 7 |
| (b) | Develop code to implement insertion and deletion algorithms of min priority heap? | CO3 | L3 | 7 |
| **OR** | | | | | |
| 4 | (a) | Explain Binomial Queues and the properties of Binomial Queues with examples. | CO1 | L2 | 6 |
| (b) | Construct a binomial heap using the following elements 9, 11, 1, 13, 5, 4, 7, 14, 2, 8, 6, 3, 10, 12, and 15 one at a time, into an initially empty binomial heap. Show the resultant Binomial heap after performing delete minimum element. | CO3 | L3 | 8 |
| **UNIT-III** | | | | | |
| 5 | (a) | Construct an AVL Tree using the following data entered as a sequence set. Show the balance factors in the resulting tree: 13, 22, 6, 9, 32, 55, 79, 65, 70 | CO3 | L3 | 7 |
| (b) | Insert 42, 43, 46 and 49 in the above constructed AVL tree and show a balanced AVL Tree. | CO3 | L3 | 7 |
| **OR** | | | | | |
| 6 | (a) | Construct 60, 65, and 62 in the following Red-Black Tree. Show the resultant Red-Black Tree | CO3 | L3 | 7 |
| (b) | Apply the properties of Red-Black tree and demonstrate deletion in Red-Black tree with an example. | CO3 | L3 | 7 |
| **UNIT-IV** | | | | | |
| 7 | (a) | Develop an algorithm to find the shortest path from a Single Source to all other vertices in a graph using Dijkstra’s algorithm. | CO3 | L3 | 7 |
| (b) | Apply Dijkstra’s algorithm on the below graph | CO3 | L3 | 7 |
| **OR** | | | | | |
| 8 | (a) | Apply Floyd’s-Warshall’s Algorithm on the given below graph and compute sequence of n-1 matrices to find the shortest path among all the vertices in the given graph.  Floyd-Warshall Algorithm and How It Works | by 13517087 Timothy | Medium | CO3 | L3 | 7 |
| (b) | Infer can Bellman-ford algorithm applied on directed acyclic graph with suitable example. | CO1 | L2 | 7 |
| **UNIT-V** | | | | | |
| 9 | (a) | Apply the steps in Knuth-Morris pattern matching algorithm with an example for both successful and unsuccessful cases. | CO2 | L3 | 7 |
| (b) | Analyze an algorithm to implement a pattern searching algorithm with a performance that is linearly dependent on the length of the string being searched. | CO4 | L4 | 7 |
| **OR** | | | | | |
| 10 | (a) | Analyze an algorithm that will efficiently search a given text for a pattern and record the number of times the keyword found.  Pattern: TEST Text: THIS IS A TEST TEXT. | CO4 | L4 | 7 |
| (b) | Explain an efficient Union and Find algorithms in disjoint sets. | CO1 | L2 | 7 |