PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY KANURU, VIJAYAWADA

Department of Computer Science and Engineering

II B.Tech – II Semester

**20CS3402** **Advanced Data Structures**

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| **CO** | **Statement** | **Skill** | **Blooms** | **Units** |
| **CO1** | |  | | --- | | Understand the basic principles and operations of data structures | | Understand | L2 | 1,2,3,4,5 |
| **CO2** | |  | | --- | | Apply Hashing and String Matching techniques for solving problems effectively. | | Apply,  Communication | L3 | 2 |
| **CO3** | |  | | --- | | Apply the concepts of advanced Trees and Graphs for solving problems effectively. | | Apply | L3 | 3,4,5 |
| **CO4** | Analyze the given scenario and choose appropriate Data Structure for solving problems | Analyze,  Individual Performance, Communication | L4 | 3,4,5 |

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| **Advanced Data Structures** | | |
| **Unit No.** | **Contents** | **Mapped CO** |
| I | **Hashing –** General Idea, Hash Function, Separate Chaining, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Universal Hashing, Extendible Hashing. | **CO1,CO2** |
| II | **Priority Queues (Heaps) –** Introduction, Binary Heaps, Basic Heap Operations, Binomial Heaps/Queues, Binomial Queue Structure, Binomial Queue Operations. Implementation of Binomial Heaps | **CO1,CO3** |
| III | **Efficient Binary Search Trees –** AVL Trees, Single rotation, Double rotation, Splay Trees, Red-Black Trees, B-Trees: Definition of B-trees, Basic operations on B-trees, Deleting a key from a B-tree. 2-3 Trees. | **CO1,CO3** |
| IV | **The Disjoint Sets Class –** Equivalence relation, Basic Data Structure, Union and Find algorithms, Smart Union and Path compression algorithm.  **Graphs Algorithms –** Elementary Graph Operations: Topological sort, Single Source Shortest Path Algorithms: Dijkstra’s, Bellman-Ford, All-Pairs Shortest Paths: Floyd-Warshall’s Algorithm.  Network Flow Problems: A simple Maximum flow algorithm. | **CO1,CO3,CO4** |
| V | **String Matching –** The naive string-matching algorithm, The Rabin-Karp algorithm, The Knuth-Morris-Pratt algorithm.  **Digital Search Structures –** Operations on search trees: Insertion, Searching, Deletion. Binary Tries and Patricia: Binary Tries, Compressed Binary Trie, Patricia: searching, insertion, deletion | **CO1,CO2,CO4** |

**CO-PO Mapping**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Contribution of Course Outcomes towards achievement of Program Outcomes** | | | | | | | | | | | | | | |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** |  |  |  |  |  |  |  |  |  |  |  |  | **√** |  |
| **CO2** |  |  |  |  | **√** |  |  |  | **√** |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  | **√** |  |  |  |  |
| **CO4** | **√** |  |  |  |  |  |  |  |  | **√** |  |  |  |  |

**Strength of Correlation**

|  |  |
| --- | --- |
| **% of marks towards PO through CO’s** | **Level (Weight)** |
| >=20% of total marks | 3 |
| >=10% and <20% of total marks | 2 |
| < 10% of total marks | 1 |

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| **CO** | **Skill** | **Blooms** | **Assessing Tools can be used to measure CO (CIE)**  **Marks** | | | **CIE-Total** | **Assessing Tools can be used to measure CO (SEE)**  **Marks** | **Total**  **(CIE+SEE)** | **Percentage**  **(%)** | **Strength of Correlation** | **PO** |
|  |  |  | DDE | R | IE |  |  |  |  |  |  |
| **CO1** | Apply | L3 | 1.5 | - | 1.5 | 3 | 10 | 13 | 26% | 3 | PSO1 |
| **CO2** | Modern Tools,  Individual Performance | L3 | 1  0.5 | - | 1  0.5 | 2  1 | 3  2 | 5  3 | 10%  6% | 2  1 | PO5  PO9 |
| **CO3** | Written Communication | L3 | - | 5 | - | 5 | - | 5 | 10% | 2 | PO10 |
| **CO4** | Apply,  Communication | L3 | 1  1 | - | 1  1 | 2  2 | 5  5 | 7  7 | 14%  14% | 2  2 | PO1  PO10 |
| **CO5** | Analyze | L4 | - | - | - | - | 10 | 10 | 20% | 3 | PO3 |

**Course Articulation Matrix:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)** | | | | | | | | | | | | | | |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| **CO1** |  |  |  |  |  |  |  |  |  |  |  |  | 3 |  |
| **CO2** |  |  |  |  | 2 |  |  |  | 1 |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |  |  | 2 |  |  |  |  |
| **CO4** | 2 |  |  |  |  |  |  |  |  | 2 |  |  |  |  |
| **CO5** |  |  | 3 |  |  |  |  |  |  |  |  |  |  |  |
| **Average** | **2** |  | **3** |  | **2** |  |  |  | **1** | **2** |  |  | **3** |  |

**Course Coordinators Module Coordinators Program Coordinator**

1. Dr. M. Madhavi Dr. G. Lalitha Kumari Dr P. Sai Kiran

2 Dr. M Sailaja

3. Dr. K. Jyothsna Devi