PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY KANURU, VIJAYAWADA

Department of Computer Science and Engineering

III B.Tech – I Semester

20CS3301 **AdvancedData 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.  **Skip Lists:** Skip list representation, Search and Update Operations on skip lists | **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**

Distribution of marks weightage to PO’s through CO’s.

* The strength of correlation levels is based on percentage of marks distribution towards PO.

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| CIE | **Test** | **Test Number** | **Marks** |
| ObjectiveExam (10) | Objective Exam-1 | 10 |
| Objective Exam-2 | 10 |
| Assignment (5) | Assignment -1 | 5 |
| Assignment - 2 | 5 |
| DescriptiveExam (15) | Descriptive Exam - 1 | 15 |
| Descriptive Exam - 2 | 15 |

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| **CO** | **Skill** | **Blooms** | **Units** | **Assessing Tools can be used to measure CO (CIE)**  **Marks** | **Assessing Tools can be used to measure CO (SEE)**  **Marks** |
| CO1 | Understand | L2 | 1,2,3,4,5 | Objective Exam– (10)  Descriptive Exam-2.5 | 25 |
| CO2 | Apply,  Communication | L3 | 2,5  2 | Descriptive Exam – (2.5)  Assignment – 2(1.5+0.5) | 15 |
| CO3 | Apply | L3 | 2, 3,4  3,4 | Descriptive Exam-8.5  Assignment – 1 | 20 |
| CO4 | Analyze,  Individual Performance, Communication  Life-Long Learning | L4 | 4,5 | Descriptive Exam – 1.5  Assignment – 2(0.5+0.5+0.5+0.5) | 10 |

**Strength of Correlation**

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| --- | --- |
| **% of questions towards PO** | **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** | **Bloom's** | **Units** | **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** |
| CO1 | Understand | L2 | 1,2,3,4,5 | | Objective Exam – (10)  Descriptive Exam-2.5 | 12.5 | 25 | 37.5 | 37.5% | 3 | PO1 |
| CO2 | Apply,  Communication | L3 | 2,5 | | Descriptive Exam – (2.5)  Assignment – 2(1+0.5+0.5) | 3.5  0.5  0.5 | 15 | 18.5  0.5  0.5 | 18.5%  0.5%  0.5% | 2  1  1 | PO1  PO10  PSO2 |
| CO3 | Apply | L3 | 2, 3,4 | | Descriptive Exam-8.5  Assignment – 1 | 9.5 | 20 | 29.5 | 29.5% | 3 | PSO1, |
| CO4 | Analyze,  Individual Performance, Communication,  Life-Long Learning | L4 | 4,5 | | Descriptive Exam – 1.5  Assignment – 2 (0.5+0.5+0.5+0.5) | 2  0.5  0.5  0.5 | 10 | 12  0.5  0.5  0.5 | 12%  0.5%  0.5%  0.5% | 2  1  1  1 | PO2  PO9  PO10  PO12 |

**Course Articulation Matrix:**

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| **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 |  |  |  | 1 |
| **CO3** |  |  |  |  |  |  |  |  |  |  |  |  | 3 |  |
| **CO4** |  | 2 |  |  |  |  |  |  | 1 | 1 |  | 1 |  |  |
| **Average** | **2.5** | **2** |  |  |  |  |  |  | **1** | **1** |  | **1** | **3** | **1** |

**Course Coordinators Module Coordinators Program Coordinator**

1. DrS.MadhaviDrG.LalithaKumariDr B Lakshmi Ramani

2 Mr. B.Rajesh

3. MsShilpeekumari