PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY KANURU, VIJAYAWADA

Department of Computer Science and Engineering

II B.Tech – I Semester

**23CS3301** **Advanced Data Structures & Algorithm Analysis**

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| **CO** | **Statement** | **Skill** | **Blooms** | **Units** |
| **CO1** | Understand the fundamental concepts of algorithm analysis and design techniques. | Understand | L2 | 1,2,3,4,5 |
| **CO2** | Use appropriate Data Structure and Algorithm technique to solve problem. | Apply,  Communication | L3 | 1.2,3,4,5 |
| **CO3** | Apply the concepts of Trees and Graphs for solving problems effectively. | Apply | L3 | 1,2,3,4,5 |
| **CO4** | Analyze the given scenario and choose appropriate algorithm design for solving problems. | Analyze,  Individual Performance, Communication | L4 | 3,4,5 |

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| **Advanced Data Structures & Algorithm Analysis** | | |
| **Unit No.** | **Contents** | **Mapped CO** |
| **I** | **Introduction**:  Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations.  **AVL Trees** – Creation, Insertion, Deletion operations  **B-Trees** – Creation, Insertion, Deletion operations., Applications, | **CO1, CO2,CO3** |
| **II** | **Heap Trees** (Priority Queues) – Min and Max Heaps, Operations and Applications  **Graphs** – Terminology, Representations, Basic Search and Traversals, Sets and Disjoint set Union, Applications | **CO1,CO2, CO3** |
| **III** | **Divide and Conquer:** The General Method, Max-Min, Quick Sort, Merge Sort, Strassen’s matrix multiplication  **Greedy Method:** General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths | **CO1, CO2, CO3, CO4** |
| **IV** | **Dynamic Programming:** General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem. | **CO1, CO2, CO3, CO4** |
| **V** | **Backtracking:** General Method, n-Queens Problem, Sum of Subsets problem, Graph Coloring,  **Branch and Bound:** The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem.  **Introduction to Complexity classes:** P and NP Problems, NP-Complete Problems. | **CO1, CO2, CO3, 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** |
| Objective Exam (10) | Objective Exam-1 | 10 |
| Objective Exam-2 | 10 |
| Assignment (5) | Assignment -1 | 5 |
| Assignment - 2 | 5 |
| Descriptive Exam (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) | 20 |
| CO2 | Apply,  Communication | L3 | 3,4,5  3,4 | Descriptive Exam – (6.25)  Assignment – 1(1.25) | 20 |
| CO3 | Apply | L3 | 1,2, 3,4,5  1,2 | Descriptive Exam-(6.25)  Assignment – 1 (1.25) | 20 |
| CO4 | Analyze,  Individual Performance, Communication  Life-Long Learning | L4 | 3,4,5  3,4,5 | Descriptive Exam – (2.5)  Assignment – 2(2.5) | 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) | 10 | 20 | 30 | 30% | 3 | PO1 |
| CO2 | Apply,  Communication | L3 | 1,2,3,4,5  1,2 | | Descriptive Exam – (6.25)  Assignment – 1  (1.25) | 7.5 | 20 | 27.5 | 27.5% | 3  1  1  3  1 | PO1,  PO9,  PO10  PSO1  PSO2 |
| CO3 | Apply,  Communication | L3 | 1,2,3,4,5  1,2 | | Descriptive Exam-  6.25  Assignment – 1  (1,25) | 7.5 | 20 | 27.5 | 27.5% | 3  1  1  3  1  1 | PO2,  PO9,  PO10,  PSO1  PSO2 |
| CO4 | Analyze,  Individual Performance, Communication,  Life-Long Learning | L4 | 3,4,5  3,4,5 | | Descriptive Exam –  2.5  Assignment – 2  2.5 | 5 | 10 | 15 | 15% | 2  1  1 | PO2  PO9  PO10 |

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

**Course Coordinators Module Coordinators Program Coordinator**

1. Mr. L. V. Krishna Rao

2. Dr. K. Jyothsna Devi Dr. G. Lalitha Kumari Dr P. Sai Kiran

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