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| **Format No: LP01**  **Issue No: 01**  **Issue Date: 07/01/09** |

**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**RAMAPURAM CAMPUS, CHENNAI-600089**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**LESSON PLAN**

**Degree/Branch : B.Tech / CSE Total No. of Hour as per Syllabus: 75**

**Year/Sem : IIYr / IVSem Lecture : 45**

**Subject Code : 18CSC204J Tutorial : 00**

**Subject Name : Design And Analysis Practical : 30**

**of Algorithms Grand Total : 75**

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| **UNIT 1** | | | | | | | | | |
| **S#** | **Proposed**  **Date** | **Period** | **Topics to be Handled** | **Teaching Aids** | | **Contact Hours** | Actual  Date | Learning Resource | Ref Pg, Chapter |
| 1 |  |  | Introduction-Algorithm Design, Fundamentals of Algorithms | Chalk Board | | 1 |  | LR4 | 1/CH-1 |
| 2 |  |  | Correctness of algorithm, Time complexity analysis | Chalk Board | | 1 |  | LR4 | 52/ CH-2,  58 / CH-3 |
| 3 |  |  | Insertion sort-Line count, Operation count, Algorithm Design paradigms | Chalk Board | | 1 |  | LR4 | 65 / CH-3 |
| 4 |  |  | Designing an algorithm, And its analysis-Best, Worst and Average case | Smart Class | | 1 |  | LR4 | 11 /CH-1,  71/CH-12 |
| 5 |  |  | Asymptotic notations Based on growth function, O,O,Ө, ω, Ω | Smart Class | | 1 |  | LR4 | 78/CH-3 |
| 6 |  |  | Mathematical analysis, Induction, Recurrence relations | Chalk Board | | 1 |  | LR4 | 98/CH-4 |
| 7 |  |  | Solution of recurrence relation, Substitution method | Problem Solving | | 1 |  | LR4 | 109/CH-4 |
| 8 |  |  | Solution of recurrence relation, Recursion tree | Problem Solving | | 1 |  | LR4 | 112/CH-4 |
| 9 |  |  | Solution of recurrence relations, Examples | Problem Solving | | 1 |  | LR4 | 112/CH-4 |
| **No.of lecture hrs. Given in the syllabus :** | | | | | 9 Hrs | | | | |
| **Actual No.of lecture hrs. taken :** | | | | | Hrs | | | | |

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| **UNIT 2** | | | | | | | | | | | | | | | | | | | | | |
| **S#** | **Proposed**  **Date** | | **Period** | | **Topics to be Handled** | | | **Teaching Aids** | | | **Contact Hours** | | | | Actual  Date | | Learning Resource | | | Ref Pg., Chapter | |
| 1 |  | |  | | Introduction-Divide and Conquer, Maximum Sub array Problem | | | Smart Class | | | 1 | | | |  | | LR4,  LR1 | | | 262/CH8,  68/CH-4 | |
| 2 |  | |  | | Binary Search, Complexity of binary search | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 326/CH-9 | |
| 3 |  | |  | | Merge sort, Time complexity analysis | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 264/CH-8 | |
| 4 |  | |  | | Quick sort and its Time complexity analysis, Best case, Worst case, Average case analysis | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 269/CH-8 | |
| 5 |  | |  | | Strassen's Matrix multiplication and its recurrence relation, Time complexity analysis of Merge sort | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 284/CH-8 | |
| 6 |  | |  | | Largest sub-array sum, Time complexity analysis of Largest sub-array sum | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 295/CH-8 | |
| 7 |  | |  | | Master Theorem Proof, Master theorem examples | | | Chalk Board | | | 1 | | | |  | | LR4 | | | 127/CH-4 | |
| 8 |  | |  | | Finding Maximum and Minimum in an array, Time complexity analysis-Examples | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 277/CH-8 | |
| 9 |  | |  | | Algorithm for finding closest pair problem, Convex Hull problem | | | Smart Class | | | 1 | | | |  | | LR4 | | | 291/CH-8 | |
| No.of lecture hrs. Given in the syllabus : | | | | | | | | | 9 Hrs | | | | | | | | | | | | |
| Actual No.of lecture hrs. taken : | | | | | | | | | Hrs | | | | | | | | | | | | |
| **UNIT 3** | | | | | | | | | | | | | | | | | | | | | |
| **S#** | **Proposed**  **Date** | | **Period** | | **Topics to be Handled** | | | **Teaching Aids** | | | **Contact Hours** | | | | **Actual**  **Date** | | **Learning Resource** | | | **Ref Pg, Chapter** | |
| 1 |  | |  | | Introduction-Greedy and Dynamic Programming, Examples of problems that can be solved by using greedy and dynamic approach | | | Smart Class | | | 1 | | | |  | | LR4 | | | 372/  CH-11 | |
| 2 |  | |  | | Huffman coding using greedy approach, Comparison of brute force and Huffman method of encoding | | | Smart Class | | | 1 | | | |  | | LR4 | | | 393 /  CH-11 | |
| 3 |  | |  | | Knapsack problem using greedy approach, Complexity derivation of knapsack using greedy | | | Chalk Board | | | 1 | | | |  | | LR4 | | | 384 /  CH-11 | |
| 4 |  | |  | | Tree traversals, Minimum spanning tree - greedy, Kruskal's algorithm - greedy | | | Smart Class | | | 1 | | | |  | | LR4 | | | 401 /  CH-11 | |
| 5 |  | |  | | Minimum spanning tree - Prim's algorithm, Introduction to dynamic programming | | | Smart Class | | | 1 | | | |  | | LR1 | | | 631 /  CH-23 | |
| 6 |  | |  | | 0/1 knapsack problem, Complexity calculation of knapsack problem | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 496 /  CH-13 | |
| 7 |  | |  | | Matrix chain multiplication using dynamic programming, Complexity of matrix chain multiplication | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 488 /  CH-13 | |
| 8 |  | |  | | Longest common subsequence using dynamic programming, Explanation of LCS with an example | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 825 /  CH-18 | |
| 9 |  | |  | | Optimal binary search tree (OBST)using dynamic programming, Explanation of OBST with an example | | | Problem Based Learning | | | 1 | | | |  | | LR4 | | | 500 /  CH-13 | |
| **No.of lecture hrs. Given in the syllabus :** | | | | | | | | | 9 Hrs | | | | | | | | | | | | |
| **Actual No.of lecture hrs. taken :** | | | | | | | | | Hrs | | | | | | | | | | | | |
| **UNIT 4** | | | | | | | | | | | | | | | | | | | | | |
| **S#** | **Proposed**  **Date** | | **Period** | | **Topics to be Handled** | | | **Teaching Aids** | | **Contact Hours** | | | | Actual  Date | | | Learning Resource | | Ref Pg, Chapter | | |
| 1 |  | |  | | Introduction to backtracking - branch and bound, N queen’s problem - backtracking | | | Smart Class | | 1 | | | |  | | | LR4 | | 517 -522  / CH-14 | | |
| 2 |  | |  | | Sum of subsets using backtracking, Complexity calculation of sum of subsets | | | Problem Based Learning | | 1 | | | |  | | | LR4 | | 525 /  CH-14 | | |
| 3 |  | |  | | Graph introduction, Hamiltonian circuit - backtracking | | | Chalk Board | | 1 | | | |  | | | LR4 | | 531 /  CH-14 | | |
| 4 |  | |  | | Branch and bound - Knapsack problem, Example and complexity calculation. Differentiate with dynamic and greedy | | | Problem Based Learning | | 1 | | | |  | | | LR4 | | 562 /  CH-14 | | |
| 5 |  | |  | | Travelling salesman problem using branch and bound, Travelling salesman problem using branch and bound example | | | Problem Based Learning | | 1 | | | |  | | | LR4 | | 559 /  CH-15 | | |
| 6 |  | |  | | Travelling salesman problem using branch and bound example, Time complexity calculation with an example | | | Chalk Board | | 1 | | | |  | | | LR4 | | 559 /  CH-15 | | |
| 7 |  | |  | | Graph algorithms, Depth first search and Breadth first search | | | Chalk Board | | 1 | | | |  | | | LR1 | | 603 /  CH-22,  594. | | |
| 8 |  | |  | | Shortest path introduction, Floyd-Warshall Introduction | | | Smart Class | | 1 | | | |  | | | LR4 | | 478/  CH-13 | | |
| 9 |  | |  | | Floyd-Warshall with sample graph, Floyd-Warshall complexity | | | Smart Class | | 1 | | | |  | | | LR4 | | 478 /  CH-13 | | |
| **No.of lecture hrs. Given in the syllabus :** | | | | | | | | | 9 Hrs | | | | | | | | | | | | |
| **Actual No.of lecture hrs. taken :** | | | | | | | | | Hrs | | | | | | | | | | | | |
| **UNIT 5** | | | | | | | | | | | | | | | | | | | | | |
| **S#** | | **Proposed**  **Date** | | **Period** | | **Topics to be Handled** | **Teaching Aids** | | | | | | **Contact Hours** | | | Actual  Date | | Learning Resource | | | Ref Pg, Chapter |
| 1 | |  | |  | | Introduction to randomization and approximation algorithm, Randomized hiring problem | Smart Class | | | | | | 1 | | |  | | LR1 | | | 1123/ CH-35 |
| 2 | |  | |  | | Randomized quick sort, Complexity analysis | Chalk Board | | | | | | 1 | | |  | | LR1 | | | 179/CH-7 |
| 3 | |  | |  | | String matching algorithm, Examples | Smart Class | | | | | | 1 | | |  | | LR1 | | | 985/  CH-32 |
| 4 | |  | |  | | Rabin Karp algorithm for string matching, Example discussion | Chalk Board | | | | | | 1 | | |  | | LR1 | | | 990 /  CH-32 |
| 5 | |  | |  | | Approximation algorithm, Vertex covering | Smart Class | | | | | | 1 | | |  | | LR1 | | | 1106 / CH-35 |
| 6 | |  | |  | | Introduction Complexity classes, P type problems | Chalk Board | | | | | | 1 | | |  | | LR1 | | | 1053 / CH-34 |
| 7 | |  | |  | | Introduction to NP type problems, Hamiltonian cycle problem | Smart Class | | | | | | 1 | | |  | | LR1 | | | 1048 / CH-34 |
| 8 | |  | |  | | NP complete problem introduction, Satisfiability problem | Chalk Board | | | | | | 1 | | |  | | LR1 | | | 1067 / CH-34 |
| 9 | |  | |  | | NP hard problems, Examples | Chalk Board | | | | | | 1 | | |  | | LR1 | | | 1078 / CH-35 |
| **No.of lecture hrs. Given in the syllabus :** | | | | | | | | | | | | 9 Hrs | | | | | | | | | |
| **Actual No.of lecture hrs. taken :** | | | | | | | | | | | | Hrs | | | | | | | | | |

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| **Sl. No.** | **LEARNING RESOURCES** |
|  | Thomas H Cormen, Charles E Leiserson, Ronald L Revest, Clifford Stein, Introduction to Algorithms, 3rd ed., The MIT Press Cambridge, 2014 |
|  | Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd ed., Pearson Education, 2006 |
|  | Ellis Horowitz, Sartajsahni, Sanguthevar, Rajesekaran, Fundamentals of Computer Algorithms, Galgotia Publication, 2010 |
|  | S. Sridhar, Design and Analysis of Algorithms, Oxford University Press, 2015 |

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| Learning Assessment | | | | | | | | | | | |
|  | Bloom’s level of Thinking | Continuous Learning Assessment (50% weightage) | | | | | | | | Final Examination (50% Weightage) | |
| CLA-1(10) | | CLA-2(15%) | | CLA-3(15%) | | CLA-4(10%)# | |
| Theory | Practical | Theory | Practical | Theory | Practical | Theory | Practical | Theory | Practical |
| Level 1 | Remember | 20% | 20% | 15% | 15% | 15% | 15% | 15% | 15% | 15% | 15% |
| Understand |
| Level 2 | Apply | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% |
| Analyze |
| Level 3 | Evaluate | 10% | 10% | 15% | 15% | 15% | 15% | 15% | 15% | 15% | 15% |
| Create |
| Total | | 100% | | 100% | | 100% | | 100% | | 100% | |

#CLA-4 can be from any of these Assignments, Seminars, Tech Task, Mini-Projects, Self-study, MOOCs, Certifications, Conf. Paper etc.,

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| **Test** | **CLA 1** | **CLA 2** | **CLA 3** | **CLA 4** | **University exam** |
| Date of Test |  |  |  |  |  |
| Total No. of Students |  |  |  |  |  |
| No. of Students Appeared |  |  |  |  |  |
| No. of Students Absent |  |  |  |  |  |
| No. of Students Passed |  |  |  |  |  |
| No. of Students  Failed |  |  |  |  |  |
| Percentage of Pass |  |  |  |  |  |

**Prepared by Approved by**

**R.SATHYA HOD/CSE**

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**RAMAPURAM CAMPUS, CHENNAI-600089**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**LESSON PLAN - LAB**

**Degree/Branch: B.Tech / CSE**

**Year/ Sem: II / IV**

**Sub Code: 18CSC204J Practical Hours : 30**

**Sub Name: DESIGN AND ANALYSIS OF ALGORITHMS Total Hours : 30**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Proposed Date** | **Period** | **Lecturer Topics** | **No. of Hours** | **Actual Date** | **Learning Resource** | **Reference Page** |
| 1 |  |  | Simple Algorithm-Insertion sort | 2 |  | LR1 | 65 |
| 2 |  |  | Bubble Sort | 2 |  | LR4 | 68 |
| 3 |  |  | Recurrence Type-Merge sort, Linear search | 2 |  | LR4 | 109 |
| 4 |  |  | Quicksort, Binary search | 2 |  | LR4 | 2,69,326 |
| 5 |  |  | Strassen Matrix multiplication | 2 |  | LR4 | 284 |
| 6 |  |  | Finding Maximum and Minimum in an array, Convex Hull problem | 2 |  | LR4 | 277 |
| 7 |  |  | Huffman coding, knapsack and using greedy | 2 |  | LR4 | 393 |
| 8 |  |  | Various tree traversals, Krukshall’s MST | 2 |  | LR4 | 401 |
| 9 |  |  | Longest common subsequence | 2 |  | LR4 | 825 |
| 10 |  |  | N queen’s problem | 2 |  | LR4 | 522 |
| 11 |  |  | Travelling salesman problem | 2 |  | LR4 | 559 |
| 12 |  |  | BFS and DFS implementation with array | 2 |  | LR1 | 5,94,603 |
| 13 |  |  | Randomized quick sort | 2 |  | LR1 | 179 |
| 14 |  |  | String matching algorithms | 2 |  | LR1 | 990 |
| 15 |  |  | Discussion over analyzing a real time problem | 2 |  | LR4 | -- |

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**R.SATHYA HOD/CSE**

**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**RAMAPURAM CAMPUS, CHENNAI-600089**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**LIST OF EXPERIMENTS**

**Degree/Branch: B.Tech / CSE**

**Year/ Sem: II / IV**

**Sub Code: 18CSC204J Practical Hours : 30**

**Sub Name: DESIGN AND ANALYSIS OF ALGORITHMS Total Hours : 30**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Name of the experiment** | **No. of Hours** |
| **PHASE-I Experiments** | | |
| 1 | Simple Algorithm-Insertion sort | 2 |
| 2 | Bubble Sort | 2 |
| 3 | Recurrence Type-Merge sort, Linear search | 2 |
| 4 | Quicksort, Binary search | 2 |
| 5 | Strassen Matrix multiplication | 2 |
| 6 | Finding Maximum and Minimum in an array, Convex Hull problem | 2 |
| 7 | Huffman coding, knapsack and using greedy | 2 |
| 8 | Various tree traversals, Krukshall’s MST | 2 |
| **PHASE-II Experiments** | | |
| 9 | Longest common subsequence | 2 |
| 10 | N queen’s problem | 2 |
| 11 | Travelling salesman problem | 2 |
| 12 | BFS and DFS implementation with array | 2 |
| 13 | Randomized quick sort | 2 |
| 14 | String matching algorithms | 2 |
| 15 | Discussion over analyzing a real time problem | 2 |

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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**MARK SPLIT UP**

**Degree/Branch: B.Tech / CSE**

**Year/ Sem: II / IV**

**Sub Code: 18CSC204J Practical Hours : 30**

**Sub Name: DESIGN AND ANALYSIS OF ALGORITHMS Total Hours : 30**

|  |  |  |
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| **S.NO** | **CONTENT** | **MARKS** |
| **1** | **CONCEPT EXPLANATION AND ALGORITHM** 1.1 Concept explanation-1 Mark  1.2 Algorithm (Logic) - 1 mark  1.3 Presentation-1 Mark | **3 Marks** |
| **2** | **CODING** 2.1 Implementing the Concept-2 Marks  2.2 Code Efficiency-1 Mark | **3 Marks** |
| **3** | **EXECUTION AND TESTING** 3.1 Various Inputs (Generic)-1 Mark  3.2 Output-1 Mark | **2 Marks** |
| **4** | **VIVA** 4.1 Program Logic-1 Mark  4.2 Answers for related questions-1 Mark | **2 Marks** |
| **TOTAL** | | **10 Marks** |

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**R.SATHYA HOD/CSE**