|  |  |
| --- | --- |
| LOGO.jpg | **GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY**  (**AN AUTONOMOUS INSTITUTION**)  **(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu)**  **(Accredited byNAACwith“A”Grade, NBA (EEE,ECE&ME)&ISO9001:2008CertifiedInstitution)** |
| **QUESTIONBANK(DESCRIPTIVE)**  **Subject Name withCode:**ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS (23A05302T)  **Course&Branch:Year& Semester**:II-I **Regulation:**RG23 | |

**UNIT - I**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Question** | **[BT Level] [CO][ Marks]** |
| **2 Marks Questions (Short)** | | |
|  | What is an algorithm? | L1, CO1,2M |
|  | What are the algorithm characteristics? | L1, CO1,2M |
|  | What are the algorithm specifications? | L1, CO1,2M |
|  | Define Space Complexity. | L1, CO1,2M |
|  | Define Time Complexity. | L1, CO1,2M |
|  | Define Asymptotic Notations. | L1, CO1,2M |
|  | Define Big-Oh notation (O). | L1, CO1,2M |
|  | Define Omega notations(Ω. | L1, CO1,2M |
|  | Define Theta notation (θ). | L1, CO1,2M |
|  | What are Applications of A VL Trees? |  |
| **Descriptive Questions (Long)** | | |
|  | Explain about algorithm and algorithm characteristics. | **L2,CO1,10M** |
|  | Explain about Space and Time Complexity analysis. | **L2,CO1,10M** |
|  | Calculate the time complexity for Matrix addition and Matrix Multiplications. | **L3,CO1,10M** |
|  | Analyze the Asymptotic Notations:Big-oh notation(O),Omega notation(Ω),Theta notation(θ). | **L4,CO1,10M** |
|  | Explain about AVL Trees and its operations. | **L2,CO1,10M** |
|  | Illustrate the AVL Tree rotations with examples. | **L3,CO1,10M** |
|  | Apply the AVL Tree rotations for the given elemets.1,2,3,4,5,6,7,8 | **L3,CO1,10M** |
|  | Explain about B-Trees and its operations. | **L2,CO1,10M** |
|  | Construct the B-Tree for the given elements with order-5  45,96,3,127,68,11,69,72,35,76,90,48,55,23,111,79,6 | **L3,CO1,10M** |

**UNIT - II**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Question** | **[BT Level] [CO][ Marks]** |
| **2 Marks Questions (Short)** | | |
|  | Define Heap Tree. | **L1,CO2,2M** |
|  | Define Min Heaps. | **L1,CO2,2M** |
|  | Define Max Heap. | **L1,CO2,2M** |
|  | Define Graph. | **L1,CO2,2M** |
|  | List out representations of Graphs. | **L1,CO2,2M** |
|  | List out graph travelling techniques. | **L1,CO2,2M** |
|  | Define Connected Components with example. | **L1,CO2,2M** |
|  | Define Bi connected Components with example. | **L1,CO2,2M** |
|  | Define Convex Hull. | **L1,CO2,2M** |
|  | What is the complexity of best, worst, average case of Merge sort? | **L1,CO2,2M** |
|  | What is the complexity of best, worst, average case of quick sort? | **L1,CO2,2M** |
| **Descriptive Questions (Long)** | | |
|  | Explain about operations of Heap Tree and construct the Heap tree for the given elements.46,61,100,5,1,98 | **L2,CO2,10M** |
|  | Apply the Min Heap tree for the given elements 44,33,77,11,55,88,66 | **L3,CO2,10M** |
|  | Explain about Representations of graphs. | **L2,CO2,10M** |
|  | Explain about Connected Components and Bi connected Components. | **L2,CO2,10M** |
|  | Illustrate the graph traversal techniques. | **L3,CO2,10M** |
|  | Illustrate the Quick Sort and it's time complexity? | **L3,CO2,10M** |
|  | Illustrate the Merge Sort and it's time complexity? | **L3,CO2,10M** |
|  | Analyze the Strassen’s matrix multiplication? | **L4,CO2,10M** |
|  | Explain about Convex Hull | **L2,CO2,10M** |

**UNIT - III**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Question** | **[BT Level] [CO][ Marks]** |
| **2 Marks Questions (Short)** | | |
|  | Define General method in Greedy Method. | **L1, CO3, 2M** |
|  | Define Job Sequencing with deadlines in Greedy Method. | **L1, CO3, 2M** |
|  | Define Knapsack Problem in Greedy Method. | **L1, CO3, 2M** |
|  | Define Minimum cost spanning trees in Greedy Method. | **L1, CO3, 2M** |
|  | Define Single Source Shortest Paths in Greedy Method. | **L1, CO3, 2M** |
|  | Define the The Principle of Optimality. | **L1, CO3, 2M** |
|  | Define All pair’s shortest paths in Dynamic Programming. | **L1, CO4, 2M** |
|  | Define Single Source Shortest Paths in Dynamic Programming. | **L1, CO4, 2M** |
|  | Define Optimal Binary Search Trees in Dynamic Programming. | **L1, CO4, 2M** |
|  | Define 0/1 Knapsack in Dynamic Programming. | **L1, CO4, 2M** |
|  | Define Travelling Salesperson problem in Dynamic Programming. | **L1, CO4, 2M** |
|  | What are the Applications of Dynamic Programming? | **L1, CO4, 2M** |
| **Problems (Long)** | | |
|  | Write the algorithm for Fractional Knapsack. Apply the fractional knapsack problem for given problem: Objects n=5, Knapsack Capacity M=100,objects are (P1,P2,P3,P4,P5)=(20,30,66,40,60), weights are (W1,W2,W3,W4,W5)=(10,20,30,40,50). | **L3,CO3,10M** |
|  | Write the algorithm for Fractional Knapsack.Apply the fractional knapsack problem for given problem: n=7,Knapsack Capacity M=15, objects are (P1,P2,P3,P4,P5,P6,P7)=(10,5,15,7,6,18,3), (W1,W2,W3,W4,W5,W6,W7)=(2,3,5,7,1,4,1). | **L3,CO3,10M** |
|  | Write the algorithm for the Job sequencing with deadlines. Apply the job sequencing with deadlines for given problem: n=5 jobs, (P1, P2, P3, P4, P5) = (100,19,38,27,52), deadlines (d1, d2,d3, d4, d5) = (2,1,2,1,3). | **L3,CO3,10M** |
|  | Write the algorithm for the Job sequencing with deadlines. Apply the job sequencing with deadlines for given problem: n=5 jobs, (P1, P2, P3, P4, P5) = (20,13,10,4,1), deadlines (d1, d2,d3, d4, d5) = (2,1,2,3,3). | **L3,CO3,10M** |
|  | Write the Prim’s algorithm. Apply Prim’s algorithm on the given graph | **L3,CO3,10M** |
|  | Apply the Prim’s algorithm on the given graph. | **L3,CO3,10M** |
|  | Write the kruskal’s algorithm. Apply Kruskal’s algorithm on the given graph: | **L3,CO3,10M** |
|  | Write the Kruskal’s algorithm. Apply Kruskal’s algorithm on the given graph. | **L3,CO3,10M** |
|  | Apply the Single Source Shortest Path problem on the given graph. | **L3,CO3,10M** |
|  | Apply the Single Source Shortest Path problem on the given graph. | **L3,CO3,10M** |
|  | Solve the all pairs shortest path problem for given graph by using Dynamic Programming. | **L3,CO4,10M** |
|  | Solve the all pairs shortest path problem for given graph by using Dynamic Programming. | **L3,CO4,10M** |
|  | Solve the travelling sales person problem for the given problem by using Dynamic Programming. | **L3,CO4,10M** |
|  | Solve the travelling sales person problem for the given problem by using Dynamic Programming.  . | **L3,CO4,10M** |
|  | Apply the optimal binary search tree in given problem by using Dynamic Programming.  N=4 (a1,a2,a3,a4)=(do,if,int,while) p(1:4)=(3,3,1,1) q(0:4)=(2,3,1,1,1) | **L3,CO4,10M** |
|  | Apply the 0/1 Knapsack problem for given problem n=3,M=6,(p1,p2,p3)=(1,2,5) (w1,w2,w3)=(2,3,4) by using Dynamic Programming. | **L3,CO4,10M** |

**UNIT - IV**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Question** | **[BT Level] [CO][ Marks]** |
| **2 Marks Questions (Short)** | | |
|  | Define the general method in Backtracking. | L1,CO5,2M |
|  | What is the solution vector for 8-queens problem in Backtracking. | L2,CO5,2M |
|  | Define the Sum of subsets problem in Backtracking. | L1,CO5,2M |
|  | What is the Graph colouring problem in Backtracking. | L2,CO52M |
|  | List out the application for Backtracking. | L1,CO5,2M |
|  | What are the applications of Branch and Bound | L2,CO5,2M |
| **Descriptive Questions (Long)** | | |
|  | Apply the N-Queens problem in Backtracking. | L3,CO5,10M |
|  | Explain about Graphcolouring in Backtracking. | L2,CO5,10M |
| **Problems (Long)** | |  |
|  | Examine the Sum of subsets problem in Backtracking for given problem.  N=4,(w1,w2,w3,w4)=(11,13,24,7) M=31 | L3,CO5,10M |
|  | Illustrate the Hamiltonian cycles in Backtracking. | L3,CO5,10M |
|  | Analyze the method of reduction to solve TSP problem using branch and bound to the given problem. | L4,CO5,10M |
|  | Apply the 0/1 knapsack problem- LC branch and bound solution for the given problem.Consider the instance M=15, n=4, (P1,p2,p3,p4) = 10, 10, 12, 18 and (w1,w2,w3,w4)-(2,4, 6, 9) | L4,CO5,10M |
|  | Compare FIFO branch and bound and LC branch and bound. | L4,CO5,10M |

**UNIT - V**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Question** | **[BT Level] [CO][ Marks]** |
| **2 Marks Questions (Short)** | | |
|  | Define the NP-Hard problem. | **L1,CO6,2M** |
|  | Definethe NP-Complete problems. | **L1,CO6,2M** |
|  | Define Cook’s theorem. | **L1,CO6,2M** |
|  | Define NP Hard Graph Problems. | **L1,CO6,2M** |
|  | DfineNP Hard Scheduling Problems. | **L1,CO6,2M** |
| **Descriptive Questions (Long)** | | |
|  | Explain about NP-Hard and NP-Complete. | **L2,CO6,10M** |
|  | Explain aboutCook’s theorem | **L2,CO6,10M** |
|  | Explain about Clique Decision Problem (CDP) in NP Hard Graph Problems. | **L4,CO6,10M** |
|  | Explain about Chromatic Number Decision Problem (CNDP) in NP Hard Graph Problems. | **L2,CO6,10M** |
|  | Explain about Traveling Salesperson Decision Problem (TSP)in NP Hard Graph Problems. | **L2,CO6,10M** |
|  | Explain about NP Hard Scheduling Problems | **L2,CO6,10M** |

**Signature of the Staff:**

**Signature of Department Academic Committee Member 1:**

**Signature of Department Academic Committee Member 2:**

**Signature of Department Academic Committee Member 3:**