|  |  |  |  |
| --- | --- | --- | --- |
| **Qno** | **Question** | **Marks** | **Unit** |
| 1 | What is an Algorithm? Explain its characteristics in detail. | 8 | Unit-I |
| 2 | Explain the general method of Divide and Conquer algorithm and specify its Applications? | 8 | Unit-I |
| 3 | Discuss about Pseudo Code conventions for expressing algorithms | 8 | Unit-I |
| 4 | What do you mean by Performance analysis? Explain about various Asymptotic notations for time complexity analysis with neat diagrams. | 8 | Unit-I |
| 5 | Write Binary Search algorithm with suitable example and analyse its time complexity? | 8 | Unit-I |
| 6 | Illustrate the tracing of Quick sort algorithm for the following set of numbers: 25, 10, 72, 18, 40, 11, 64, 58, 32, 9. Specify best case and worst case time complexity of the Quick sort algorithm. | 8 | Unit-I |
| 7 | Give an algorithm for Merge sort. Derive it’s time complexity. | 8 | Unit-I |
| 8 | Perform Merge sort on the array of elements  a[1:10] ={31,28,17,65,35,42,86,25,45,52}. Represent tree of calls for Merge sort. | 8 | Unit-I |
| 9 | Define time and space complexity. Explain with examples | 8 | Unit-I |
| 10 | Explain Quick Sort Algorithm and analyse with suitable example | 8 | Unit-I |
| 11 | Explain the importance of weighted rule for Union operation with a suitable example. | 8 | Unit-II |
| 12 | Explain the General method of Backtracking and write the various applications of Backtracking. | 8 | Unit-II |
| 13 | Define Articulation Point or Cut Vertex? Find Articulation points for the following graph? | 8 | Unit-II |
| 14 | Briefly discuss Bi connected components with suitable graph. | 8 | Unit-II |
| 15 | State and explain the Sum of Subset problem, Consider the following Sum of Subsets problem instance: n = 6, m = 30 and w [1:6] = {5, 10, 12, 13, 15, 18}. Find all possible subsets of w that sum to m. Draw the portion of the state space tree that is generated. | 8 | Unit-II |
| 16 | Discuss the 4 –Queen’s problem. Draw the portion of the state space tree for n = 4 queens using Backtracking algorithm. | 8 | Unit-II |
| 17 | What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm? | 8 | Unit-II |
| 18 | Explain the Graph–Coloring problem and draw the state space tree for m= 3 colors and n=4 vertices graph. Discuss the time and space complexity. | 8 | Unit-II |
| 19 | Explain about Disjoint set operations. | 8 | Unit-II |
| 20 | Find a solution to the 8-Queen problem using Backtracking strategy. Draw the solution space using necessary bounding function | 8 | Unit-II |
| 21 | Explain the control abstraction for Greedy method with suitable example. | 8 | Unit-III |
| 22 | Briefly discuss components of Greedy algorithm. What are the applications of Greedy algorithm? | 8 | Unit-III |
| 23 | Use the Greedy algorithm for sequencing unit time jobs with deadlines and profits to generate the solution when n=7, (p1, p2,…p7)=(3, 5, 20, 18, 1, 6, 30), and (d1, d2,…, d7)=(1, 3, 4, 3, 2, 1, 2). | 8 | Unit-III |
| 24 | Apply the greedy method to solve Knapsack problem for given instance where n=3, m=20, (P1,P2,P3) = (25,24,15) and weight (W1,W2,W3)= (18,15,10) | 8 | Unit-III |
| 25 | What is a Minimum Cost Spanning tree list some applications of it? Construct Minimum cost spanning trees for the given weighted graph by using Prim’s algorithm. | 8 | Unit-III |
| 26 | Discuss the Dijkstra’s single source shortest path algorithm, Consider the below graph and find the shortest path from the source to all the nodes. | 8 | Unit-III |
| 27 | Distinguish between the Dynamic Programming and Greedy Method | 8 | Unit-III |
| 28 | Contrast between the Prim’s and Kruskal’s algorithm. | 8 | Unit-III |
| 29 | Develop a minimum Spanning tree for the given weighted graph by using Kruskal’s algorithm | 8 | Unit-III |
| 30 | Write a greedy algorithm for sequencing unit time jobs with deadlines and profits. | 8 | Unit-III |
| 31 | State the principle of optimality. List the characteristics of dynamic programming. | 8 | Unit-IV |
| 32 | Explain 0/1 Knapsack problem using set method in dynamic programming. | 8 | Unit-IV |
| 33 | What is purging or dominance rule. Obtain the solution vector for the given 0/1 knapsack instance: n=4,  pi = { 1,2,5,6 } , wi = { 2,3,4,5} and m=8. | 8 | Unit-IV |
| 34 | Apply Floyd Warshalls Algorithm to find shortest path between all the pairs for the given directed graph. | 8 | Unit-IV |
| 35 | Find the least cost route for Travelling sales person problem using dynamic programming by considering the given distance matrix:  0 2 9 10  1 0 6 4  15 7 0 8  6 3 12 0 | 8 | Unit-IV |
| 36 | Consider A1 = 3 × 2, A2=2 × 4, A3= 4 × 2, A4= 2 × 5 and apply matrix chain multiplication to obtain optimal sequence. | 8 | Unit-IV |
| 37 | Solve the 0/1 Knapsack problem for the given n=4, m=5,  w[i] = {1, 2, 1, 3} and p[i] = {10, 7, 11, 15} using Tabulation method. | 8 | Unit-IV |
| 38 | Compare the 0/1 knapsack problem and fractional knapsack problem. List out the applications of Dynamic programming. | 8 | Unit-V |
| 39 | Explain how solution will be provided for all pairs shortest path problem using dynamic  programming | 8 | Unit-V |
| 40 | Describe Travelling Salesperson Problem (TSP) using Branch and Bound | 8 | Unit-V |
| 41 | Apply the branch and bound algorithm to generate minimum length tour for the given cost adjacency matrix.  ∞ 20 30 10 11  15 ∞ 16 4 2  3 5 ∞ 2 4  19 6 18 ∞ 3  16 4 7 16 ∞ | 8 | Unit-V |
| 42 | Define: i) State-Space tree ii) E – Node iii) Dead Node. iv) LC – Search v) Branch and Bound. | 8 | Unit-V |
| 43 | Discuss about general method of branch and bound technique | 8 | Unit-V |
| 44 | Generate LCBB solution for the given knapsack problem, m=15, n=4, (P1, P2, P3, P4) = (10,10,12,18), (w1,w2,w3,w4)=(2,4,6,9) | 8 | Unit-V |
| 45 | State the concept of branch and bound method and also mention its applications. | 8 | Unit-V |
| 46 | Distinguish branch and bound method and backtracking. | 8 | Unit-V |
| 47 | What is state space tree? What are the different ways of searching an answer node in an state space tree  explain with example | 8 | Unit-V |
| 48 | Explain in detail about Deterministic and non-deterministic algorithms. | 8 | Unit-V |
| 49 | What are differences between NP-Hard and NP-Complete classes? Explain with examples. | 8 | Unit-V |
| 50 | How are P and NP problems related? Give the relation between NP-hard and NP problems with a neat diagram. | 8 | Unit-V |