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|  | **ABES Engineering College, Ghaziabad**  **Department of Information Technology** | **SESSION: 2023-24** |
| **DESIGN AND ANALYSIS OF ALGORITHM**  **(KCS 503)**  **UNIT-III** | **CLASS/SEM: B.TechVth (ODD)** |

**Note: Write solution of each question in clear handwriting.**

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| 1 | Differentiate between Prim’s and Kruskal’s algorithm. Explain Prim’s Algorithm and find Minimum Spanning Tree of following graph. |
| 2 | Consider 5 items along with their respective weights and value  I= < I1, I2, I3, I4. I5>  W=<5,10,20,30,40>  V=<30,20,100,90,160>  The capacity of knapsack W=60. Find the solution to fractional knapsack problem**.** |
| 3 | What do you mean by convex hull? Describe an algorithm that solves the convex hull problem. |
| 4 | When do Dijkstra’s and Bellman ford algorithm both failed to find a shortest path? Can Bellman ford detect all negative cycles?Apply greedy single source shortest path algorithm on following graph. |
| 5 | Solve This question using Strassen”s Matrix Multiplication Method. |
| 6 | Activity Selection Problem with algorithm and solve following problem  S= { a1,A2,A3,A4,A5, A6 }  Si = {5,1,3,0,5,8}  Fi = {9,2,4,6,7,9} |
| 7 | Write the algorithm of unite of two binomial heaps. Create a binomial heap for following sequence: 8,3,5,18,2,12,7,9,16,11.21. |
| 8 | Write Short Notes on:  a.) Skip List  b.) Properties of Binomial Tree  c.) Tries |
| 9 | **Consider the below graph:**    Apply Bellman ford algorithm to find the shortest path. |
| 10 | Show the result of inserting the keys F, S, Q, K, C, L, H, T, V, W, M, R, N, P, A, B, X, Y, D, Z, E in order into an empty b-Tree. use t=3, where t is the degree of B-tree. |
| 11 | |  | | --- | | Show the result of inserting the keys F, S, Q, K, C, L, H, T, V, W, M, R, N, P, A, B, X, Y, D, Z, E in order into an empty b-Tree. use t=3, where t is the minimum degree of B-tree. | |
| 12 | |  | | --- | | What are the differences in Binomial and Fibonacci Heap? Write down the algorithm for decrease key operation in binomial heap also write its time complexity. | |
| 13 | Explain Job Scheduling (Task Scheduling) with deadlines with suitable Example. |
| 14 | Discuss and write algorithm of Strassen Matrix Multiplication. Also, Discuss how Strassen Matrix Multiplication is better than Standard |
| 15 | What is skip list? Explain the search operation in skip list with suitable example. Also write its algorithm. |
| 16 | Discuss task scheduling problem with the help of greedy strategy and develop an algorithm to solve the following problem. We are given 9 tasks T1, T2,…T9. The execution of each task requires one unit time. We can execute one task at a time. Ti has a penalty Pi and a deadline Di. Penalty Pi is paid if task is not completed before the end of the Di unit of time.  Task T1 T2 T3 T4 T5 T6 T7 T8 T9  Penalty 15 20 30 18 18 10 23 16 25  Deadline 7 2 5 3 4 5 2 7 3 |