BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)

Computer Science & Engineering

B. Tech. Sem - IV :SUMMER : 2023

SUBJECT : DESIGN OF ALGORITHMS

Day : Wednesday | Time : 10:00 AM-01:00 PM

Date : 31-05-2023 | **S-25584-2023** | Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.

Q.1 Estimate the time complexity using f(n) and g(n) functions in all asymptotic notations Theta(Θ), Big-Oh (O) & Big-Omega (Ω). **(10)**

OR

a) Explain time and space trade off with examples.
b) Write Insertion sort algorithm and discuss its running time in all three cases (best, average and worst)

Q.2 Explain working of Strassen's Matrix Multiplication. Justify how it is efficient than conventional matrix multiplication. **(10)**

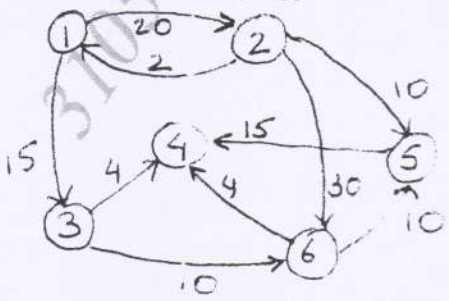
OR

Write Quick sort algorithm. Discuss the running time of Quick sort in Best case, Average case and Worst case. Take suitable example.

Q.3 Find the solution to the Knapsack problem instance n=6, M=15, $(p_1,...,p_6)=\{10, 5, 15, 7, 6, 18\}$, $(w_1,...,w_6)=\{2, 3, 5, 7, 1, 4\}$ using Dynamic Programming and Greedy Approach. Do comparative analysis. **(10)**

OR

Generate the actions of shortest path for the given graph from vertex 1 to all remaining vertices using Greedy Approach. Also write the algorithm.



Q.4 Write algorithm to compute lengths of the shortest paths between all the pairs of nodes for the given adjacency matrix $\begin{bmatrix} 0 & 6 & 13 \\ 8 & 0 & 4 \\ 5 & \infty & 0 \end{bmatrix}$ **(10)**

OR

Write and explain DFS and BFS algorithms with examples. Compare their time complexities.

P.T.O.

Q.5 Describe working of backtracking algorithms. Find all the solutions to 4 Queen's problem. Also show the state space for 4 Queen's problem. **(10)**

OR

Write a note on
a) LIFO BB
b) FIFO BB
c) LCBB

Q.6 Explain P, NP, NP-Hard and NP-Complete classes in detail. Show Vertex Cover problem is NPC. **(10)**

OR

Explain k-server problem

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