BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - IV COMPUTER SCIENCE & ENGINEERING : WINTER : 2024
SUBJECT: DESIGN OF ALGORITHMS

Day : Tuesday
Date : 26/11/2024

W-25584-2024

Time : 02:30 PM-05:30 PM
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}, $(w_1,\ldots,w_6)$={2, 3, 5, 7, 1, 4}using Dynamic Programming and Greedy Approach. Do comparative analysis. **(10)**

OR

Write and explain Kruskal's algorithm. Take a suitable example to apply the algorithm. Also discuss the running time of 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

a) Obtain the solution to Knapsack problem using Dynamic Programming where n=6, M=15, $(p_1,..,p_6)$={10, 5, 15, 7, 6, 18}, $(w_1,\ldots,w_6)$={2, 3, 5, 7, 1, 4}
b) Write algorithm for BFS. Also discuss its running time.

Q.5 Write a note on **(10)**

a) Graph coloring using backtracking.
b) Hamiltonian Cycle using backtracking.

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 Hamiltonian Cycle problem is NPC. **(10)**

OR

Discuss the approximation algorithm for NP-Hard problem.

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