10CS43

Fourth Semester B.E. Degree Examination, July/August 2021
Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Write an Euclid's algorithm for computing GCD and solve for GCD (60, 24) using Euclids method. **(04 Marks)**
   b. Compare order of growth of $\log_2 n$ & $\sqrt{n}$, n^2 & 2^n. **(06 Marks)**
   c. Write general plan for analyzing efficiency of recursive algorithm. And also find an efficiency for Tower of Hanoi puzzle. **(10 Marks)**

2 a. Write an algorithm for binary search. Give Best, Average and Worst case time complexity. **(04 Marks)**
   b. What is defective chessboard problem? Explain how divide and conquer method leads to an elegant solution to defective chessboard problem. **(06 Marks)**
   c. Write an algorithm for merge sort. And sort the data "E X A M P L E" in ascending order. **(10 Marks)**

3 a. Explain Greedy method control abstraction for subset paradigm. **(04 Marks)**
   b. Solve for job sequencing with deadline where n = 4, profits are (100, 10, 15, 27) with deadlines (2, 1, 2, 1) using greedy approach. **(06 Marks)**
   c. Show the steps involved in construction of MST using Prim's and Kruskal's algorithm for the graph shown in Fig.Q.3(c). And also bring out the difference between them. **(10 Marks)**
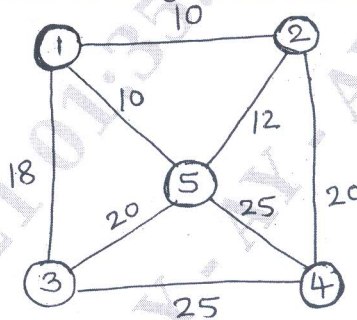

Fig.Q.3(c)

4 a. Define principle of optimality. Explain differences between Greedy method and dynamic programming. **(04 Marks)**
   b. Write an algorithm for All Pairs Shortest Path (APSP). Apply this algorithm to the cost adjacency matrix shown below. **(06 Marks)**

A°	1	2	3
1	0	4	11
2	6	0	2
3	3	∞	0

c. Write Bellman and Ford algorithm to compute shortest paths. Find shortest paths from node 1 to every other node in the graph of Fig.Q.4(c). **(10 Marks)**

Fig.Q.4(c)
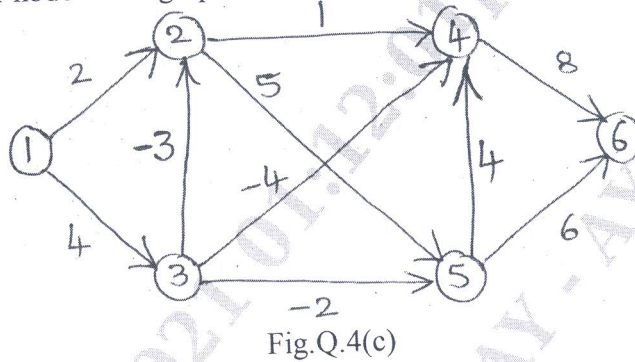
5 a. Bring out the difference between DFS and BFS. **(04 Marks)**

b. Write an algorithm for Insertion sort and solve for n = 7, A[ ] = 89, 45, 68, 90, 29, 34, 17. **(06 Marks)**

c. Write Boyes-Moore algorithm. And search for substring BABAS in main string BEST_KNEW_ABOUT_BABAS using Boyer-More method. **(10 Marks)**

6 a. What is Numerical Analysis? Discuss challenges of Numerical analysis. **(04 Marks)**

b. Define P, NP and NP-complete problem. **(06 Marks)**

c. What do you mean by Decision Tree? Obtain a decision trees for searching a sorted array by considering four elements in an array. **(10 Marks)**

7 a. What is backtracking? Construct a state space tree to the instance S = {3, 5, 6, 7} and d = 15 of the subset-sum problem and solve. **(10 Marks)**

b. What do you mean by Branch and bound? Give state space tree of the branch and bound algorithm for the following instance of the Knapsack problem.

Item	Weight	Value	Value/weight
1	4	$40	10
2	7	$42	6
3	5	$25	5
4	3	$12	4

The Knapsack's capacity is 10. **(10 Marks)**

8 a. What are the several ways of resolving read and write conflicts? **(05 Marks)**

b. Explain how matrix $\tilde{M}$ is computed using parallel algorithm for the given graph Fig.Q.8(b). **(05 Marks)**
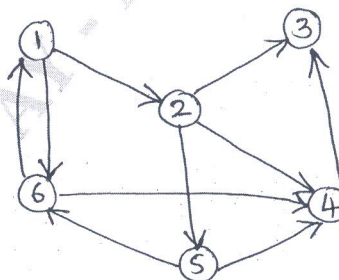

Fig.Q.8(b)

c. Explain list ranking algorithm with suitable examples. **(10 Marks)**

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