Name of the Candidate: Reg. No.:

20CB510

B.Tech. DEGREE– NOVEMBER 2022 – EXAMINATIONS

BRANCH :COMPUTER SCIENCE AND BUSINESS SYSTEMS

DESIGN AND ANALYSIS OF ALGORITHMS

Duration : 3Hours Maximum: 100 Marks

Answer All Questions

PART – A (5 x 3 = 15) CO Marks

A1. Discuss on various asymptotic notations. CO1 (3)
Arrange the given functions in increasing order of asymptotic complexity
f1(n) = 2^n
f2(n) = n^(3/2)
f4(n) = n^(Logn)

A2. Find the longest common subsequence between the input strings “ACADB” and “CBDA” using dynamic programming. CO2 (3)

A3. List the differences between BFS and DFS. CO4 (3)

A4. Find the minimum number of bins needed for the objects of weight[]= {4, 8, 1, 4, 2, 1} and for the bin Capacity c = 10 using bin approximation algorithm. CO6 (3)

A5. Elaborate on computability classes with examples. CO5 (3)

PART – B (7 x 5 = 35) CO Marks

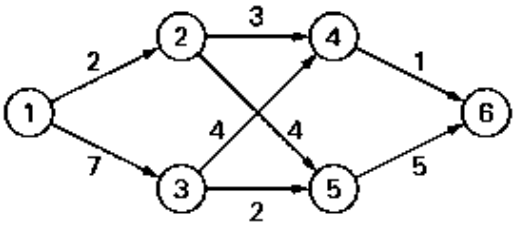
B1. Write Huffman coding for “approximation”. Find the total number of bits required and the average number of bits required for representing a character? CO2 (5)

B2. Construct a state space tree for the given assignment problem based on branch and bound algorithm CO3 (5)

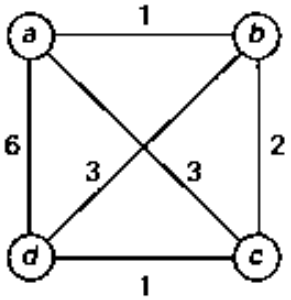
	Job 1	Job 2	Job 3	Job 4
A	9	2	7	8
B	6	4	3	7
C	5	8	1	8
D	7	6	9	4

B3. Write N-Queens backtracking algorithm and analyze its working principle with time complexity. CO2 (5)

B4. Consider the following graph and derive its topological sorting using DFS. Find the time complexity of the derived algorithm. CO4 (5)

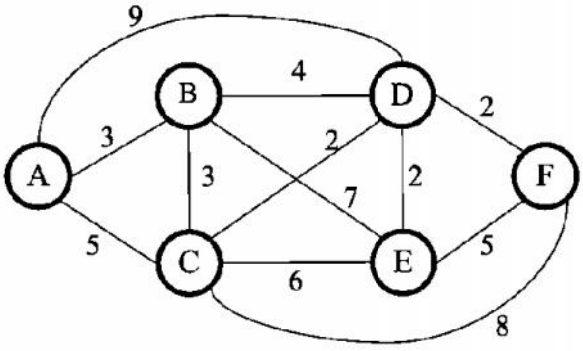


B5. Explain approximation algorithm for Travelling salesman problem and compute its approximation ratio. C06 (5)



CONTD.,

B6. Find the single source shortest path from node A using Dijkstra's algorithm for the weighted graph given below. CO4 (5)



B7. Write the algorithm for convex hull problem using divide and conquer approach and discuss on its time complexity. CO2 (5)

PART – C (4 x 12.5 = 50) CO Marks

C1. a) Construct the state space tree showing the various possibilities using backtracking algorithm on the given subset sum problem CO3 (12.5)
Given the set of elements, W={ 5, 10, 3, 7} find the sum, m= 10 in the set.

(OR)

C2. a) Find the efficient way to multiply the given matrices of dimension {40, 20, 30, 10, 30} and derive the split matrix to parenthesize the sequence of matrix multiplication. CO3 (12.5)

C3. a) Solve the recurrence relation usi eorem CO1 (6)

$$T(n) = \begin{cases} T\ \text{ng master th}\ (\sqrt{n}) + \log n & \text{if } n \geq 2 \\ 1 & \text{otherwise} \end{cases}$$

b) Solve the recurrence relation usin rsive tree method CO1 (6.5)

$$T(n) = \begin{cases} 1 & \text{if } n=1 \\ 3T\left(\frac{n}{4}\right) + cn^2 & \text{otherwise} \end{cases}$$

(OR)

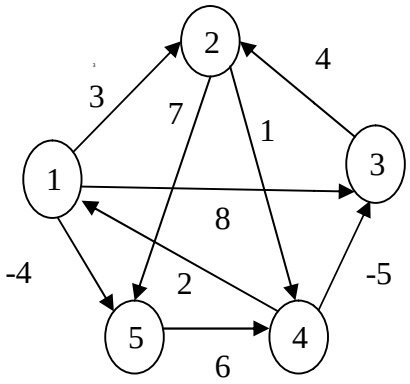
C4. a) Solve the recurrence relation using substitution method CO1 (6)

$$T(n) = \begin{cases} T(n-1) + \log n & \text{if } n > 1 \\ 1 & \text{if } n=1 \end{cases}$$

b) Solve the recurrence relation using substitution method CO1 (6.5)

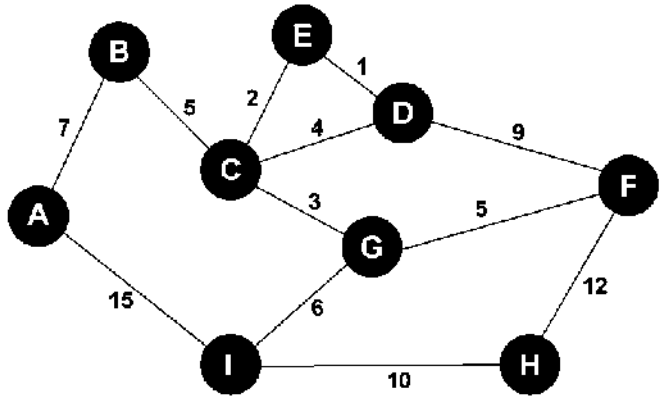
$$T(n) = \begin{cases} 1 & \text{if } n=1 \\ 2T\left(\frac{n}{2}\right) + n & \text{otherwise} \end{cases}$$

C5. a) Find the all pair shortest path using Floyd warshall algorithm for the given graph and compare the time complexity with bellman ford algorithm applied recursively. CO4 (12.5)



(OR)CONTD.,

C6. a) Construct a minimum spanning tree using prim's algorithm for the given graph and write an algorithm to derive it'stime complexity. CO4 (12.5)



C7. a) Show Satisfiability problem is NP complete and use cooks theorem to prove the completeness of clique decision problem for the given CNF=(x1'v x2'v x3) ^ (x1'v x2 v x3) ^ (x1'v x2' v x3). CO5 (12.5)

(OR)

C8. a) Prove graph coloring problem and subset sum problem is reducible from 3SAT problem for the given CNF= (x v y' v z') ^ (x' v y v z). CO5 (12.5)

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