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VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech, II Semester, Sessional Examinations-I, April 2024

Subject: Design and Analysis of Algorithms

(COMMON TO CSE & IT)

Time: 120Mins | DoE: 08-04-2024 | Max. Marks: 30 M

PART-A

Answer ALL questions — 5 X 2 = 10M

		Marks	CO	BL
1.	List out the characteristics of algorithm.	2	1	1
2.	Solve the Recurrence relation T(n)=2T(n/2)+n (when n>1) and T(n)=1(when n=1) using Substitution method	2	1	3
3.	Write the general method of Divide and Conquer strategy.	2	2	1
4.	Define Feasible solution and Optimal solution.	2	2	1
5.	Define principle of optimality.	2	3	1

PART-B

Answer any ONE from each group — 8+8+4 = 20M

UNIT-I

		Marks	CO	BL
1.	What is time complexity? Describe the various Asymptotic notations used to represent time complexities.	8	1	2

OR

2.	a)Discuss the psuedocode Conventions in detail and write one example pseudocode.	4	1	2
	b)Solve the recurrence relation T(n)=T(9n/10)+T(n/10)+n using Recurrence Tree method	4	1	3

UNIT-II

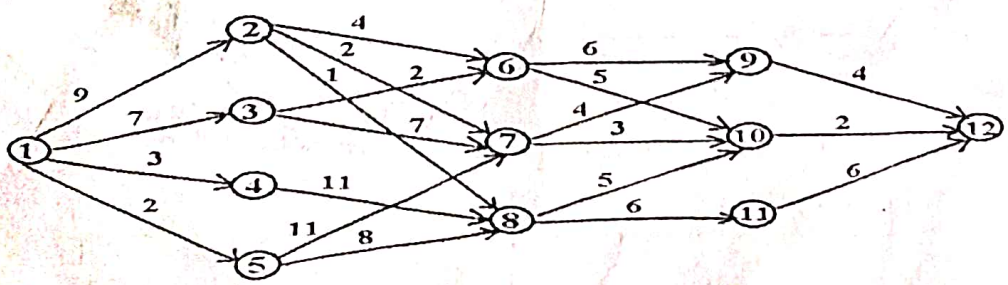
3.	Explain about Strassen's Matrix Multiplication and derive its time complexity.	8	2	2

OR

4.	Using Job sequencing with deadlines algorithm, find the solution for the following instance of values. n=5,(p1,p2,p3,p4,p5)=(60,100,20,40,20) and (d1,d2,d3,d4,d5)=(2,1,3,2,1).	8	2	3

UNIT-III

5.	Find a minimum cost path from 1 to 12 in the following multistage graph using forward approach	4	3	3



OR

6.	Find the number of operations required for the following chain matrix multiplications using Dynamic programming.A1(5 x 4),A2(4 x 6),A3(6 x 2),A4(2 x 7)	4	3	3

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VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
II B.Tech II Semester II SESSIONAL EXAMINATIONS, July,2024

DESIGN AND ANALYSIS OF ALGORITHMS
(CSE/IT)

Time: 120 Mts **Date of Examination: 01/07/2024** **Max. Marks: 30M**

PART-A

I. Answer the following. **5X2=10M**

1. Define All pairs shortest path problem. Which algorithmic technique used to solve this problem. <CO-3> BL-1,4
2. Define Hamiltonian cycle and give an example. <CO-1> BL-1,4
3. Differentiate between backtracking and branch and bound. <CO-3> BL-2
4. What do you mean by bi connected component and give an example? <CO-4> BL-1,4
5. State the Cook's theorem. <CO-5> BL-1

PART-B

II. Answer one question from each unit. **1X4=4M, 2X8=16M**

UNIT-III

1. Write short notes on Reliability design. (4M) <CO-3> BL-2

(OR)

2. Solve the 0/1 knapsack problem for the given Weights: {3, 4, 6, 5}, Profits: {2, 3, 1, 4} and the capacity is 8. (4M) <CO-3> BL-3

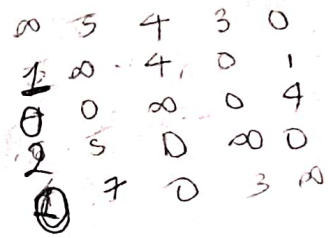
UNIT-IV

3. Write an algorithm for N-Queen problem using back tracking technique? (8M) <CO-4> BL-1

(OR)

4. Solve the TSP for the given cost matrix using LC branch and bound technique. (8M)

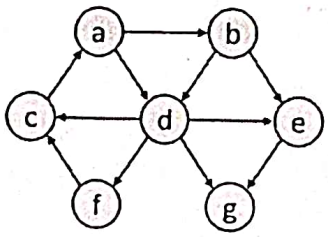
∞	11	10	9	6
8	∞	7	3	4
8	4	∞	4	8
11	10	5	∞	5
6	9	2	5	∞



<CO-3> BL-5

UNIT-V

5. Write an algorithm for BFS and DFS traversal. Find the BFS and DFS for the given graph below



(8M) <CO-4>BL-1,3

(OR)

6. Define the terms P, NP, NP-hard and NP-Complete. Give an example for each. (8M) <CO-5>BL-1

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VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

B.Tech. II Year I Semester Regular Examinations, January /February 2024

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CyS, AIML, DS, IoT and AIDS)

Time: 3 hours **Max. Marks: 60**

Answer ALL questions in PART-A.
Answer any ONE question from each unit in PART-B.
All Questions Carry Equal Marks.

PART-A

5X2 =10M

a)	State and discuss Masters' Theorem with an example.	2M	CO1	BL1
b)	Write the Control Abstraction of Divide and conquer?	2M	CO2	BL2
c)	Distinguish between Dynamic programming and Greedy Algorithm.	2M	CO2,3	BL3
d)	Distinguish between FIFOBB and LCBB.	2M	CO2,3	BL3
e)	What is an Articulation point and Bi-connected component?	2M	CO4	BL1

PART- B

5X10=50M

UNIT-1

1. a) What is an Algorithm? Discuss the Characteristics of an Algorithm? 5M CO1 BL1

   b) What is meant by Time – Complexity? Explain time complexity for the following fragment of code: 5M CO1,2 BL3

```
for i=1 to n do
{
  for j=1 to n do
  {
    sum:=0;
       for k=1 to m do
           {
                sum:=sum+a[i,k]+a[k,j];
               k++;
           }
    j++;
  }
 i++;
}
```

OR

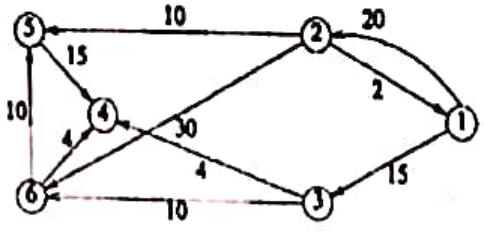
2. a) Give the algorithm for addition of two matrices and determine the time complexity of this algorithm by frequency – count method. 5M CO1,2 BL2

   b) Solve the recurrence relation: $a_n=2\ a_{n/2}+(n-1)$ where $a_1=0$ (using substitution method) 5M CO1 BL3

UNIT-II

3. a) State the Greedy Knapsack? Find an optimal solution to the Knapsack instance n=3, m=20, (P1, P2, P3) = (25, 24, 15) and (W1, W2, W3) = (18, 15, 10). 5M CO2 BL3

   b) Solve the given graph using Dijkstra's algorithm and find its Single Source Shortest path and also write the algorithm. Consider Source Node=1, Destination Node=5. 5M CO2,4 BL3

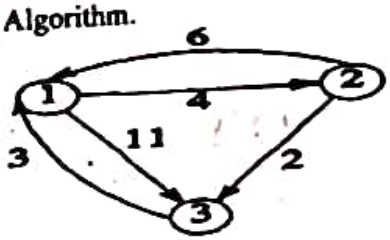


OR

4	a) Explain Strassens's Matrix multiplication analysis and algorithm with suitable example?	5M	CO1,2	BL2
	b) Explain in detail about Merge Sort with an example of your own. Find the time complexity of MergeSort in all three cases.	5M	CO2	BL2

UNIT-III

5	a) What is meant by All Pair Shortest Path? Solve the given graph using All Pair Shortest Path algorithm and write the Algorithm.	5M	CO3,4	BL3



	b) Explain how Matrix chain Multiplication problem can be solved using dynamic programming with a suitable example.	5M	CO2	BL2

OR

6	Draw an Optimal Binary Search Tree for n=4 identifiers (a1,a2,a3,a4) = (do ,if, read, while) P(1:4)=(3,3,1,1) and Q(0:4)=(2,3,1,1,1) and also Write OBST Algorithm and discuss the time complexity.	10M	CO1,3	BL3

UNIT-IV

7	a) Write N – Queens Problem algorithm and draw the portion of state space tree for N=4 queens.	5M	CO3,4	BL2
	b) What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm and draw the portion of the state space tree.	5M	CO4	BL2

OR

8	Explain Travelling salesperson problem LCBB procedure with the following instance and draw the portion of the state space tree and find an optimal tour.	10M	CO4	BL3

$$\begin{pmatrix} \infty & 7 & 3 & 12 & 8 \\ 3 & \infty & 6 & 14 & 9 \\ 5 & 8 & \infty & 6 & 18 \\ 9 & 3 & 5 & \infty & 11 \\ 18 & 14 & 9 & 8 & \infty \end{pmatrix}$$

UNIT-V

9	a) Discuss the differences between BFT and DFT algorithms with suitable example.	5M	CO4	BL2
	b) State and explain Cook's theorem with an example.	5M	CO5	BL2

OR

10	a) Explain relationship between P, NP, NP-complete and NP-hard with neat sketch.	5M	CO5	BL2
	b) Describe Network Flow Algorithm and discuss with suitable example.	5M	CO4	BL2

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VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
B.Tech. II Year I Semester Sessional Examination-I, Nov/2023.
Design and Analysis of Algorithms
(Branch/ Common to CyS, AIML, DS, IOT, AIDS Branches)

Time: 2 hours **DoE:06/11/2023** **Max. Marks: 30**

PART-A

All Questions are compulsory. **5X2M=10 M**

a)	Discuss the characteristics of an algorithm.	CO-1	BL-2
b)	Write the control abstraction for Divide and Conquer.	CO-2	BL-1
c)	How does KMP improve the brute force method.	CO-2	BL-2
d)	Differentiate Greedy approach and Dynamic Programming.	CO-2	BL-4
e)	Discuss the principle of optimality with an example.	CO-2	BL-2

PART-B

Answer any ONE question from each Unit

2X8=16M
1X4=4M

UNIT-I

1. a)	Illustrate the relations $f(n)=\Omega(g(n))$ and $f(n)=O(g(n))$ in estimating the time complexities with an example.	4M	CO-1	BL-3
b)	State the Master's theorem. Solve the following recurrence relations using Master's theorem. *(i)* $T(n)=4T(n/2)+n$ *(ii)* $T(n)=2T(n/2)+n\log n$	4M	CO-1	BL-3

OR

2. a)	Write the non-recursive algorithm for finding the Fibonacci sequence and define its time complexity.	4M	CO-2	BL-2
b)	Solve the following recurrence relation using substitution method. $T(n) = 2T(n/2) + 7$ for $n>1$ and $T(n)=2$ for $n=1$	4M	CO-2	BL-2

UNIT-II

3. a)	Trace the Quick sort algorithm to sort a list A, R,T,I,F,I,C,I,A,L in alphabetical order and mention the best, average and worst-case time complexities of quick sort.	4M	CO-2	BL-3
b)	Solve the following Job sequencing with deadlines problem n=7. Profits (P1, P2.... P7) = {3,5,20,18,1,6,30}. Deadlines (d, d2...d7) = {1,3,4,3,2,1,2}. Calculate Time complexity.	4M	CO-2	BL-2

OR

4. a)	Explain General method of Greedy method. Formulate the Knapsack problem with greedy method and find the optimal solution for n=7, m=15, (p1-p7) =(10,5,15,7,6,18,3), (w1-w2)=(2,3,5,7,1,4,1).	4M	CO-2	BL-2
b)	Solve the Single source shortest path for the given weighted undirected graph. Consider Source as "0" and Destination as"4".	4M	CO-2	

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GNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
...minations, January /February 2024
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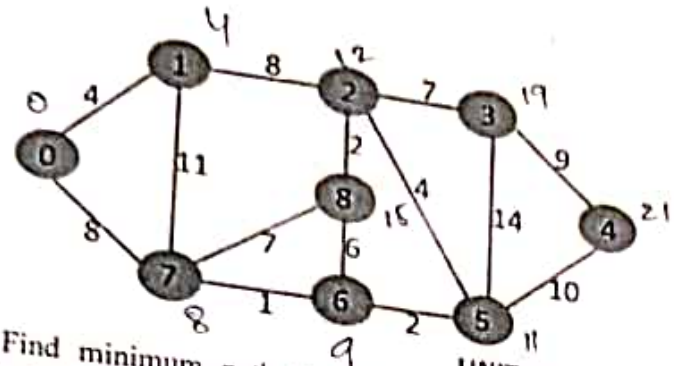
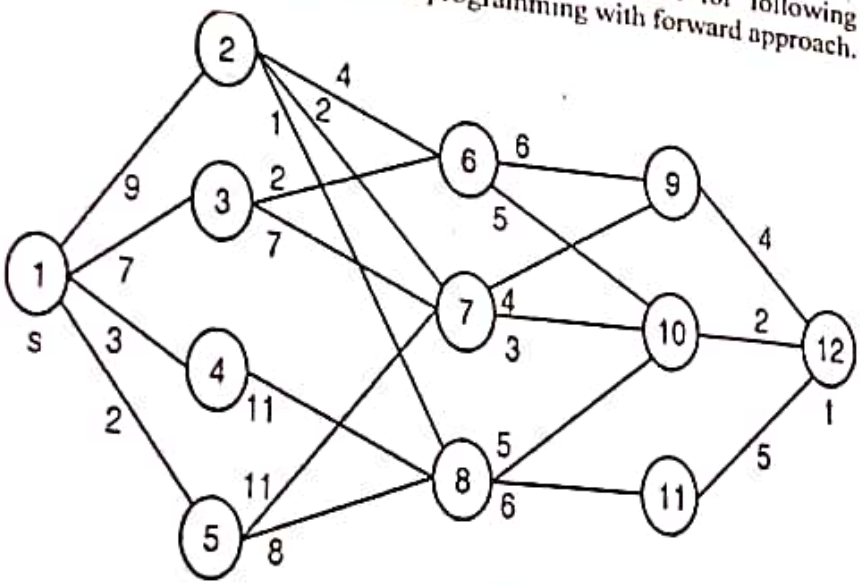


5. Find minimum path cost between vertex s and t for following multistage graph using dynamic programming with forward approach. 4M CO-2 BL-4

UNIT-III



OR

6. Apply dynamic programming to find the optimal order of multiplying 3 matrices A 5X25, B25X10, C10X1. 4M CO-4 BL-3

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