

Name: Sweala VS
Roll No: 59



Rajagiri College of Social Sciences (Autonomous)
Continuous Assessment Examination - 1
January 2023
II MCA

Code: MCA204 **Total Time** : 90 minutes
Sub: Design and Analysis of Algorithms **Total Marks** : 40

Level	Blooms Taxonomy Levels of Learning
L1	Remembering
L2	Understanding
L3	Applying
L4	Analyzing
L5	Evaluating
L6	Creating

SECTION A
Each Question has 10 marks

Sl.no	Question	CO Mapped	Bloom's Taxonomy level
1	Explain the asymptotic notations used to represent growth of functions? – (Embedded Question – Compulsory)	MCA204.1	L2
2	What is the significance of hashing in searching techniques? Explain the method of chaining for handling collisions in hash tables.		

OR

3	Illustrate selection sorting algorithm with an example. Compute the complexity for the algorithm.		
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SECTION B
Each Question has 10 marks

4	State and explain Sum of Subsets Problem. Consider a set s= { 10, 7, 5, 18, 12, 20, 15} and d=35. Solve it for obtaining sum of subset. – (Embedded Question – Compulsory)	MCA204.2	L3
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5	Illustrate Merge sort algorithm and derive the time complexity	

OR

6	Use the branch and bound technique to solve the following Travelling Salesman problem with the cost matrix given below.		
A B C D	$ \begin{array}{cccc} A & \infty & 4 & 12 & 7 \\ B & 5 & \infty & \infty & 18 \\ C & 11 & \infty & \infty & 6 \\ D & 10 & 2 & 3 & \infty \end{array} $		

Rajagiri College of Social Sciences (Autonomous)
Continuous Assessment Examination - 1
February 2022
II MCA

Code: MCA204

Sub: Design and Analysis of Algorithms

Total Time : 1 hr

Total Weightage : 16

SECTION A

Each question has a weightage of 4

1. Explain the asymptotic notations used to represent growth of functions? -
 (Embedded Question - Compulsory)

 2. What is the significance of hashing in design and analysis of algorithms?
 Illustrate any one method of handling collisions in hashing technique.
- OR
3. Discuss the basic idea behind interpolation search. What advantage does it have over binary search?

SECTION B

Each question has a weightage of 4

4. State and explain Sum of Subsets Problem. Consider a set $s = \{10, 5, 6, 20, 15\}$ and $d = 35$. Solve it for obtaining sum of subset - (Embedded Question - Compulsory)

 5. Solve the recurrence relation for recursive MaxMin Algorithm.
- OR
6. Write and illustrate Merge Sort algorithm with an example. Compute the Complexity of Merge Sort algorithm.

Name: Sweaba
Reg. No.: 2224059

Rajagiri College of Social Sciences (Autonomous)

Second semester MCA Degree Examination

April, 2023

(Regular – 2022 admissions)

Code: 4544

Sub: (MCA204) Design and Analysis of Algorithms

Max. Marks: 75

Duration: 3 Hrs.

SECTION A

Answer any **TEN** questions.
(Each question carries 3 marks)

[$10 \times 3 = 30$]

- 1 Derive the time complexity for bubble sort.
- 2 What is the role of Pivot element in Quick Sort?
- 3 State longest common subsequence problem.
- 4 Explain Kruskal algorithm for finding the minimum spanning tree of a graph.
Demonstrate with a graph having minimum four vertices.
- 5 Write Euclid's algorithm for finding GCD
- 6 Define Hashing.
- 7 Define and explain n-Queens problem.
- 8 Differentiate dynamic programming with greedy strategy.
- 9 Give any two practical applications of Dijkstra's Algorithm.
- 10 Define Modular Arithmetic.
- 11 Explain a hashing function of your own choice.
- 12 Give an approximation algorithm for travelling sales man problem.

SECTION B

Answer **ALL** questions.
(Each question carries 9 marks)

[$5 \times 9 = 45$]

- 13 (a) Explain in detail the asymptotic notations used to represent growth of functions.

[OR]

- (b) Explain how data structure affects the performance of an algorithm with respect to time and space complexity.

- 14 (a) Explain backtracking strategy with an example.

[OR]

- 14 (b) Solve for obtaining sum of Subset. $S=\{15, 20, 25, 30\}$, $D=45$. Draw a complete state space tree using backtracking algorithm for solving the above problem.

15 (a) Solve the following problem of matrix chain multiplication using Dynamic Programming Approach and Construct the optimal solution from the split table.

Matrix	Dimension
A ₁	5×4
A ₂	4×10
A ₃	10×2
A ₄	2×5

[OR]

(b) Write and illustrate the Greedy algorithm for solving fractional knapsack problem. Why is Greedy approach not suitable for solving 0/1 knapsack problem?

16 (a) Explain any one application of DFS with example.

[OR]

(b) Illustrate Floyd's algorithm for finding all pair shortest paths in a graph with an example.

17 (a) Explain Miller Rabin algorithm for Primality Testing with an example.

[OR]

(b) Discuss the need of Approximation Algorithms. Illustrate the Approximation Algorithm for Centre Selection problem.

Name: Swealm

Roll No: 59



Rajagiri College of Social Sciences (Autonomous)

Continuous Assessment Examination - II

March 2023

II MCA

Code: MCA 204

Total Time : 90 minutes

Sub: Design and Analysis of Algorithms

Total Marks : 40

Level	Blooms Taxonomy Levels of Learning
L1	Remembering
L2	Understanding
L3	Applying
L4	Analyzing
L5	Evaluating
L6	Creating

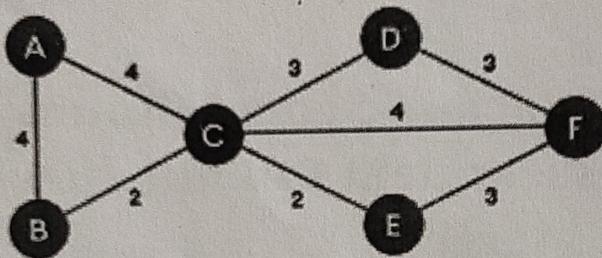
SECTION A

Each Question has 10 marks

Sl.no	Question	CO Mapped	Bloom's Taxonomy level
1	Illustrate and explain Dynamic Programming Approach for finding Longest Common Subsequence with the strings x=ABRACADABRA y=ARCADA. Embedded Question	MCA204.3	L2
2	Consider the following 8 activities with their starting and finishing time. Find the maximum number of activities a person or machine can perform, assuming that the person or machine involved can only work on a single activity at a time.		
OR			
3	How a fractional knapsack problem is solved using greedy approach? Illustrate with an example.		
SECTION B		Each Question has 10 marks	

4

Explain and analyse Kruskal's Algorithm for finding minimum spanning tree with following graph-
Embedded Question



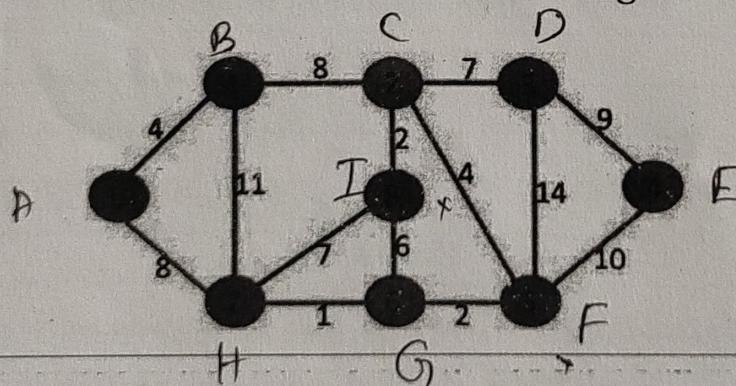
5

Explain any one application of DFS with example.

OR

6

Illustrate Dijkstra's Algorithm for shortest path with graph given below. Define relaxation of edges.



Rajagiri College of Social Sciences (Autonomous)
Continuous Assessment Examination - 2
April 2022
II MCA

Code: MCA204

Sub: Design and Analysis of Algorithms

Total Time : 1 hr
Total Weightage : 16

SECTION A

Each question has a weightage of 4

1. Solve the problem of computing longest common subsequence for :

	1	2	3	4	5	6	7
X[i]	A	G	G	T	A	B	
Y[i]	G	X	T	X	A	Y	B

- (Embedded Question - Compulsory)

2. Parenthesize the product $A(10 \times 5)B((5 \times 5)C(5 \times 10))$ such that the total number of scalar multiplications is minimized.

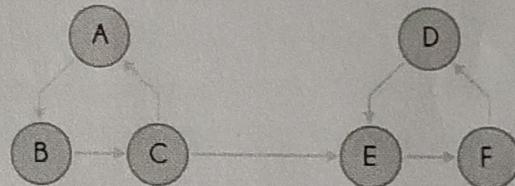
OR

3. Mention the algorithmic design strategy used for solving Huffman coding Problem. Obtain the Huffman encoding for following data: a:52 b:12 c:45 d:20 e:10.

SECTION B

Each question has a weightage of 4

4. Define strongly connected components in a Graph. Illustrate it with the following Graph

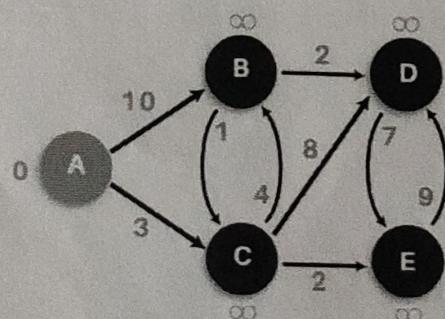


- (Embedded Question - Compulsory)

5. Explain Kruskal's Algorithm for finding minimum spanning tree with an example.

OR

6. Illustrate Dijkstra's Algorithm on the following graph and find the shortest path from the source vertex A to all other vertices.



Name:
Reg. No. :

Rajagiri College of Social Sciences (Autonomous)
Second semester MCA Degree Examination
April, 2022
(Regular/Supplementary - 2020 admission onwards)

Code: 4119
Sub: (MCA204) Design and Analysis of Algorithms

Max. Weightage: 30
Duration: 3 Hrs.

[10 X 1 = 10]

SECTION A

*Answer any TEN questions.
(Each question carries a weightage of 1)*

- 1 Mention any two notations used to represent the complexity of an algorithm.
- 2 What is the time complexity of Merge sort and why it is not considered as the best sorting algorithm?
- 3 What is the condition for 2 activities a_i and a_j to be compatible in an activity selection problem?
- 4 Explain Kruskal algorithm for finding the minimum spanning tree of a graph. Demonstrate it with a graph having minimum four vertices.
- 5 Define Modular Arithmetic.
- 6 Define Interpolation Search.
- 7 Explain the n-Queens problem.
- 8 What do you mean by greedy choice property?
- 9 What are the merits and demerits of List and Matrix representation of Graph?
- 10 What do you mean by a reducible problem?
- 11 How can dynamic-programming used to overcome the drawback of recursion?
- 12 What do you mean by Big O Notation? Explain.

SECTION B

Answer ALL questions.

(Each question carries a weightage of 4)

[5 X 4 = 20]

- 13 (a) Discuss the binary search algorithm. Compute its time complexity.

[OR]

- (b) Discuss and Illustrate Interpolation search. What advantage does it have over binary search?

- ~~14~~ (a) Apply branch and bound strategy to find the optimal path for the following travelling salesman problem.

	C0	C1	C2	C3	C4
C0	INF	20	30	10	11
C1	15	INF	16	4	2
C2	3	5	INF	2	4
C3	19	6	18	INF	3
C4	16	4	7	16	INF

[OR]

- ~~(b)~~ Solve for obtaining sum of Subset. $S = \{5, 10, 15, 20, 30\}$, $D=40$. Draw a complete state space tree using backtracking algorithm for the above problem.

- ~~15~~ (a) Find the Longest Common Subsequence for the set $X = \{A, B, C, B, D, A, B\}$ and $Y = \{B, D, C, A, B, A\}$ using Dynamic Programming Strategy.

[OR]

- ~~(b)~~ Solve the problem for longest common subsequence using Dynamic Programming approach and construct the LCS from the Solution Matrix:

	1	2	3	4	5	6	7	8	9
X[i]	D	I	R	E	C	T	O	R	
Y[i]	S	E	C	R	E	T	A	R	Y

- ~~16~~ (a) Explain the algorithm for finding the shortest path from a source vertex using BFS.

[OR]

- ~~(b)~~ How can a graph be represented using adjacency lists and adjacency matrix? State its merits and demerits.

- ~~17~~ (a) Write the algorithms for Greatest Common Divisor (GCD) and Least Common Multiple (LCM) using Euclid's algorithm.

[OR]

- ~~(b)~~ Write Pollard's rho heuristic algorithm for Integer factorization and explain.