IIPS DAVV : M.Tech 6 Semester

ADA Internal Test 3A and 3B

Roll Number:

1. In Strassen's matrix multiplication, the number of multiplications needed to multiply two 2x2 matrices is:
   a) 4 b) 6 c) 8 d) 10

2. The Huffman code is a type of:
   a) Lossless compression algorithm
   b) Lossy compression algorithm
   c) Encryption algorithm
   d) Decryption algorithm

3. In Kruskal's algorithm, what is the time complexity for sorting the edges of the graph?
   a) O(n) b) O(nlogn)
   c) O(n^2) d) O(n^3)

4. In Prim's algorithm, what is the time complexity for finding the minimum-weight edge from a vertex?
   a) O(n) b) O(nlogn)
   c) O(n^2) d) O(n^3)

5. Depth-first search (DFS) can be used to find:
   a) The shortest path between two nodes in a graph
   b) The longest path between two nodes in a graph
   c) The minimum spanning tree of a graph
   d) The maximum flow in a network

6. Breadth-first search (BFS) can be used to find:
   a) The shortest path between two nodes in a graph
   b) The longest path between two nodes in a graph
   c) The minimum spanning tree of a graph
   d) The maximum flow in a network

7. Dynamic programming can be used to solve problems that exhibit:
   a) Optimal substructure and overlapping subproblems
   b) Optimal substructure and non-overlapping subproblems
   c) Non-optimal substructure and overlapping subproblems
   d) Non-optimal substructure and non-overlapping subproblems

8. The Matrix Chain Multiplication problem can be solved using:
   a) Dynamic programming
   b) Breadth-first search
   c) Depth-first search
   d) Kruskal's algorithm

9. The Longest Common Subsequence problem can be solved using:
   a) Dynamic programming
   b) Breadth-first search
   c) Depth-first search
   d) Kruskal's algorithm

10. In Strassen's algorithm, the matrices to be multiplied are divided into:
    a) Four equal parts
    b) Two equal parts
    c) Three equal parts
    d) Five equal parts

11. The running time of Strassen's algorithm is:
    a) O(n) b) O(n^2)
    c) O(n^2.81) d) O(n^3)

12. Huffman codes are prefix codes, which means that:
    a) No code is a prefix of any other code
    b) Some codes are prefixes of other codes
    c) All codes have the same length
    d) None of the above

13. The minimum number of bits required to represent the symbols in a set using a Huffman code is:
    a) Equal to the number of symbols
    b) Less than the number of symbols
    c) Greater than the number of symbols
    d) None of the above

14. What is the time complexity of the standard matrix multiplication algorithm?
    a) O(n) b) O(nlogn)
    c) O(n^2) d) O(n^3)

15. In Strassen's algorithm, what is the base case for the recursive algorithm?
    a) When the matrices are 1x1
    b) When the matrices are 2x2
    c) When the matrices are 3x3
    d) When the matrices are 4x4
    Answer: b) When the matrices are 2x2

16. The Huffman code assigns shorter codes to:
    a) Symbols with high probability
    b) Symbols with low probability
    c) Symbols with equal probability
    d) None of the above

17. In Kruskal's algorithm, how many times are the edges of the graph sorted?
    a) Once b) Twice
    c) Three times d) Four times

18. Prim's algorithm can be used to find the minimum spanning tree of:
    a) Undirected graphs
    b) Directed graphs
    c) Both directed and undirected graphs
    d) None of the above

19. The time complexity of BFS is:
    a) O(n) b) O(nlogn)
    c) O(n^2) d) O(n^3)

20. The time complexity of DFS is:
    a) O(n) b) O(nlogn)
    c) O(n^2) d) O(n^3)

21. What is the time complexity of the Dynamic Programming approach for solving the Longest Common Subsequence problem?
    a) O(n) b) O(n^2)
    c) O(n^3) d) O(2^n)

22. In the Matrix Chain Multiplication problem, the number of matrices to be multiplied is:
    a) Given as an input to the algorithm
    b) Determined based on the size of the matrices
    c) Always equal to the size of the largest matrix
    d) None of the above

23. What is the time complexity of the Dynamic Programming approach for solving the Matrix Chain Multiplication problem?
    a) O(n) b) O(nlogn)
    c) O(n^2) d) O(n^3)

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24. Which of the following algorithms uses a greedy approach?
a) Kruskal's algorithm b) Prim's algorithm
c) DFS d) Dynamic Programming

25. The Longest Common Subsequence problem can be used to solve:
a) Text editing problems
b) DNA sequencing problems
c) Image processing problems
d) None of the above

26. The running time of Strassen's algorithm is faster than the standard matrix multiplication algorithm for matrices of size:
a) 1x1 b) 2x2
c) 3x3 d) 4x4

27. In the Huffman code, the average length of a code word is:
a) Always equal to the number of symbols
b) Less than the number of symbols
c) Greater than the number of symbols
d) None of the above

28. What is the time complexity of the dynamic programming approach to solve the Matrix Chain Multiplication problem?
A) O(n^2) B) O(n^3)
C) O(n^4) D) O(2^n)

29. What is the maximum number of subproblems that need to be solved in the dynamic programming approach for the Matrix Chain Multiplication problem for n matrices?
A) n-1 B) n
C) n^2 D) 2^n

30. In the dynamic programming approach to solve the Longest Common Subsequence problem, what is the recurrence relation used to calculate the length of the LCS?
A) LCS[i][j] = LCS[i-1][j-1] + 1 if X[i] == Y[j]
B) LCS[i][j] = max(LCS[i-1][j], LCS[i][j-1]) if X[i] != Y[j]
C) LCS[i][j] = max(LCS[i-1][j], LCS[i][j-1], LCS[i-1][j-1]) if X[i] == Y[j]
D) None of the above

31. In the dynamic programming approach to solve the Longest Common Subsequence problem, what is the time complexity to print the LCS?
A) O(n) B) O(n^2)
C) O(2^n) D) O(nlogn)

32. What is the time complexity of the dynamic programming approach to solve the Matrix Chain Multiplication problem for a given sequence of n matrices?
A) O(n^2) B) O(n^3)
C) O(n^4) D) O(2^n)

33. What is the time complexity of the dynamic programming approach to solve the Matrix Chain Multiplication problem for a given sequence of n matrices using memoization?
A) O(n^2) B) O(n^3)
C) O(n^4) D) O(2^n)

34. Which of the following algorithms can be used to solve the Longest Common Subsequence problem?
A) Brute Force B) Greedy
C) Divide and Conquer D) Dynamic Programming

35. Which of the following algorithms can be used to solve the Matrix Chain Multiplication problem?
A) Brute Force
B) Greedy
C) Divide and Conquer
D) Dynamic Programming

36. In the dynamic programming approach to solve the Matrix Chain Multiplication problem, what is the minimum number of scalar multiplications required to multiply n matrices?
A) m[1][n]
B) m[0][n-1]
C) m[0][n]
D) None of the above

37. In the dynamic programming approach to solve the Matrix Chain Multiplication problem, what is the minimum number of scalar multiplications required to multiply a chain of length n-1?
A) m[1][n-1] B) m[0][n-1]
C) m[0][n] D) None of the above

38. Which of the following is not a subproblem of the dynamic programming approach to solve the Longest Common Subsequence problem?
A) LCS[i-1][j] B) LCS[i][j-1]
C) LCS[i-1][j-1] D) LCS[i+1][j+1]

39. The dynamic programming approach to solve the Longest Common Subsequence problem has a time complexity of:
A) O(n^2) B) O(n^3)
C) O(2^n) D) O(n)

40. What is the difference between Prim's algorithm and Kruskal's algorithm for finding the Minimum Spanning Tree of a graph?
A) Prim's algorithm starts with an arbitrary node and adds the shortest edge from the set of available edges, while Kruskal's algorithm starts with the shortest edge and adds edges in increasing order of their weight.
B) Prim's algorithm uses a priority queue to select the next edge to add to the tree, while Kruskal's algorithm uses a disjoint-set data structure to maintain the set of connected components.
C) Prim's algorithm always produces a connected tree, while Kruskal's algorithm may produce a forest of disconnected trees.
D) All of the above.

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40

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1. Answer: b) 6

2. Answer: a) Lossless compression algorithm

3. Answer: b) O(nlogn)

4. Answer: a) O(n)

5. Answer: b) The longest path between two nodes in a graph

6. Answer: a) The shortest path between two nodes in a graph

7. Answer: a) Optimal substructure and overlapping subproblems

8. Answer: a) Dynamic programming

9. Answer: a) Dynamic programming

10. Answer: b) Two equal part

11. Answer: c) O(n^2.81)

12. Answer: a) No code is a prefix of any other code

13. Answer: b) Less than the number of symbols

14. Answer: d) O(n^3)

15. Answer: a) Symbols with high probability

16. Answer: a) Once

17. Answer: a) O(n)

18. Answer: a) Undirected graphs

19. Answer: a) O(n)

20. Answer: a) O(n)

21. Answer: b) O(n^2)

22. Answer: a) Given as an input to the algorithm

23. Answer: d) O(n^3)

24. Answer: a) Kruskal's algorithm

25. Answer: b) DNA sequencing problems

26. Answer: d) 4x4

27. Answer: b) Less than the number of symbols

What is the time complexity of the dynamic programming approach to solve the Matrix Chain Multiplication problem?

B) O(n^3)

28. What is the maximum number of subproblems that need to be solved in the dynamic programming approach for the Matrix Chain Multiplication problem for n matrices?

C) n^2

29. In the dynamic programming approach to solve the Longest Common Subsequence problem, what is the recurrence relation used to calculate the length of the LCS?

B) LCS[i][j] = max(LCS[i-1][j], LCS[i][j-1]) if X[i] != Y[j]

31. In the dynamic programming approach to solve the Longest Common Subsequence problem, what is the time complexity to print the LCS?

A) O(n)

32 What is the time complexity of the dynamic programming approach to solve the Matrix Chain Multiplication problem for a given sequence of n matrices?

B) O(n^3)

33. What is the time complexity of the dynamic programming approach to solve the Matrix Chain Multiplication problem for a given sequence of n matrices using memoization?

D) O(2^n)

34. Which of the following algorithms can be used to solve the Longest Common Subsequence problem?

D) Dynamic Programming

35. Which of the following algorithms can be used to solve the Matrix Chain Multiplication problem?

D) Dynamic Programming

36. In the dynamic programming approach to solve the Matrix Chain Multiplication problem, what is the minimum number of scalar multiplications required to multiply n matrices?

B) m[0][n-1]

37. In the dynamic programming approach to solve the Matrix Chain Multiplication problem, what is the minimum number of scalar multiplications required to multiply a chain of length n-1?

B) m[0][n-1]

38. Which of the following is not a subproblem of the dynamic programming approach to solve the Longest Common Subsequence problem?

D) LCS[i+1][j+1]

39. The dynamic programming approach to solve the Longest Common Subsequence problem has a time complexity of:

A) O(n^2)

40. Answer: D) All of the above.