DAA-SAMPLE-QUESTION-4TH-SEM (CSE AND CSIT)-2020

1. The method will choose when sub problems share sub problems

(a) Divide and conquer
(b) Greedy method
(c) Dynamic programming
(d) Back tracking

Ans- (c)

2. Steps of Divide and Conquer approach

Select one:

a. **Divide, Conquer and Combine**
b. Combine, Conquer and Divide
c. Combine, Divide and Conquer
d. Divide, Combine and Conquer.

3. How many number of comparisons are required in insertion sort to sort a file if the file is already sorted?

A. N2

B. N

C. N-1

D. N/2

Ans-c

4. The worst-case time complexity of Quick Sort is_____.

A. O(n2)

B. O(log n)

C. O(n)

D. O(n logn)

Ans-a

5. Dijkstra's Algorithm is used to solve _____ problems.

a) All pair shortest path

b) Single source shortest path

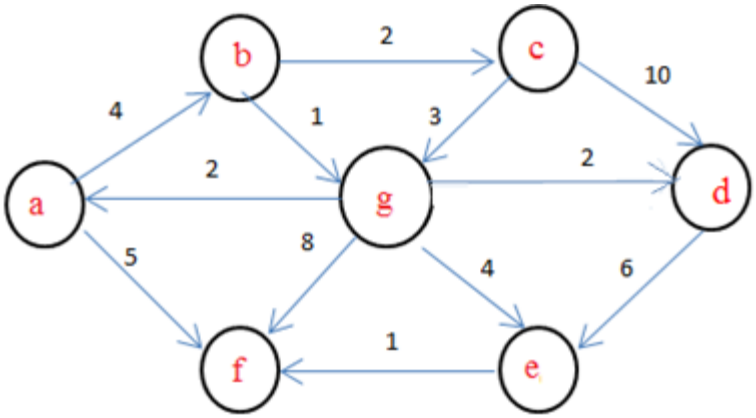
c) Network flow

d) Sorting

View Answer

Answer: b

6. Consider the following graph.



If b is the source vertex, what is the minimum cost to reach f vertex?

a) 8

b) 9

c) 4

d) 6

Answer: d

7. A graph is said to have a negative weight cycle when?

a) The graph has 1 negative weighted edge

b) The graph has a cycle

c) The total weight of the graph is negative

d) The graph has 1 or more negative weighted edges

View Answer

Answer: c

8. Which one is not the characteristics of algorithm?
    a. Finiteness

b. Effectiveness
c. Input
d. Complexity√

9. Worst case time complexity of linear search is
   a. O(1)
   b. O(n)√
   c. O(log n)
   d. O(n^n)
10. Time Complexity of Binary search is
   a. O(nlog n)
   b. O(n)
   c. O(log n)
   d. O(n^2)

11. The complexity of searching an element from a set of n elements using Binary search algorithm is

Select one:

a. O(n log n)

b. O(log n) **Correct**

c. O(n2)

d. O(n)

12. The total running time of Huffman on the set of n characters is _____.
   (a) O(n) (b) O(n log n) (c) O(n^2) (d) O(log n)
   Ans- (b) O(n log n)

13. The total running time of matrix chain multiplication of n matrices _____.

(a) Θ (n^4) (b) Θ (n^3) (c) Θ (n^2) (d) Θ (n)
Ans- (b) Θ (n^3)

14. Which of the following technique is used to solve a fractional knapsack problem?
   (a) Greedy (b) Dynamic programming (c) branch and bound (d) backtracking

Ans- Greedy

15. What is the time complexity for the longest common subsequence of two strings of length m and n.
   (a) O(m+n) O(mn) (b) O(m^n) O(m+n) (c) O(mn) O(m+n) (d) O(m+n) O(m^n)
   Answer: (C)
16. In the development of dynamic programming the value of an optimal solution is computed in Select one:

a. Top up fashion b. Bottom up fashion Correct c. In any way

17. Which algorithm approach is used in Quick Sort?
    a. Divide-and-Conquer√
    b. Greedy method
    c. Dynamic Programming
    d. Branch-and-Bound
18. Creating a heap requires _____ time.
    a. O(n)√
    b. O(logn)
    c. O(nlogn)
    d. $O(n^3)$
19. The best case running time for quick sort occurs when pivot element is at _____ position.
    a. Leftmost
    b. Middle√
    c. Rightmost
    d. Any
20. The number of operations in Matrix multiplications M1, M2, M3, M4 and M5 of sizes 5X10, 10X100, 100X2, 2X20 and 20X50 Select one:

a. 5830

b. 4600 Correct

c. 6900

d. 12890

21. In which method the decision once made is never changed
    (a) Divide and conquer
    (b) Greedy method
    (c) Dynamic programming
    (d) Back tracking

Answer- (b) Greedy method

22. The total running time of Print-LCS()on the set of n characters is _____.
    (a) O(m,n)
    (b) O(mn)
    (c) O(m+n)
    (d) O(log mn)
    Answer- (c) O(m+n)

23. The total running time of matrix-chain-order() for n matrices _____.

(a) Θ (n^4)
(b) Θ (n^3)
(c) Θ (n^2)
(d) Θ (n)
Answer- (b) Θ (n^3)

24. Which of the following technique is using for divide and conquer problem?
    (a) LCS
    (b) Matrix Chain Multiplication
    (c) Heap Sort
    (d) Activity selection problem
    Answer - (c)

25. Which case of Master's theorem is applicable in the recurrence relation T(n)=0.5*T(n/2)+1/n?

Select one:

a. Case 3

b. Case 1

c. Master's theorem is not applicable Correct

d. Case 2

26. If f(n) = O(g(n)) and g(n) = O(h(n)) then
    a. f(n) = O(h(n))√
    b. f(n) = Theta(h(n))
    c. f(n)= Big-omega(h(n))
    d. f(n)= small-oh(h(n))
27. In master method if f(n)=O($n^{\log_b a-\epsilon}$)then
    a. T(n)=Theta($n^{\log_b a}$)√
    b. T(n)=Theta($n^{\log_b a}$lg n)
    c. T(n)=O($n^{\log_b a}$lg n)
    d. T(n)=O($n^{\log_b a}$)
28. If i is the index of a node in a heap, then what are the indices of its left child and right child? Assume that index of the root starts from 0.
    a. 2i+3 and 2i+4
    b. 2i+2 and 2i+4

c. 2i+1 and 2i+2√
d. 2i and 2i+2

29. An almost complete binary tree T has 20 nodes. The number of nodes in T having two children is
    a. 7
    b. 9√
    c. 12
    d. 8

30. Division Pattern of Problems in Divide and Conquer approach

Select one:

a. Iterative

b. Recursive Correct

c. Parallel

d. Random

31. The running time of quick sort depends on the selection of.

Select one:

a. Selection of pivot elements Correct

b. Number of input

c. Number of passes.

d. Arrangements of the elements

32. Which of the following sorting algorithms does not have a worst case running time of O(n2) ?

Select one:

a. Quick sort

b. Merge sort Correct

c. Insertion sort

d. Bubble sort

33. Merge Sort divides the list in

Select one:

a. N equal parts

b. Two equal parts Correct

c. Two parts, may not be equal

d. N parts, may not be equal.

34. Time complexity of matrix chain multiplication

Select one:

a. O(n2)

b. O(n)

c. O(nlogn)

d. O(n3) Correct

35. For the function $f(n)=2n^2+5$, which is not correct bound?
    a. $O(n^2)$
    b. $O(n^3)$
    c. O(n)√
    d. $O(n^4)$
36. What is the value of the following recurrence: T(n)=5T(n/5)+sqrt(n)?
    a. Theta(n)√
    b. Theta(sqrt(n))
    c. $Theta(n^2)$
    d. Theta(nlogn)
37. Suppose T(n)=2T(n/2)+n, T(0)=T(1)=1. Which one of the following is false?
    a. T(n)=BigOmega(nlgn)
    b. T(n)=Theta(nlgn)
    c. $T(n)=BigOmega(n^2)$√
    d. T(n)=O(nlgn)
38. For the function $f(n)=2n^3+n$, which is not correct bound?
    a. $\Omega(n^2)$
    b. Ω (n!) √

c. Ω (n)
d. Ω (1)

39. The correct order of growth in increasing order for the following functions is: nlogn,n,logn,n^2,2^n
    a. nlogn, n^2, n, logn, 2^n
    b. n, nlogn, n^2, logn, 2^n
    c. logn, n, nlogn, n^2, 2^n √
    d. n, logn, n^2, nlogn, 2^n
40. log(n!)=O(?).
    a. O(nlogn)√
    b. O(n)
    c. O(n^3)
    d. O(logn)
41. F(n) = little omega g(n), when
    a. $\lim_{n->\infty} f(n)/g(n) = \infty$√
    b. $\lim_{n->\infty} f(n)/g(n) = 0$
    c. $\lim_{n->0} f(n)/g(n) = \infty$
    d. $\lim_{n->0} f(n)/g(n) = 0$

42. What is the time complexity for activity selection problem to select optimal job from the schedule?
    (a) Θ(n)
    (b) Θ (lg n)
    (c) Θ (log n^2)
    (d) O (nlog n)
    Answer: (a)Θ(n)

43. Which is optimal value in the case of fractional knapsack problem, capacity of knapsack is 20

item :	1	2	3
profit :	25	24	15
weight :	18	15	10

(a) 498
(b) 480
(c) 499
(d) 485

Ans- (a)

44. What is an optimal Huffman code for alphabet '**a**' of the following set of frequencies

a: 05, b: 48, c: 07, d: 17, e: 10, f: 13

(a) 1010 (b)0101 (c) 1001 (d) 1100

Ans- (a) 1010

45. We use dynamic programming approach when

(A) It provides optimal solution
(B) The solution has optimal substructure
(C) The given problem can be reduced to the 3-SAT problem
(D) It's faster than Greedy

Answer: (B)

46. Which notation is used for average case analysis?
    a. Big-oh
    b. Big-omega
    c. theta√
    d. small-oh
47. Which method is also called Guess method?
    a. Master method
    b. Recursion-tree
    c. Substitution√
    d. dynamic programming
48. Which tree is used to make a guess for solving recurrence relation?
    a. Binary search tree
    b. Recursion tree√
    c. Heap tree
    d. Binary tree
49. If an optimal solution can be created for a problem by constructing optimal solutions for its subproblems, the problem possesses _____ property.
    a. Overlapping subproblems
    b. Optimal substructure√
    c. Memoization
    d. Greedy

50. Find the maximum profit using 0/1 knapsack problem where the capacity of knapsack is 30.

item:	1	2	3
profit:	25	24	15
weight:	18	15	10

(a) 39
(b) 49
(c) 40

(d) 54

Answer- **(a) 39**

51. A sort which relatively passes through a list to exchange the first element with any element less than it and then repeats with a new first element is called_____.

Select one:

a. Quick sort

b. heap sort

c. Insertion sort Correct

d. Bubble sort

52. Apply Master theorem to T(n)=3.T(n/2)+n^2 and write what is f(n)

Select one:

a. f(n)=n/2+n^2

b. f(n)=n/2

c. f(n)=n^2 Correct

d. f(n)=3n/2

53. Run Time of Merge Sort is

Select one:

a. BIG O of N log N

b. Gamma of n log N

c. Theta of N log N Correct

d. Omega of N log N.

54. Time complexities of three algorithms are given. Which should execute the slowest for large values of N?

Select one:

a. O(N) Correct

b. O(N ½)

c. O(log n).

55. In dynamic programming, the output to stage n become the input to

Select one:

a. stage n-1 Correct

b. stage n+1

c. stage n itself

d. stage n-2

56. Time complexity of knapsack 0/1 where n is the number of items and W is the capacity of knapsack.

Select one:

a. O(W)

b. O(n)

c. O(nW) Correct.

57. In dynamic programming, the output to stage n become the input to

Select one:

a. Objective function

b. Feasible solution

c. Decision stages Correct

d. Optimum solution

58. Master theorem applies to recurrences of the form (a=1 and b>1) are two constants.

Select one:

a. T(n)=a.T(n/b)+f(n) Correct

b. T(n)=n.T(n/2)+b.f(n)

c. T(n)=a.T(n-1)+b

d. T(n)=n.T(n-3)+b Incorrect

59. Time complexity of LCS

Select one:

a. O(m!)

b. O(mn) Correct

c. O(n!)

60. What is an optimal Huffman code in variable length for alphabet 'e' of the following set of frequencies?

a: 45, b: 13, c: 12, d: 16, e: 9, f: 5

(a) 0
(b)1011
(c) 111
(d) 1101
Answer - (d) 1101

61. LCS for input sequences "AGGTAB" and "GXTXAYB" is
(a) AGGTAB
(b) GTAB
(c) GGAT
(d) AGGTB
Answer: (B) GTAB

62. If a problem can be broken into subproblems which are reused several times, the problem possesses _____ property.
a. Overlapping subproblems√
b. Optimal substructure
c. Memoization
d. Greedy

63. Which of the following is/are property/properties of a dynamic programming problem?
a. Optimal substructure
b. Overlapping subproblems
c. Greedy approach
d. Both optimal substructure and overlapping subproblems√

64. Which of the following problems should be solved using dynamic programming?
a. Mergesort
b. Binary search
c. Longest common subsequence√
d. Quicksort

65. In dynamic programming, the technique of storing the previously calculated values is called _____
    a. Saving value property
    b. Storing value property
    c. Memoization√
    d. Mapping

66. Which is the optimal value in case of activity selection problem?

Job	: 1	2	3	4	5	6	7
St	: 1	3	0	5	3	5	6
Ft	: 4	5	6	7	9	9	10

    (a) 1, 3, 4, 6, 7
    (b) 2, 4, 7
    (c) 1, 4
    (d) 1

Answer:- (c)

67. Find an minimum number of scalar multiplications required for a matrix chain product whose sequence of dimension s is <5,4,6,2,7> .
    (a) 156 (b) 154 (c) 158 (d) 157
    Ans- (c) 158

68. Which is the optimal value in case of activity selection problem?

Job	: 1	2	3	4	5	6	7
St	: 1	3	4	5	6	8	10
Ft	: 4	5	6	7	9	9	14

    (a) 1, 3, 4, 6, 7
    (b) 2, 4, 7
    (c) 1, 3,5,7
    (d) 1,2,5,6,7
    Answer: - (c)1,3,5,7

69. Find the minimum number of scalar multiplications required for a matrix chain product whose sequence of dimension s is <10,20,30,40,50> .
    (a) 25000
    (b) 30000
    (c) 45000
    (d) 51000
    Answer - (b) 30000

70. The running time of matrix chain multiplication problem is
    a. $O(n^2)$

b. $O(n^3)$√
c. O(n)
d. O(1)

71. How many bases are there in a DNA strand?
a. 2
b. 5
c. 3
d. 4√

72. If Z = <B, C, D, B> is a subsequence of X = <A, B, C, B, D, A, B>, then the corresponding index sequence is
a. <3, 4, 6, 7>
b. <2, 3, 5, 7>√
c. <1, 2, 4, 6>
d. <2, 4, 5, 6>

73. A minimum cost spanning tree for a graph with e edges and v vertices can be found in
(a)O(eloge) time in general and in O(e) time if e is sufficiently large compared with the number of vertices.
(b) O(vlogv) time in general and in O(v) time if v is sufficiently large compared with the number of edges .
(c) O(vloge) time in general and in O(e) time if e is sufficiently large compared with the number of vertices.
(d) O(elogv) time in general and in O(v) time if v is sufficiently large compared with the number of edges.

74. Which of the following is the single-source shortest path problems?
(a)Prim's algorithm
(b)Kruskal's algorithm
(c)MST
(d)Bellman-Ford algorithm

75. Which of the following is the all-pairs shortest path problem?
(a)Floyd-Warshall algorithm
(b)Bellman-Ford algorithm
(c)Dijkstra's algorithm
(d)Kruskal's algorithm

76. The best case time complexity of Rabin-Karp algorithm is
(a)Θ(m)
(b) Θ(n)
(c) Θ(m-n)
(d)Θ(m-n+1)

77. The complexity class NP is the class of languages that can be
(a)solvable in polynomial time.
(b)verified in polynomial time.

(c)solvable and verifiable in polynomial time.
(d)deterministic.

78. Which of the following is true?

(a)P ⊆NP
(b)P≠Co-NP
(c)NP≠Co-NP
(d)P=NP

79. Which of the following is NP complete problem?

(a)Kruskal's algorithm
(b)Clique problem
(c)Prim's algorithm
(d)Bellman-Ford algorithm

80. Which of the following standard algorithms is not a Greedy algorithm?
    a. Bellman-Ford shortest path algorithm√
    b. Kruskal's minimum spanning tree
    c. Dijkstra shortest path algorithm
    d. Huffman coding
81. Which of the following methods can be used to solve the fractional Knapsack problem?
    a. Dynamic programming
    b. Greedy method√
    c. Divide-and-Conquer
    d. Backtracking
82. You are given a knapsack that can carry a maximum weight of 60. There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. What is the maximum value of the items you can carry using the knapsack if fractions are allowed?
    a. 160√
    b. 200
    c. 170
    d. 90
83. How many edges are there in a minimum cost spanning tree if there are n number of vertices in the corresponding graph?
    a. n/2-1
    b. n-2
    c. n/2
    d. n-1√
84. The output of Prim's and Kruskal's algorithm is
    a. Maximum spanning tree
    b. Spanning tree
    c. Minimum spanning tree√
    d. None of these

85. What is the time complexity of Huffman coding algorithm?

a. O(n)
b. O(nlogn)√
c. $O(n^2)$
d. $O(n\log^2 n)$

86. Activities a_i and a_j are *compatible* if

a. $s_i \geq f_j$ or $s_j \geq f_i$√
b. $s_i \leq f_j$ or $s_j \geq f_i$
c. $s_i \geq f_j$ or $s_j \leq f_i$
d. $s_i \leq f_j$ or $s_j \leq f_i$

87. The running time of kruskal's algorithm for MST ----------.
(a) O(E) (b) O(V) (c) O(E log V) (d) $O(V^2)$
Ans-(c) O(E log V)

88. The running time of BFS is ----------.

a. O (V)
b. O (V log E)
c. O(V+E)
d. $O (V^2)$

Ans-(C) O(V+E)

89. The running time of Floyd-Warshall algorithm is ----------.
(A) Θ (n) (B) Θ (n^3) (C) Θ (n^2) (D) Θ (n log n)
Ans-(b) Θ (n^3)

90. How many passes is required to find out shortest path using Bellman Ford algorithm?
(a) |V| (b) |E| (c) |V-1| (d) |E-1|
Ans-(c)

91. Dijkstra algorithm is also called the ..... shortest path problem.

A) multiple source
B) single source
C) single destination
D) multiple destination

Ans-(B)

92. 0/1 Knapsack problem is the problem in which

(a)item must either be taken or left behind.
(b)item can be taken fractionally or more than once.
(c)item is only removed from knapsack.
(d)item is only inserted into the knapsack.

93. Travelling salesman problem is

(a)P
(b)NP
(c)NPC
(d)Co-NP

94. A language is NP complete if

(a)L is in NP
(b)L is NP-hard
(c)L is in P
(d)L is in NP and L is NP-hard

95. If L is a language such that complement of L is polynomial time reducible to L for some complement language belongs to NPC then L is

(a)NPC
(b)NP hard
(c)P
(d)Co-NP

96. If S={1,2,5,7,14,15,18,20} and t=14,then the subset

(a)S_1= {14} or S_1={1,2,5} is a subset sum problem.
(b)S_1={14} or S_1={2,5,7} is a subset sum problem.
(c)S_1={14} or S_1={7, 14} is the subset sum problem.
(d)S_1=empty set is the subset sum problem.

97. Merge sort uses

(a)Greedy method
(b)Array
(c)Linked list
(d)Divide-Conquer strategy

98. Which of the problems cannot be solved by backtracking method?

a) n-queen problem

b) subset sum problem

c) hamiltonian circuit problem

d) travelling salesman problem

Answer: d

99. Backtracking algorithm is implemented by constructing a tree of choices called as?

a) State-space tree

b) State-chart tree

c) Node tree

d) Backtracking tree

Answer: a

100. How many solutions are there for 8 queens on 8*8 board?

a) 12

b) 91

c) 92

d) 93

Answer: c

101. In how many directions do queens attack each other?

a) 1

b) 2

c) 3

d) 4

Answer: c

102. If a problem can be solved by combining optimal solutions to non-overlapping problems, the strategy is called _____

a) Dynamic programming

b) Greedy

c) Divide and conquer

d) Recursion

Answer: c

103. In the deletion operation of max heap, the root is replaced by

(a)next available value in the left sub-tree
(b)next available value in right sub-tree
(c)first element of the last level
(d)last element of the last level

104. Which of the following sorting procedures is the slowest?

(a) Quick sort
(b) Heap sort
(c) Shell sort
(d) Bubble sort

105. Two main measures for the efficiency of an algorithm are

(a) Processor and memory
(b) Complexity and capacity
(c) Time and space
(d) Data and space

106. The concept of order Big O is important because

(a)It can be used to decide the best algorithm that solves a given problem
(b) It determines the maximum size of a problem that can be solved in a given amount of time
(c) It is the lower bound of the growth rate of algorithm
(d) It determines the minimum size of a problem that can be solved in a given amount of time

107. In activity selection problem, activities are sorted according to
   a. monotonically decreasing order of finish time
   b. monotonically increasing order of start time
   c. monotonically increasing order of finish time√
   d. monotonically decreasing order of start time

108. In greedy approach, which of the following problem fits ordering paradigm?
   a. KNAPSACK PROBLEM
   b. JOB SEQUENCING WITH DEADLINES
   c. SINGLE-SOURCE SHORTEST PATHS √
   d. MINIMUM-COST SPANNING TREE

109. In greedy approach, which of the following problem fits subset paradigm?
   a. OPTIMAL STORAGE ON TAPE
   b. TREE VERTEX SPLITTING √
   c. OPTIMAL MERGE PATTERNS
   d. SINGLE-SOURCE SHORTEST PATHS

110. Which of the following properties is exhibited by both dynamic programming and greedy method?
   a. Greedy choice property
   b. Overlapping subproblems
   c. Optimal substructure√
   d. None of these

111. Longest common subsequence is an example of _____

a) Greedy algorithm

b) 2D dynamic programming

c) 1D dynamic programming

d) Divide and conquer

Answer: b

112. The worst-case efficiency of solving a problem in polynomial time is?

a) O(p(n))

b) O(p(n log n))

c) O(p(n2))

d) O(p(m log n))

Answer: a

113. Problems that cannot be solved by any algorithm are called?

a) tractable problems

b) intractable problems

c) undecidable problems

d) decidable problems

Answer: c

114. Which of the following problems is similar to that of a Hamiltonian path problem?

a) knapsack problem

b) closest pair problem

c) travelling salesman problem

d) assignment problem

Answer: c

115. Which type of the following algorithm proceeds in top-down manner?
   a. Dynamic Programming
   b. Divide-and-Conquer
   c. Branch-and-Bound
   d. Greedy method√

116. The 0/1 knapsack problem can be solved by which technique?
   a. Greedy method
   b. Dynamic Programming√
   c. Divide-and-Conquer
   d. None of these

117. The objects in fractional knapsack problem are arranged in _____ to get maximum profit.
   a. Increasing order of weights
   b. Decreasing order of profits
   c. Decreasing order of profit per weight√
   d. Increasing order of profit per weight

118. Path Compression algorithm performs in which of the following operations?
   a. Create operation
   b. Insert operation
   c. Find operation√
   d. Delete operation

119. In a disjoint set forest, each member points only to its
   a. Children
   b. Left child
   c. Right child
   d. Parent √

120. In the Union/Find algorithm, the ranks of the nodes on a path will increase monotonically from?
   a. leaf to root√
   b. root to node
   c. root to leaf
   d. left subtree to right subtree

121. The running time of Prim's algorithm for MST ----------.
(a) O(E) (b) O(V) (c) O(E log V) (d) O(V log E)
Ans-(c) O(E log V)

122. The running time of DFS is ----------.
(A) O (1) (B) O(V) (C) O(V+E) (D) O(E)
Ans-(C) O(V+E)

123. The running time of BELLMAN-FORD algorithm is ----------.

(A) O (V) (B) O (E) (C) O (VE) (D) O (V+E)

Ans-(c) O(VE)

124. Floyd Warshall'salgorithm is used for_____ shortest path problem.

A) multiple source

B) single source

C) All pair

D) singlepair

Answer : (c) All Pair

125. Which operation is not supported by disjoint set?

(A) FIND-SET(x)

(B) DELETE-SET(x)

(C) UNION(x)

(D) MAKE-SET(x)

Answer: (B) DELETE-SET(x)

126. If we have a chain of three matrices as:$<A_1,A_2,A_3>$ with the corresponding dimensions 10x100,100x5 and 5x50 respectively then which of the following gives less number of scalar multiplications

a)$A_1(A_2A_3)$

b) $(A_1A_2)A_3$

c) $A_1(A_3A_2)$

d) $(A_1A_3)A_2$

127. Complexity of matrix chain order is

a) $O(n^3)$

b) $o(n^3)$

c) $w(n^2)$

d) $\Omega(n^3)$

128. Activities i and j are compatible if

a)$s_j \geq f_i$

b) $s_j \leq f_i$

c)$f_j \geq s_i$

d) $s_i = s_j$

129. The 5 items $I=<I_1,I_2,I_3,I_4,I_5>$ along with their respective weights and values are $w=<5,10,20,30,40>$ and $v=<30,20,100,90,160>$. The solution to the fractional knapsack problem whose capacity W=60 is

a)140

b) 270

c)160

d) 130

130. If we have a sequence of characters with their frequencies a:4,b:2,c:3,d:1.Then the codes of each character using Huffman coding technique are:

a) a=00,b=1011,c=11,d=100
b) a=000,b=100,c=111,d=100
c) a=0,b=101,c=11,d=100
d) a=1,b=010,c=00,d=011

131. One application of disjoint set data structures are to determining

a)the connected components of an undirected graph
b)the stack representation
c)disjoint set forests
d)rank

132. A MAKE-SET operation creates a tree with _____ node.

a. 2
b. 3
c. 1√
d. 4

133. Running time of Prim's algorithm in adjacency matrix implementation is

a. O(ElogV)
b. $O(V^2)$√
c. O(VlogE)
d. O(VlogV)

134. Which of the following is false in the case of a spanning tree of a graph G?

a. It is a tree that spans G
b. It is a subgraph of G
c. It includes every vertex of G
d. It can be cyclic or acyclic√

135. The travelling salesman problem can be solved using _____.

a. A spanning tree
b. A minimum spanning tree√
c. Bellman – Ford algorithm
d. DFS traversal

136. Consider a undirected graph G with vertices { A, B, C, D, E}. In graph G, every edge has distinct weight. Edge CD is edge with minimum weight and edge AB is edge with maximum weight. Then, which of the following is false?

a. Every minimum spanning tree of G must contain CD
b. If AB is in a minimum spanning tree, then its removal must disconnect G
c. No minimum spanning tree contains AB√
d. G has a unique minimum spanning tree

137. What are the appropriate data structures for following algorithms?

i. Breadth First Search
ii. Depth First Search
iii. Prim's Minimum Spanning Tree
iv. Kruskal' Minimum SpanningTree

(A) Stack, Queue, Priority queue, Union Find
(B) Queue, Stack, Priority queue, Union Find
(C) Stack, Queue, Union Find, Priority queue
(D) Priority Queue, Queue, Stack, Union Find

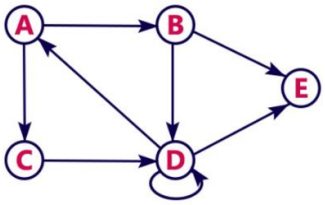
Answer: (B)

138. How many different spanning tree we can have of a complete graph with n-vertices.

(A) n
(B) n-1
(C) n^n
(D) n^{n-2}

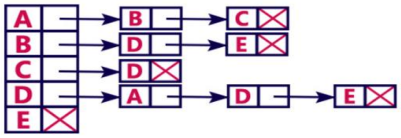
Answer: (D)

139.

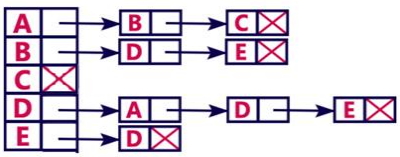


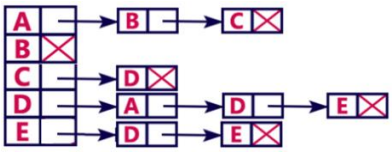
Which one of the following Adjacency List representation (implemented using linked list) is correct for the above graph?

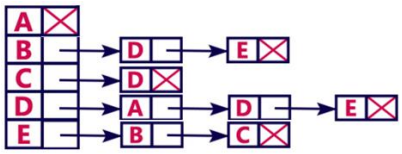
(a)



(b)



(c) 

(d) 

Ans (a)

140. Indicate the runtime of Dijkstra's algorithm when the implementation is based on a binary heap. (E = edges; V = vertices)
   a. O(ElogV)√
   b. O(V^2)
   c. O(E + VlogV)
   d. O(E + V)

141. Which of the following is the most commonly used data structure for implementing Dijkstra's Algorithm?
   a. Max priority queue
   b. Stack
   c. Circular queue
   d. Min priority queue√

142. Dijkstra’s Algorithm cannot be applied on _____
   a. Directed and weighted graphs
   b. Graphs having negative weight function√
   c. Unweighted graphs
   d. Undirected and unweighted graphs

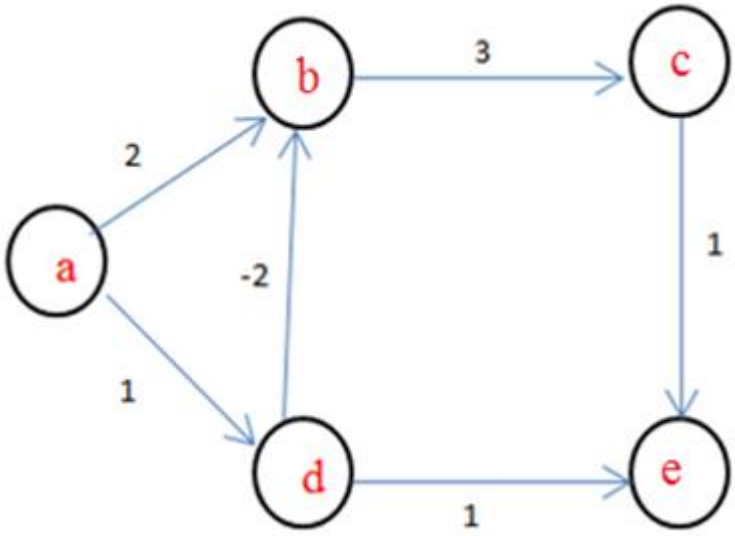
143. The Bellmann Ford algorithm returns _____ value.
   a. Boolean√
   b. Integer
   c. String
   d. Double

144. Bellmann ford algorithm provides solution for _____ problems.
   a. All pair shortest path
   b. Sorting
   c. Network flow
   d. Single source shortest path√

145. How many solution/solutions are available for a graph having negative weight cycle?
   a. One solution
   b. Two solutions

c. No solution√
d. Infinite solutions

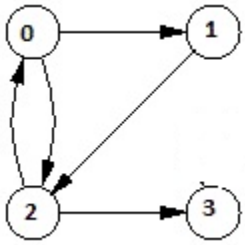
146. Consider the following graph:



What is the minimum cost to travel from node A to node C?

a. 5
b. 2√
c. 1
d. 3

147. In which sequence the following Graph will be traversed using DFS (starting from vertex no 2).



(A) 2 0 1 3
(B) 2 3 0 1
(C) 2 1 3 0
(D) 2 0 3 1

Answer: (a) 2 0 1 3

148. Floyd Warshall's Algorithm is used for solving _____

a. All pair shortest path problems√

b. Single Source shortest path problems
c. Network flow problems
d. Sorting problems

149. What approach is being followed in Floyd Warshall Algorithm?
a. Greedy technique
b. Dynamic Programming√
c. Linear Programming
d. Backtracking

150. Floyd Warshall's Algorithm can be applied on _____
a. Undirected and unweighted graphs
b. Undirected graphs
c. Directed graphs√
d. Acyclic graphs

151. Which tree is used to solve problems using backtracking and branch-and-bound method?
a. Binary search tree
b. State space tree√
c. Heap tree
d. AVL tree

152. Tree organizations that are problem instance dependent are called _____ trees.
a. Static tree
b. Expression tree
c. Dynamic tree√
d. Threaded binary tree

153. States that correspond to solutions to the problem are called _____.
a. Problem state
b. Answer state
c. Solution state
d. Goal state√

154. Which search method is used in Backtracking?
a. Breadth-first search
b. Depth-first search√
c. Least cost search
d. Max profit search

155. A node is called _____ if it cannot lead to a feasible (or optimal) solution.
a. Nonpromising√
b. Promising
c. Succeeding
d. Preceding

156. A node which has been generated and all of whose children have not yet been generated is called _____.
a. Expanded node
b. Dead node

c. Feasible node
d. Live node√

157. Which of the following notation gives asymptotic upper bound?

a) Big oh notation
b) Little oh notation
c) Big omega notation
d) Little omega notation

158. Worst case is the worst case time complexity of Prim's algorithm if adjacency matrix is used?

a) O(log V)

b) O(V2)

c) O(E2)

d) O(V log E)

Answer: b

159. Fractional knapsack problem is also known as _____

a) 0/1 knapsack problem

b) Continuous knapsack problem

c) Divisible knapsack problem

d) Non continuous knapsack problem

Answer: b

160. Given items as {value,weight} pairs {{40,20},{30,10},{20,5}}. The capacity of knapsack=20. Find the maximum value output assuming items to be divisible.

a) 60

b) 80

c) 100

d) 40

Answer: a

161. Which of the following algorithms is the best approach for solving Huffman codes?

a) exhaustive search

b) greedy algorithm

c) brute force algorithm

d) divide and conquer algorithm

Answer: b

162. The type of encoding where no character code is the prefix of another character code is called?

a) optimal encoding

b) prefix encoding

c) frequency encoding

d) trie encoding

Answer: b

163. The result of intersection of o(g(n)) and w(g(n)) is the

a) Singleton set

b) Empty set

c) Lower bound set

d) Upperbound set

164. Which of the following is correct?

a) $n!=w(n^n)$

b) $n!=O(2^n)$

c) $n!=w(n^2)$

d) $n!=o(n^n)$

165. How many methods are there for solving recurrences?

a) 2

b) 3

c) 4

d) 5

166. The solution of the recurrence $T(n)=T(n^{0.5})+1$ is

a) O(loglogn)

b) O(logn)

c) Ω(logn)

d) Θ(loglogn)

167. The lower bound for decision tree sorting is

a) Ω(nlgn)

b) O(nlgn)

c) o(nlgn)

d) w(nlgn)

168. Which of the following is the LCS of the sequences X={A,B,C,B,D,A,B} andY={B,D,C,A,B,A}?

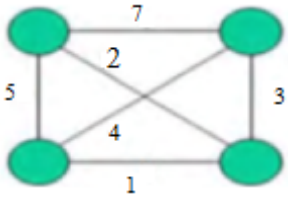
a){B,D,A,C}

b) {B,D,A,B}

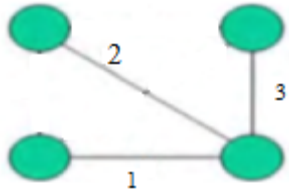
c){B,C,D,B}

d){B,C,A,B}

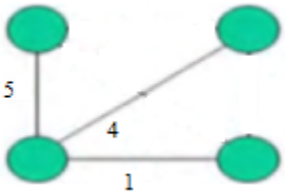
169. Which one is the correct MST for the following graph –



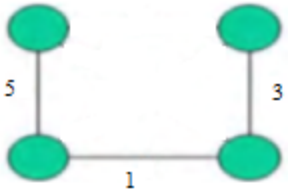
(a)

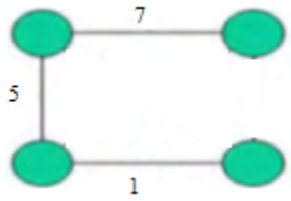


(b)



(c)

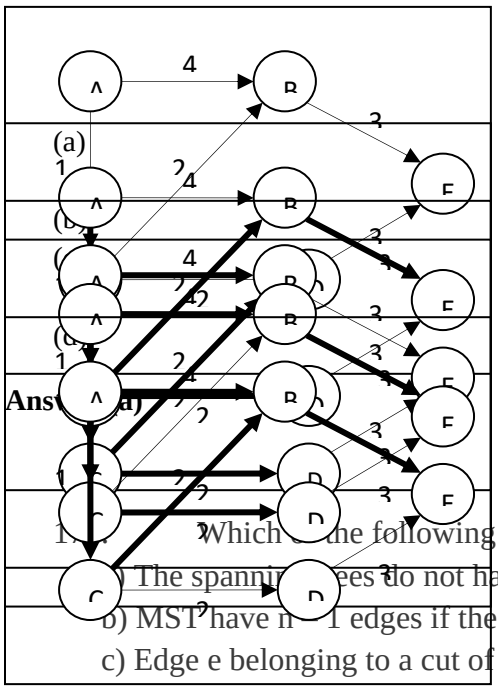




(d)

Answer: (a)

170. Consider the following graph. Which one from the four options depicts the shortest path (represented using solid lines) generated by applying Dijkstra's algorithm to it?



(a)

(b)

(c)

(d)

Answer: (a)

171. Which of the following is false?

a) The spanning trees do not have any cycles

b) MST have n – 1 edges if the graph has n edges

c) Edge e belonging to a cut of the graph if has the weight smaller than any other edge in the same cut, then the edge e is present in all the MSTs of the graph

d) Removing one edge from the spanning tree will not make the graph disconnected

Answer: d

172. Kruskal's algorithm is a _____

a) divide and conquer algorithm

b) dynamic programming algorithm

c) greedy algorithm

d) approximation algorithm

Answer: c

173. What is the time complexity of Kruskal's algorithm?

a) O(log V)

b) O(E log V)

c) O(E2)

d) O(V log E)

Answer: b

174. Consider the following statements.

S1. Kruskal's algorithm might produce a non-minimal spanning tree.

S2. Kruskal's algorithm can efficiently implemented using the disjoint-set data structure.

a) S1 is true but S2 is false

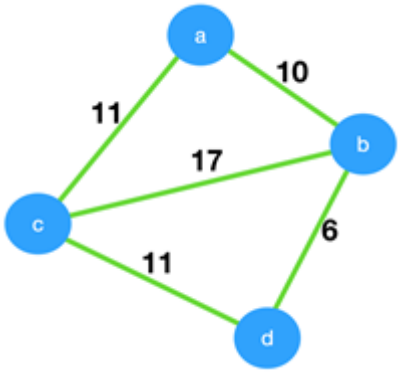
b) Both S1 and S2 are false

c) Both S1 and S2 are true

d) S2 is true but S1 is false

Answer: d

175. Consider the given graph.



What is the weight of the minimum spanning tree using the Prim's algorithm,starting from vertex a?

a) 23

b) 28

c) 27

d) 11

Answer: c

176. In the 8-Queen problem, the solution space consists of _____ number of tuples if only explicit constraint is applied.
   a. 8^8√
   b. 8!
   c. 8^2
   d. 2^8

177. The solution to 8-queen problem is
   a. (1, 5, 4, 2, 3, 6, 8, 7)
   b. (8, 6, 3, 4, 5, 1, 2, 5)
   c. (7, 5, 8, 6, 4, 1, 3, 2)
   d. (4, 6, 8, 2, 7, 1, 3, 5)√

178. The branch-and-bound method was first proposed by A. H. Land and A. G. Doig in _____.
   a. 1950
   b. 1970
   c. 1960√
   d. 1940

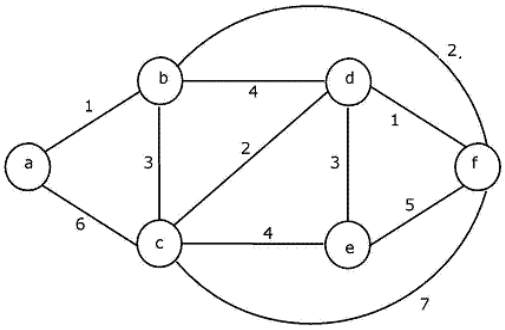
179. Which technique is not used in branch-and-bound strategy?
   a. Max Profit search√
   b. Least Cost search
   c. First-in-first-out search
   d. Last-in-first-out search

180. The number of nodes generated in the state space tree for 4-queens' problem is
   a. 66
   b. 46
   c. 65√
   d. 58

181. In fixed-tuple formulation of 0/1 knapsack problem consisting of 4 objects, the number of nodes generated in the tree organization is

a. 32
b. 31√
c. 33
d. 30

182. Consider the following graph.

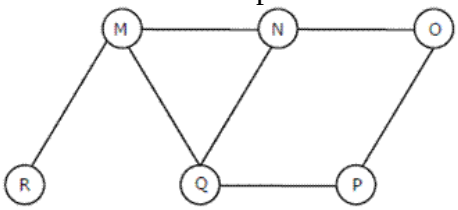


Which one of the following cannot be the sequence of edges added, in that order, to a minimum spanning tree using Kruskal's algorithm?

(A) (a—b),(d—f),(b—f),(d—c),(d—e)
(B) (a—b),(d—f),(d—c),(b—f),(d—e)
(C) (d—f),(a—b),(d—c),(b—f),(d—e)
(D) (d—f),(a—b),(b—f),(d—e),(d—c)

Answer: (D)

183. The Breadth First Search algorithm has been implemented using the queue data structure. One possible order of visiting the nodes of the following graph is



(A) MNOPQR
(B) NQMPOR
(C) QMNPRO
(D) QMNPOR

Answer: (C)

184. What is the basic formula applied in Rabin Karp Algorithm to get the computation time as Theta(m)?

a) Halving rule

b) Horner's rule

c) Summation lemma

d) Cancellation lemma

Answer: b

185. What is the basic principle in Rabin Karp algorithm?
a) Hashing
b) Sorting
c) Augmenting
d) Dynamic Programming

Answer: a

186. Which of the following is false in the case of a spanning tree of a graph G?

a) It is tree that spans G

b) It is a subgraph of the G

c) It includes every vertex of the G

d) It can be either cyclic or acyclic

Answer: d

187. Consider a complete graph G with 4 vertices. The graph G has ____ spanning trees.

a) 15

b) 8

c) 16

d) 13

Answer: c

188. The travelling salesman problem can be solved using _____

a) A spanning tree

b) A minimum spanning tree

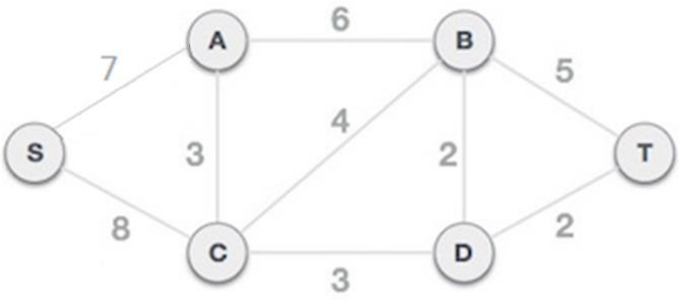
c) Bellman – Ford algorithm

d) DFS traversal

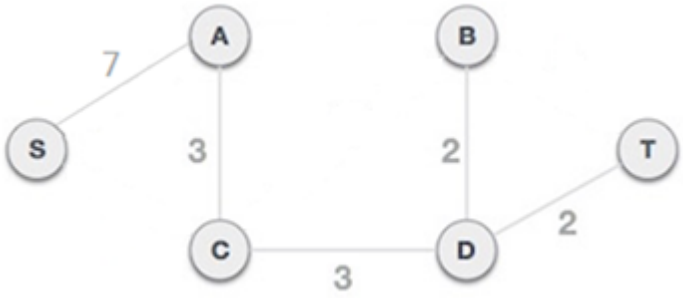
View Answer

Answer: b

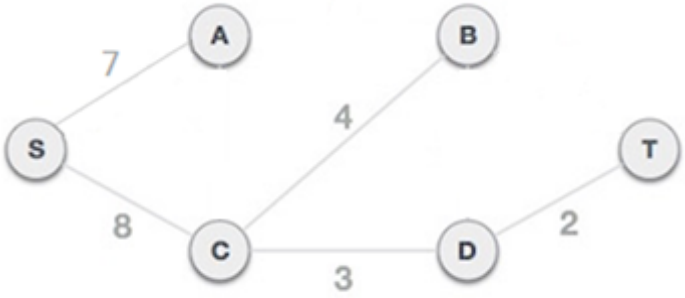
189. Consider the following graph. Which one is the correct spanning tree using Prim's algorithm?



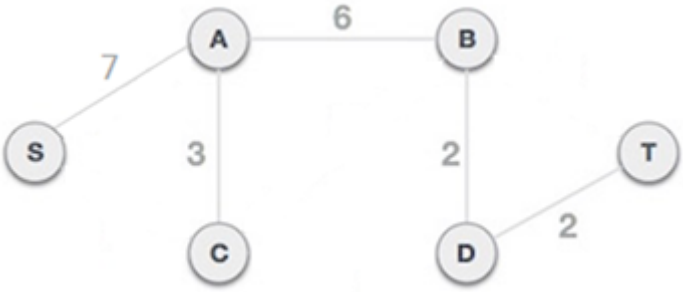
(a)



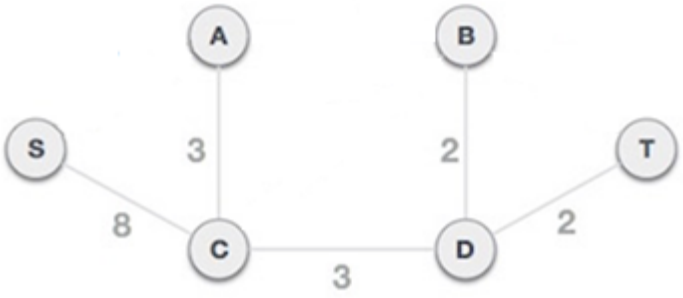
(b)



(c)

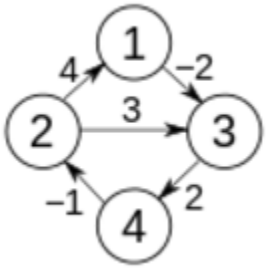


(d)



Answer : (a)

190. Which one of the correct matrix for above graph in Floyd Warshal's algorithm?



(a) $\begin{pmatrix} 0 & -1 & -2 & 0 \\ 4 & 0 & 2 & 4 \\ 5 & 1 & 0 & 2 \\ 3 & -1 & 1 & 0 \end{pmatrix}\begin{pmatrix} 0 & -1 & -2 & 0 \\ 4 & 0 & 2 & 4 \\ 5 & 1 & 0 & 2 \\ 3 & -1 & 1 & 0 \end{pmatrix}$

(b) $\begin{pmatrix} 0 & -1 & 2 & 0 \\ 4 & 0 & 2 & 4 \\ 5 & 1 & 0 & 2 \\ 3 & 1 & 1 & 0 \end{pmatrix}\begin{pmatrix} 0 & -1 & 2 & 0 \\ 4 & 0 & 2 & 4 \\ 5 & 1 & 0 & 2 \\ 3 & 1 & 1 & 0 \end{pmatrix}$

(c) $\begin{pmatrix} 0 & 1 & -2 & 0 \\ 4 & 0 & 2 & -4 \\ 5 & 1 & 0 & 2 \\ 3 & -1 & 1 & 0 \end{pmatrix}\begin{pmatrix} 0 & 1 & -2 & 0 \\ 4 & 0 & 2 & -4 \\ 5 & 1 & 0 & 2 \\ 3 & -1 & 1 & 0 \end{pmatrix}$

(d) $\begin{pmatrix} 0 & -1 & -2 & 0 \\ 4 & 0 & 2 & 4 \\ 5 & 1 & 0 & -2 \\ 3 & 1 & 1 & 0 \end{pmatrix}\begin{pmatrix} 0 & -1 & -2 & 0 \\ 4 & 0 & 2 & 4 \\ 5 & 1 & 0 & -2 \\ 3 & 1 & 1 & 0 \end{pmatrix}$

Answer (a)

191. The number of operations supported to specify nondeterministic algorithms is
    a. 5
    b. 4
    c. 3√
    d. 2
192. The class of problems that can be solved by nondeterministic polynomial time algorithm is known as _____.
    a. NP Complete
    b. P
    c. NP√
    d. NP Hard
193. The time complexity of traveling salesperson problem is _____.
    a. $O(2^{n/2})$
    b. $O(n^2 2^n)$√
    c. $O(2^n)$
    d. $O(n^2)$
194. The number conditions to be satisfied by a problem to be NP-Complete is _____.
    a. 1
    b. 3
    c. 4
    d. 2√
195. Which class the Hamiltonian cycle problem belongs to?
    a. Class P
    b. Class NP
    c. Class NP Hard
    d. Class NP Complete√
196. Which of the following relationships between different complexity classes is not true?
    a. P is a subset of NP
    b. NP Complete is a subset of NP
    c. NP Complete is a subset of NP Hard
    d. NP Hard is a subset of NP√
197. Which of the following statements is not true?
    a. Class P is closed under concatenation
    b. Class P is closed under complementation
    c. Class P is closed under union
    d. Class P is not closed under intersection√
198. The problems that can be solved in polynomial time are _____ problems.
    a. Tractable√
    b. Intractable
    c. Decidable
    d. Undecidable

199. Floyd Warshall Algorithm can be used for finding _____

a) Single source shortest path

b) Topological sort

c) Minimum spanning tree

d) Transitive closure

View Answer

Answer: d

200. Minimum number of unique colors required for vertex coloring of a graph is called?

a) vertex matching

b) chromatic index

c) chromatic number

d) color number

View Answer

Answer: c

201. Which of the following is an NP complete problem?

a) Hamiltonian cycle

b) Travelling salesman problem

c) Calculating chromatic number of graph

d) Finding maximum element in an array

View Answer

Answer: c

202. What is the recurrence relation for the linear search recursive algorithm?

a) T(n-2)+c

b) 2T(n-1)+c

c) T(n-1)+c

d) T(n+1)+c

Answer: c

203. Merge sort uses which of the following technique to implement sorting?
a) backtracking

b) greedy algorithm

c) divide and conquer

d) dynamic programming

Answer: c