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1. In a binary tree, the number of terminal nodes (leaf nodes) are 10, then the number of nodes with two children are

1. **9**
2. 10
3. 11
4. 20

2. If the postorder and preorder traversal of a binary tree are M, N, L, P, R, O, K and M, N, L, P, R, O, K respectively then, the inorder traversal of that tree is

1. **M, L, N, K, P, O, R**
2. L, N, M, K, P, R, O
3. P, R, O, K, L, N, M
4. M, N, O, P, R, L, K

3. Which of the following statement is true in case of a binary tree

1. **There is no node with degree greater than two**
2. The left or right subtree can not be empty
3. A node is said to be a leaf only if it contains one child
4. the level of any node is two more than the level of parent node
4. When comparing the binary tree with the general tree, which statement is true?

1. The binary tree as well as the general tree can be empty
2. The binary tree or the general tree can never be empty
3. The general tree, like the binary tree consists of left and right child
4. **Binary tree consists of left and right child, whereas a general tree consists of collection of sub trees.**

5. Traversing a tree means

1. visiting each node in the tree strictly twice
2. visiting each node in the tree three times
3. **visiting each node in the tree exactly once**
4. visiting each node in the tree four times

6. What is the preorder traversal of the tree in the Figure (a)

Figure(a)

1. **& & & &**
2. & & & &
3. & & & &
4. & & & &

7. What is the inorder traversal of the tree in the Figure (a)

Figure(a)

1. & & & &
2. **& & & &**
3. & & & &
4. & & & &

8. What is the postorder traversal of the tree in the Figure (a)

Figure(a)

1. & & & &
2. & & & &

3. & & & &

4. & & & &

9. Which of the following statement is true in case of Expression tree?

1. **All nodes other than leaf nodes represent operators of the expressions**

2. All the operators are represented by the leaf nodes of the tree

3. All the operators are present in the left subtree only

4. All the operators are present in the right sub tree only

10. If the height of the binary tree is 2 then the maximum number of nodes are _ _

_ _ _

1. 4

2. 5

3. 6

4. 7

11. Which of the following statement is not true in case of Adjacency Matrix?

1. **For the undirected graph, the adjacency Matrix is symmetric**

2. Due to Symmetric relation between two sets of vertices of undirected graph, lower and upper triangle are same

3. Adjacency Matrix can also deal with parallel edges

4. If it is directed graph or undirected graph, all diagonal elements are zero in the adjacency Matrix

12. Which of the following statement is not true in case of a graph

1. A directed graph is also called as digraph

2. In the undirected graph, there is no arrowhead or tail

3. **The number of nodes on the path is path length**

4. A cycle is a path in which initial and terminal vertex is the same

13. Which of the following statement is NOT TRUE in case of DFS?

1. The search can begin from any vertex of the graph

2. The order of visiting each vertex through DFS is not unique

3. DFS can also be used for directed graphs

4. **DFS is suitable for unconnected graphs also**

14. Which of the following statement is not true in case of a BFS

1. The BFS starts by showing all vertices as unvisited as in the case of DFS

2. BFS picks each vertex one by one and adds it to the rear of the queue

3. BFS creates very wide and short trees

4. **In BFS, all the unvisited vertices are pushed on to the stack**

15. The BFS of the graph of Figure (a), starting at vertex 1 and using the adjacency list, results in the vertices being visited in the following order.

Figure(a)

1. 1, 2, 4, 8, 5, 6, 3, 7

2. **1. 2. 3. 4. 5. 6. 7. 8**

3. 1, 2, 4, 8, 7, 3, 6, 5

4. 1, 3, 7, 6, 8, 5, 4, 2

16. What is the another name for adjacency Matrix?

1. Boolean Matrix

2. Digraph Matrix

3. Tree Matrix

4. Traversal Matrix

17. If $T(n, e)$ represents the maximum time taken by DFS for an n -vertex, e -edge graph, then what is the value of $T(n, e)$ if adjacency lists are used.

1. $O(n+e)$

2. $O(ne)$

3. $O(n-e)$

4. $O(2n)$

18. If $S(n, e)$ represents the maximum additional space taken by DFS for an n -vertex, e -edge graph, then what is the value of $S(n, e)$ if adjacency lists are used.

1. $O(n)$

2. $O(n+e)$

3. $O(n-e)$

4. $O(2n)$

19. If $T(n, e)$ represents the time complexity of DFS for an n -vertex, e -edge graph, then what is the value of $T(n, e)$ if adjacency matrix is used.

1. $O(n+e)$

2. $O(ne)$

3. 0

4. $O(n^2)$

20. If adjacency matrix is used, then what is the time complexity of BFS algorithm?

1. $O(n)$

2. $O(e)$

3. $O(n^2)$

4. $O(n+e)$

21. In the Figure (a), _____ is the total cost to solve the problem P2

Figure(a)

1. 1

2. 2

3. 3

4. 4

22. In the Figure (a), to solve the problem in a optimal way, the total cost is _ _ _

—

— — — — —

Figure(a)

1. 1

2. 2

3. 3

4. 8

23. The breaking down of a complex problem into several subproblems can be

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represented by _ _ _ _ _

1. queue
2. binary tree
3. binary search tree

4. directed graph

24. Which statement is not true in case of AND/OR graph

1. The AND/OR graph may have directed cycle.
- 2. The presence of a directed cycle in AND/OR graph, implies that the problem is unsolvable.**

3. When problem reduction is used, two different problems may generate a common subproblem.

4. In AND/OR graph, nodes with no descendants are called terminals.

25. In the Figure (a) , the optimal way to solve P1 is _ _ _ _ _

Figure(a)

1. solve P4, then P2 and finally P1
2. solve P5, then P2 and finally P1
3. solve P7 and finally P1
- 4. solve P6 first, then P3 and finally P1**

26. Breaking down a problem into several subproblems is known as _ _ _ _ _

_ _ _

1. problem expansion
2. problem simplification

3. problem reduction

4. problem Identification

27. In the AND/OR graph, the _ _ _ _ _ nodes are drawn with an arc across all edges leaving the node.

1. OR
- 2. AND**
3. EX-OR
4. NOR

28. In the AND/OR graph, the solvable terminal nodes are represented by _ _ _ _ _

_ _ _ _ _

1. circles
2. dots
- 3. rectangles**
4. triangles

29. In the Figure (a) , the problem to be solved is _ _ _ _ _

Figure(a)

- 1. P1**
2. P4
3. P6
4. P7

30. In the Figure (a) , _ _ _ _ _ is an AND node.

Figure(a)

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1. P1
 2. **P2**
 3. P4
 4. P5
31. Which statement is not true as far as Game theory is considered?
1. A game must have a finite number of competitions called players
 2. If a game has two players then it is called 2-person game
 3. The game theory can also be applied to the variety of competitive situations like military battles, elections and marketing
 4. **Each player play to minimize his/her gain or maximize loss**
32. A terminal board configuration is one which represents _ _ _ _ _
1. starting situation of the game
 2. middle situation of the game
 3. **either a win, loose or draw situation**
 4. chess board setting
33. To assign a numeric value to the board configuration x , _ _ _ _ _ function can be used
1. **Evolution function $E(x)$**
 2. Newton function
 3. Fibonacci function
 4. Floyd function
34. Alpha cutoff and Beta cutoff are combined to get _ _ _ _ _
1. Alpha-beta cutoff
 2. Beta-alpha cutoff
 3. **alpha-beta pruning**
 4. Min-max theory
35. Which statement is not true in case of the game of NIM
1. The game of Nim is a finite game
 2. The game of nim is played by two players
 3. The player who removes the last tooth picks loses the game
 4. **The game of Nim may end in a draw**
36. What is the legal move in the game of Nim?
1. **Removing either 1 or 2 or 3 of the toothpicks from the pile.**
 2. Removing either 2 or 3 or 4 of the toothpicks from the pile.
 3. Removing either 3 or 4 or 5 of the toothpicks from the pile.
 4. Removing either 4 or 5 or 6 of the toothpicks from the pile.
37. Game of Nim comes under the class of _ _ _ _ _
1. **finite game**
 2. Infinite game
 3. dead game
 4. N-person game
38. Which algorithm will produce output that is same as the post order Evaluation of a game tree?
1. win-loss algorithm

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2. win-win algorithm

3. Min-Max algorithm

4. alpha-beta algorithm

39. In the game tree of a 2-person game, _ _ _ _ _ is used to represent the move of player A

1. Circle

2. square

3. ellipse

4. rectangle

40. In the game tree of a 2-person game, _ _ _ _ _ is used to represent the move of player B

1. square

2. circle

3. ellipse

4. rectangle

41. To identify articulation points in a graph _ _ _ _ _ is very useful

1. game tree

2. inorder traversal algorithm

3. depth first spanning tree

4. Chinese remainder theorem

42. The number of biconnected components of the graph in Figure (a) are _ _ _ _ _
Figure(a)

1. three

2. four

3. five

4. six

43. Which statement is true as far as graph in Figure (a) is considered?
Figure(a)

1. Vertex 2 is an articulation point

2. Vertex 3 is an articulation point

3. Vertex 4 is an articulation point

4. The graph contains no articulation points

44. The articulation points in graph of Figure (a) are _ _ _ _ _
Figure(a)

1. Nodes 1, 2 and 3

2. Nodes 2, 3 and 5

3. Nodes 1, 3 and 4

4. Nodes 6, 9 and 10

45. The depth first numbers (dfns) of the vertex of the depth first spanning tree indicates _ _ _

1. the order in which a depth first search visits these vertices

2. the indegree of the vertex

3. the outdegree of the vertex

4. the number of children of the vertex

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46. The solid edges of the depth first spanning tree of the graph are called _ _ _ _

1. Heavy edges
2. light edges
3. dark edges

4. tree edges

47. The broken edges of the depth first spanning tree of the graph are called _ _ _ _

-
1. light edges
 2. dark edges

3. back edges

4. invisible edges

48. A graph G is biconnected if and only if _ _ _ _ _

1. it contains no articulation points

2. it contains no loops
3. it contains no cycle
4. it contains no parallel edges

49. Two biconnected components can have _ _ _ _ _

1. at most one vertex in common

2. at most two vertices in common
3. no common vertex at all
4. at most one edge in common

50. The common vertex of two biconnected components is called _ _ _ _ _

1. super node
2. dead node
3. Hi node

4. articulation point

51. Which statement is not true in case of backtracking Method ?

1. Many problems which deal with searching for a set of solutions can be solved using the backtracking method.
2. Backtracking is a variation of the basic dynamic programming idea.
3. Using backtracking method, we can solve problems in an efficient way, when compared to greedy method.

4. For a given solution space a unique tree organization is possible.

52. Which statement is not true in case of backtracking Method ?

1. Implicit constraints describe the way in which the x_i must relate to each other.

2. Backtracking can not be used for N queens problem

3. Often the problem to be solved using backtrack method, calls for finding one vector that maximizes or minimizes or satisfies a criterion function.
4. Explicit constraints are rules that restrict each x_i to take on values only from a given set.

53. If the Array of Integers $a[1..n]$ are sorted by using backtracking method, then the criterion function P is _ _ _ _ _

1. for

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2. for

3. **for**

4. for

54. In backtracking, _ _ _ _ _ are the rules that restrict each x_i to take on

values only from a given set.

1. **Explicit constraints**

2. implicit constraints

3. solution space

4. criterion functions

55. In backtracking, _ _ _ _ _ are the rules that determine which

of the tuples in the solution space of I satisfy the criterion function.

1. Explicit constraints

2. **implicit constraints**

3. bounding function

4. permutation tree

56. The name backtrack was first coined by _ _ _ _ _

1. **D. H. Lehmer**

2. J. D. Ullman

3. K. Thompson

4. R. E. Bellman

57. In many applications of the backtrack method, the desired solution is expressible as _ _ _ _ _

1. **an n -tuple($x_1, x_2, \dots, x_n$)**

2. a algebraic equation

3. a matrix

4. a set of binary trees

58. In backtracking Method, modified criterion function is also known as _ _ _ _ _

1. **bounding function**

2. solution space

3. Explicit constraints

4. implicit constraints

59. In backtracking, the function which needs to be maximized or minimized for a given problem is known as _ _ _ _ _

1. **Criterion function**

2. Maxmin function

3. Backtracking function

4. Leveling function

60. If we represent solution space in the form of a tree, then the tree is referred as

_ _ _

1. BFS tree

2. DFS tree

3. **state space tree**

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4. Min - cost spanning tree

61. _ _ _ _ _ no of leaf nodes are available in tree organization of the 4-Queens solution space.

1. 4
2. 8
3. 16
4. 24

62. If two queens are placed at position (i, j) and (k, l). Then they are on the same diagonal if and only if _ _ _ _ _

1. $i + j = k + l$
- 2.
3. $i \% j = k \% l$
4. $i/j = k/l$

63. In backtracking, the tree organization for the solution space is also known as _

- _ _ _ _ _
1. Binary tree
 2. AVL tree
 3. **Permutation tree**
 4. Balanced tree

64. The solution space tree of 8 queens contain _ _ _ _ _

1. 8 tuples
2. 8×8 tuples
3. tuples
4. **8 to the power of 8 tuples**

65. In 8 Queens problem, after applying the conditions, the size of solution space is

- _ _ _ _ _
1. 8 tuples
 2. **factorial 8 tuples**
 3. 16 tuples
 4. 32 tuples

66. Each node in the tree organization defines _ _ _ _ _

1. solution space
2. criterion function
3. **problem state**
4. explicit condition

67. A node which has been generated and all of whose children have not yet been generated is _ _ _ _ _

1. **live node**
2. dead node
3. E-node
4. X-node

68. The live node whose children are currently being generated is called _ _ _ _ _

1. live node

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2. dead node

3. E-node

4. X-node

69. What is the problem statement of N Queens problem ?

1. N Queens are to be placed on a 8 X 8 chess board

2. N Queens are to be placed on a large chess board

3. N Queens are to be placed on a N X N chess board

4. N Queens are to be placed on a N X N chess board so that no two queens are on the same row, column or diagonal.

70. For N Queens problem, the time complexity is _ _ _ _ _

1. $O(n)$

2. $O(nn)$

3.

4. $O(\log n)$

71. In sum of subsets problem, if n weights are considered then the solution space consists of _ _ _ _ _

1. 2 to the power of n distinct tuples

2. $n*n$ tuples

3. tuples

4. n tuples

72. In the sum of subsets problem, if $n=4$, $(w_1, w_2, w_3, w_4) = (11, 13, 24, 7)$ and $m=31$ then solutions are _ _ _ _ _ where 1 represents weight chosen 0 represents weight is not chosen.

1. $(1, 1, 0, 1)$ and $(0, 0, 1, 1)$

2. $(0, 1, 1, 0)$ and $(1, 0, 0, 1)$

3. $(1, 1, 1, 1)$ and $(0, 0, 0, 1)$

4. $(1, 0, 0, 0)$ and $(1, 0, 1, 0)$

73. In sum of subsets problem, the implicit constraint is _ _ _ _ _

1. the sum of the corresponding weights must be m

2. the product of the corresponding weights must be m

3. the difference between any two weights must be m

4. the square root of the sum of the corresponding weights must be m

74. If $n = 4$ in the sum of subset problem, then the possible leafnodes in the tree organization are _ _ _ _ _

1. 4

2. 8

3. 20

4. 16

75. In the tree of fixed tuple size formulation, edges from level i nodes to level i + 1

nodes are labeled with _ _ _ _ _

1. the value of x_i , which is either zero or one

2. the value of $i^{*}x_i$

3. the value of $(i+1)^{*}x_i$

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4. the value of $2^{\sum x_i}$

76. From the given n distinct positive numbers, finding all combinations of these numbers whose sums are m is called _ _ _ _ _

1. chromatic number problem
2. N queens problem

3. sum of subsets problem

4. mn combination problem

77. In the tree of variable tuple size formulation, the solution space is defined by _ _ _

1. All paths from the root node to any node in the tree

2. All paths from the root node to the leaf node
3. All paths from one leaf node to another leaf node
4. All paths in the left sub tree

78. In the tree of variable tuple size formulation, the nodes are numbered as in _ _

_ _ _ _ _

1. random order
2. BFS
3. DFS
4. FIFO order

79. In the tree of fixed tuple size formulation, all paths from the root to a leaf node

define _ _ _ _ _

1. solution space

2. problem state
3. degree of bounding function
4. critical path

80. In the tree of fixed tuple size formulation, the nodes are numbered as in _ _

1. linear order
2. random order

3. D-search

4. BFS

81. If a graph is represented by its adjacency matrix $n \times n$, and colors by the integers $1, 2, 3, \dots, m$, then the degree of the state space tree is _ _ _ _ _

1. n
2. m
3. mn
4. m/n

82. If a graph is represented by its adjacency Matrix $n \times n$ and colors by the integers $1, 2, \dots, m$, then the height of the state space tree is _ _ _ _ _

1. m
2. n
3. $n + 1$
4. $m + 1$

83. A graph with one or more edges, without a self-loop is atleast _ _ _ _

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1. 1-chromatic

2. 2-chromatic

3. 3-chromatic

4. 4-chromatic

84. If d is the degree of the given graph, then it can be colored with _ _ _ colors

1. $d + 1$

2. $d - 1$

3. $2*d$

4. d

85. What is the time complexity of graph coloring problem ?

1. $O(mn)$

2. $O(m + n)$

3. $O(m - n)$

4. $O(n * m \text{ to the power of } n)$

86. A graph that can not be drawn on a plane without cross over between its edges is called _ _ _ _ _

1. planar

2. nonplanar

3. spanning tree

4. Euler graph

87. Painting all the vertices of a graph with colors such that no two adjacent vertices have the same color is called _ _ _ _ _ of the graph.

1. N -chromatic

2. bichromatic

3. coloring

4. Hi-color

88. To check whether the nodes of G can be colored in such a way that no two adjacent nodes have the same color yet only m colors are used. This is termed as _ _ _ _ _

1. coloring problem

2. m -coloring problem

3. m -colorability decision problem

4. planar color problem

89. How many colors (minimum) are needed for the graph in Figure (a) ?

Figure(a)

1. 5

2. 4

3. 3

4. 2

90. What is the chromatic number of the graph in Figure (a) ?

Figure(a)

1. 1

2. 2

3. 3

4. 5

91. The total number of different Hamiltonian cycles in a complete graph of n vertices is _ _ _ _ _

- 1.
- 2.
- 3.
- 4.

92. A sufficient condition for a simple graph G with n vertices have a Hamiltonian cycle is that the degree of every vertex in G is atleast _ _ _ _ _

1. n
2. $n/2$
3. $n/3$
4. $n/4$

93. Which statement is not true in case of Hamiltonian cycle ?

1. A Hamiltonian cycle is a round-trip path along n edges of G that visits every vertex once and returns to its starting position.
2. **A graph may contain more than one Hamiltonian cycle.**
3. A Hamiltonian cycle in a graph of n vertices consists of exactly n edges
4. Every connected graph has atleast one Hamiltonian cycle

94. The traveling salesperson problem which asked for a tour that has minimum cost. Then this tour is a _ _ _ _ _

1. **Hamiltonian cycle**
2. cube connected cycle
3. principle of optimality
4. multistage graph problem

95. In the Figure (a) , the removal of the following edge will not effect the Hamiltonian cycle

Figure(a)

1. (3, 1)
2. **(1, 7)**
3. (1, 2)
4. (4, 5)

96. What is the directed Hamiltonian cycle in the graph of Figure (a) ?

Figure(a)

1. 1, 2, 4, 5, 1
2. **1, 2, 3, 4, 5, 1**
3. 5, 2, 3, 4, 5
4. no directed Hamiltonian cycle

97. If the edge _ _ _ _ is deleted from the graph of Figure (a) , then it has no directed Hamiltonian cycle.

Figure(a)

1. **(5, 1)**
2. (5, 2)
3. (1, 5)

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4. the removal of any edge has no effect on

98. What is the Hamiltonian cycle in the graph of Figure (a) ?

Figure(a)

1. 1, 2, 3, 6, 7, 1

2. 1, 2, 8, 7, 1

3. 1, 2, 8, 7, 6, 5, 4, 3, 1

4. 1, 3, 6, 7, 8, 2, 1

99. The number of edges in the Hamiltonian cycle of the Figure (a) is _ _ _ _ _

Figure(a)

1. 8

2. 9

3. 6

4. 7

100. What is the Hamiltonian cycle in the graph of Figure (a) ?

Figure(a)

1. 1, 2, 3, 4, 5, 1

2. 1, 5, 2, 4, 3, 1

3. 1, 2, 5, 4, 3, 1

4. No Hamiltonian cycle

101. In state space tree of the 4-queens problem, initially, Node 1 is the only one live node. This represents _ _ _ _ _

1. All the 4-queens are placed randomly on the chess board

2. All the 4-queens are placed at four corners of the chess board

3. No queen has been placed on the chess board

4. Sixteen queens have been placed on the chess board

102. In branch-and-bound terminology, a D-search like state space search will be called _ _ _ _ _ search

1. random

2. linear

3. FIFO

4. LIFO

103. In the 4-queens state space tree generated by FIFO branch-and-bound, nodes that are killed as a result of the bounding functions have a _ _ _ _ _ under them

1. B

2. F

3. Q

4. S

104. Knapsack problem is _ _ _ _ _

1. Maximization problem

2. minimization problem

3. an example of divide and conquer technique

4. is an example of multi stage graph problem

105. Branch-and-bound technique is applicable for only _ _ _ _ _

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1. minimization problem

2. maximization problem
3. reliability design problem
4. BFS algorithm

106. The term _ _ _ _ _ refers to all state space search methods in which all children of the E-node are generated before any other live node can become the E-node

1. Branch-and-bound

2. modular arithmetic
3. interpolation
4. transformation

107. A search strategy that uses a cost function to select the next E-node would always choose for its next E-node a live node with least _ _ _ _ _

- _ _ _ _ _
1. FIFO function
 2. LIFO function

3. cost function

4. branch function

108. The 15-puzzle problem was invented by _ _ _ _ _

1. Mr. Sam Loyd

2. Mr. T. Ibaraki
3. Mr. C. kiarel
4. Mr. S. Martello

109. In 15-puzzle problem, each move creates a new arrangement of tiles. These arrangements are called the _ _ _ _ _ of the puzzle

1. States

2. goals
3. frames
4. configurations

110. A maximization problem is easily converted to a minimization problem _

_ _ _ _ _
1. by changing the sign of the objective function

2. by taking the reciprocal of the objective function
3. by taking the square root of the objective function
4. by taking the functional value of the objective function

111. _ _ _ _ _ is the time complexity for the traveling salesperson problem, if it is solved by using dynamic programming

1. $O()$

2. $O(n^2)$
3. $O(2n)$
4. $O(n)$

112. _ _ _ _ _ is the column wise reduction sum of the cost matrix

1. 4
2. 8

3. 12

4. 16

113. _ _ _ _ _ is the cumulative reduction sum of the cost matrix

1. 5

2. 15

3. **25**

4. 29

114. Depth first search is also called _ _ _ _ _

1. **D-search**

2. F-search

3. L-search

4. I-search

115. An optimal solution is a feasible solution with _ _ _ _ _

1. **maximum value**

2. minimum value

3. zero value

4. infinite value

116. We start at a particular node in the graph, visiting all nodes exactly once and come back to initial node with minimum cost. This is known as _ _ _ _ _

_ _ _ _ _

1. 0/1 knapsack problem

2. optimal storage on tapes

3. minimum cost spanning tree

4. **traveling sales person problem**

117. In finding the reduced cost matrix from a given cost matrix, we take minimum element from first row, then subtract that element from first row and take minimum element from second row, then subtract that element from second row and so on. This is known as _ _ _ _ _

1. row subtraction

2. row manipulation

3. **row reduction**

4. row-cost finding

118. In finding the reduced cost matrix from a given cost matrix, we take minimum element from first column, then subtract that element from first column and take minimum element from second column, and then subtract that element from second column and so on. This is known as _ _ _ _ _

1. **column reduction**

2. column manipulation

3. column subtraction

4. column hiding

119. For the cost matrix _ _ _ _ _ is the resultant matrix if row reduction is applied

1.

2.

3.

4.

120. _ _ _ _ _ is the row wise reduction sum of the cost matrix

1. 7

2. 14

3. **21**

4. 28

121. If $M=15$, $n=4$, $P_1, P_2, P_3, P_4=(10, 10, 12, 18)$ and $W_1, W_2, W_3, W_4=(2, 4, 6, 9)$ of 0/1 knapsack problem then using LC branch-and-bound search, the upper bound of node 1 is _ _ _ _ _

1. **-32**

2. -34

3. -36

4. -38

122. If $M=15$, $n=4$, $P=(10, 10, 12, 18)$ and $W=(2, 4, 6, 9)$ of 0/1 knapsack problem then using LC branch-and-bound search, the lower bound of node 1 is

_ _ _ _ _

1. -32

2. -34

3. -36

4. **-38**

123. If $M=15$, $n=4$, $P=(10, 10, 12, 18)$ and $W=(2, 4, 6, 9)$ of 0/1 knapsack problem then the maximum profit is _ _ _ _ _

1. 32

2. 34

3. 36

4. **38**

124. In Job sequencing with deadlines problem, for any Job i the profit P_i is earned if and only if _ _ _ _ _

1. **the Job is completed by its deadline.**

2. the Job is initiated before the deadline.

3. half of the Job is completed by its deadline.

4. 75 % of the Job is completed by its deadline

125. If $M=15$, $n=4$, $P=(10, 10, 12, 18)$ and $W=(2, 4, 6, 9)$ of 0/1 knapsack problem then the solution is _ _ _ _ _

1. (1, 1, 0, 1)

2. (1, 1, 1, 1)

3. (1, 0, 1, 1)

4. **(1, 0, 0, 1)**

126. In the Job sequencing with deadlines problem, for the given set of n Jobs, _ _ _

1. **Only one machine is available for processing Jobs**

2. n machines are available for processing the Jobs

3. $n/2$ machines are available for processing the Jobs

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4. $n/4$ machines are available for processing the Jobs

127. A feasible solution for the Job sequencing with deadlines problem is _ _

1. A subset J of Jobs such that each Job in this subset can be completed by its deadline.

2. A subset J of Jobs such that each job in this subset can be initiated by its deadline.

3. A subset J of Jobs such that half of the jobs in this subset can be completed by their deadline.

4. A subset J of Jobs such that 90 % of the Jobs in this subset can be completed by their deadline

128. The value of a feasible solution J for the Job sequencing with deadlines problem is _ _ _ _ _

1. the average of the profits of the jobs in J

2. the sum of the profits of the Jobs in J

3. the square root of the sum of the profits of the Jobs in J

4. the max. difference in the profits of the Jobs in J

129. _ _ _ _ _ is the resultant matrix obtained after applying both row wise reduction and column wise reduction to the given matrix

1.

2.

3.

4.

130. _ _ _ _ _ is the cumulative reduction of the cost matrix

1. 0

2. α

3. 1

4. 2

131. For infinite state space trees with no answer nodes _ _ _ _ _

1. LC search will terminate

2. LC search will not terminate

3. LC search can not be conducted

4. Termination of LC search depends on cost function

132. In branch-and-bound method, for nodes representing infeasible solutions, $C(x) =$ _ _ _ _ _

1. infinite

2. 0

3. 1

4. 2

133. The value of the optimal solution for $n=4$, $=(100, 10, 15, 27)$ and

$()=(2, 1, 2, 1)$ in Job sequencing with deadlines problem is _ _ _ _ _

1. 152

2. 142

3. 127

4. 25

134. In Job sequencing with deadlines problem for $n=4$, $d=(100, 10, 15, 27)$ and $(p)=(2, 1, 2, 1)$ to get the optimal solution _ _ _ _ _

1. Job 3 followed by Job 2 must be processed

2. Job 2 followed by Job 3 must be processed

3. Job 4 followed by Job 1 must be processed

4. Job 1 followed by Job 4 must be processed

135. In the Least Count (LC) search, the search for an answer node can often be speeded by using _ _ _ _ _ for live nodes

1. an intelligent ranking function

2. a variable function

3. a bounding function

4. a branching function

136. _ _ _ _ _ Functions find a live node with least cost function in LC search

1. minimum()

2. Maximum()

3. Least()

4. Search()

137. In the Job sequencing with deadlines and penalty problem, the objective is _ _ _ _

1. to select a subset J of the n Jobs such that all Jobs in J can be completed by their deadlines

2. to select a subset J of the n Jobs such that the sum of the penalty of all Jobs in J is maximum.

3. To select a subset J of the n Jobs such that the sum of the deadline times of all jobs in J is maximum.

4. To select a subset J of the n Jobs such that the sum of the required processing time of all Jobs in J is maximum

138. In the Least Count (LC) search, which one is the ranking function ?

1.

2.

3.

4.

139. An LC search coupled with bounding functions is called as _ _ _ _ _

1. LC branch-and-bound search

2. bound-and-branch search

3. Least count search

4. State space search

140. In LC search, every time the child is checked by the condition that _ _ _ _

1. the child is right or left

2. the child is problem node or not

3. the child is answer node or not

4. the child is dead node or not

141. Which is not true in case of LC search ?

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1. It uses the cost function
2. Among all the live nodes, we select a node which has minimum cost
3. LC search algorithm gives answer node
4. **LC search algorithm gives the answer node, but it may not give the optimal answer node.**

142. In branch and bound Method, the three common search strategies are _

— — —

1. **FIFO, LIFO and LC**
2. queue, stack and tree
3. array, linked list and stack
4. stack, queue and graph

143. The solution space can be organized into a tree by means of either of the two formulations. They are _ _ _ _ _ and _ _ _ _ _

1. **variable tuple size, fixed tuple size**
2. heavy tuple size, light tuple size
3. red tuple size, green tuple size
4. high tuple size, low tuple size

144. _ _ _ _ _ is the time complexity for the traveling salesperson problem, if it is solved by using LCBB.

1. $O(n)$
2. $O(2n)$
3. $O(n^3)$
4. **$O(n^2 2n)$**

145. In branch-and-bound terminology, a BFS like state space search will be called _ _ _ _ _ search.

1. linear
2. random
3. **FIFO**
4. LIFO

146. The LC branch and bound search of a tree will begin with upper = _ _ _ _

— — — —

1. 1
2. 2
3. **0**
4. infinite

147. The FIFO search coupled with bounding functions is called as _ _ _ _ _

—

1. **FIFOBB**
2. least count search
3. cumulative reduction function
4. column reduction

148. The algorithm of FIFO branch and bound can begin with upper bound =

— — — —

1. 0

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2. 1

3. 8

4. 2

149. In FIFO branch and bound, if cost function of the node is greater than upper, then _ _ _ _ _

1. the node gets killed

2. the node becomes E-node

3. that node is the minimum cost answer node

4. that node is the problem node

150. In FIFOBB, square nodes indicate _ _ _ _ _

1. answer nodes

2. E-nodes

3. dead nodes

4. feasible nodes

151. In FIFOBB, initially, the queue of live nodes is _ _ _ _ _

1. empty

2. full

3. half filled

4. alternatively filled

152. How do we reduce P to Q ?

1. Transform instances of P to instances of Q in polynomial time so that the solutions to Q provides the solutions to P

2. The solutions to Q is the solutions to P

3. complement the variables

4. inverse the variables

153. What does it mean if Q is NP-Hard ?

1. Every problem P is NP less than Q

2. Every problem NP is less than P less than Q

3. Every problem P is NP less than P less than Q

4. Every problem NP is less than P less than Q

154. What does it mean if Q is NP-Complete ?

1. Q is NP-Hard and Q is NP

2. Q is nearly NP-Hard

3. Q is NonDeterministic Turing Machine

4. Q is Deterministic turing Machine

155. What is the relation between P and NP?

1. P is NP, but no one knows whether P= NP

2. P = NP

3. P > NP

4. P < NP

156. What, intuitively, does it mean if we can reduce problem P to problem Q ?

1. P is "no harder than" Q

2. P is equal to Q

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3. P is less than Q
4. P is greater than Q
157. A problem is intractable if all algorithms to solve that problem are of at least _ _ _ _ _
 1. logarithmic time complexity
 - 2. exponential time complexity**
 3. polynomial-time complexity
 4. linear time complexity
158. NP complete stands for _ _ _ _ _
 1. Natural polynomial time complete
 2. Non polynomial time complete
 3. N-power time complete
 - 4. Nondeterministic Polynomial-time complete**
159. 2^n does not overtake until _ _ _ _ _
 1. n reaches 200
 2. n reaches 150
 3. n reaches 100
 - 4. n reaches 59**
160. What do you mean, when you say a problem is in P ?
 - 1. A solution can be found in Polynomial time.**
 2. A solution can not be found in Polynomial time
 3. A solution can be found in logarithmic time
 4. A solution can not be found in logarithmic time
161. What do you mean, when you say a problem is in NP ?
 - 1. A solution can be verified in Polynomial time.**
 2. A solution can not be verified in Polynomial time
 3. A solution can be verified in logarithmic time
 4. A solution can not be verified in logarithmic time
162. How do we usually prove that a problem R is NP-Complete ?
 - 1. Show $R \in NP$, and reduce a known NP-complete problem Q to R.**
 2. Show $R \in P$, and reduce a known P-complete problem Q to R
 3. Show either $R \in NP$ or $R \in P$, and reduce a known NP-complete problem Q to R
 4. check R has got exponential time complexity or not
163. In _ _ _ _ _ algorithms, the result of every operation is uniquely defined
 1. linear
 2. non linear
 - 3. deterministic**
 4. Nondeterministic
164. _ _ _ _ _ are the examples of NP-Complete problems?
 - 1. K-clique, subset-sum, 0/1 knapsack, Hamiltonian path, Graph coloring**
 2. Linear Search, Binary Search
 3. Merge Sort, Quick Sort

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4. Heap Sort, AVL Tree

165. An Optimization problem is one which asks _ _ _ _ _

_ _ _ _ _

1. "What is the optimal solution to problem X "
2. "What is the worst time complexity to the problem X "
3. "What is the average time complexity to the problem X "
4. "What is the best time complexity to the problem X "

166. What is a clique?

1. A clique is a subset of vertices fully connected to each other i.e., a complete subgraph of G

2. A clique is a subgraph with exactly three vertices
3. A clique is a subgraph with exactly six vertices
4. A clique is a subgraph with exactly nine vertices

167. What is the clique Problem ?

1. To find out "How large is the maximum-size clique in a graph "
2. To find out "How many Nodes are there in the graph "
3. To find out "How many parallel edges are there in the graph "
4. To find out "How many loops are there in the graph "

168. The problem is intractable, it means _ _ _ _ _

1. as the input size n increases, we are unable to solve them in reasonable time

2. it is a decision problem
3. its time complexity is exponential
4. its time complexity is polynomial

169. What is nondeterministic computer?

1. A computer that can guess the right answer or solution.

2. A computer that can understand the human feelings
3. A computer that is blessed with common sense
4. A computer with common sense and IQ

170. Boolean Satisfiability Problem can be solved in Polynomial time by a _ _

_ _ _ _ _

1. deterministic turning machine

2. Nondeterministic turning machine
3. simple linear algorithm
4. complex algorithm

171. In _ _ _ _ _ algorithms, operations are allowed to choose any one of the outcomes subject to the termination condition.

1. bubble
2. hyper
3. deterministic

4. Nondeterministic

172. In general, a positive integer k has a length of _ _ _ _ _ bits when represented in binary

1. $k+2$

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2. $k+10$

3. $\log k + 1$

4. $\log k + 5$

173. Two problems are said to be polynomially equivalent if and only if _

--

1.

2.

3.

4.

174. _ _ _ _ _ Shown in figure represents the commonly believed relationship between P and NP

1. Shown in figure(a)

Figure(a)

2. Shown in figure(a)

Figure(a)

3. Shown in figure(a)

Figure(a)

4. Shown in figure(a)

Figure(a)

175. _ _ _ _ _ is the time complexity of the function choice(), success() & failure()

1. 0 (1)

2. 0 (n)

3. 0 (nlogn)

4. 0(n²)

176. A nondeterministic algorithm terminates _ _ _ _ _ if and only if there exists no set of choices leading to a success signal

1. successfully

2. unsuccessfully

3. abruptly

4. with multiple results

177. Any problem for which the answer is either zero or one is called _ _ _ _ _

1. a decision problem

2. minimization problem

3. maximization problem

4. optimization problem

178. Any problem that involves the identification of either minimum or maximum value of a given cost function is known as _ _ _ _ _

--

1. min problem

2. max problem

3. decision problem

4. optimization problem

179. The most famous unsolved problem in computer science is _ _ _ _ _

-
1. $P > NP$ or $P < NP$
 2. **$P = NP$ or $P \neq NP$**
 3. $P + NP = \log(P - NP)$ or not
 4. $P \neq NP = \log(P + NP)$ or not
180. Only _ _ _ _ _ can be NP-complete
1. linear problems
 2. Non-linear problems
3. **decision problems**
4. hard problems
181. If is polynomial time reducible to , then we write it as _ _ _ _ _
- _ _ _ _ _
- 1.
 - 2.
 - 3.
 - 4.
182. _ _ _ _ _ problems involve finding a grouping, ordering or assignment of a discrete, finite set of objects that satisfies given conditions
1. Linear
 2. Non-Linear
3. **Combinational**
4. Hyper
183. _ _ _ _ _ is the branch of the theory of computation that studies which problems are computationally solvable using different models of computation
1. **Computability theory**
2. Finite automata
 3. Pushdown automation
 4. Turing Machine
184. The set of problems that can not be solved i.e., No algorithm can be written for it. Such problems are known as _ _ _ _ _
1. **Undecidable problems**
2. Intractable problems
 3. Heavy hard problems
 4. Arbitrary problems
185. _ _ _ _ _ states that satisfiability is in P if and only if $P=NP$
1. **cook's theorem**
2. Max clique theorem
 3. Bin Packing Theorem
 4. Best Fit Theorem
186. Tractability means _ _ _ _ _
1. **Practically useful algorithm**
2. the algorithm can not be executed
 3. the algorithm is infinite in length

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4. the execution time of the algorithm is infinite

187. _____ has a finite-state-control (its program), a two way infinite tape(its memory) and a read-write head(its program counter)

1. CD-ROM
2. CD Writer

3. turning Machine

4. parallel computer

188. If the time complexity of the algorithm is $O()$ then _____

1. **it is not a natural problem**
2. it is practically useful algorithm
3. it is a linear problem
4. it is a non-linear problem

189. In traveling Salesperson problem, the salesperson needs to visit 1000 cities, then the complexity is _____

1. **$O(1000!)$**
2. $O(10)$
3. $O(100)$
4. $O(50)$

190. A Boolean circuit is a circuit of AND, OR and NOT Gates. We have to determine if there is an assignment of 0's and 1's to a circuits inputs so that the circuit output is 1. The problem is called _____

1. **CIRCUIT- SAT Problem**
2. Boolean Problem
3. KnapSack Problem
4. High Circuit problem

191. _____ problem can be phrased as given below "Given a description of a turning machine and its initial input, determine whether the program, when executed on this input, ever completes"

1. **The halting problem**
2. Turning Machine problem
3. Nonturning Machine problem
4. Oracle Mahine problem

192. _____ is the set of decision problems that can be solved by a deterministic machine in polynomial time

1. **The complexity class P**
2. The complexity class NP
3. Co-NP class
4. Game complexity

193. If $E = ()$ and $()$ where $\sim$ indicates NOT and are literals and E has two classes, then this problem is known as ---

1. **3-SAT Problem**
2. 4-SAT Problem
3. 2K-SAT Problem
4. 6-SAT Problem

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194. _____ process is one whose behaviour is non-deterministic i.e., the next state of the environment is not fully determined by the previous state of the environment.

1. Stochastic

2. Prefix tree
3. Kraft's inequality
4. Genotype

195. Given N people, does there exist a group of size K such that every pair of people in the group know each other? This is another example of _____ problem

1. Clique problem

2. Knapsack problem
3. Travelling Salesperson Problem
4. Undecidable problem

196. All NP-Complete problems are _____

1. NP-Hard

2. P-Hard
3. P
4. NP

197. _____ search will run the same steps every time if it is given the same input.

1. Deterministic Search

2. Nondeterministic Search
3. TABU search
4. Huffman search

198. Given a set S of n nonnegative integers, _____ requires the division of S into two subsets such that the sums of number in each subset are as close as possible.

1. Number Partitioning Problem

2. Number Set Problem
3. Number finding Problem
4. Number elimination Problem

199. What is true in case of Clique problem ?

1. The clique problem is not in NP

2. The clique problem is in NP

3. The time complexity for clique problem is $O(n)$ where n is the number of vertices
4. clique problem is also known as vertex cover problem

200. What is K-Colouring problem ?

1. Given a graph G with K edges, Can G be painted with K colors?
2. Given a graph G with K vertices, Can G be painted with K colors?
3. Given a graph G with K loops, Can G be painted with K colors?
4. Given a graph G and an integer K , Can G be painted with K colors?