Mid & Final

Quiz by Attiq Kundi

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100 % CORRECT MCSQ

AND Many MoRe

CS-502

1) The sieve technique works where we have to find ---------- tem(s) from a large input. **Single page 34**

2) The only way to convert an empty string into a string of j characters is by doing j insertions, represented as **E(0 , j)=j page 78**

3) In Selection problem, the Sieve technique works in ---------- **Phases page 34**

4) Algorithm is a sequence of computational steps that --------- the input into output. **Transform page 7**

5) In max heap (for Heap Sort algorithm), when every time maximum element is removed from top we replace it with ---------- in the leaf tree. **Last page 41**

6) If pj dominates pi and pi dominates ph then pj also dominates ph. It means dominance relation is **Transitive page 18**

7) To find maximal points in brute-force algorithm, each point of space is compared against ----------of the space. **All other points page 13**

8) In the following code the statement "cout<<j;" executes---------- times
For(j=1;j<=5;j=j+2)
Cout<<j; **3 times (conceptual)**

9) For average-case time analysis of Quick sort algorithm, Pivot selection is on average basis from ----------. **All possible random values page 50**

10) In the statement, "output P[i].x,P[i].y", the number of times elements of P are accessed is ----------. **2 page 14**

11) Identify the TRUE statement. **The Knapsack problem belongs to the domain of optimization problems Page 91**

12) Matrix multiplication is a(n) ---------- operation. **Associative page 85**

13)provides us more accurate result when input values are not closer to each other. **Median page 34(conceptual)**

14) In merge sort algorithm, we split the array around the ---------- index q. **Mid page 28**

15) In the analysis of Selection algorithm, we get the convergent ---------- series. **Geometric page 37**

16) In Selection problem, the Sieve technique ----------. **Eliminate undesired data items each time page 35**

17) If matrix A of dimension p x q is multiplied with matrix B of dimension q x r, then each entry in resultant matrix takes---------- time. **O(q) page 84**

18) In Sorting the key value or attribute ---------- form an ordered domain. **Not always page 39**

19) In Heap Sort algorithm, the total running time for Heapify procedure is ----------. **Theta (log n) page 43**

20) Pseudo code of algorithm are to be read by ----------. **People page 12**

21) In Dynamic Programming based solution of Knapsack Problem, if we decide to take an object 'i', then we gain ----------. **Vi(value of object i)**

22) The worst-case running time of Quick sort algorithm---------- --. **Is quadratic (google)**

23) The only way to convert a string of i characters into the empty string is with i deletions, represented as

- **E(i , 0)=i page 78**

24) In Selection problem, the rank of an element will be its ---------- position if we sort the input data. **Final page 34**

25) Which one is not passed as parameter in Quick sort algorithm? **Array (containing input elements) (cs301)**

26) While Sorting, the ordered domain means for any two input elements x and y ----------satisfies only. **All of the above page 39**

27) Which of the following is calculated with Big O notation? **Upper bounds page 25**

28) For solving Selection problem, we introduced Sieve technique due to ---------- **Eliminating Rank of an element page 35**

29) The worst-case running time of merge sort is ---------- in order to sort an array of n elements. **O(n log n) page 30**

30) Quick sort is a recursive algorithm. **True page 49**

31) While analyzing Selection algorithm, we make a number of passes, in fact it could be as many as ----------. **log(n) page 37**

32) Approach for solving geometric problems by sweeping a line across the plane is called---------- sweep. **Plane page 18**

33) ---------- time is the maximum running time over all legal inputs. **Worst-case page 13**

34) The asymptotic growth of n(n+1)/2 is: **O(□2) page 15**

35) One of the limitations in 0/1 Knapsack is that an item can either be ---------- in the bag or not. **Put page 91**

36) --------- is one of the few problems, where provable lower bounds exist on how fast we can sort. **Sorting page 39**

37) Selection algorithm takes theta ----------. **(n) page 37**

38) The Sieve technique is a special case, where the numbers of sub-problems is just -----. **1 page 34**

39) Following is not the application of Edit Distance problem **Ascending Sort page 76**

40) We can use the optimal substructure property to devise a----------formulation of the edit distance problem. **Recursive page 78**

41) In plane sweep approach, a vertical line is swept across the 2d-plane form ----------. **Left to right page 18**

42) In 3-Dimensional space, a point P has----------coordinate(s). **(X,Y,Z) (google)**

43) ---------- items are not allowed in the 0/1 Knapsack. **Fractional page 91**

44) Radix sort is not a non-comparative integer sorting algorithm. **False (google)**

45) Fibonacci sequence was named on---------- , a famous mathematician in 12th Century. **Leonardo Pisano page 73**

46) In generating Fibonacci Sequence, we can avoid unnecessary repetitions by ----------process. **Memorization page 74**

47) The sequence of merge sort algorithm is: **Divide-Conquer-Combine page 27**

48) Sorting can be in ----------. **Both Increasing and Decreasing order page 52**

49) The process of----------ends when you are left with such tiny pieces remaining that it is trivial to solve them. **Divide and Conquer page 27**

50) Time complexity of the "0-1" knapsack algorithm depends on---------- --. **Number of items and capacity of knapsack (Google)**

51) In max-heap, largest element is stored at root node. Where is the smallest element stored? **Leaf Node (Google)**

52) For ---------- values of n, any----------algorithm is fast enough. **Small pg#14**

53) To predict the cost of an algorithm in terms of resources is called-------- --. **Analysis (Google)**

54) Dynamic programming comprises of----------**Recursion only pg#75**

55) For Quick sort algorithm, Partitioning takes theta ----------? **nlog(n) (Google)**

56) An in-place sorting algorithm is one that ---------- uses additional array for storage. **Does not pg#54**

57) In Dynamic Programming approach, we do not store the solution to each sub-problem in case if it reappears. **False pg#75**

58) Counting sort has time complexity: **O(n+k) pg#58**

59) Due to left complete nature of binary tree, the heap ca be stored in **Arrays pg#40**

60) For the heap sort we store the tree node in **Level-order traversal pg#40**

61) In the clique cover problem, for two vertices to be in the same group, they must be---------- each other. **Adjacent to pg#176**

62) In in-place sorting algorithm is one that uses arrays for storage: **No additional array pg#54**

63) Brute-force algorithm for 2D-Maxima is operated by comparing ---------- pairs of points. **All pg#18**

64) F(n) and g(n) are asymptotically equivalent. This means they have essentially the same --------- for large n. **Growth rates pg#23**

65) Quick sort is **Not stable but in place pg#54**

66) Heaps can be sorted in arrays without using any pointers; this is due to the---------- nature of the binary tree. **Left-complete pg#40**

67) Which may be a stable sort? **Both above page 54**

68) For the Sieve Technique we take time **T(nk) page 34**

69) One of clever aspects of heaps is that they can be stored in arrays without using any --------. **Pointer's page 40**

70) Counting sort is suitable to sort the elements in range 1 to k. **K is small page 57**

71) Asymptotic growth rate of the function is taken over ---------- case running time. **Worst page 14**

72) The Sieve technique is a special case, where the number of a sub-problems is just. **1 page 34**

73) Dynamic programming algorithms need to store the results of intermediate sub-problems. **True page 75**

74) In counting sort, once we know the ranks, we simply---------- numbers to their final positions in an output array. **Copy page 57**

75) In Quick sort, we don't have control over the sizes of recursive calls. **True page 49**

76) Before sweeping a vertical line in a plane sweep approach, in start sorting of the points is done in increasing order of their ---------- coordinates. **X (page #18)**

77) Random access machine or RAM is a/an **Mathematical model (page #10)**

78) The Huffman codes provide a method of encoding data inefficiently when coded using ASCII standard. **True (page #99)**

79) A heap is a left-complete binary tree that conforms to the ----------. **Heap order**

80) For the sieve technique we solve the problem, **recursively (page #34)**

81) Median is not useful measure of central tendency of given input set especially when the distribution of values is highly skewed. **False (page # 34)**

82) The omega-notation allows us to state only the asymptotic ---------- bounds. **Lower (page #25)**

83) In plane sweep approach, a vertical line is swept across the 2-D plane and ---------- structure is used for holding the maximal points lying to the left of the sweep line. **Stack (page #18)**

84) When a heapify procedure is applied to the root node to restore the heap, then at each level, the comparison performed takes time. **It will takeO (1) (page #43)**

85) Efficient algorithm requires less computational----------. **Memory and running time (page #9)**

86) Recurrence can be described in terms of a tree. **Yes (page#31)**

87) Time complexity of dynamic programming-based algorithm for computing the minimum cost of Chain Matrix multiplication is-------- --. **n^3(n cube) (page#90)**

88) In order to say anything meaningful about our algorithms, it will be important for us to settle on a----------. **Mathematical model of computation**

89) The iteration method is used for---------- --. **Solving recurrence relation (page # 31)**

90) Chain matrix multiplication problem can be solved through--------- strategy. **Dynamic programming (page #85)**

91) For comparison-based sorting algorithms, it is---------- possible to sort more efficiently than Omega nlog (n) time. **Not (page #54)**

92) Dynamic Programming approaches are usually useful in solving optimization problems. **True (page # 97)**

93) In sorting the key value or attribute---------- from an ordered domain. **Must be (page #39)**

94) Result of asymptotical analysis of n (n-3) and 4n*n is that----------. **both are asymptotically Equivalent (page #23)**

95) Floor and ceiling are----------to calculate while analyzing algorithms. **Usually consider difficult pg#31**

96)of reference is an important fact of current processor technology. **Locality (page # 8)**

97) As per algorithm of dynamic programming, we need to store **Intermediate sub-problems (page #75)**

In Sieve technique, we solve the problem --. In recursive manner (page # 34)

98) Upper bound requires that there exist positive constant c2and n0 such that f(n)-------- c2n for all n<= n0. **Equal to or less than (page # 24)**

99) In 2-D matrix problem, A point p is said to be dominated by point q if -------. **P.x≤q.x and p.y≤q.y (page # 11)**

100) A Random-Access Machine (RAM) is an idealized machine with ----------random access. **Infinite large (page # 10)**

101) There are----------entries in the Edit Distance Matrix. **Θ (n2) (page # 84)**

102) Counting sort is suitable for sorting the elements within range 1 to P, where ----------. **P is small (page # 57)**

103) While analyzing searching algorithm, we make a number of passes, in fact it called----- **log(n) (page #37)**

104) It is not a Fibonacci Sequence.
1,1,1,2,3,5,8,13,21,34,55, --- **True (page #73)**

105) In Random Access Machine (RAM), instructions are executed in----------. **One by one (page # 10)**

106) Dynamic programming formulation of the matrix chain multiplication problem will store the solutions of each sub problem in a(n): **Table (page #86)**

107) An algorithm is a mathematical entity, which is independent of---------- --. **Programming language Compiler and Machine (page #7)**

108) In Fibonacci sequence, unnecessary repetitions do not exist at all. **True (page# 74)**

109) In Quick sort algorithm, pivots form -------- --.**Binary Search Tree (page #49)**

110) In Heap Sort Algorithm, Heapify procedure is ----------in nature. **Recursive (page #43)**

111) In Bucket sort, if there are duplicates then each bin can be replaced by a: **Link list (page #69)**

112) Counting sort assumes that the numbers to be sorted are in the range ----------. **1 to k where k is small (page # 57)**

113) In Dynamic Programming, our approach is to ---------- --. **Build the solution in a bottom- up fashion. Pg#92**

114) In knapsack Problem, the goal is to put items in the knapsack such that the value of the items is ---------- -------- subject to weight limit of knapsack. **maximized**

115) If there are Θ (n2) entries in edit distance matrix then each entry E(i,j) takes ----------time to compute.• **Θ (1) (page #84)**

116) In---------- knapsack Problem, limitation is that an item can either be put in the bag or not. Fractional items are not allowed. **0/1 (page #91)**

117) Heapsort is a/an ---------- and---------- sorting algorithms. **In-place, not stable one (page#54)**

118) Selection sort is not an in-place sorting algorithm. **False (page #54)**

119) Memoization is a part of Dynamic Programming strategy. **True (page 74)**

27)Quick sort algorithms divide the entire array into ---------- sub arrays.**Two (Google)**

121) Insertion sort is an in-place algorithm. **True (page #54)**

122) When matrix A of 5x3 is multiply with matrix B of 3x4 then the number of multiplication required is: **60 page 84**

123) If matrix A of dimensions 2x4 is multiply with matrix B of dimensions 4x3, then the dimensions of resultant matrix is: **2x3 page 84(conceptual)**

124) Dynamic Programming strategy is useful when sub- problems are independent. **False google**

125) If Matrix-A of dimension 2x4 multiply with Matrix-B of dimension 4x3, then the dimension of resultant Matrix is: **2x3**

126) In the following code the statement "cout<< i" executes----------times.
for (int i=1; i<=n; i++)
cout<< i; **n times (conceptual)**

127) Edit distance algorithm based on----------strategy. **Dynamic programming page 77**

128) If Matrix A has dimensions "3x2" and Matrix B has dimensions "2x3", then multiplication of Matrix-A and Matrix-B will result a new Matrix-C having dimensions. **3x3 page 84(conceptual)**

129) The function f (n) =n (logn+1)/2 is asymptotically equivalent to nlogn. Here Lower Bound means function f (n) grows asymptotically at ---------- as fast as nlogn. **Least page 24**

130) Single atom from a larger set of--------- --. **n items page 34**

131) Fibonacci sequence was named on a ---------- , a famous mathematician in 12th century. **Leonardo Pisano (page # 73)**

132) In dynamic programming, our approach is to---------- --. **Build the solution in a bottom up fashion (page #92)**

133) In heap sort algorithm, we build ----------for ascending order. **Max heap page 42(conceptual)**

134) Bubble sort is not an in-place sorting algorithm. **False (page #54)**

135) In partition algorithm, the subarray----------has elements which are greater than pivot element X.**A[q+1… r] (page #46)**

136) In Heap sort algorithm, if heap property is violated ----------. **We call heapify procedure (page # 41)**

137)is not a characteristic of Random-Access Machine.**Locality of reference (page #10)**

138) Boolean operation is a---------- operation on an idealized RAM model of computation. **Basic (page #10)**

139) How much time merge sort takes for an array of numbers? **T(n log n) page 40**

141) Sorting is one of the---------problems in Computer Sciences. **Easiest page 39**

142) We can make--------- recursive calls in Fibonacci sequence. **Infinite google**

140) Insertion sort is a ---------- sorting algorithm. **In-place page 54**

141) We do not need to prove comparison- based sorting algorithms by mathematically, it always takes----------: **Omega nlog(n) page 54**

142) A Principal operation for maintaining the heap property is called heapify, it is also called: **Shifting Down page 43**

143) The number of nodes in a complete binary tree of height h is: **2^(h+1) page 45**

144) After partitioning array in Quick sort, pivot is placed in a position such that: **Values smaller than pivot are on left and larger than pivot is on right page 35**

145)programming is essentially recursion without repetition: **Dynamic page 75**

146) We can use the_____property to devise a recursive formulation of the edit distance problem. **optimal substructure page 78**

147) Applying the sieve technique to selection problem,_____element is picked from array. **Pivot page 35**

148) If matrix A of dimension p* q is multiplied with matrix B of dimension q*r, then the dimension of the resultant matrix is: **p*r page 84**

149) In knapsack problem, each item must be entirely accepted or rejected, is called_____problem. **"0-1" page 92**

150) In the case of_____analysis does not depend upon on the distribution of input. **Quick sort page 50**

151) In Heapsort Algorithm, total time taken by heapify procedure is: **O(log n) page 43**

152) In merge sort algorithm, we split the array_____to find index q. **midway page 28**

153) Al-Khwarizmi was a/an_____**mathematician page 7**

154) In Sieve Technique, we know the item of interest. **False page 34**

155) Radix sort is a_____integer sorting algorithm. **Non-comparative googles**

156) Random Access Machine (RAM) can execute_____instruction. **logical and arithmetic page 10**

157) Which of the following is calculated with Big Omega notation? **Upper bounds page 25**

158) Asymptotic growth of 8n^2 + 2n – 3 is: **O(n^2) page 23**

159) _____is the process of avoiding unnecessary repetitions by writing down the results of recursive calls and looking them up again if we need them later. **Memorization page 74**

160) In Heap Sort algorithm, the first step is to_____. **Call Build-Heap procedure page 43**

161) The time assumed for each basic operation to execute on RAM model of computation is_____. **Constant page 10**

162) If input "n" is odd, then median will be_____. **(n+1)/2 page 34**

163) In quick sort algorithm,_____decides nature of Binary Search Tree formed by pivots. **rank of the pivot page 49**

164) The brute-force algorithm for 2D-Maxima runs in order O(----------) time: **n*n page 18**

165) In average-case time analysis of quick sort algorithm, the most balanced case for partition is when we divide the list of elements into---------- **Two nearly equal pieces google**

166) The main purpose of mathematical analysis is measuring the---------- required by the algorithm: **Execution time page 13**

167) Dynamic Programming algorithms often use some kind of---------- to store the results of intermediate Sub-problems: **Table page 75**

168) The average case running time of quick sort algorithm is theta ----------: **nlog(n) page 53**

169) What is the best-case time complexity of merge sort? **O((nlogn) page 40**

170) While solving Selection problem, in Sieve technique we partition input data ----------: **According to Pivot page 35**

171) In average-case time the probability of seeing input is denoted by---------- **P(I) page 13**

172) To check whether a function grows faster or slower than the other function, we use some asymptotic notations, which Is ---------- **All of the given google**

173) Asymptotic notations are used to describe -------- of an algorithm: **Running time (google)**

174) In recursive formulation of Knapsack Problem
V[0,j] = ---------- for j>=0 **0 (page #93)**

175) If a matrix has three rows and two columns, then dimensions of matrix will be: **3x2 (google0**

176) Selection sort takes theta --- in the worst case: **(n^2)**

177) Which of the following problems can be solved using dynamic problem? **Matrix chain multiplication problem page 92**

178) ---------- algorithm based on Dynamic Programming strategy: **Edit distance page 77**

179) The definition of theta-notation relies on proving ------- asymptotic bound: **Both lower and upper page 25**

180) In order to say anything meaningful about our algorithms, it will be important for us to settle on a --------: **Mathematical model of computation page 10**

181) In asymptotical analysis of n(n-3) and 4n*n , as n becomes large, the dominant (fastest growing) term is some Constant times ---------- , **n*n page 23**

182) ---------- is in- place sorting algorithm **Bubble sort page 54**

183) In chain matrix multiplication, if there are --------- ways in which outer most pair of parentheses can placed: **n-1 page 85**

184) In chain matrix multiplication, table is filled------ to find the multiplication of matrix: **diagonally page 86**

185) Which one sorting algorithm is best suited to sort an array of 2 million elements? **Quick sort google**

186) The problem with the brute-force algorithm is that it uses ----- in pruning out decisions: **No intelligence page 18**

187) Quicksort is a/an --------- and ---------- sorting algorithm: **In-place , not stable one page 54**

191) In Heap Sort algorithm, the maximum levels an element can move upward is ----------: **Theta (log n) page 43**

192) If the time complexity of an algorithm is O(n), then it is called---------- time complexity: **Linear page 37**

193) Dynamic Programming approach is usually useful in solving ---------- problems: **Optimization page 97**

194) What time does Merge Sort algorithm take in order to sort an array of 'n' numbers? **Θ(n log n) page 30**

1. The sequence of merge sort algorithm is:
a. Divide Combine-Conquer

b. Conquer-Divide-Combine

c. **Divide-Conquer-Combine Page 27**
d. Combine-Divide-Conquer

2. In Knapsack Problem, limitation is that an item can either be put in the bag or not. Fractional items are not allowed.
a. 0

b. 1

0/1 Page 91
c. Fractional

3. In Selection algorithm, we assume pivot selection takes theta running time.
a. **n**
b. n2

c. n3

d. log (n)

4. In Heap Sort algorithm (using max heap), when every time maximum elements removed from top .
a. We call merge Sort Algorithm

b. it becomes Order n2 Algorithm

c. Divide and Conquer strategy helps us

We are left with a hole Page – 41

5. If matrix A of dimension p x q is multiply with matrix B of dimension q x r, then each entry in resultant matrix takes time.

O (q)
a. O (1)

b. O (p x q)

c. O (q x r)

6. _ is a method of solving a problem in which we check all possible solutions to the problem to find the solution we need.
a. Plane-Sweep Algorithm

b. Sorting Algorithm

Brute-Force Algorithm google
c. Greedy approach

7. The worst-case running time of Quick sort algorithm _.
a. Cannot be quadratic

Is quadratic google

b. ls always Exponential

c. Is linear

8. In max heap (for Heap Sort algorithm), when every time maximum element is removed from top, we replace it with leaf in the tree.
a. second last

Last Page -41

b. First

c. Any

9. Quick sort algorithm was developed by -

a. AlferdAho

b. Sedgewick

c. John Vincent Atanasoff

Tony Hoare – Google wikipedia

10. If Matrix-A has dimensions "3x2" and Matrix-B has dimensions "2x3", then multiplication of Matrix-A and Matrix-B will result a new Matrix-C having dimensions.

a. 3x2

b. 2x3

c. 2x2

3x3

11. For comparison-based sorting algorithms, it is possible to sort more efficiently than Omega n log(n) time.

a. Always

Not P-54

b. Sometimes

c. Sometimes not

12. Dynamic Programming approach is usually useful in solving optimization problems.

True

a. False

13. In Sorting the key value or attribute from an ordered domain.

Must be page 39

14. Result of asymptotical analysis of n(n -3) and 4n*n is that _

Both are asymptotically Equivalent page 23 (4n*n= 4n2)

15. Floor and ceiling are to calculate while analyzing algorithms

Usually considered difficult P-31

16. _ of reference is an important fact of current processor technology.

Locality P-8

17. In max-heap, largest element is stored at root node. Where is the smallest element stored?

Leaf Node

18. In average-case time analysis of Quick sort algorithm, the most balanced case for partition is when we divide the list of elements into _.

Equal no. of pieces as of input elements

19. Which of the following is calculated with Big O notation?

Upper bounds Page - 25

Both upper and lower bounds

20. Edit distance algorithm based on strategy

Dynamic Programming Page - 81

21. In Heapsort Algorithm, total time taken by heapify procedure is _

O (log n) Page-43

22. Al-Khwarizmi was a/an

Mathematician P-7

23. When matrix A of 5x3is multiply with metric B of 3x4 then the number of multiplications required is: Not found exactly

60 Not Found exactly but as per formula at page 84,

24. Pseudo code of algorithms are to be read by _ .

People Page -12

25. The sieve technique is a special case, where the number of sub-problems is Just

_

1 P-34

26. When a recursive algorithm revisits the same problem over and over again, we say that the optimization problem has sub-problems.

Overlapping – Google Search

27. Sieve technique is very important special case of Divide-and-Conquer

strategy.

True P-34

28. In order to say anything meaningful about our algorithms, it will be important for us to settle on a .

Mathematical model of computation P-10

29. Merge sort is based on .

Divide and Conquer P-27

30. What time does Merge Sort algorithm take in order to sort an array of 'n' numbers?

~~Θ~~ (n log n) Google Search

31. In Heap Sort algorithm, the first step is to _ _.

Call Build-Heap procedure Page - 46

32. The definition of theta-notation relies on proving asymptotic bound.

Both lower & upper Page - 25

33. In merge sort algorithm, to merge two lists of size n/2 to a list of size n, takes _ time.

Theta (n) Page - 32

34. We can make _ recursive calls in Fibonacci Sequence.

Finite google

35. Following is NOT the application of Edit Distance problem.

Ascending Sort Page - 76

36. In plane sweep approach, a vertical line is swept across the 2d-plane and structure is used for holding the maximal points lying to the left of the sweep line.

Stack Page - 18

37. When a heapify procedure is applied to the root node to restore the heap, then at each level, the comparison performed takes time:

It will take O (1). Page - 43

38. _ time is the maximum running time over all legal inputs.

Worst-case Page – 13

39. Efficient algorithm requires less computational...

Memory and Running Time Page - 9

40. For average-case time analysis of Quick sort algorithm, Pivot selection is on average basis from ___

all possible random values Page – 50

41. Selection algorithm takes theta

(n) Page - 37

42. Recurrence can be described in terms of a tree.

Yes Page – 31

43. Time complexity of Dynamic Programming based algorithm for computing the minimum cost of Chain Matrix Multiplication is

n^3 (n cube) Page -90

44. The Iteration method is used for

Solving Recurrence relations Page 31

45. In 3-Dimensional space, a point P has coordinate(s).

(X,Y, Z)

46. Chain matrix multiplication problem can be solved through strategy.

Dynamic programming Page – 85

47. Merge sort have running time running time of Heap sort. Not found exactly

Less than Google

48. Median is not useful measure of central tendency of given input set especially when the distribution of values is highly skewed.

False Page – 34

49. We do not need to mathematically prove that for comparison-based sorting algorithms always takes Omega nlog (n) time.

True Google & VU Tech (pg 46 not very clear)

50. The Omega-notation allows us to state only the asymptotic bounds.

Lower Page 25

51. Both lower & upperSorting can be in

Both Increasing and Decreasing order – (My opinion)

52. Radix sort performs sorting the numbers digit (s) at a time.

One Page – 71

53. Quicksort is a/an and sorting algorithm.

In place , not stable one Page - 54

54. Consider three matrices X,Y,Z of dimensions 1x2, 2x3,3x4 respectively. The number of multiplications of (XY) Z is:

18 As per lecture slides

55. In Fibonacci Sequence, unnecessary repetitions do not exist at all.
a. True

False Page – 74

56. It is not a Fibonacci sequence . 1,1,1,2,3,5,8,13,21,34,55,…..

True Page - 73
a. False

57. Heap sort is a/ an and _ sorting algorithem.

In place , not stable one Page - 54

58. Identify the True Statement

The knapsack problem belongs to the domain of optimization problems. Page - 91

59. In Dynamic Programming, our approach is to _

Build the solution in a bottom-up fashion Page – 75

60. Counting sort is suitable to sort the elements in range 1 to K;

K is small Page - 57

61. We can multiply two matrices A and B only when they are compatible which means

Number of columns in A must be equal to number of rows in B. it seems Correct as per page 84

62. Matrix multiplication is a (n) operation.

Associative Page 85

63. In Dynamic Programming approach, solution is modified / changed

At each stage google and Wikipedia

64. In Knapsack problem, the goal is to put items in the Knapsack such that the value of the items is _ subject to weight limit of knapsack.
Maximized Page - 91

65. An in-place sorting algorithm is one that uses additional array for storage.

Does not Page - 54

66. Memoization is a part of Dynamic Programming Strategy.
True Page – 74
67. If matrix A of dimension 2x4 is multiply with matrix B of dimension 4x3, then the dimension of resultant matrix is Not found exactly
i. 2x3 It seems correct as per second last Para of page 84

Which method is preferable for dealing with chain matrix multiplication?
ii. Divide and conquer strategy
iii.Dynamic programming formulation
iv. Graph theory
v. Greedy Approach

Huffman algorithm produces the…….prefix code tree.
i. Better
ii. Optimal
iii. Worst
iv. Best

A….w is adjacent to vertex v if there is an edge from v to w.
i. Acyclic
ii. Vertex
iii. Loop
iv. Cycle

Using ASCII standard the string "greedy" will be encoded with
i. 44 bits
ii. 120 bits
iii. 40 bits
iv. 48 bits

In activity scheduling algorithm, each activity is represented by a
i. Rectangle
ii. Square
iii. Circle
iv. Triangle

Those problems in which greedy finds good, but not always best is called a greedy…..
i. Heuristic
ii. Solution
iii. Result

iv. Algorithm

The knapsack problem belongs to the domain of…..Problems
i. Searching
ii. Sorting
iii. Linear solution
iv. Optimization

The general coin change problem can be solved using
i. Recursion
ii. Greedy algorithm
iii. Dynamic programming
iv. Divide and conquer

Huffman algorithm produces the… .....prefix code tree
i. Optimal
ii. Better
iii. Best
iv. Worst

Huffman algorithm generates an optimum .....code
i. Postfix
ii. Infix
iii. None of the given options
iv. Prefix

There are …..ways of representing graphics

i. 2
ii. 1
iii. 3
iv. 4

Knapsack word originates from ……language
i. German
ii. English
iii. French
iv. Norwegian

Graphs are important…….model for many application problems
i. Mathematical
ii. Unpredictable
iii. Haphazard
iv. Unsystematic

Which type of algorithm is harder to prove the correctness?
i. Dynamic
ii. Greedy

iii. Divide and conquer
iv. Brute force

….. Items are not allowed in 0/1 knapsack problem

i. Fractional
ii. 0
iii. 1
iv. 0/1

Matrix multiplication is a(n) ..... operation
i. Nether commutative nor associative
ii. Transitive
iii. Commutative
iv. Associative

For a Diagraph G= (V.E), Sum of in-degree (v) ----------.
• Not equal to sum of out-degree(v)
• = sum of out-degree(v) pg#115
• < sum of out-degree(v)
• > sum of out-degree(v)

DFS or BFS yields a ----------of the graph.
• Traversed tree
• Spanning tree pg#125

• Simple tree
• Free tree

Using ASCII code, each character is represented by a fixed-length code of ---------- bits per character.
• 4
• 6
• 8 pg#100
• 10

In Knapsack Problem, the goal is to put items in the Knapsack such that the value of the items is ----------subject to weight limit of the Knapsack.
• Minimized
• Decreased
• Maximized pg#109
• None of the above given

A graph is said to be acyclic if it contains ---------.
• At least one cycle
• Exactly one cycle
• Always more than one cycle
• No cycles pg#116

The number of edges that come out of a vertex is called the----------of that vertex in the digraph.
• Post-degree
• in-degree
• out-degree pg#114
• pre-degree

If Matrix-A has dimensions “3x2” and Matrix-B has dimensions “2x3”, then multiplication of Matrix-A and Matrix-B will result a new Matrix-C having dimensions.

- 3x2
- 2x3
- 2x2
- **3x3pg#87**

A/an----------is one in which you want to find, not just a solution, but the best solution.

- **Optimization problem**
- Divide and Conquer
- NP complete problem

- Best problem Fractional Knapsack is founded on method.
  - **Greedy**

- Recursive
- Divide and Conquer
- Dynamic programming

If the graph is represented using an adjacency matrix, then Breadth-first search takes ---------- time.

- O(E+1)
- **O(V^2)**
- O(V)
- O(E)

In inductive approach of Knapsack problem, we consider 2 cases, ----------or----------.

- Median, Mode
- Recursive, Iterative
- **Leave object, Take object pg#93**
- Sequentially, Parallel

A Greedy algorithm can NOT be used to solve all the----------problems.

- **Dynamic programming (Google)**
- Memorization programming
- Edit-distance programming
- Storing value programming

In Huffman encoding, the -------- is the number of occurrences of a character divided by the total characters in the message.

- Counting
- Parsing
- **Relative Probability pg#100**
- Weight

The Binary Tree constructed by a Huffman Encoding is a:

- **Full Binary Tree pg#102**
- Partial Binary Tree
- Incomplete Binary Tree
- None of the given option

Following is not the application of Edit Distance Problem.
• **Speech recognition pg#76**
• Spelling correction
• Ascending order
• Computational Molecular Biology

Consider three Matrices X, Y, Z of dimensions 1x2, 2x3, 3x4 respectively. The number of multiplication of(XYZ) is:

• **18**

• **32**
• 24
• 30

18) In ----------Knapsack Problem, limitation is that an item can either be put in the bag or not. Fractional items are not allowed.
• 0
• 1
• **0/1 pg#91**
• Fractional

An in-place sorting algorithm is one that ----------uses additional array for storage.
• Always
• Permanently
• **Does not pg#54**
• Sometime

If Matrix-A has dimensions “pxq” and Matrix-B has dimensions “qxr”, then multiplication of Matrix-A and Matrix-B will result a new Matrix-C having dimensions.
• P x q
• **P x r page#84**
• q x r
• q x p

Counting sort is suitabl o sort the elements in range 1 to K.
• K is large
• **K is small pg#71**
• K may be large or small
• None

When matrix A of 5x 3 is multiply with matrix B of 3x 4 then the multiplication required is:
• 15
• 12
• 36
• **60**

----------is a linear time sorting algorithm.
• Merge sort
• Quick sort
• Bubble sort
• **Radix sort**

In Dynamic Programming approach, we do not store the solution to each sub problem in case if

• True
• False page#75

Dynamic Programming approach is usually useful in solving optimization problem.
• True page#97
• False

Which of the following algorithm provides an optimal solution for the activity selection problem?
• Divide and Conquer
• Brute force
• Greedy pg#105
• Recursive

A graph is---------- if every vertex can reach every other vertex.
• Connected pg#116
• Cycle
• Acyclic
• Loop

In a Huffman encoding when a new node is created by combining two nodes, the new node is placed in the_____.
• Priority queue pg#100
• Linked list
• Min heap tree
• Graph traversal

Huffman algorithm produces the_____prefix code
• Optimal pg#105
• Best
• Worst
• Better

In_____algorithm, you hope that by choosing a local optimum at each step, you will end up a global
optimum.
• Simple
• Divide and conquer
• Greedy pg#97
• Brute Force

The string “Imncde” is coded with ASCII code, the message length would be_____bits.
• 24
• 36

• 48
• 60

For graph traversal, breadth-first search strategy _____
• Is always recursive
• Cannot br recursive

• Cannot be non-recursive
• Can be both recursive and non-recursive page 119

In activity scheduling algorithm, the width of a rectangle _____
• Is always ignored
• Directs towards recursion
• Should be maximized
• Indicates the duration of an activity pg#106

If the graph is represented using an adjacency list, then Breadth-first search takes ---------time
• O(V^2)
• O(V)
• O(V+E) pg#138
• O(E+1)

Suppose you are given infinite coins of 1,2 ,3, and 4.Select the ways of the minimum number of coins that required to achieve a sum of 6:
• 1
• 2 conceptual
• 3
• 4

sing ASCII standard the string “greedy” will be encoded with
• 48 bits Conceptual
• 120 bits
• 44 bits
• 40 bits

The Huffman codes provide a method of -------data efficiency.
• Reading/Writing
• Encoding/Decoding pg#99
• Divide/Conquer
• Inserting/Deleting

In the context of activity selection algorithm, time s dominated by sorting of the activities by.....
• Start Times
• Finish Times pg#106
• Average Times
• CPU Burst Times

Time complexity of the “0-1” knapsack algorithm depends on----

Number of items
• Capacity of the knapsack
• Size of the Table
• Number of items and capacity of knapsack (not sure)

The greedy approach gives us an optimal solution when the coins are all powers of a -------- denomination
• Fixed pg#98
• Variable
• Constant
• Static

In Activity Selection, we say that two activities are non-interfering if their start-finish interval ------ overlap
• Do
• Do not pg#105
• Sometimes
• Once

How many steps are involved to design the dynamic programming strategy?
• 2
• 3
• 1
• 4 pg#92

Bag is a .....
• type of algorithm pg#119
• data structure
• program
• compiler

The running time of brute-force algorithm to solve Knapsack problem is------
• O(n)
• O(n3)
• O (n!)
• O(2^n) pg#92

If a matrix has three rows and two columns, the dimension of matrix will be:
• 3x2 Conceptual
• 2x3
• 3x3
• 2x2

The Probability in Huffman encoding is the number of occurrences of a character divided by the total----------in the message.
• Numbers
• Frequencies
• Strings
• Characters pg#100

In recursive formulation of Knapsack Problem: V [0, j] = ----------for j>=0
• -1
• 0 pg#93
• 1
• 2

The Knapsack Problem belongs to the domain of ---------- problem.
• Optimization pg#91
• Sorting
• Linear solution
• Searching

An optimization problem is one in which you want to find the ----------solution.
• Simple
• Good

• Best pg#97
• Worst

Huffman algorithm generates an optimum ---------- code.
• Prefix page 102
• Postfix
• Infix
• None of the above

Which of the following algorithms solves the Fractional Knapsack Problem more effectively?
• Divide and Conquer
• Greedy algorithm page 109
• Dynamic programming
• Backtracking

If we implement the bag by using a queue, we have -------- --.
• BFS page 124
• DFS
• Graph
• Loop

One of the limitation in 0/1 Knapsack is that an item can either be----------in the bag or not.
• Use
• Put page 91

• Move
• Store

In Dynamic Programming based solution of Knapsack Problem, if we decide to take an object'i' then we gain ---------- --.
• W(Total weight of Knapsack)
• V(Total value of all items)
• vi(value of object i) page 93
• None of the given option

An activity scheduling algorithm, the width of a rectangle ----------.
• Is always ignored
• Direct toward recursion
• Should be maximized
• Indicates the duration of an activity page 106

The prefix code generated by Huffman algorithm---------- the expected length of the encoded string.
• Minimizes page 102
• Balances
• Maximizes
• Keeps constant

In Huffman encoding, the characters with smallest probabilities are placed at the ---------- depth of the tree.
• Minimum
• Average
• Maximum page 102
• Root

There are ---------- ways to representing graphs.
• 3
• 1
• 2 page 116
• 4

Each time we traverse graph by Breadth-first search algorithm, we count the distance from.....
• Starting node
• Neighbors of the starting node page 117
• Right most node
• Left most node In Activity Selection problem, intuitively --.

• There are always short activities as inputShort activities are not attractive
• Duration of the activities does not matter
• We do not like long activities page105

62) The activity scheduling is a simple scheduling problem for which the greedy algorithm approach provides a/an ---------- solution.
• Simple
• Sub-optimal
• Optimal page 105
• Non optimal

The---------- is a problem for which the greedy algorithm approach provides an optimal solution.

• Activity selection page 105

• Dynamic programming
• Knapsack problem
• NP complete problem

Which of the following ways can be used to represent a graph?
• Adjacency list
• Incidence matrix
• Adjacency list , Adjacency Matrix page 116
• No way to represent

Queue Data Structure work on ---------- principles.
• FIFO(first in first out) cs301
• LIFO(last in first out)
• JLO(just in last out)
• LOFI(last out first in)

Graphs can be represented by an---------- and---------- --.
• queue , stack
• adjacency list , adjacency matrix page 116
• adjacency right , adjacency left
• Binary, linear

Identify a TRUE statement about Knapsack.
• The Knapsack Problem does not belongs to the domain of optimization problems
• The Knapsack Problem belongs to the domain of optimization problems page 91
• The Knapsack Problem cannot be solved by using Dynamic programming
• The Knapsack Problem is optimally solved by using Brute force algorithm
Which of the following is true about graph?
• A graph may contain no edges and many vertices
• A graph may contain many edges and no vertices

Which type of algorithm is harder to prove the correctness?
• Greedy google
• Brute force
• Dynamic programming
• Divide and Conquer

Final term Quiz

1. Which method is preferable for dealing with chain matrix multiplication?
   Divide and conquer strategy
   Dynamic programming formulation
   Graph theory
   Greedy Approach

2. Huffman algorithm produces the…….prefix code tree.
   Better
   Optimal
   Worst
   Best

3. A….w is adjacent to vertex v if there is an edge from v to w.
   Acyclic
   Vertex
   Loop
   Cycle

Using ASCII standard the string “greedy” will be encoded with
i. 44 bits
ii. 120 bits
iii. 40 bits
iv. 48 bits

Find the maximum value of the items which can carry using knapsack weight capacity =50
Item weight Value
10 70
20 20
30 80
70 200
i. 90
ii. 280

iii. 200
iv. 100

In activity scheduling algorithm, each activity is represented by a

Rectangle

ii. Square
iii. Circle
iv. Triangle

Those problems in which greedy finds good, but not always best is called a greedy…..

i. Heuristic
ii. Solution
iii. Result
iv. Algorithm

The knapsack problem belongs to the domain of…..Problems
i. Searching
ii. Sorting
iii. Linear solution
iv. Optimization

The general coin change problem can be solved using
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iii. 1
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Matrix multiplication is a(n) .....operation
i. Nether commutative nor associative
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For a Diagraph G= (V.E), Sum of in-degree (v) ----------.
• Not equal to sum of out-degree(v)
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• 4
• 6
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• 10

In Knapsack Problem, the goal is to put items in the Knapsack such that the value of the items is----------subject to weight limit of the Knapsack.
• Minimized
• Decreased
• Maximized pg#109
• None of the above given

Consider the string"abcdaacac",if the string is coded with ASCII codes, the message length would be---
• 70 bits
• 60 bits
• 90 bits
• 72 bits

A graph is said to be acyclic if it contains ---------.
• At least one cycle
• Exactly one cycle
• Always more than one cycle
• No cycles pg#116

The number of edges that come out of a vertex is called the----------of that vertex in the digraph.
• Post-degree
• in-degree
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If Matrix-A has dimensions "3x2" and Matrix-B has dimensions "2x3", then multiplication of Matrix-A and Matrix-B will result a new Matrix-C having dimensions.
• 3x2
• 2x3
• 2x2
• 3x3pg#87

A/an----------is one in which you want to find, not just a solution, but the best solution.
• Optimization problem
• Divide and Conquer
• NP complete problem
• Best problem

Fractional Knapsack is founded on ---------- method.

• Greedy
• Recursive
• Divide and Conquer
• Dynamic programming

If the graph is represented using an adjacency matrix, then Breadth-first search takes ---------- time.
• O(E+1)
• O(V^2)

• O(V)
• O(E)

In inductive approach of Knapsack problem, we consider 2 cases, ----------or----------.
• Median, Mode
• Recursive, Iterative
• Leave object, Take object pg#93
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The Binary Tree constructed by a Huffman Encoding is a:
• Full Binary Tree pg#102
• Partial Binary Tree
• Incomplete Binary Tree
• None of the given option

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Consider three Matrices X, Y, Z of dimensions 1x2, 2x3, 3x4 respectively. The number of multiplication of(XYZ) is:
• 18
• 32
• 24
• 30

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• 0
• 1
• 0/1 pg#91
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• Always
• Permanently
• Does not pg#54
• Sometime

If Matrix-A has dimensions “pxq” and Matrix-B has dimensions “qxr”, then multiplication of Matrix-A and Matrix-B will result a new Matrix-C having dimensions.
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• P x r page#84
• q x r
• q x p

Counting sort is suitabl o sort the elements in range 1 to K.
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• K is small pg#71
• K may be large or small
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When matrix A of 5x 3 is multiply with matrix B of 3x 4 then the multiplication required is:
• 15
• 12
• 36
• 60

----------is a linear time sorting algorithm.
• Merge sort
• Quick sort
• Bubble sort
• Radix sort

In Dynamic Programming approach, we do not store the solution to each sub problem in case if it reappears.
• True
• False page#75

Dynamic Programming approach is usually useful in solving optimization problem.
• True page#97
• False

Which of the following algorithm provides an optimal solution for the activity selection problem?
• Divide and Conquer
• Brute force
• Greedy pg#105

A graph is---------- if every vertex can reach every other vertex.
• Connected pg#116
• Cycle
• Acyclic
• Loop

In a Huffman encoding when a new node is created by combining two nodes, the new node is placed in the_____.
• Priority queue pg#100
• Linked list
• Min heap tree
• Graph traversal

Huffman algorithm produces the_____prefix code
• Optimal pg#105
• Best
• Worst
• Better

In_____algorithm, you hope that by choosing a local optimum at each step, you will end up a global
optimum.
• Simple
• Divide and conquer
• Greedy pg#97
• Brute Force

The string “Imncde” is coded with ASCII code, the message length would be_____bits.

• 24

• 36
• 48
• 60

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• Is always recursive
• Cannot br recursive
• Cannot be non-recursive
• Can be both recursive and non-recursive page 119

In activity scheduling algorithm , the width of a rectangle _____
• Is always ignored
• Directs towards recursion
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• Indicates the duration of an activity pg#106

If the graph is represented using an adjacency list, then Breadth-first search takes ---------time
• O(V^2)
• O(V)
• O(V+E) pg#138
• O(E+1)

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• 1
• 2 conceptual

sing ASCII standard the string “greedy” will be encoded with
• 48 bits Conceptual
• 120 bits
• 44 bits
• 40 bits

The Huffman codes provide a method of -------data efficiency.
• Reading/Writing
• Encoding/Decoding pg#99
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• Inserting/Deleting

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• Start Times
• Finish Times pg#106
• Average Times
• CPU Burst Times

Time complexity of the "0-1" knapsack algorithm depends on----
• Number of items
• Capacity of the knapsack
• Size of the Table
• Number of items and capacity of knapsack (not sure)

The greedy approach gives us an optimal solution when the coins are all powers of a --------
Denomination
• Fixed pg#98
• Variable
• Constant
• Static

In Activity Selection, we say that two activities are non-interfering if their start-finish interval-------
overlap
• Do
• Do not pg#105
• Sometimes
• Once

How many steps are involved to design the dynamic programming strategy?
• 2
• 3
• 1
• 4 pg#92

Bag is a.....
• type of algorithm pg#119
• data structure
• program
• compiler

• If a problem is in NP-complete, it must also be in NP.
• True page#170
► False

1. The Huffman algorithm finds a optimal solution.
• True pg#105
► False

2. The Huffman algorithm finds an exponential solution
► True
• False pg#105

3. The Huffman algorithm finds a polynomial solution
► True google
► False

4. The greedy part of the Huffman encoding algorithm is to first find two nodes
with smallest frequency.
• True pg#100

► False

5. The code word assigned to characters by the Huffman algorithm have the property that no code word is the prefix of any other.

• True pg#101

► False

6. Huffman algorithm uses a greedy approach to generate a postfix code T that minimizes the expected length B (T) of the encoded string.

► True

• False pg#102

7. Dijkstra's single source shortest path algorithm works if all edges weights are non-negative and there are negative cost cycles.

► True

• False pg#154

8. The term "coloring" came from the original application which was in architectural design.

► True

• False pg#176

9. In the clique cover problem, for two vertices to be in the same group, they must be adjacent to each other.

• True pg#176

► False

10. Dijkstra's algorithm is operated by maintaining a subset of vertices

• True pg#155

False

11.We do sort to,

► keep elements in random positions

► keep the algorithm run in linear order

► keep the algorithm run in (log n) order

• keep elements in increasing or decreasing order pg#40

12. After partitioning array in Quick sort, pivot is placed in a position such that

• Values smaller than pivot are on left and larger than pivot are on right pg#48

►Values larger than pivot are on left and smaller than pivot are on right

Pivot is the first element of array

► Pivot is the last element of array

13. Merge sort is stable sort, but not an in-place algorithm

• True pg#54

► False

14. A p × q matrix A can be multiplied with a q × r matrix B. The result will be a p × r matrix C. There are (p . r) total entries in C and each takes_____to compute.

• O (q) pg#84

► O (1)

► O (n2)

► O (n3)

15. One of the clever aspects of heaps is that they can be stored in arrays without using any _____.

Pointers pg#40
constants
variables
functions

16. Merge sort requires extra array storage,

True pg#54
False

17. The Huffman codes provide a method of encoding data inefficiently when coded using ASCII standard.

True
False pg#99

18. Using ASCII standard the string abacdaacac will be encoded with_____bits.

80 pg#99
160
320
100
Using ASCII standard the string abacdaacac will be encoded with 160 bits. True
False pg#99

19. Using ASCII standard the string abacdaacac will be encoded with 10 bytes.

True
False pg#99

23. Huffman algorithm uses a greedy approach to generate an prefix code T that minimizes the expected length B (T) of the encoded string.

True
pg#100
False

24. An optimization problem is one in which you want to find,

► Not a solution
► An algorithm
► Good solution
► **The best solution pg#97**

25. Although it requires more complicated data structures, Prim's algorithm for a minimum spanning tree is better than Kruskal's when the graph has a large number of vert

► True pg#149
► False

26. If a problem is in NP, it must also be in P.

► True
► False
► **unknown pg#173**

27. What is generally true of Adjacency List and Adjacency Matrix representations of graphs?
► **Lists require less space than matrices but take longer to find the weight of an edge (v1,v2) pg#116**
► Lists require less space than matrices and they are faster to find the weight of an edge (v1,v2)
► Lists require more space than matrices and they take longer to find the weight of an edge (v1,v2)

If a graph has v vertices and e edges then to obtain a spanning tree we have to delete
► v edges.
► v – e + 5 edges
► v + e edges.
► **None of these**

28. Maximum number of vertices in a Directed Graph may be |V2|
► True
► **False pg#115**

29. The Huffman algorithm finds a (n)_____solution.
► **Optimal pg#105**

► non-optimal

► Exponential
► Polynomial

30. The Huffman algorithm finds an exponential solution
► True
► **False pg#115**

31. Edge (u, v) is a forward edge if
► u is a proper descendant of v in the tree
► **v is a proper descendant of u in the tree pg#129**
► None of these

32. After partitioning array in Quick sort, pivot is placed in a position such that
► **Values smaller than pivot are on left and larger than pivot are on right (Page 48)**
► Values larger than pivot are on left and smaller than pivot are on right
► Pivot is the first element of array
► Pivot is the last element of array

33. Merge sort is stable sort, but not an in-place algorithm
► **True Page #54**
► False

34. In counting sort, once we know the ranks, we simply_____numbers to their final positions in an output array.
► Delete
► **copy Page# 57**
► Mark
► arrange

35. Dynamic programming algorithms need to store the results of intermediate sub-problems.
► **True pg#75**
► False

36. A p × q matrix A can be multiplied with a q × r matrix B. The result will be a p × r matrix C. There are (p . r) total entries in C and each takes_____to compute.
► **O (q) pg#48**
► O (1)
► O (n2)
► O (n3)

37._____is a graphical representation of an algorithm
► notation
► notation
► **Flowchart**

► Asymptotic notation

38.Which of the following is calculated with big o notation?
► Lower bounds
► **Upper bounds pg#25**
► Both upper and lower bound
► Medium bounds

39.Merge sort makes two recursive calls. Which statement is true after these recursive calls finish, but before the merge step?
► The array elements form a heap
► **Elements in each half of the array are sorted amongst themselves**
► Elements in the first half of the array are less than or equal to elements in the second half of the array
► None of the above

40.What is the solution to the recurrence T(n) = T(n/2)+n, T(1) = 1
► O(logn)
► **O(n) pg#37**

41.Consider the following Huffman Tree
The binary code for the string TEA is
► **10 00 010**
► 011 00 010
► 10 00 110
► 11 10 110

42.A greedy algorithm does not work in phases.
► True
► **False pg#97**

43. Can an adjacency matrix for a directed graph ever not be square in shape?
► Yes
► **No pg#116**

44. One of the clever aspects of heaps is that they can be stored in arrays without using any_____.

► **Pointers pg#40**

► constants

► variables

► functions

45. Merge sort requires extra array storage,

► **True Page 54**

► False

Non-optimal or greedy algorithm for money change takes_____

► **O(k) Pg #99**

► O(kN)

► O(2k)

► O(N)

46. The Huffman codes provide a method of encoding data inefficiently when coded using ASCII standard.

► True

► **False Pg# 99**

47. Using ASCII standard the string abacdaacac will be encoded with_____bits.

► **80 pg# 99**

► 160

► 320

► 100

48. Using ASCII standard the string abacdaacac will be encoded with 160 bits.

► True

► **False (Pg# 99)**

49. Using ASCII standard the string abacdaacac will be encoded with 320 bits.

► True

► **False (Pg# 99)**

50. Using ASCII standard the string abacdaacac will be encoded with 100 bits.

► True

► **False (Pg# 99)**

51. Using ASCII standard the string abacdaacac will be encoded with 32 bytes

► True

► **False (Pg# 99) 8bytes**

52. The greedy part of the Huffman encoding algorithm is to first find two nodes with smallest frequency.

► **True (Pg# 100)**

► False

53. The greedy part of the Huffman encoding algorithm is to first find two nodes with character frequency

► True

► **False (Pg# 100)**

54. Huffman algorithm uses a greedy approach to generate an antefix code T that minimizes the expected length B (T) of the encoded string.

► True

► **False (Pg# 102)**

55.Depth first search is shortest path algorithm that works on un-weighted graphs.
► True
► **False (Pg# 159)**

56.Floyd-Warshall algorithm is a dynamic programming algorithm; the genius of the algorithm is in the clever recursive formulation of the shortest path problem.
► **True (Pg# 162)**
► Flase

57.Floyd-Warshall algorithm, as in the case with DP algorithms, we avoid recursive evaluation by generating a table for
► k
► k
ij d **(Pg# 164)**
► True
► Flase

58.The term coloring came from the original application which was in map drawing.
► **True (Pg# 176)**
► False

59. In the clique cover problem, for two vertices to be in the same group, they must be_each other.
► Apart from
► Far from
► Near to
► **Adjacent to (Pg# 176)**

60. Fixed-length codes may not be efficient from the perspective of_____the total quantity of data.
Select correct option:
► **Minimizing Pg# 99**
► Averaging
► Maximizing
► Summing

61.In greedy algorithm, at each phase, you take the_____you can get right now, without regard for future consequences.
► Worst
► Minimum
► Good
► **Best Page #97**

62.The difference between Prim s algorithm and Dijkstra s algorithm is that Dijkstra s algorithm uses a same key.
►True
► False Page# 156

63. If a problem is in NP-complete, it must also be in NP.
► True Page# 178
► False

64.If there are n items, there are_____possible combinations of the items.
►2
►n
► 2^n Page# 92
►3^n

65.Using ASCII code, each character is represented by a fixed-length code word of_____bits per character.
►4
►6
► 8 pg # 99
►10

66.In Knapsack Problem, the thief's goal is to put items in the bag such that the_____of the items does not exceed the limit of the bag.
► Value Page #91
►Weight
►Length
►Balance

67. The knapsack problem does not belong to the domain of optimization problems.
►True
► False Page# 91

68.In Huffman encoding, for a given message string, the frequency of occurrence (relative probability) of each character in the message is determined last.

►True
► False Page 100

69. Fixed-length codes are known for easy break up of a string into its individual characters.
► True Page# 99
►False

70.In_____Knapsack Problem, limitation is that an item can either be put in the bag or not-fractional items

are not allowed.
►0
►1
► 0/1 Page# 91
►Fractional

71.In Knapsack Problem, value and weight both are to be under consideration.
► **True page #91**
► False

72. Time complexity of DP based algorithm for computing the minimum cost of chain matrix Multiplication is _____.
► log n
► n
► n2
► **n3 Page #90**

73.In DP based solution of knapsack problem, to compute entries of V we will imply a/an_____approach.
► Subjective
► **Inductive Page #93**
► Brute force
► Combination

74. A greedy algorithm sometimes works well for optimization problems.
► **True Page# 97**
► False

75. In Huffman encoding, frequency of each character can be determined by parsing the message and _____how many times each character (or symbol) appears.
► Printing
► Incrementing
► **Counting (Page 100)**
► Deleting

76. Greedy algorithm can do very poorly for some problems.
► **True Page# 97**
► False

77. The Huffman codes provide a method of_____data efficiently.
► Reading
► **Encoding Page# 99**
► Decoding
► Printing

78. In_____based solution of knapsack problem, we consider 2 cases, Leave object Or Take object.
► Brute force
► Dynamic programming Page #93

79. Those problems in which Greedy finds good, but not always best is called a greedy_____.
► Algorithm
► Solution
► Heuristic Page# 97
► Result

80. In brute force based solution of knapsack problem, we consider 2 cases, Leave object Or Take object.
► TRUE
► FALSE Page# 97

81._____problem, we want to find the best solution.
► Minimization
► Averaging
► Optimization Page# 97
► Maximization

82. Using ASCII standard the string abacdaacac will be encoded with 10 bytes.
► True Page #101
► False

83. In_____algorithm, you hope that by choosing a local optimum at each step, you will end up at a global optimum.
► Simple
► Non-Greedy
► Greedy Page# 97
► Brute force

84. Huffman algorithm uses a greedy approach to generate an prefix code T that minimizes the expected length B (T) of the encoded string.
► True Page# 102
► False

85. Counting Money problem is an example which cannot be optimally solved by greedy algorithm.
► True Page# 97
► False

86. Huffman algorithm generates an optimum prefix code.
► True Page# 102
► False

87. If the string “lmncde” is coded with ASCII code, the message length would be_____bits.
► 24
► 36
► 48 6*8=48 page #99
► 60

88. There are_____nested loops in DP based algorithm for computing the minimum cost of chain matrix multiplication.
►2
► 3 Page# 90
►4

90.A number of lectures are to be given in a single lecture hall. Optimum scheduling for this is an example of Activity selection.
► True Page# 105
► False

91. The activity scheduling is a simple scheduling problem for which the greedy algorithm approach provides a/an_____solution.
► Simple
► Sub optimal
► Optimal Page# 105
► Non optimal

92. The string |xyz|, if coded with ASCII code, the message length would be 24 bits.
► True (3*8=24) page#99
► False

93. An application problem is one in which you want to find, not just a solution, but the_____solution.
► Simple
► Good Page #113
► Best

94. Suppose that a graph G = (V,E) is implemented using adjacency lists. What is the complexity of a breadth first traversal of G?
► O(|V |^2)
► O(|V | |E|)
► O(|V |^2|E|)
► O(|V | + |E|) pg #116

95. Which is true statement?
► Breadth first search is shortest path algorithm that works on un-weighted graphs Page #153
► Depth first search is shortest path algorithm that works on un-weighted graphs.

► Both of above are true.
► None of above are true.

96. Forward edge is:
► (u, v) where u is a proper descendent of v in the tree.
► (u, v) where v is a proper descendent of u in the tree. Page #129
► (u, v) where v is a proper ancesstor of u in the tree.
► (u, v) where u is a proper ancesstor of v in the tree.

97. If you find yourself in maze the better traversal approach will be :
► BFS (google)
► BFS and DFS both are valid

► Level order
► DFS

98. In digraph G=(V,E) ;G has cycle if and only if
► The DFS forest has forward edge.
► The DFS forest has back edge Page#131
► The DFS forest has both back and forward edge

99. Back edge is:
► (u, v) where v is an ancestor of u in the tree. Page# 128
► (u,v) where u is an ancesstor of v in the tree.
► (u, v) where v is an predcessor of u in the tree.
► None of above

100. Cross edge is :
► (u, v) where u and v are not ancestor of one another
► (u, v) where u is ancesstor of v and v is not descendent of u.
► (u, v) where u and v are not ancestor or descendent of one another Page# 129
► (u, v) where u and v are either ancestor or descendent of one another.

101. Kruskal's algorithm (choose best non-cycle edge) is better than Prim's (choose best tree edge) when the graph has relatively few edges.
► True google
► False

102. What algorithm technique is used in the implementation of Kruskal solution for the MST?
► Greedy Technique Page# 142
► Divide-and-Conquer Technique
► Dynamic Programming Technique
► The algorithm combines more than one of the above techniques

103. What is the time complexity to extract a vertex from the priority queue in Prim's algorithm?

► O (log E)

► (V)
► (V+E)
► O (log V) Page #152

104. The relationship between number of back edges and number of cycles in DFS is,
► Both are equal
► Back edges are half of cycles
► Back edges are one quarter of cycles
► There is no relationship between no. of edges and cycles Page# 131

105. You have an adjacency list for G, what is the time complexity to compute Graph transpose G^T.?
► (V + E) Page# 138
► (V E)
► (V)
► (V^2)

106. There is relationship between number of back edges and number of cycles in DFS
► Both are equal.

► Cycles are half of back edges.
► Cycles are one fourth of back edges.
► There is no relationship between back edges and number of cycles. Page# 131

107. A digraph is strongly connected under what condition?
► A digraph is strongly connected if for every pair of vertices u, v e V, u can reach v .
► A digraph is strongly connected if for every pair of vertices u, v e V, u can reach v and vice versa. Page# 135
► A digraph is strongly connected if for at least one pair of vertex u, v e V, u can reach v and vice versa.
► A digraph is strongly connected if at least one third pair of vertices u, v e V, u can reach v and vice versa.

108. In in-place sorting algorithm is one that uses arrays for storage :

► An additional array
► No additional array Page#54
► Both of above may be true according to algorithm
► More than 3 arrays of one dimension.

109. In stable sorting algorithm
► One array is used
► In which duplicating elements are not handled.
► More than one arrays are required.
► Duplicating elements remain in same relative position after sorting. Page# 54

110. Which sorting algorithm is faster :
► O(n^2)
► O(nlogn) Page# 46
► O(n+k)
► O(n^3)

111. In Quick sort algorithm, constants hidden in T(n lg n) are
► Large
► Medium
► Not known
► Small

112. Quick sort is based on divide and conquer paradigm; we divide the problem on base of pivot element and:
► There is explicit combine process as well to conquer the solution.
► No work is needed to combine the sub-arrays, the array is already sorted
► Merging the sub arrays
► None of above. Page# 51

113. Dijkstra's algorithm :
► Has greedy approach to find all shortest paths

► Has both greedy and Dynamic approach to find all shortest paths
► Has greedy approach to compute single source shortest paths to all other vertices Page# 154
► Has both greedy and dynamic approach to compute single source shortest paths to all other vertices.

114. Which may be stable sort:
► Bubble sort
► Insertion sort
► Both of above page# 54
► Selection sort

115. In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent_____series in the analysis,
► linear
► arithmetic
► geometric page #37
► exponent

116. How much time merge sort takes for an array of numbers?
► T(n^2)
► T(n) Page# 40
► T(log n)
► T(n log n)

117. Dijkstra's algorithm is operates by maintaining a subset of vertices
True Page# 155
False

118. The difference between Prim's algorithm and Dijkstra's algorithm is that Dijkstra's algorithm uses a different key.
►True Page# 156
► False

118. Consider the following adjacency list:
Which of the following graph(s) describe(s) the above adjacency list?

119. We do sorting to,
► keep elements in random positions

► keep the algorithm run in linear order
► keep the algorithm run in (log n) order
►keep elements in increasing or decreasing order Page# 40

120. After partitioning array in Quick sort, pivot is placed in a position such that
►Values smaller than pivot are on left and larger than pivot are on right Page# 48
► Values larger than pivot are on left and smaller than pivot are on right
► Pivot is the first element of array
► Pivot is the last element of array

121. Merge sort is stable sort, but not an in-place algorithm
►True (Page# 54)
► False

122. In counting sort, once we know the ranks, we simply_____numbers to their final positions in an output array.
► Delete
►copy (Page# 57)
► Mark
► arrange

123. Dynamic programming algorithms need to store the results of intermediate sub-problems.
►True (Page# 75)
► False

124. A p × q matrix A can be multiplied with a q × r matrix B. The result will be a p × r matrix C. There are (p . r) total entries in C and each takes_____to compute.
►O (q) (Page# 84)

► O (1)
► O (n2)
► O (n3)

125. _____is a graphical representation of an algorithm
► notation
► notation
► Flowchart
► Asymptotic notation

126. Which of the following is calculated with big o notation?
► Lower bounds
► Upper bounds (Page# 25)
► Both upper and lower bound
► Medium bounds

126. Merge sort makes two recursive calls. Which statement is true after these recursive calls finish, but before the merge step?
► The array elements form a heap
► Elements in each half of the array are sorted amongst themselves
► Elements in the first half of the array are less than or equal to elements in the second half of the array
► None of the above

127. non-optimal or greedy algorithm for money change takes_____
► O(k) (Page #99)
► O(kN)
► O(2k)
► O(N)

128. The Huffman codes provide a method of encoding data inefficiently when coded using ASCII standard.
► True
► **False (Page# 99**)

129. Using ASCII standard the string abacdaacac will be encoded with_____bits.
► 80 (Page #99)
► 160
► 320
► 100

130. Using ASCII standard the string abacdaacac will be encoded with 160 bits.
► True
► False (Page #99)

131. using ASCII standard the string abacdaacac will be encoded with 32 bytes
► True
► False (Page #99)

132. The greedy part of the Huffman encoding algorithm is to first find two nodes with smallest frequency.
► True (Page #100)

► False

133. The greedy part of the Huffman encoding algorithm is to first find two nodes with character frequency
► True
► False (Page# 100)

134. Huffman algorithm uses a greedy approach to generate an antefix code T that minimizes the expected length B (T) of the encoded string.
► True
► False (Page #102)

135. Depth first search is shortest path algorithm that works on un-weighted graphs.
► True
► False (Page# 153)

136. Dijkstras single source shortest path algorithm works if all edges weights are non negative and there are no negative cost cycles.
► True (Page#159)
► False

137. Dijkstra s single source shortest path algorithm works if all edges weights are negative and there are no negative cost cycles.
► True
► False (Page #159)

138. Floyd-Warshall algorithm is a dynamic programming algorithm; the genius of the algorithm is in the clever recursive formulation of the shortest path problem.
► True (Page #162)
► False

139. Floyd-Warshall algorithm, as in the case with DP algorithms, we avoid recursive evaluation by generating a table for
►k
► k
► ij d (Page# 164)
► True
► False

140. the term coloring came from the original application which was in map drawing.
► True (Page #176)
► False

141. In the clique cover problem, for two vertices to be in the same group, they must be__each other.
► Apart from
► Far from
► Near to
► Adjacent to (Page# 176)

142. Fixed-length codes may not be efficient from the perspective of_____the total quantity of data.
Select correct option:
►**Minimizing (Page #99)**
► Averaging
► Maximizing
▸ Summing

In greedy algorithm, at each phase, you take the_____you can get right now, without regard for future consequences.

► Worst
► Minimum
► Good
►**Best (Page #97)**

143. The difference between Prim s algorithm and Dijkstra s algorithm is that Dijkstra s algorithm uses a same key.
► True
►**False (Page# 156)**

144. If a problem is in NP-complete, it must also be in NP.
►**True (Page #178)**
► False

145. If there are n items, there are_____possible combinations of the items.
►2
►n
►**2^n (Page# 92)**
►3^n

146. Using ASCII code, each character is represented by a fixed-length code word of _____bits per character.

►4
►6
►**8 (Page #99)**
►10

147. In Knapsack Problem, the thief's goal is to put items in the bag such that the _____ of the items does not exceed the limit of the bag.
►**Value (Page# 91)**
►Weight
►Length
►Balance

148. The knapsack problem does not belong to the domain of optimization problems.
►True
►**False (Page# 91)**

149. In Huffman encoding, for a given message string, the frequency of occurrence (relative probability) of each character in the message is determined last.

► True
► False (Page #100)

150. Fixed-length codes are known for easy break up of a string into its individual

characters.
► True (Page# 99)
► False

151. In_____Knapsack Problem, limitation is that an item can either be put in the bag or not-fractional items are not allowed.
► 0
► 1
► 0/1 (Page# 91)
► Fractional

152. The term "coloring" came from the original application which was in architectural design.
► True
► False (Page# 173)

153. In Knapsack Problem, value and weight both are to be under consideration.
► True (page# 91)
► False

154. Time complexity of DP based algorithm for computing the minimum cost of chain matrix Multiplication is_____.
► log n
► n
► n2
► n3 (Page# 90)

155. In DP based solution of knapsack problem, to compute entries of V we will imply a/an approach.
► Subjective
► Inductive (Page# 93)
► Brute force
► Combination

156. A greedy algorithm sometimes works well for optimization problems.
► True (Page# 97)
► False

157. In Huffman encoding, frequency of each character can be determined by parsing the message and _ how many times each character (or symbol) appears.
► Printing
► Incrementing
► Counting (Page# 100)

► Deleting

159 .Greedy algorithm can do very poorly for some problems.

►**True (Page# 97)**

► False

160. The Huffman codes provide a method of_____data efficiently.

► Reading

►**Encoding (Page# 99)**

► Decoding

► Printing

161. In_____based solution of knapsack problem, we consider 2 cases, Leave object Or Take object.

► Brute force

►**Dynamic programming (Page #93)**

162. Those problems in which Greedy finds good, but not always best is called a greedy_____.

► Algorithm

► Solution

►**Heuristic (Page# 97)**

► Result

163. In brute force based solution of knapsack problem, we consider 2 cases, Leave object Or Take object.

► TRUE

►**FALSE (Page# 97)**

164. _____problem, we want to find the best solution.

► Minimization

► Averaging

►**Optimization (Page#97)**

► Maximization

165. Using ASCII standard the string abacdaacac will be encoded with 10 bytes.

►**True (Page# 101)**

► False

166. In_____algorithm, you hope that by choosing a local optimum at each step, you will end up at a global optimum.

► Simple

► Non Greedy

►**Greedy (Page# 97)**

► Brute force

167. Huffman algorithm uses a greedy approach to generate an prefix code T that minimizes the expected length B (T) of the encoded string.

►**True (Page #102)**

► False

168. How many elements do we eliminate in each time for the Analysis of Selection algorithm?
►**n / 2 elements (Page #37)**
► (n / 2) + n elements
► n / 4 elements
► 2 n elements

169. Slow sorting algorithms run in,
►**T(n^2) (Page #39)**
► T(n)
► T(log n)
► T(n log n)

170. Counting sort is suitable to sort the elements in range 1 to k:
► K is large
►**K is small (Page# 57)**
► K may be large or small
► None

171. Heaps can be stored in arrays without using any pointers; this is due to the _____nature of the binary tree,
►**left-complete (Page# 40)**
► right-complete
► tree nodes
► tree leaves

172. Sieve Technique can be applied to selection problem?
►**True (Page#35)**
► False

173. A heap is a left-complete binary tree that conforms to the _____
► increasing order only
► decreasing order only
►**heap order (Page# 40)**
► (log n) order

174. Divide-and-conquer as breaking the problem into a small number of
► pivot

► Sieve
►**smaller sub problems (Page #34)**
► Selection

175. In Sieve Technique we do not know which item is of interest
►**True (Page# 34)**
► False

176. The recurrence relation of Tower of Hanoi is given below T(n)={1 if n=1 and 2T(n-1) if n >1 In order to move a tower of 5 rings from one peg to another, how many ring moves are required?
► 16
► 10
► 32

►**31**

177. For the heap sort, access to nodes involves simple_____operations.
►**arithmetic (Page# 41)**
►binary
►algebraic
►logarithmic

178. For the sieve technique we solve the problem,
►**recursively (Page# 34)**
►mathematically
►precisely
►accurately

179. The sieve technique works in_____as follows
►**phases (Page #34)**
►numbers
►integers
►routines

180. A (an)_____is a left-complete binary tree that conforms to the heap order
►**heap (Page# 40)**
►binary tree
►binary search tree
►array

181. The sieve technique is a special case, where the number of sub problems is just
►5
►many

►**1 (Page #34)**
►few

182. Analysis of Selection algorithm ends up with,
►T(n)
►T(1 / 1 + n)
►T(n / 2)
►**T((n / 2) + n) (Page #37)**

183. For the heap sort we store the tree nodes in
►**level-order traversal (Page #40)**
►in-order traversal
►pre-order traversal
►post-order traversal

184. The reason for introducing Sieve Technique algorithm is that it illustrates a very important special case of,
►**divide-and-conquer (Page# 34)**
►decrease and conquer
►greedy nature
►2-dimension Maxima

185. Theta asymptotic notation for T (n) :

► Set of functions described by: c1g(n)Set of functions described by c1g(n)>=f(n) for c1 s
► Theta for T(n)is actually upper- and worst-case comp

► Set of functions described by:
► c1g(n)

186. Sieve Technique applies to problems where we are interested in finding a single item from a larger set of _____
► n items (Page# 34)
► phases
► pointers
► constant

187. Memorization is?
► To store previous results for future use
► To avoid these unnecessary repetitions by writing down the results of recursive calls and looking them up again if we need them later (Page# 47)
► To make the process accurate
► None of the above

188. Quick sort is
► Stable & in place

► Not stable but in place (Page#57)
► Stable but not in place
► Sometime stable & some times in place

189. One example of in place but not stable algorithm is
► Merger Sort

► Quick Sort (Page# 54)
► Continuation Sort
► Bubble Sort

190. Continuation sort is suitable to sort the elements in range 1 to k
► K is Large
► K is not known
► K may be small or large

► K is small (Page# 57)

191. Which may be a stable sort?
► Merger
► Insertion

► Both above (Page #54)
► None of the above

192. An in-place sorting algorithm is one that uses____arrays for storage
► Two dimensional arrays
► More than one array

► **No Additional Array (Page #54)**
► None of the above

193. Continuing sort has time complexity of ?
► **O(n**

► O(n+k)
► O(nlogn)
► O(k)

194. single item from a larger set of _____

► **n items (Page# 34)**
► phases
► pointers
► v constant

195. For the Sieve Technique we take time

► **T(nk) (Page# 34)**
► T(n / 3)
► n^2

► n/3

196. One Example of in place but not stable sort is

► **Quick (Page# 54)**
► Heap
► Merge
► Bubble

197. Consider the following Algorithm:
Factorial (n){
if (n=1)
return 1
else
return (n * Factorial(n-1))
{
Recurrence for the following algorithm is:
- ► T(n) = T(n-1) +1
- ► T(n) = nT(n-1) +1
- ► T(n)= T(n-1) +n
- ► **T(n)=T(n(n-1)) +1**

197. Due to left complete nature of binary tree, the heap can be stored in

► **Arrays (Page #40)**
- ► Structures
- ► Link List
- ►Stack

198. What type of instructions Random Access Machine (RAM) can execute?

► Algebraic and logic
► Geometric and arithmetic

► Arithmetic and logic (Page# 10)
► Parallel and recursive

199. What is the total time to heapify?

► O(log n) (Page 43)
► O(n log n)
► O(n2 log n)
► O(log2 n)

200. word Algorithm comes from the name of the Muslim author _____

► Abu Jaafar Mohammad ibn Musa al-Khwarizmi.

201. Al-Khwarizmi's work was written in a book titled _____

► al Kitab al-mukhatasar fi hisab al-jabr wa'l-muqabalah

202. Random access machine or RAM is a/an
► Machine build by Al-Khwarizmi
► Mechanical machine
► Electronics machine

► Mathematical model (Page# 10)

203. A RAM is an idealized machine with_____random-access memory.
► 256MB
► 512MB

► an infinitely large (Page #10)
► 100GB

204. What will be the total number of max comparisons if we run brute-force maxima algorithm with n elements?
►
►
► **(Page# 14)**
►

205. Consider the following code:

```
For(j=1; j<n;j++)

For(k=1; k<15;k++)
For(l=5; l<n; l++)
{
Do_something_constant();
```

}
What is the order of execution for this code.

- **► O(n)**
- ► O(n3)
- ► O(n2 log n)
- ► O(n2)

206. Is it possible to sort without making comparisons?

► Yes (Page# 57)

- ► No

207. When we call heapify then at each level the comparison performed takes time

► It will take Θ (1) (Page# 43)

- ► Time will vary according to the nature of input data
- ► It can not be predicted
- ► It will take Θ (log n)

208. In Quick sort, we don't have the control over the sizes of recursive calls

► True (Page# 40)

- ► False
- ► Less information to decide
- ► Either true or false

209. For Chain Matrix Multiplication we cannot use divide and conquer approach because,

► We do not know the optimum k (Page# 86)

- ► We use divide and conquer for sorting only
- ► We can easily perform it in linear time
- ► Size of data is not given

210. The Knapsack problem belongs to the domain of_____problems.

► Optimization (Page# 91)

- ► NP Complete
- ► Linear Solution
- ► Sorting

211. Suppose we have three items as shown in the following table, and suppose the capacity of

the knapsack is 50 i.e. W = 50.

Item Value Weight
1 60 10
2 100 20
3 120 30
The optimal solution is to pick

- ► Items 1 and 2
- ► Items 1 and 3

► **Items 2 and 3**
► None of these

212. who invented the quick sort

► **C.A.R. Hoare**
213. main elements to a divide-and-conquer

► **Divide, conquer, combine (Page# 27)**

214. Merge sort is a stable algorithm but not an in-place algorithm.

► **True (Page# 54)**
► false

215. Counting sort the numbers to be sorted are in the range 1 to k where k is small.

► **True (Page# 57)**
► False

216. In selection algorithm, because we eliminate a constant fraction of the array with each phase, we get the

► **Convergent geometric series (Page 37)**
► Divergent geometric series
► None of these

217 .In RAM model instructions are executed

► **One after another (Page# 10)**
► Parallel

218. Due to left-complete nature of binary tree, heaps can be stored in
► Link list
► Structure

► **Array (Page# 40)**
► None of above

219. The time assumed for each basic operation to execute on RAM model of computation is-----
► Infinite
► Continuous

► **Constant (Page# 10)**
► Variable

220. If the indices passed to merge sort algorithm are not equal, the algorithm may return immediately.
► True

► **False (Page# 28)**

221. Brute-force algorithm uses no intelligence in pruning out decisions.

► **True (Page #18)**
► False

222. In analysis, the Upper Bound means the function grows asymptotically no faster than its largest term.

► **True (Page #24)**
► False

223. For small values of n, any algorithm is fast enough. Running time does become an issue when n gets large.

► **True (Page #14)**
► False

224. In simple brute-force algorithm, we give no thought to efficiency.

► **True (Page# 11)**

► False

225. The ancient Roman politicians understood an important principle of good algorithm design that is plan-sweep algorithm.
► True

► **False (Page# 27)**

226. In 2d-space a point is said to be_____if it is not dominated by any other point in that space.
► Member
► Minimal

► **Maximal (Page# 11)**
► Joint

227. An algorithm is a mathematical entity that is dependent on a specific programming language.
► True

► **False (Page# 7)**

228. The running time of an algorithm would not depend upon the optimization by the compiler but that of an implementation of the algorithm would depend on it.

► **True (Page# 13)**
► False

229. F (n) and g (n) are asymptotically equivalent. This means that they have essentially the same _____for large n.
► Results
► Variables
► Size

► **Growth rates (Page#23)**

230. 8n2 + 2n - 3 will eventually exceed c2*(n) no matter how large we make c2.

► **True (Page# 25)**
► False

231. If we associate (x, y) integers pair to cars where x is the speed of the car and y is the negation of the price. High y value for a car means a_____car.
► Fast
► Slow

►Expensive

►Cheap (Page# 11)

232. The function f(n)= n(logn+1)/2 is asymptotically equivalent to n log n. Here Upper Bound means the function f(n) grows asymptotically_____faster than n log n.

► More
►Quiet

►Not (Page# 24)
►At least

233. Counting Money problem is an example which cannot be optimally solved by greedy algorithm.

►True (Page# 97)
►False

234. Huffman algorithm generates an optimum prefix code.

►True (Page #102)
►False

235. If the string "lmncde" is coded with ASCII code, the message length would be_____bits.
►24
►36
►48 (6*8=48)
►60

236. There are_____ nested loops in DP based algorithm for computing the minimum cost of chain matrix multiplication.
►2

►3 (Page# 90)
►4
►5

237. Inductive approach to compute entries of V is implied in_____based solution of knapsack problem.
►Brute force

►Dynamic programming (Page #93)

238. A number of lectures are to be given in a single lecture hall. Optimum scheduling for this is an example of Activity selection.

►True (Page# 105)
►False

239. The activity scheduling is a simple scheduling problem for which the greedy algorithm approach provides a/an_____solution.

►Simple

►Sub optimal

►Optimal (Page# 105)

►Non optimal

240. The string |xyz|, if coded with ASCII code, the message length would be 24 bits.

►True (3*8=24)

►False

241. An application problem is one in which you want to find, not just a solution, but the _____ solution.

►Simple

►Good (Page# 113)

►Best

►Worst

• A free tree with n vertices has exactly_____edges.

n

n+1

►c. n-1 page 142

►1

3) Kruskal`s algorithm works by adding_____in increasing order of weight (lightest edge first)

• Verticals

b. **Edges page 147**

• Trees

• Weights

6) Computing the strongly connected components of a digraphs is a/an_____of the problem to determine whether a diagraph is strongly connected or not

• Size

b. Generalization page 135

10) The process of updating estimates in Dijkstra`s algorithm is called _____

• Updating

• Amendment

c. Relaxation page 154

• Insertion

• An un-weighted graph can be considered as a graph in which every edge has weight_____Unit.

7
5
3
1 page 153

The breadth-first-search algorithm is a shortest-path algorithm that works

on_____
graphs.
• Weighted
• Directed
c. **Un-weighted page 153**
d. Un-directed

14) Which activity creates a unique cycle in a free tree:
• adding any vertex
• adding any sub tree
• adding root
d. **adding any edge page 142**

8. An edge (u, v)_____ E - A is safe if A_____{(u, v)} is viable.
a. **Ɛ,U page 143**
• U,Ɛ
• Ɛ,Π
• Π,U

18) The relationship between number of back edges and Number of cycles in DFS is,
• Both are equal
• Back edges are half of cycles
• Back edges are one quarter of cycles
d. There is no relationship between no. of edges and cycles google

10. From given algorithms which one considered as best for finding the shortest-path:
19) DFS
20) Bellman-Ford algorithm
c. **Dijkstra's algorithm page 154 / google**
d. BFS

11. Overall time for Kruskal algorithm is
a. Θ(log E)
b. Θ(E log V) page 149 / google

12. Dijkstra's Algorithm is used to solve_____problems.
a. All-pair shortest path
b. Single-source shortest path page 154
• Multi-source shortest path
• Sorting & searching

13. A digraph is strongly connected under what condition?
A digraph is strongly connected if for
every pair of vertices u, v e V, u can

reach v.

A digraph is strongly connected if for every pair of vertices u, v e V, u can reach v and vice versa. Page 135

A digraph is strongly connected if for at least one pair of vertex u, v e V, u can reach v and vice versa.

A digraph is strongly connected if at least one third pair of vertices u, v e V, u can reach v and vice versa.

14. Floyd-Warshall Algorithm is based on _____

a. **Dynamic Programming page 161**

• Greedy Approach

• Divide and Conquer

• Complexity theory

15. In strong components algorithm, vertices are sorted in_____order of finish times.

a. Any

b. Increasing

Decreasing page 141 / google

c. Strong

16. _____is commonly the running time of Dijkstra's Algorithm using the binary heap method.

a. **Θ (E log V) page 156**

• Θ (V log)

• Θ (log E)

• Θ (Blog V)

17. Which technique is used in the implementation of Kruskal solution for the MST?

a. **Greedy Technique page 142 / google**

26) Divide-and-Conquer Technique

27) Dynamic Programming Technique

28) The algorithm combines more than one of the above techniques i.e. Divideand-Conquer and Dynamic Programming

18. A fully connected undirected graph of 5 nodes will have_____edges.

28) 4

29) 5

c. **10 n(n-1)/2**

d. 15

19. Prim's algorithm is based on_____strategy.

Greedy page 150 / google
a. Dynamic programming
b. Divide and Conquer
c. Exponential

20. We say that two vertices u and v are mutually_____if u can reach v and vice versa.
Crossed
Forward
Reachable page 135
Not Reachable

21. In Dijkstra's algorithm, initially the estimated value from source vertex to any vertex v is:
a. Zero (0)
b. One (1)
c. Minus one (-1)
d. Infinity (∞) page 154

22. A strongly connected component only apply to:
a. **Directed Graph page 135 / google**
• Undirected Graph
• Minimum Spanning Tree
• Breadth First Search

23. A graph may contain_____
32) Exactly one MST
33) No MST
34) One or zero MST
d. **More than one MST google**

24. In_____algorithm(s), at any time, the subset of edges A forms a single tree.
a. Kruskals
b. Prim's page 149
32) kruskal's and Prim's
33) BFS

25. The_____given by DFS allow us to determine a number of things about a graph or digraph
a. color stamps
c. time stamps page 130
b. line stamps
c. node stamps

26. In Kruskal's algorithm, the vertices will be stored in_____.
a. links
d. sets page 147

• nodes
• Loops

27. Keeping in mind the shortest path, if given scenarios occur in computer networks like the internet where data packets have to be routed. The vertices are_____. Edges are _____which may be wired or wireless.
a. **Routers, communication links page 153**
• Internet, routers
• Communication links, routers
• Routers, internet

28. In computing the strongly connected components of a digraph. vertices of the digraph are_____into subsets
a. Joined
e. Partitioned page 135
b. Deleted
c. Created

29. In undirected graph, by convention all the edges are called_____edges.
a. Forward
f. Back page 130
37) Cross
38) Both forward and back

30. In Timestamped DFS, No back edges means_____
a. 1 cycle
g. no cycles page 131
38) DFS
39) BFS

31. In Prim's algorithm, we start with the_____vertex r, it can be any vertex.
• Pivot
• Leaf
• negative
d. **Root page 149**

32. The ancestor and descendent relation can be nicely inferred by the_____lemma.
addition
division

parenthesis page 129
node

33. Which of the following statement is true?
• Kruskal algorithm is multiple source technique for finding MST.
• Kruskal's algorithm is used to find minimum spanning tree of a graph, time complexity of this algorithm is 0(EV)
• Both I and II
• Kruskal’s algorithm (choose best non-cycle edge) is better than Prim's (choose best Tree edge) when the graph has relatively few edges.
See option B of Sr 46

34. The time complexity to compute Graph transposes G^T is (V+E), if you have___for G.
a. **an adjacency list page 138**
• Array list
• complete list
• stack

35. In Prim's algorithm, If there is no edge from u to a vertex in S. we set the key value to_____
• 0
• 1
• -1
d. ∞ **page 151**

36. What is the time complexity to extract a vertex from the priority queue in Prim's algorithm?
• O(log E)
• O(V)
• O(V+E)
d. **O(logV) page 152**

37. Edge weights can be interpreted as distance _____
• in breadth-First Search
• in Queue's
c. **in the shortest-paths page 153**
d. in depth-First Search

38. The_____given by DFS allow us to determine whether the graph contains any cycles.
a. Order

Time stamps page 130
47) BFS traversing

48) Topological sort

39. Dijkstra's algorithm works on a weighted directed graph G(V, E) in which all weights _____are non-negative.
a. vertices

edges page 154
• nodes
• links

40. By breaking any edge on a cycle created in free tree, the free_____is restored.
a. Edge

Tree page 142
49) Cycle
50) Vertex

41. Bellman-Ford algorithm is used to solve_____problems.
a. All pair shortest path

Single source shortest path google
49) Flow of networking
50) Double source shortest path

42. From the given options which one is correct regarding the time complexity of Dijkstra's algorithm
• O(N)
• O(N^3)
• O(N^2)
d. **O(log N) google**

43. In which algorithm, information of shortest path is propagated sequentially along each shortest path in the graph.

Bellman-Ford page 16
52) Brute-force technique
53) Dijkstra's
54) Prim's

44. In Timestamped DFS-cycles lemma, if edge (u, v) is a tree, forward or cross edge, then a. f[u] < f[v]

f[u] > f[v] page 130
52) f[u] ≤ f[v]
53) f[u] ≥ f[v]

45. Bellman-Ford Algorithm does not allow G(graph) to have _____
a. positive cost cycles

negative cost cycles page 159
53) negative weights edges
54) positive weights edges

46. Kruskal algorithm (choose best non cycle edge) is better than Prims (choose best tree edge) when the_____has relatively few_____
a. tree, edges

graph edges see option D of Sr 23
• tree, branches
• graph, branches

47. Finding the faster result of the shortest path from u to v for every pair of vertices and we use
54) Single-pair shortest-paths problem
55) Two pair shortest the problem

All pair shortest paths problem page 153
b. both I and II

48. There are no _ edges in undirected graph.
a. Forward
b. Back

Cross page 130
c. Both forward and back

49. Networks are_____in the sense that it is possible from any location in the network to reach any other location in the digraph

a. Complete page 135
56) Incomplete
57) Not graphs
58) Transportation

50. Dijkstra's algorithm:
a. Has greedy approach to find all shortest paths
b. Has both greedy and Dynamic approach to find all shortest paths

Has greedy approach to compute single source shortest paths to all other vertices page 154

57) Has both greedy and dynamic approach to compute single source shortest paths to all other vertices

51. Bellman-Ford algorithm is slower than
a. Brute-force technique

Dijkstra's page 159
58) Prim's
59) Graph Algorithm

52. Dijkstra's Algorithm cannot be applied on
a. directed and weighted graphs

graphs having negative weight function (google)

53. Which of the following is used in the data structure for implementing Dijkstra's Algorithm?
59) Max heap
60) Stack's

Circular queue

d. Priority queue (Google)

54. In Generic approach determining of Greedy MST, we maintain a subset A of _____
a. **Edges page 143**
• Vertices
• Cycles
• Paths

55. In Dijkstra's algorithm the estimated value of source vertex d[s] is
a. **Equal to 0 page 154**
• Equal to 1
• Greater than 0
• Greater than 1

56. Dijkstra's algorithm is a simple_____algorithm for computing the single-source shortest-paths to all other vertices.
a. **Greedy page 154**
61) Bellman-Ford
62) Divide and conquer
63) Brute-Force

57. In Timestamped DFS. If there is a back edge (u, v) then v is an ancestor of u and by following tree edge from v to u, we get_____.
a. nothing
b. a cycle page 131
62) a line
63) a graph

58. There exists a unique path between any_____vertices of a free tree.
a. One
c. Two page 142
• Three
• Four

59. _____technique is look like propagating wave-front outward.
a. Generic traversal
d. Breadth first traversal page 117
64) Depth first traversal

60. You have an adjacency list for G, what is the time complexity to compute Graph transpose G^T?
a**. (V+E) page 138**
• V.E
• V
• E

61. In the shortest-paths problem, we are given a weighted of_____G =(V, E).
a. **Directed graph page 153**
65) Line graph
66) Un-directed graph
67) Weighted graph

62. Equivalence relation partitions the vertices into_____classes of mutually reachable vertices and these are the strong components
a. Variance
e. Equivalence page 136
66) Non equivalence
67) Non classes

63. Overall Running time of Prim's algorithm is_____.
67) Θ(ElogE)
68) Θ(ElogV)
f. Θ((V+E)logV) page 152
b. Θ((V+E)logE)

64. For_____graphs, there is no distinction between forward and back edges.
a. large
b. directed
g. undirected page 130
c. medium

65. For_____graphs, there is no distinction between forward and back edges.
a. **Undirected page 130**
• directed
• small
• large

66. As the Kruskal's algorithm runs, the edges in viable set A induce a_____on the vertices.
a. Set
b. Graph
c. Tree
h. Forest page 147

67. In strong components algorithm, the form of graph is used in which all the_____of

original graph G have been reversed in direction.
a. Vertices
i. Edges page 138
b. Both edges & vertices
c. Trees

68. In computing the_____components of a digraph, vertices of the digraph are partitioned into subsets.
a. weakly connected
j. strongly connected page 135
b. best
c. worst

69. Timestamp structure of_____is used in determining the strong components of a digraph.
DFS google
a. BFS

b. Both DFS & BFS
c. MST

70. In Prim's algorithm, if the color of a vertex is_____then it is in S otherwise not.
a. White
b. Gray
Black page 151
c. Blue

71. Digraphs_____in communication and transportation networks.
a. are not used
are used page 135
b. parts are used
c. final value is used

72. Once you enter a strong component, every vertex in the component is_____.
a. not reachable
reachable page 137
b. reachable some times
c. removed

73. In Kruskal's algorithm, the next edge is added to viable set A, if its adding does not induce a/an_____.
a. Vertex
b. Edge
Cycle page 147
c. Tree

74. Problems such as the shortest route between cities can be solved efficiently by modelling the road map as a_____.
a. Tree
Graph page 153
b. Linked list
c. Stack

75. In Bellman-Ford Algorithm, relaxation applies to every edge of the graph and repeat this_____time.
a. E – 1
b. E + 1
c. V + 1
V – 1 page 159

76. A topological sort of a DAG is a_____ordering of the vertices of the DAG such

that for each edge (u, v), u appears before v in the ordering.

Linear page 134

a. Parallel
b. Sequence
c. Non-linear

77. Adding any edge to a free tree creates a unique _____

a. Vertex
b. Edge

Cycle page 142

c. Strong component

78. Back edge is:

(u, v) where v is an ancestor of u in the tree. Page 128

a. (u, v) where u is an ancestor of v in the tree.
b. (u, v) where v is a predecessor of u in the tree.
c. (u, v) where u is a mid of v in the tree.

79. In Kruskal's algorithm, the next_____is not added to viable set A, if its adding induce a/an cycle.

a. Vertex

Edge page 147

b. Cycle
c. Tree

80. Which of the following statement is false about Dijkstra'sAlgorithm?

It can be applied on graphs having a negative weight function google

a. It is used to solve Single-source shortest path
b. It works on a weighted directed graph
c. Its implementation in data structure is possible through the priority queue 81. In

strong components algorithm, first of all DFS is run for getting_____times of vertices.

Start page 138

a. Finish
b. Both start & finish
c. Middle

82. The tricky part of_____algorithm(s) is/are, how to detect whether the addition of an edge will create a cycle in viable set A.

Kruskal's page 149

a. Prim's
b. Both Kruskal's and Prim's
c. DFS

83. _____components are not affected by reversal of all edges in terms of vertices reachability.

Strongly connected page 139

a. Weakly connected
b. First two
c. Last two

84. In Prim's algorithm, we will make use of_____.

a. Stack

Priority Queue page 150

b. Array
c. List

85. The component digraph is necessarily_____.

a. straight
b. cyclic

acyclic page 136

c. strong

86. A free tree with n_____have exactly n - 1_____.

a. vertices, nodes
b. edges, vertices
c. nodes, vertices

vertices, edges page 142

87. For each vertex u ∈ (V-S), we associated Key

a. Key[v]
b. Key[s]

Key[u] page 151

c. Key[v-s]

88. If you find yourself in maze the better traversal approach will be:

a. **BFS google (always return with short part)**
c. Level order
d. DFS

89. Forward edge is :

a. (u, v) where u is proper descendent of v in the tree

(u, v) where v is proper descendent of u in the tree page 129

b. (u, v) where v is proper ancestor of u in the tree
c. (u, v) where u is proper ancestor of v in the tree

90. cross edge is :
a. (u, v) where u and v are not ancestor of one another
b. (u, v) where u is ancestor of v and v is not descendent of u
(u, v) where u and v are not ancestor or descendent of one another page 129
c. (u, v) where u and v are either ancestor of descendent of one another

91. The running time of Bellman-Ford algorithm is_____.
a. Θ(V + E)
b. Θ(E + E)
Θ(VE) page 159
c. Θ(V + V)

92. In Bellman-Ford Algorithm, relaxation applies to_____of the graph.
a. **Every edge page 159**

93. If a subset of edges A is visible for building MST, it cannot contain a/an_____
a. Vertex
b. Edge
Cycle page 143
c. Graph

94. In Timestamped DFS-cycles lemma, if edge (u, v) is a back edge, then_____.
a. f[u] <f[v]
b. f[u] > f[v]
f[u] ≤ f[v] page 130
c. f[u] ≥ f[v]

95. In digraph G=(V,E) ;G has cycle if and only if
a. The DFS forest has forward edge.
The DFS forest has back edge page 131
b. The DFS forest has both back and forward edge
c. BFS forest has forward edge

96. The key[u] is the weight of the_____going from u to any vertex in S.
a. **lightest edge page 151**

97. In Bellman-Ford Algorithm, path consists of at most_____edges.
a. V + 1
V-1 page 160
b. E + 1
c. E-1

98. According to parenthesis lemma, vertex u is a descendent of v vertex it and only if;

a. **[d[u], f[u]] ⊆ [d[v], f[v]] page 129**
b. [d[u], f[u]] ⊇ [d[v], f[v]]
c. Unrelated
d. Disjoint

99. According to parenthesis lemma, vertex u is an ancestor of v vertex it and only if; a. [d[u], f[u]] ⊆[d[v], f[v]]
b. **[d[u], f[u]] ⊇ [d[v], f[v]] page 129**
c. Unrelated
d. Disjoint

100. Edge weights can be interpreted as distance_____.
a. in breadth-First Search
b. in Queue's
in the shortest-paths page 153
c. in depth-First Search

101. _____algorithm allows negative weights edges and no negative cost cycles.
a. Brute-force technique
Bellman-Ford page 159
b. Dijkstra's
c. Prim's

In Huffman encoding, the characters with smallest probabilities are placed at the---------- depth of the tree.
• Minimum
• Average
Maximum page 102
• Root

There are----------ways to representing graphs.
• 3
• 1
2 page 116
• 4

Each time we traverse graph by Breadth-first search algorithm, we count the distance from---.
• Starting node
Neighbors of the starting node page 117
• Right most node
• Left most node

In Activity Selection problem, intuitively ----------.
• There are always short activities as input
• Short activities are not attractive
• Duration of the activities does not matter
We do not like long activities page105

65) The activity scheduling is a simple scheduling problem for which the greedy algorithm approach provides a/an ---------- solution.
• Simple
• Sub-optimal
Optimal page 105
• Non optimal

The---------- is a problem for which the greedy algorithm approach provides an optimal solution.
Activity selection page 105
• Dynamic programming
• Knapsack problem
• NP complete problem

Which of the following ways can be used to represent a graph?
• Adjacency list
• Incidence matrix
Adjacency list , Adjacency Matrix page 116
• No way to represent

Queue Data Structure work on ---------- principles.
FIFO(first in first out) cs301

Graphs can be represented by an---------- and---------- --.
• queue , stack
adjacency list , adjacency matrix page 116
• adjacency right , adjacency left
• Binary , linear

Identify a TRUE statement about Knapsack.
• The Knapsack Problem does not belongs to the domain of optimization problems
The Knapsack Problem belongs to the domain of optimization problems page

The running time of brute-force algorithm to solve Knapsack problem is------
• O(n)

• O(n3)
• O (n!)
O(2^n) pg#92

If a matrix has three rows and two columns, the dimension of matrix will be:
3x2 Conceptual
• 2x3
• 3x3
• 2x2

The Probability in Huffman encoding is the number of occurrences of a character divided by the total ---------- in the message.
• Numbers
• Frequencies
• Strings

Characters pg#100

In recursive formulation of Knapsack
Problem: V [0, j] = ---------- for j>=0
• -1
0 pg#93
• 1
• 2

The Knapsack Problem belongs to the domain of ---------- problem.
Optimization pg#91
• Sorting
• Linear solution
• Searching

An optimization problem is one in which you want to find the ----------solution.
• Simple
• Good
Best pg#97
• Worst

Huffman algorithm generates an optimum ---------- code.
Prefix page 102
• Postfix
• Infix
• None of the above

Which of the following algorithms solves the Fractional Knapsack Problem more effectively?

Divide and Conquer
Greedy algorithm page 109

If we implement the bag by using a queue, we have -------- --.
BFS page 124
• DFS
• Graph
• Loop

One of the limitation in 0/1 Knapsack is that an item can either be----------in the bag or not.
• Use
Put page 91
• Move
• Store

In Dynamic Programming based solution of Knapsack Problem, if we decide to take an object'i' then we gain ---------- --.
• W(Total weight of Knapsack)
• V(Total value of all items)
vi(value of object i) page 93
• None of the given option

An activity scheduling algorithm, the width of a rectangle ----------.
Indicates the duration of an activity page 106

The prefix code generated by Huffman algorithm---------- the expected length of the encoded string.

Minimizes page 102

• Balances
• Maximizes
• Keeps constant