



BRAINWARE UNIVERSITY

Term End Examination 2021 - 22

Programme – Bachelor of Technology in Computer Science & Engineering

Course Name – Design and Analysis of Algorithm

Course Code - BCSE401

(Semester IV)

Time allotted : 1 Hrs.25 Min.

Full Marks : 70

[The figure in the margin indicates full marks.]

Group-A

(Multiple Choice Type Question)

1 x 70=70

Choose the correct alternative from the following :

- (1) Which of the following is/are property/properties of a dynamic programming problem?

a) Optimal substructure	b) Overlapping sub problems
c) Greedy approach	d) Both optimal substructure and overlapping sub problems
- (2) If a problem can be solved by combining optimal solutions to non-overlapping problems, the strategy is called _____

a) Dynamic programming	b) Greedy
c) Divide and conquer	d) Recursion
- (3) In dynamic programming, the technique of storing the previously calculated values is called _____

a) Saving value property	b) Storing value property
c) Memoization	d) Mapping
- (4) Which of the following problems is NOT solved using dynamic programming?

a) 0/1 knapsack problem	b) Matrix chain multiplication problem
c) Edit distance problem	d) Fractional knapsack problem
- (5) The 0/1 Knapsack problem is an example of _____

a) Greedy algorithm	b) 2D dynamic programming
c) 1D dynamic programming	d) Divide and conquer
- (6) Which of the following methods is efficient in solving Fractional Knapsack problem?

a) Brute force	b) Recursion
c) Dynamic programming	d) Greedy
- (7) You are given a knapsack that can carry a maximum weight of 60. There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. What is the maximum value of the items you can carry using the knapsack?

a) 160	b) 200
c) 170	d) 90
- (8) Consider the two matrices P and Q which are 10 x 20 and 20 x 30 matrices respectively. What is

the number of multiplications required to multiply the two matrices?

a) 10 X 20

b) 20 X 30

c) 10 X 30

d) 10 X 20 X 30

(9) Which of the problems cannot be solved by backtracking method?

a) n-queen problem

b) Subset sum problem

c) Hamiltonian circuit problem

d) Travelling salesman problem

(10) Backtracking algorithm is implemented by constructing a tree of choices called as?

a) State-space tree

b) State-chart tree

c) Node tree

d) Backtracking tree

(11) What happens when the backtracking algorithm reaches a complete solution?

a) It backtracks to the root

b) It continues searching for other possible solutions

c) It traverses from a different route

d) Recursively traverses through the same route

(12) In what manner is a state-space tree for a backtracking algorithm constructed?

a) Depth-first search

b) Breadth-first search

c) Twice around the tree

d) Nearest neighbor first

(13) In general, backtracking can be used to solve?

a) Numerical problems

b) Exhaustive search

c) Combinatorial problems

d) Graph coloring problems

(14) Worst case complexity is equivalent to bound.

a) upper

b) lower

c) tight

d) no

(15) _____ enumerates a list of promising nodes that could be computed to give the possible solutions of a given problem.

a) Exhaustive search

b) Brute force

c) Backtracking

d) Divide and conquer

(16) The problem of finding a subset of positive integers whose sum is equal to a given positive integer is called as?

a) n- queen problem

b) Subset sum problem

c) Knapsack problem

d) Hamiltonian circuit problem

(17) The problem of placing n queens in a chessboard such that no two queens attack each other is called as?

a) n-queen problem

b) Eight queens puzzle

c) Four queens puzzle

d) 1-queen problem

(18) For how many queens was the extended version of Eight Queen Puzzle applicable for n X n squares?

a) 5

b) 6

c) 8

d) n

(19) How many solutions are there for 8 queens on 8 X 8 board?

a) 12

b) 91

c) 92

d) 93

(20) How many total solutions are for 3 queens on a 3 X 3 board?

a) 1

b) 2

c) 3

d) 0

(21) Average case complexity is equivalent to bound.

a) upper

b) lower

c) tight

d) no

(22) Which of the following is/are asymptotic notation?

- a) Big-O
c) Theta
- b) Big-Omega
d) All of these
- (23) Of the following given options, which one of the following is a correct option that provides an optimal solution for 4-queens problem?
- a) 3,1,4,2
c) 4,3,2,1
- b) 2,3,1,4
d) 4,2,3,1
- (24) Which of the following methods can be used to solve n-queen's problem?
- a) Greedy algorithm
c) Iterative improvement
- b) Divide and conquer
d) Backtracking
- (25) In n-queen problem, how many total solutions are there for n=4?
- a) 1
c) 3
- b) 2
d) 4
- (26) Given items as {value,weight} pairs $\{\{60,20\},\{50,25\},\{20,5\}\}$. The capacity of knapsack=40. Find the maximum value output assuming items to be divisible and non-divisible respectively.
- a) 100, 80
c) 130, 110
- b) 110, 70
d) 110, 80
- (27) The main time taking step in fractional knapsack problem is _____
- a) Breaking items into fraction
c) Sorting
- b) Adding items into knapsack
d) Looping through sorted items
- (28) Given items as {value,weight} pairs $\{\{40,20\},\{30,10\},\{20,5\}\}$. The capacity of knapsack=20. Find the maximum value output assuming items to be divisible.
- a) 60
c) 100
- b) 80
d) 40
- (29) What is the objective of the knapsack problem?
- a) To get maximum profit
c) To get maximum weight in the knapsack
- b) To get minimum profit
d) To get minimum weight in the knapsack
- (30) Fractional knapsack problem is solved most efficiently by which of the following algorithm?
- a) Divide and conquer
c) Greedy algorithm
- b) Dynamic programming
d) Backtracking
- (31) How many number of moves are required to move 3 discs from one tower to another tower in Tower of Hanoi problem?
- a) 5
c) 7
- b) 6
d) 8
- (32) How many number of moves are required to move N discs from one tower to another tower in Tower of Hanoi problem?
- a) (2 to the power N) - 1
c) (2 to the power N) / 1
- b) (2 to the power N) + 1
d) (N to the power 2) - 1
- (33) What is the objective of tower of hanoi puzzle?
- a) To move all disks to some other rod by following rules
c) To move all disks to some other rod in random order
- b) To divide the disks equally among the three rods by following rules
d) To divide the disks equally among three rods in random order
- (34) Recurrence equation formed for the tower of hanoi problem is given by _____
- a) $T(n) = 2T(n-1)+n$
c) $T(n) = 2T(n-1)+c$
- b) $T(n) = 2T(n/2)+c$
d) $T(n) = 2T(n/2)+n$
- (35) Master's theorem is used for?
- a) Solving recurrences
c) Analyzing loops
- b) Solving iterative relations
d) Calculating the time complexity of any code

- (36) How many cases are there under Master's theorem?
 a) 2
 b) 3
 c) 4
 d) 5
- (37) In which case of master theorem can be solved by binary search?
 a) 1
 b) 2
 c) 3
 d) It cannot be solved using master's theorem
- (38) What is the definition of graph according to graph theory?
 a) visual representation of data
 b) collection of vertices and edges
 c) collection of edges
 d) collection of vertices
- (39) The number of colors used by a proper coloring graph is called?
 a) k coloring graph
 b) x coloring graph
 c) m coloring graph
 d) n coloring graph
- (40) What is a chromatic number?
 a) The maximum number of colors required for proper edge coloring of graph
 b) The maximum number of colors required for proper vertex coloring of graph
 c) The minimum number of colors required for proper vertex coloring of graph
 d) The minimum number of colors required for proper edge coloring of graph
- (41) What will be the chromatic number for an empty graph having n vertices?
 a) 0
 b) 1
 c) 2
 d) n
- (42) What will be the chromatic number for a line graph having n vertices?
 a) 0
 b) 1
 c) 2
 d) n
- (43) Which algorithm is used to solve a minimum cut algorithm?
 a) Gale-Shapley algorithm
 b) Ford-Fulkerson algorithm
 c) Stoer-Wagner algorithm
 d) Prim's algorithm
- (44) _____ separates a particular pair of vertices in a graph.
 a) line
 b) arc
 c) cut
 d) flow
- (45) How many edges in a spanning tree of a graph with v vertices and E edges?
 a) V-1
 b) V+1
 c) E-1
 d) E+1
- (46) Which of the following algorithm is/are used to find minimum spanning tree?
 a) Prim
 b) Kruskal
 c) Prim and Kruskal
 d) None of these
- (47) Which of the following is/are methods to solve recurrence equations?
 a) substitution
 b) recursion tree
 c) master method
 d) all of these
- (48) Does Ford- Fulkerson algorithm use the idea of?
 a) Naive greedy algorithm approach
 b) Residual graphs
 c) Minimum cut
 d) Minimum spanning tree
- (49) Which of the following is/are parameter to check efficiency of an algorithm?
 a) time complexity
 b) space complexity
 c) time and space complexity
 d) none of these
- (50) A simple acyclic path between source and sink which pass through only positive weighted edges is called?
 a) Augmenting path
 b) critical path

- c) residual path
d) maximum path
- (51) Dijkstra's Algorithm is used to solve _____ problems.
a) All pair shortest path
b) Single source shortest path
c) Network flow
d) Sorting
- (52) Dijkstra's Algorithm cannot be applied on _____
a) Directed and weighted graphs
b) Graphs having negative weight function
c) Unweighted graphs
d) Undirected and unweighted graphs
- (53) Which of the following is the correct recurrence equation of finding Fibonacci series using recursion?
a) $T(n) = T(n-1) + T(n-2)$
b) $T(n) = T(n-1) - T(n-2)$
c) $T(n) = T(n-1) + T(n-1)$
d) $T(n) = T(n-2) + T(n-2)$
- (54) Sorting the edges in increasing order to find MST is a part of algorithm.
a) Kruskal
b) Prim
c) Dijkstra
d) None of these
- (55) The Bellman Ford algorithm returns _____ value.
a) Boolean
b) Integer
c) String
d) Double
- (56) How many solution/solutions are available for a graph having negative weight cycle?
a) One solution
b) Two solutions
c) No solution
d) Infinite solutions
- (57) What is the basic principle behind Bellman Ford Algorithm?
a) Interpolation
b) Extrapolation
c) Regression
d) Relaxation
- (58) A graph is said to have a negative weight cycle when?
a) The graph has 1 negative weighted edge
b) The graph has a cycle
c) The total weight of the graph is negative
d) The graph has 1 or more negative weighted edges
- (59) Floyd Warshall's Algorithm can be applied on _____
a) Undirected and unweighted graphs
b) Undirected graphs
c) Directed graphs
d) Acyclic graphs
- (60) What approach is being followed in Floyd Warshall Algorithm?
a) Greedy technique
b) Dynamic Programming
c) Linear Programming
d) Backtracking
- (61) Which of the following is false in the case of a spanning tree of a graph G?
a) It is tree that spans G
b) It is a subgraph of the G
c) It includes every vertex of the G
d) It can be either cyclic or acyclic
- (62) The travelling salesman problem can be solved using _____
a) A spanning tree
b) A minimum spanning tree
c) Bellman – Ford algorithm
d) DFS traversal
- (63) Consider the following statements. S1. Kruskal's algorithm might produce a non-minimal spanning tree. S2. Kruskal's algorithm can efficiently implemented using the disjoint-set data structure.
a) S1 is true but S2 is false
b) Both S1 and S2 are false
c) Both S1 and S2 are true
d) S2 is true but S1 is false
- (64) Time Complexity of DFS is? (V – number of vertices, E – number of edges)
a) $O(V + E)$
b) $O(V)$
c) $O(E)$
d) None of the mentioned
- (65) The Data structure used in standard implementation of Breadth First Search is?
a) Stack
b) Queue

