BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Master of Technology in Computer Science & Engineering
Course Name – Advanced Algorithms
Course Code - PCC-MCS201
(Semester II)

Time allotted : 1 Hrs.15 Min. **Full Marks : 60**

[The figure in the margin indicates full marks.]

Group-A

(Multiple Choice Type Question) 1 x 60=60

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) Recurrence equation formed for the tower of hanoi problem is given by _____

a) T(n) = 2T(n-1)+n
b) T(n) = 2T(n/2)+c
c) T(n) = 2T(n-1)+c
d) T(n) = 2T(n/2)+n

(3) 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*20
b) 20*30
c) 10*30
d) 10*20*30

(4) What is the space complexity of the above dynamic programming implementation of the matrix chain problem?

a) O(1)
b) O(n)
c) $O(n^2)$
d) $O(n^3)$

(5) 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

(6) The Bellmann Ford algorithm returns _____ value.

a) Boolean
b) Integer
c) String
d) Double

(7) What is the running time of Bellmann Ford Algorithm?

a) O(V)
b) $O(V^2)$
c) O(ElogV)
d) O(VE)

(8) 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

(9) 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

(10) A person wants to visit some places. He starts from a vertex and then wants to visit every vertex till it finishes from one vertex, backtracks and then explore other vertex from same vertex. What algorithm he should use?

a) Depth First Search
b) Breadth First Search
c) Trim's algorithm
d) None of the mentioned

(11) What is the running time of insertion sort algorithm if the input is pre-sorted?

a) $O(N^2)$
b) O(N log N)
c) O(N)
d) O(M log N)

(12) What is an external sorting algorithm?

a) Algorithm that uses tape or disk during the sort
b) Algorithm that uses main memory during the sort
c) Algorithm that involves swapping
d) Algorithm that are considered 'in place

(13) What is the space complexity of the above dynamic programming implementation of the Knapsack problem?

a) O(n)
b) O(n + w)
c) O(nW)
d) $O(n^2)$

(14) Which one of the following is an application of the backtracking algorithm?

a) Finding the shortest path
b) Finding the efficient quantity to shop
c) Ludo
d) Crossword

(15) The problem of finding a list of integers in a given specific range that meets certain conditions is called?

a) Subset sum problem
b) Constraint satisfaction problem
c) Hamiltonian circuit problem
d) Travelling salesman problem

(16) How many solutions are there for 8 queens on 8*8 board?

a) 12
b) 91
c) 92
d) 93

(17) Of the following given options, which one of the following does not provides an optimal solution for 8-queens problem?

a) (5,3,8,4,7,1,6,2)
b) (1,6,3,8,3,2,4,7)
c) (4,1,5,8,6,3,7,2)
d) (6,2,7,1,4,8,5,3)

(18) In how many directions do queens attack each other?

a) 1
b) 2
c) 3
d) 4

(19) Fractional knapsack problem is also known as _____

a) 0/1 knapsack problem
b) Continuous knapsack problem
c) Divisible knapsack problem
d) Non continuous knapsack problem

(20) What is the condition for proper coloring of a graph?

a) two vertices having a common edge should not have same color
b) two vertices having a common edge should always have same color
c) all vertices should have a different color
d) all vertices should have same color

(21) Calculating the chromatic number of a graph is a

a) P problem
b) NP hard problem
c) NP complete problem
d) cannot be identified as any of the given problem types

(22) Which algorithm is used to solve a maximum flow problem?

a) Prim's algorithm
b) Kruskal's algorithm
c) Dijkstra's algorithm
d) Ford-Fulkerson algorithm

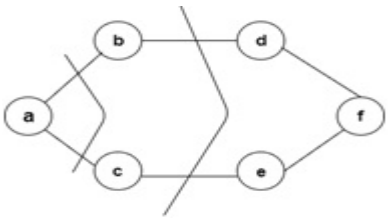
(23) A simple acyclic path between source and sink which pass through only positive weighted edges is called?

a) Augmenting path
b) critical path
c) residual path
d) maximum path

(24) 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

(25) What does the given figure depict?



a) min cut problem
b) max cut problem
c) maximum flow problem
d) flow graph

(26) If an optimal solution can be created for a problem by constructing optimal solutions for its sub problems, the problem possesses _____ property.

a) Overlapping sub problems
b) Optimal substructure
c) Memorization
d) Greedy

(27) When dynamic programming is applied to a problem, it takes far less time as compared to other methods that don't take advantage of overlapping sub problems.

a) True
b) False
c) All of above
d) None of these

(28) 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

(29) What is the objective of tower of hanoi puzzle?

a) To move all disks to some other rod by following rules
b) To divide the disks equally among the three rods by following rules
c) To move all disks to some other rod in random order
d) To divide the disks equally among three rods in random order

(30) Minimum number of moves required to solve a tower of hanoi problem with n disks is _____

a) 2n
b) 2n-1
c) n2
d) n2-1

(31) How many cases are there under Master's theorem?

a) 2
b) 3
c) 4
d) 5

(32) Under what case of Master's theorem will the recurrence relation of merge sort fall?

a) 1
b) 2
c) 3
d) It cannot be solved using master's theorem

(33) Which of the following methods can be used to solve the matrix chain multiplication problem?

a) Dynamic programming
b) Brute force
c) Recursion
d) All of the mentioned

(34) What is the time complexity of the above dynamic programming implementation of the matrix chain problem?

a) O(1)
b) O(n)
c) O(n2)
d) O(n3)

(35) Which of the following is the most commonly used data structure for implementing Dijkstra's Algorithm?

a) Max priority queue
b) Stack
c) Circular queue
d) Min priority queue

(36) How many priority queue operations are involved in Dijkstra's Algorithm?

a) 1
b) 3
c) 2
d) 4

(37) What is running time of Dijkstra's algorithm using Binary min- heap method?

a) O(V)
b) O(VlogV)
c) O(E)
d) O(ElogV)

(38) What is the running time of Bellmann Ford Algorithm?

a) O(V)
b) O(V2)
c) O(ElogV)
d) O(VE)

(39) What is the basic principle behind Bellmann Ford Algorithm?

a) Interpolation
b) Extrapolation
c) Regression
d) Relaxation

(40) Bellmann Ford Algorithm is an example for _____

a) Dynamic Programming
b) Greedy Algorithms
c) Linear Programming
d) Branch and Bound

(41) Floyd Warshall's Algorithm can be applied on _____

a) Undirected and unweighted graphs
b) Undirected graphs
c) Directed graphs
d) Acyclic graphs

(42) What approach is being followed in Floyd Warshall Algorithm?

a) Greedy technique
b) Dynamic Programming
c) Linear Programming
d) Backtracking

(43) Floyd Warshall Algorithm can be used for finding _____

a) Single source shortest path
b) Topological sort
c) Minimum spanning tree
d) Transitive closure

(44) What procedure is being followed in Floyd Warshall Algorithm?

a) Top down
b) Bottom up
c) Big bang
d) Sandwich

(45) Who proposed the modern formulation of Floyd-Warshall Algorithm as three nested loops?

a) Robert Floyd
b) Stephen Warshall
c) Bernard Roy
d) Peter Ingerman

(46) Kruskal's algorithm is used to _____

a) find minimum spanning tree
b) find single source shortest path
c) find all pair shortest path algorithm
d) traverse the graph

(47) 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

(48) The Data structure used in standard implementation of Breadth First Search is?

a) Stack
b) Queue
c) Linked List
d) None of the mentioned

(49) Which data structure is used for implementing a LIFO branch and bound strategy?

a) Stack
b) Queue
c) Array
d) Linked list

(50) What is the average case running time of an insertion sort algorithm?

a) O(N)
b) O(N log N)
c) O(log N)
d) O(N2)

(51) What will be the number of passes to sort the elements using insertion sort? 14, 12,16, 6, 3, 10

a) 6
b) 5
c) 7
d) 1

(52) What is the worst case complexity of selection sort?

a) O(nlogn)
b) O(logn)
c) O(n)
d) O(n2)

(53) The 0/1 Knapsack problem is an example of _____

a) Greedy algorithm
b) 2D dynamic programming
c) 1D dynamic programming
d) Divide and conquer

(54) What is the time complexity of the brute force algorithm used to solve the Knapsack

problem?

a) O(n)
b) O(n!)
c) O(2n)
d) O(n3)

(55) What is the space complexity of the above dynamic programming implementation of the Knapsack problem?

a) O(n)
b) O(n + w)
c) O(nW)
d) O(n2)

(56) 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

(57) 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

(58) Who coined the term ‘backtracking’?

a) Lehmer
b) Donald
c) Ross
d) Ford

(59) 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

(60) When was the Eight Queen Puzzle published?

a) 1846
b) 1847
c) 1848
d) 1849