BRAINWARE UNIVERSITY

Term End Examination 2020 - 21

Programme – Master of Computer Applications

Course Name – Algorithm Analysis

Course Code - MCA302

Semester / Year - Semester III

Time allotted : 75 Minutes Full Marks : 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 60=60

1. *(Answer any Sixty)*

(i)

Complexity the recurrence relation $T(n) = 8T(n/2)\ n^2$

a) O (n)

b) $O(n^2)$

c) $O(\log_2 n)$

d) $O(n^3)$

(ii) Complexity of Tower of Hanoi problem is

a) O (n)

b) O (n2)

c) $O(2^n)$

d) None of these

(iii) The complexity of searching an element from a set of n elements using Binary search algorithm is

a) O(n log n)

b) O(log n)

c) $O(n^2)$

d) O(n)

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

a) Case 3
b) Case 1
c) Master's theorem is not applicable
d) Case 2

(v) The worst-case time complexity of Bubble Sort is_____.

a) $O(n^2)$
b) O(log n)
c) O(n)
d) O(n logn)

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

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

(vii) Two main measures for the efficiency of an algorithm are

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

(viii) The time factor when determining the efficiency of algorithm is measured by

a) Counting microseconds
b) Counting the number of key operations
c) Counting the number of statements
d) Counting the kilobytes of algorithm

(ix) ? - notation provides an asymptotic

a) Upper bound
b) Lower bound
c) One that is sandwiched between the two bounds
d) None of these

(x) The operation of processing each element in the list is known as

a) Sorting
b) Merging

c) Inserting
d) Traversal

(xi) Which of the following algorithm design techniques is used in the quick sort algorithm?

a) Dynamic Programming
b) Backtracking
c) Divide and conquer
d) greedy method

(xii) Which of the following approaches is adopted in Divide and Conquer algorithms?

a) Top-down
b) Bottom-up
c) Both Top-down & Bottom-up
d) none of these

(xiii) The worst-case time complexity of Quick Sort is_____.

a)
b) O(log n)

$O(n^2)$

c) O(n)
d) O(n logn)

(xiv) Recursive solution of tower of Hanoi problem is an example of which of the following algorithm?

a) Dynamic programming
b) Backtracking
c) Greedy algorithm
d) Divide and conquer

(xv) Which one of the following sorting algorithms is best suited to sort an array of 1 million elements?

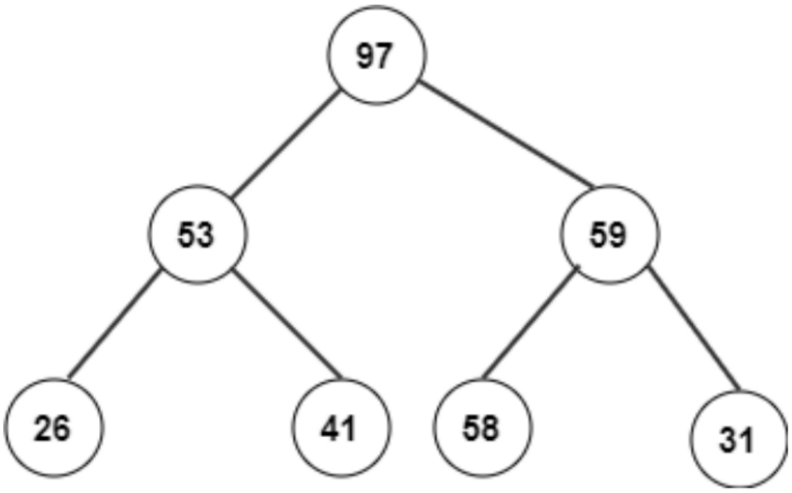
a) Bubble sort
b) Insertion sort
c) Merge sort
d) Quick sort

(xvi) What is the auxiliary space complexity of merge sort?

a) O(1)
b) O(log n)
c) O(n)
d) O(n log n)

(xvii)

Consider the following heap after build heap phase. What will be its corresponding array?



a) 26,53,41,97,58,59,31
b) 26,31,41,53,58,59,97
c) 26,41,53,97,31,58,59
d) 97,53,59,26,41,58,31

(xviii) What is the depth of any tree if the union operation is performed by height?

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

(xix) Disjoint set data structure applicable to find

a) Minimum spanning tree
b) Minimum shortest path
c) Maximum spanning tree
d) Maximum path

(xx) Select the algorithm which is not followed Dynamic Programing

a) 0/1 Knapsack Problem
b) Matrix Chain Multiplication
c) All Pair Shortest Path - Floyd Warshall Algorithm
d) Job sequencing with deadline

(xxi) What is the time complexity of Kruskal's algorithm?

a) O(log V)

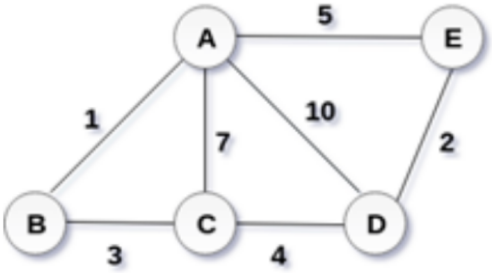
b) O(E log V)

c) $O(E^2)$

d) O(V log E)

(xxii)

Consider the given graph.



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

a) 23

b) 28

c) 27

d) 10

(xxiii) In Depth First Search, how many times a node is visited?

a) Once

b) Twice

c) Equivalent to number of in degree of the node

d) None of the mentioned

(xxiv) The main time taking step in fractional knapsack problem is _____

a) Breaking items into fraction

b) Adding items into knapsack

c) Sorting

d) Looping through sorted items

(xxv) Consider a complete graph G with 4 vertices. The graph G has ____ spanning trees.

a) 15
b) 8
c) 16
d) none of these

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

a) 60
b) 80
c) 100
d) 40

(xxvii) Worst case is the worst case time complexity of Prim's algorithm if adjacency matrix is used?

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

(xxviii) 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

(xxix) Which of the following algorithms solves the All-pair shortest path problem?

a) Dijkstra's
b) Floyd's Warshall's
c) Prim's
d) Kruskal's

(xxx) What is the time complexity of the dynamic programming implementation of the Knapsack problem with n items and a maximum weight of W?

a) O(n)
b) O(n + w)

c) O(nW)

d) O(n2)

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

a) Overlapping subproblems

b) Optimal substructure

c) Memorization

d) Greedy

(xxxii) What is the time complexity of the brute force algorithm used to solve the Knapsack problem?

a) O(n)

b) O(n!)

c)

$O(2^n)$

d)

$O(n^3)$

(xxxiii) Consider the brute force implementation in which we find all the possible ways of multiplying the given set of n matrices. What is the time complexity of this implementation?

a) O(n!)

b)

$O(n^3)$

c)

$O(n^2)$

d) Exponential

(xxxiv) How many times the for loop in the Bellmann Ford Algorithm gets executed?

a) V times

b) V-1

c) E

d) E-1

(xxxv) Bellmann Ford Algorithm can be applied for _____

a) Undirected and weighted graphs

b) Undirected and unweighted graphs

c) Directed and weighted graphs

d) All directed graphs

(xxxvi) What is the time complexity of Dijikstra's algorithm?

a) O(N)

b) $O(N^3)$

c) $O(N^2)$

d) O(logN)

(xxxvii) Dijkstra's Algorithm cannot be applied on _____

a) Directed and weighted graphs

b) Graphs having negative weight

c) Unweighted graphs

d) Undirected and unweighted graphs

(xxxviii) 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

(xxxix) 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

(xl) Which of the following is not a backtracking algorithm?

a) Knight tour problem

b) N queen problem

c) Tower of Hanoi

d) M coloring problem

(xli) _____ 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

(xlii) 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

(xliii) How many fundamental solutions are there for the eight-queen puzzle?

a) 92
b) 10
c) 11
d) 12

(xliv) 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

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

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

(xlvi) Placing n-queens so that no two queens attack each other is called?

a) n-queen's problem
b) 8-queen's problem
c) Hamiltonian circuit problem
d) subset sum problem

(xlvii) Which of the following methods can be used to solve n-queen's problem?

a) greedy algorithm
b) divide and conquer
c) iterative improvement
d) backtracking

(xlviii) The number of colors used by a proper coloring graph is called?

a) k coloring graph
b) x coloring graph
c) c coloring graph
d) m coloring graph

(xlix) Hamiltonian path problem is _____

a) NP problem
b) N class problem
c) P class problem
d) NP complete problem

(l) Which of the following is not a branch and bound strategy to generate branches?

a) LIFO branch and bound
b) FIFO branch and bound
c) Lowest cost branch and bound
d) Highest cost branch and bound

(li) Which data structure is most suitable for implementing the best first branch and bound strategy?

a) stack
b) queue
c) priority queue
d) linked list

(lii) Which of the following can traverse the state space tree only in DFS manner?

a) branch and bound
b) dynamic programming
c) greedy algorithm
d) backtracking

(liii) What is the worst case time complexity of the KMP algorithm for pattern searching (m = length of text, n = length of pattern)?

a) O(n)
b) O(n*m)
c) O(m)
d) O(log n)

(liv) The worst-case efficiency of solving a problem in polynomial time is?

a) O(p(n))
b) O(p(n log n))
c) O(p(n2))
d) O(p(m log n))

(lv) Problems that can be solved in polynomial time are known as?

a) intractable
b) tractable
c) decision
d) complete

(lvi) _____ is the class of decision problems that can be solved by non-deterministic polynomial algorithms?

a) NP
b) P
c) Hard
d) Complete

(lvii) The Euler's circuit problem can be solved in-

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

(lviii) How many stages of procedure does a non-deterministic algorithm consist of?

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

(lix) To which of the following class does a CNF-satisfiability problem belong?

a) NP class
b) P class
c) NP complete
d) NP hard

(lx) Which of the following problems is not NP complete?

a) Hamiltonian circuit
b) Bin packing
c) Partition problem
d) Halting problem