BRAINWARE UNIVERSITY

Term End Examination 2020 - 21

Programme – Bachelor of Science (Honours) in Computer Science

Course Name – Design & Analysis of Algorithms

Course Code - BCSC303

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 of Tower of Hanoi problem is

a) O (n) b) O (n^2)

c) O (2^n) d) None of these

(ii) Complexity of the recurrence relation T(n) = T(n-1) + 1

a) O (n^2) b) O (n)

c) O (1) d) O (n-1)

(iii) What is time complexity of fun()? int fun(int n) { int count = 0; for (int i = n; i > 0; i /= 2) for (int j = 0; j < i; j) count = 1; return count; }

a) O(n^2) b) O(n Log n)

c) O(n) d) O(n Log n Log n)

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

a) 2 b) 3

c) 4 d) 5

(v) What is the result of the recurrences which fall under first case of Master's theorem (let the recurrence be given by T(n)=aT(n/b) f(n) and f(n)=n^c?

a) b)

$T(n) = O(n^{\log_b a})$

$T(n) = O(n^c \log n)$

c)

d)

$T(n) = O(f(n))$

$T(n) = O(n^2)$

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

a) 2^n

b) 2^n-1

c) n^2

d) n^2-1

(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) Which of the following is used to depict the working of algorithm?

a) Flow chart

b) Pseudo code

c) Source code

d) All of these

(x) Which case of Master's theorem is applicable in the recurrence relation T(n)= 8T(n/2) -1/n?

a) Case 3

b) Case 1

c) Master's theorem is not applicable

d) Case 2

(xi) The time complexity of the expression f(n) = 6*2^n + n^7 using big-O notation is

a) O(2^n)

b) O(n^7)

c) O (n log n)
d) O(n)

(xii) Space complexity of matrix_multiplication (A,B,C,n)?

a) O(n^2)
b) O(n^3)
c) O(n^2 * log n)
d) O(n * log n)

(xiii) for i = 1 to n do sum = sum A[i]; if i = = 100 then break; endif endfor the time complexity of the above algorithm is____

a) O(n - 100)
b) O(n)
c) O(100)
d) None of these

(xiv) Which of the following data structure is not linear data structure?

a) Arrays
b) Linked lists
c) Both of these
d) None of these

(xv) 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

(xvi) Divide and conquer strategy is used in which of the following algorithms?

a) Merge sort and Selection sort
b) Quick sort and Computation of x^n
c) Both Merge sort and Selection sort and Quick sort and Computation of xn
d) none of these

(xvii) Run Time of Merge Sort is

a) Big oh of n log n
b) Gamma of n log n
c) Big theta of n log n
d) Omega of n log n

(xviii) Recursive solution of heap sort is an example of which of the following

algorithm?

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

(xix) Apply Quick sort on a given sequence 7 11 14 6 9 4 3 12. What is the sequence after first phase, pivot is first element?

a) 6 4 3 7 11 9 14 12
b) 6 3 4 7 9 14 11 12
c) 7 6 14 11 9 4 3 12
d) 7 6 14 11 9 4 3 12

(xx) The best case behavior occurs for quick sort is, if partition splits the array of size n into _____

a) n/2 : (n/2) – 1
b) n/2 : n/3
c) n/4 : 3n/2
d) n/4 : 3n/4

(xxi) What is the worst case efficiency for a path compression algorithm?

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

(xxii) 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

(xxiii) Optimal substructure property is exploited by

a) Dynamic programming
b) Greedy method
c) Both Dynamic programming and Greedy method
d) none of these

(xxiv) 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

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

a) O(log v)
b) O(e log v)
c) O(e2)
d) O(v log e)

(xxvi)

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)

Kruskal's algorithm might produce a non-minimal spanning tree.is true but Kruskal's algorithm can efficiently implemented using the disjoint-set data structure.is false

b)

Both Kruskal's algorithm might produce a non-minimal spanning tree.and Kruskal's algorithm can efficiently implemented using the disjoint-set data structure.are false

c)

Both Kruskal's algorithm might produce a non-minimal spanning tree. Kruskal's algorithm can efficiently implemented using the disjoint-set data structure.are true

d)

Kruskal's algorithm might produce a non-minimal spanning tree.is true but Kruskal's algorithm can efficiently implemented using the disjoint-set data structure. is false

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

a) Stack
b) Queue
c) Linked List
d) None of these

(xxviii) 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 these

(xxix) Which is not feasible solution in the case of job sequence problem item: 1, 2, 3, 4 profit: 100, 10, 15, 27 deadline: 2, 1, 2, 1

a) (1,4)

b) (4,3)

c) (2,4)

d) (1,2)

(xxx) Which is optimal value in the case of job sequence problem item: 1, 2, 3, 4, 5, 6, 7 profit: 3, 5, 20, 18, 1, 6, 30 deadline: 1, 3, 4, 3, 2, 1, 2

a) (1,5,6,4)

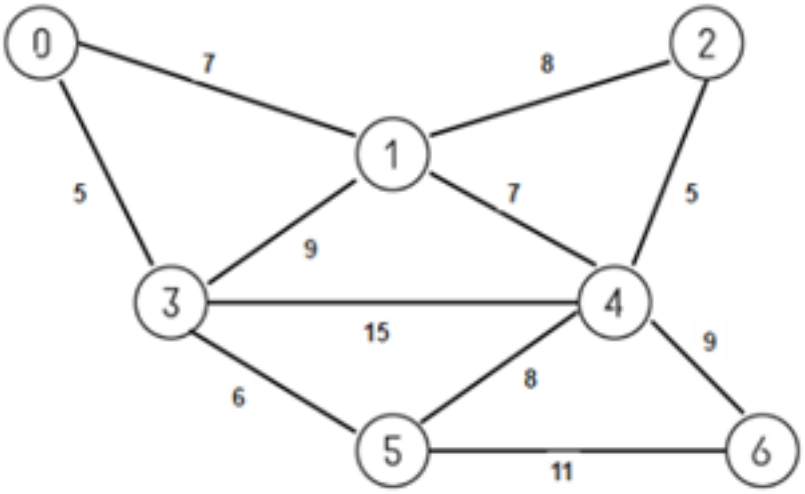
b) (7,6,4,3)

c) (2,3,1,7)

d) (1,2,3,4)

(xxxi)

Consider the following graph. Using Kruskal’s algorithm, which edge will be selected first?



a) 25

b) 24

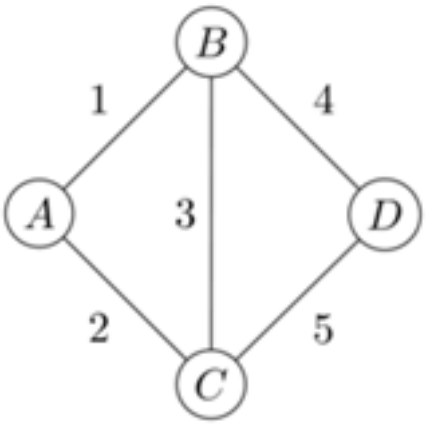
c) 35

d) 1

(xxxii)

Which of the following edges form minimum spanning tree on the graph using

kruskals algorithm?



a) (B-C)(A-C)(B-D)
b) (A-B)(A-C)(B-D)
c) (B-D)(A-B)(A-D)
d) (B-D)(C-A)(D-A)

(xxxiii) 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 sub graph of the G
c) It includes every vertex of the G
d) It can be either cyclic or acyclic

(xxxiv) Fractional knapsack algorithm select the item

a) Any value from 0 to1
b) All value as 0
c) All value as 1
d) All value as 0.5

(xxxv) Time complexity of fractional knapsack problem is _____

a) O(n log n)
b) O(n)
c) O(n2)
d) O(nW)

(xxxvi) In dynamic programming, the technique of storing the previously calculated values is called _____

a) Saving value property
b) Storing value property
c) Memorization
d) Mapping

(xxxvii) When a top-down approach of dynamic programming is applied to a

problem, it usually _____

a) Decreases both the time complexity and space complexity

b) Decreases the time complexity and increases the space complexity

c) Increases the time complexity and decreases the space complexity

d) Increases both the time complexity and space complexity

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

a) Greedy algorithm

b) 2D dynamic programming

c) 1D dynamic programming

d) Divide and conquer

(xxxix) 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

(xl) 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)

(xli) What is the time complexity of the above 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(n^2)

(xlii) 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)

(xliii) 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

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

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

(xlv) 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

(xlvi) A matrix chain having 5 matrices can be parenthesized in

a) 14 different combinations
b) 15 different combinations
c) 13 different combinations
d) none of these

(xlvii) 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

(xlviii) 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

(xlix) 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

(l) The minimum number of colors needed to color a graph having n > 3 vertices and 2 edges is

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

(li) Sudoku game is an example of

a) Greedy approach
b) Dynamic programming
c) Memorization
d) Backtracking

(lii)

which algorithm design technique used State-space tree concept?

a) Backtracking
b) Greedy approach
c) Dynamic programming
d) Disjoint set

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

a) Numerical problems
b) Exhaustive search
c) Combinatorial problems
d) Graph coloring problems

(liv) Space complexity of N-queen problem

a) O(n)
b) O(n log n)
c) O(n^2)
d) O(n^2 * log n)

(lv) The problem of placing n queens on 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

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

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

(lvii) How many fundamental solutions are for 3 queens on a 3*3 board?

a) 1
b) 12
c) 3
d) 0

(lviii) ~~Time Complexity of DFS is? (V = number of vertices, E = number of edg~~

a) O (V E)
b) O(V)
c) O(E)
d) None of these

(lix)

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

a) Stack
b) Queue
c) Link List
d) None of these

(lx)

The Depth First Search traversal of a graph will result into?

a)

Linked List

b) Tree

c)

Graph with back edges

d) Array