BRAINWARE UNIVERSITY
Term End Examination 2020 - 21
Programme – Diploma in Computer Science & Engineering
Course Name – Design and Analysis of Algorithm
Course Code - DCSE302
Semester / Year - Semester III

Time allotted : 85 Minutes   Full Marks : 70

[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 70=70

1.   *(Answer any Seventy)*

(i) When an algorithm is written in the form of a programming language, it becomes a _____

a) Flowchart   b) Program

c) Pseudo code   d) Syntax

(ii) An algorithm is

a) a piece of code to be executed.   b) a loosely written code to make final code.

c) a step by step procedure to solve problem.   d) All of these

(iii) The concept of order Big O is important because

a) It can be used to decide the best algorithm that solves a given problem   b) It determines the maximum size of a problem that can be solved in a given amount of time

c) It is the lower bound of the growth rate of algorithm   d) Both It can be used to decide the best algorithm that solves a given problem and It determines the maximum size of a problem that can be solved in a given amount of time

(iv) The recurrence relation capturing the optimal execution time of the Towers

of Hanoi problem with n discs is

    a) $T(n) = 2T(n - 2) + 2$ b) $T(n) = 2T(n - 1) + n$

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

(v) Master's theorem is used for?

    a) solving recurrences   b) solving iterative relations

    c) analyzing loops   d) calculating the time complexity of any code

(vi) For implementing recursive function, the data structure used is:

    a) Stack   b) Queue

    c) Linked List   d) Tree

(vii) Which of the following algorithm cannot be designed without recursion?

    a) Tower of Hanoi   b) Fibonacci Series

    c) Tree Traversal   d) All can be designed without recursion

(viii) Infinite recursion leads to ....

    a) Overflow of run-time stack   b) Underflow of registers usage

    c) Overflow of I/O cycles   d) Underflow of run-time stack

(ix) In the absence of an exit condition in a recursive function, the following error is given.

    a) Compile time error   b) Run time error

    c) Logical error   d) No error

(x) What is tail recursion?

    a) A recursive function that has two base cases   b) A function where the recursive functions leads to an infinite loop

    c) A recursive function where the function doesn't return anything and just prints the   d) A function where the recursive call is the last thing executed by the function

values

(xi) Recursion and iteration are the same programming approach. True or False?

a) =TRUE()   b) =FALSE()

c) May be   d) Can't say

(xii) Which of these is not true about recursion?

a) Making the code look clean   b) A complex task can be broken into sub-problems

c) Recursive calls take up less memory   d) Sequence generation is easier than a nested iteration

(xiii) Which of the following is a stable sorting algorithm?

a) Merge sort   b) Typical in-place quick sort

c) Heap sort   d) Selection sort

(xiv) The time complexity of heap sort in worst case is

a) O(log n)   b) O(n)

c) O(nlogn)   d) O(n2)

(xv) Which of the following algorithm design technique is used in the quick sort algorithm?

a) Dynamic programming   b) Backtracking

c) Divide-and-conquer   d) Greedy method

(xvi) A sorting technique is called stable if it

a) Takes O(nlogn) times   b) Maintains the relative order of occurrence of non-distinct elements

c) Uses divide-and-conquer paradigm   d) Takes O(n) space

(xvii) 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'

(xviii) Which of the following sorting algorithm does not use recursion?

　　a) quick sort

　　b) merge sort

　　c) heap sort

　　d) bottom up merge sort

(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 4 3 9 14 11 12

(xx) How many arrays are required to perform deletion operation in a heap?

　　a) 1

　　b) 2

　　c) 3

　　d) 4

(xxi) Which one of the following is false?

　　a) Heap sort is an in-place algorithm

　　b) Heap sort has O(nlogn) average case time complexity

　　c) Heap sort is stable sort

　　d) Heap sort is a comparison-based sorting algorithm

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

　　a) Stack

　　b) Queue

　　c) Linked List

　　d) Tree

(xxiii) A person wants to visit some places. He starts from a vertex and then wants to visit every place connected to this vertex and so on. What algorithm he should use?

a) Depth First Search   b) Breadth First Search

c) Trim's algorithm   d) Kruskal's algorithm

(xxiv) In BFS, how many times a node is visited?

a) Once   b) Twice

c) Equivalent to number of indegree of the   d) Thrice
node

(xxv) Time Complexity of DFS is? (V – number of vertices, E – number of edges)

a) $O(V + E)$ b) $O(V)$

c) $O(E)$ d) $O(V*E)$

(xxvi) 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) Kruskal's Algorithm

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

a) Once   b) Twice

c) Equivalent to number of indegree of the   d) Thrice
node

(xxviii) The number of edges in a simple, n-vertex, complete graph is

a) $n*(n-2)$ b) $n*(n-1)$

c) $n*(n-1)/2$ d) $n*(n-1) * (n-2)$

(xxix) Which of the following is true?

a) A graph may contain no edges and many   b) A graph may contain many edges and no
vertices   vertices

c) A graph may contain no edges and no   d) None of these

vertices

(xxx) 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

(xxxi) 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

(xxxii) 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

(xxxiii) Dijkstra's Algorithm is used to solve _____ problems.

a) All pair shortest path
b) Single source shortest path
c) Network flow
d) Sorting

(xxxiv) Time complexity of fractional knapsack problem is _____

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

(xxxv) Floyd Warshall's Algorithm is used for solving _____

a) All pair shortest path problems
b) Single Source shortest path problems
c) Network flow problems
d) Sorting problems

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

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

(xxxvii) Floyd- Warshall algorithm was proposed by _____

    a) Robert Floyd and Stephen Warshall   b) Stephen Floyd and Robert Warshall

    c) Bernad Floyd and Robert Warshall   d) Robert Floyd and Bernad Warshall

(xxxviii) Bellman ford algorithm provides solution for _____
problems.

    a) All pair shortest path   b) Sorting

    c) Network flow   d) Single source shortest path

(xxxix) 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

(xl) How many times the for loop in the Bellman Ford Algorithm gets executed?

    a) V   b) V-1

    c) E   d) E-1

(xli) If a problem can be broken into subproblems which are reused several times, the problem possesses _____ property.

    a) Overlapping subproblems   b) Optimal substructure

    c) Memoization   d) Greedy

(xlii) Which of the following problems should be solved using dynamic programming?

    a) Merge sort   b) Binary search

    c) Longest common subsequence   d) Quicksort

(xliii) Which of the following standard algorithms is not Dynamic Programming based?

    a) Bellman–Ford Algorithm for single   b) Floyd Warshall Algorithm for all pairs

source shortest path   shortest paths

c) 0-1 Knapsack problem   d) Prim's Minimum Spanning Tree

(xliv) 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

(xlv) When a top-down approach of dynamic programming is applied to a problem, it usually _____

a) Decreases both, the time complexity and   b) Decreases the time complexity and
the space complexity   increases the space complexity

c) Increases the time complexity and   d) Increases both, the time complexity and
decreases the space complexity   the space complexity

(xlvi) The following sequence is a fibonacci sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21,…. Which technique can be used to get the nth fibonacci term?

a) Recursion   b) Dynamic programming

c) A single for loop   d) Recursion, Dynamic Programming, For loops

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

a) 1   b) 2

c) 3   d) 4

(xlviii) Where is the n-queens problem implemented?

a) carrom   b) chess

c) ludo   d) cards

(xlix) 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)   b) (2,3,1,4)

c) (4,3,2,1)   d) (4,2,3,1)

(l) 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

(li) 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

(lii) 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

(liii) Who coined the term 'backtracking'?

   a) Lehmer   b) Donald

   c) Ross   d) Ford

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

   a) 5   b) 6

   c) 8   d) n

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

   a) 92   b) 10

   c) 11   d) 12

(lvi) Which ordered board is the highest enumerated board till now?

   a) 25*25   b) 26*26

c) 27*27   d) 28*28

(lvii) What is the domination number for 8-queen's problem?
   a) 8   b) 7
   c) 6   d) 5

(lviii) Which of the following logical programming languages is not based on backtracking?
   a) Icon   b) Prolog
   c) Planner   d) Fortran

(lix) Which bit is reserved as a parity bit in an ASCII set?
   a) first   b) seventh
   c) eighth   d) tenth

(lx) The type of encoding where no character code is the prefix of another character code is called?
   a) optimal encoding   b) prefix encoding
   c) frequency encoding   d) trie encoding

(lxi) 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

(lxii) The time complexity of the solution tower of hanoi problem using recursion is _____
   a) O(n2)   b) O(2n)
   c) O(n log n)   d) O(n)

(lxiii) _____ is a partition of the vertices of a graph in two disjoint subsets that are joined by atleast one edge.

a) Minimum cut

b) Maximum flow

c) Maximum cut

d) Graph cut

(lxiv) _____ separates a particular pair of vertices in a graph.

a) line

b) arc

c) cut

d) flow

(lxv) Which one of the following is not an application of max-flow min-cut algorithm?

a) network reliability

b) closest pair

c) network connectivity

d) bipartite matching

(lxvi) What does Maximum flow problem involve?

a) finding a flow between source and sink that is maximum

b) finding a flow between source and sink that is minimum

c) finding the shortest path between source and sink

d) computing a minimum spanning tree

(lxvii) Under what condition can a vertex combine and distribute flow in any manner?

a) It may violate edge capacities

b) It should maintain flow conservation

c) The vertex should be a source vertex

d) The vertex should be a sink vertex

(lxviii) 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

(lxix) 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

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

a) NP

b) P

c) Hard

d) Complete