DAA MCQ's

Unit 1

Q1. An _____ is defined as a set of well-defined instructions used to accomplish a particular task.

A. Algorithm
B. Function
C. Program
D. Procedure

Answer : Option A

Q2. The measure of the longest amount of time possibly taken to complete an algorithm is expressed as _____

A. Little-O
B. Little-Omega
C. Big-Omega
D. Big-O

Answer : Option D

Q3. A _____ is a compact, informal, and environment-independent description of a computer programming algorithm.

A. Stack
B. Queue
C. Psuedocode
D. Non-linear data structure

Answer : Option C

Q4. _____ of an algorithm is the amount of time required for it to execute.

A. Time complexity
B. Space complexity
C. Compiling time
D. Best case

Answer : Option A

Q5. Which of the following is used for solving the N Queens Problem

A. Greedy Algorithm
B. Dynamic Programming
C. Backtracking
D. Sorting

Answer : Option C

Q6. _____ is the first step in solving the problem ?

A. Understanding the Problem
B. Identify the Problem
C. Evaluate the Solution
D. Coding the Problem

Answer : Option B

Q7. The correctness and appropriateness of _____ solution can be checked very easily.

A. Algorithmic solution
B. heuristic solution
C. random solution
D. Brute force Solution

Answer : Option A

Q8. 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

Answer : Option C

Q9. Which of the following sorting algorithms provide the best time complexity in the worst-case scenario

A. Merge Sort
B. Quick Sort
C. Bubble Sort
D. Selection sort

Answer : Option A

Q10. Partition and exchange sort is_____

A. Quick sort
B. Tree sort
C. Heap sort
D. Bubble

Answer : Option A

Q11. Which of the following sorting algorithm is of divide and conquer type

A. Quick sort
B. Insertion sort
C. Merge sort
D. A & C

Answer : A & C

Q12. The time complexity of a quick sort algorithm which makes use of median, found by an O(n) algorithm, as pivot element is

```
A. O(n2)
B. O(nlogn)
C. O(nloglogn)
D. O(n)
```

Answer : Option B

Q13. 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
```

Answer : Option C

Q14. Which of the following is not a stable sorting algorithm

```
A. Quick sort
B. Insertion sort
C. Merge sort
D. Bubble
```

Answer : Option A

Q15. Master's theorem is used for

```
A. Solving recurrences
B. Solving iterative relations
C. Analyzing loops
D. Calculating the time complexity of any code
```

Answer : Option A

16.Prim's algorithm starts constructing a minimum spanning tree from ____

```
A. An arbitary root vertex
B. The shortest arc
C. The left most vertex
D. The right most vertex
```

Answer : Option A

17.Which method of encoding does not consider the probability of occurrence of symbols?

A. Static Huffman coding
B. Variable length coding
C. Adaptive Huffman coding
D. Fixed length coding

Answer : Option D

18.In distribution counting to sorting elements in an array _____ is used.

A. Accumulated sum of frequencies
B. Frequency
C. Count of repeating elements in the array
D. The length of the array

Answer : Option A

19.Dijkstra's algorithm is used to solve which problems

A. Network Lock
B. Single source shortest Path
C. All pair shortest path
D. Sorting

Answer : Option B

20.The basic operation of the _____ algorithm is the comparison between the element and the array given.

A. Binary search
B. Greedy
C. Brute force
D. Insertion sort

Answer : Option D

21.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)=nc?

A. T(n) = θ(n^logba)
B. T(n) = O(nc log n)
C. T(n) = O(f(n))
D. T(n) = O(n2)

Answer : Option A

22.The rate at which storage memory or time grows as a function of the input size is called

A. Storage
B. Complexity
C. Efficiency

D. Load

Answer : Option C

23.Internal and External factors of Algorithm Complexity are

A. Processor Quality
B. Space Complexity
C. Time Complexity
D. All of the above

Answer : Option D

24.Which method is practical to perform a single search in an unsorted list of elements?

A. Sequential search
B. Bubble sort
C. Horspool's method of string matching
D. Brute force method of string matching

Answer : Option A

25.Which algorithm finds the solution for the single-source shortest path problem for a tree?

A. Prim's
B. Dijkstra's
C. Kruskal's
D. Huffman code

Answer : Option B

26.___ is the minimum number of steps that can executed for the given parameters

A. Average case
B. Worst case
C. Time complexity
D. Best case

Answer : Option D

27._____ is the maximum number of steps that can executed for the given parameters

A. Average case
B. Worst case
C. Time complexity
D. Best case

Answer : Option B

28._____ is the average number of steps that can executed for the given parameters

A. Average case
B. Worst case
C. Time complexity
D. Best case

Answer : Option A

29.O(1) means computing time is _____

A. Constant
B. Quadratic
C. Linear
D. Cubic

Answer : Option A

30.O(n) means computing time is _

A. Constant
B. Quadratic
C. Linear
D. Cubic

Answer : Option C

Unit I && II CIE Questions and Answers

A freelancer has the choice of completing/partially completing tasks to maximize his profits. For partial completion of jobs, partial profit can be obtained. Example for a job with (time-in-hours, profit) =(3,90), if 1/3rd is completed, then 30 profit is received; and likewise, if 1/6th is done then 15 is the profit received He has a constraint of 100 hours and choice of 5 jobs. The 5 jobs - J1,J2,J3,J4,J5 have the following (time-in-hours, profit) respectively -((20,5), (30,20), (66, 30), (40,40), (60,50).

What is the maximum profit he can get in the given time constraint ?

A. 152
B. 156
C. 162
D. 216

Answer : Option C

Given the recurrence relation of an algorithm is T(n)=8T(n/2) +n3, what is it's time complexity as per master's theorem

A. (n^3)
B. O O(n^4 logn)
C. (n^2 logn)
D. (n^3 logn)

Answer : Option D

The time complexity of an algorithm is given as T(n)=3n+2. Select all correct statements related to the algorithm.

A. Space complexity is O(n)
B. Time complexity is Omega(n)
C. It is a sublinear algorithm
D. Algorithm has non polynomial time complexity

Answer : Option B

Select correct statements regarding multi-stage graph problem

A. It can be solved faster with a greedy strategy, like Dijkstra.
B. It requires solution of optimal subpaths of vertices (in stages nearer to destination) to
C. It requires solution of optimal subpaths of vertices (in stages nearer to destination) to
D. The backwàrd approach uses, optimal subpaths from start vertex.

Answer : Option A

For the problem of job sequencing with deadlines, where each job requires 1 unit time to complete, on the single available machine, select all the feasible solution sequence/sequences for the 5 jobs - J1,J2,J3,J4,J5 where their respective (profits, deadlines) are in following tuples (12,3), (15,2), (9,1), (18,2), (7,3).

A. J1,J2,J3
B. J5,J4,J1
C. J2,J4,J1
D. None of Above

Answer : Option C

Which statements are correct related to Greedy strategy

A. The greedy algorithm guarantees optimal solution to a given maximization / minimization c
B. Greedy algorithm always makes the choice (greedy criteria) that looks best at the moment,
C. Greedy Knapsack problem (fractional knapsack) will generally give a better profits as com
D. Greedy strategy generates a single feasible and single optimal solution
E. Time complexity of Greedy strategy, as per its control abstraction, is O(n)

Answer : B,C

Select all correct options related to Quicksort and Mergesort.

A. Mergesort çan have a worst-case time complexity of O(n^2) when the merging is poorly done
B. Other than the requirement of storing n elements, Quicksort has a space complexity of O(l

C. Quicksort is better in terms of worst-case sorting performance and may be a better choice
D. In terms of time complexity, both Quicksort and Mergesort algorithms have the same averag
E. Other than the requirement of storing n elements, Mergesort has a space complexity of O(n

Answer : B,D,E

Given the recurrence relation of an algorithm is T(n)=8T(n/2)+n, what is it's time complexity as per master's theorem?

A. (n^3)
B. O(n^2)
C. (n^2 logn)
D. (n^2 log^2(n))

Answer : Option A

For 0/1 knapsack problem solved usng dynamic progranmng, to lraceback the solution from the avalable, filled, 2 D, Kn xm] table of optinmal sub solutions, what needs to be done? Select all correct answers.

A. Start from last cell, ie. extreme bottom right cell ie. K[n,m]
B. Start from the first, i.e. extreme left uppermost cell i.e. K|1,1]
C. If K[i,j]=K[i-1,j] then this means that ith object=0 (is not selected)
D. If K[i,j]!=K[i-1,j] , then this means that ith object=l (is selected)

Answer : A,C,D

What is true regarding the general divide and conquer strategy? Select all correct options.

A. Its control abstraction -first, divides the problem into subproblems, and then combines t
B. For n>1, its time complexity generally is -> aT(n/b)+f(n), where f(n) is the time to divi
C. The solution to the small(P) situation is generally T(1)
D. It is naturally expressed as a recursive algorithm

Answer : A,B,D

Which options have the correct sequences of decreasing time complexities?

A. O(n^2 n^n),O(n^3 2^n),O(2^n),O(n!)
B. O(n*n!),O(n*2^n),O(2^n),O(n^7)
C. O(2^n),O(n),O(log n),O(1)
D. O(n^4),O(n^3),O(n^2 2^n),O(n^n)

Answer : Option C

When constructing OBST for the following instance, n = 4, and, for nodes (n1, n2, n3, n4) the p and q values are (p1, p2, p3, p4) = (12, 16, 13, 7), (q0, q1,42, q3, q4) =(17, 14, 15, 12, 19), what is the cost of the subproblem c(1,2) and root r(3,4), if c(0,4) is the cost of OBST, and r(0,4) is its root node?

A. c(1,2)=48 and r(3,4) =n3
B. c(1,2)=45 and r(3,4)=n3
C. c(1,2)=43 and r(3,4)=n4
D. c(1,2)=45 and r(3,4)=n4

Answer : Option D

What is correct asymptotically?

A. If a function is O(n) it is also O(n^2), and O(n^3)
B. If a function is O(n^3) it is also O(n)
C. If a function is Ω (n^2) it is also Ω(n) and Ω(1)
D. o(n^2) = 2n^2 +8

Answer : Option A,C

Unit 2

Q1. Greedy Algorithms have following characteristic.

A. Objective function
B. Feasible solution
C. Selection function
D. All of these

Answer : Option D

Q2. Branch & Bound Technique uses

A. Lower Bound
B. Upper Bound
C. Both Lower Bound & Upper Bound
D. None of these

Answer : Option C

Q3. Longest Common Subsequence Problem can be solved by

A. Greedy Method
B. Divide & Conquer
C. Dynamic Programming
D. None of these

Answer : Option C

Q4. Divide and Conquer is a general design paradigm does not consist the following part

A. Divide
B. Recursion
C. Iteration
D. Conquer

Answer : Option C

Q5. The Knapsack problem where the objective function is to minimize the profit is

```
A. Greedy
B. Dynamic 0 / 1
C. Back tracking
D. Branch & Bound 0/1
```

Answer : Option D

Q6. The worst case time complexity of the nondeterministic dynamic knapsack algorithm is

```
A. O(n log n)
B. O( log n)
C. O(n2)
D. O(n)
```

Answer : Option D

Q7. Which of the following standard algorithms is not a Greedy algorithm

```
A. Dijkstra's shortest path algorithm
B. Prim's algorithm
C. Kruskal algorithm
D. Huffman Coding
E. Bellmen Ford Shortest path algorithm
```

Answer : Option E

Q8. From the following algorithm design techniques which one is used to find all the pairs of shortest distances in a graph

```
A. Backtracking
B. Greedy
C. Dynamic programming
D. Divide and Conquer
```

Answer : Option C

Q9. Kruskal's algorithm uses——— and prim's algorithm uses—— in determining the MST

```
A. edges,vertex
B. vertex,edges
C. edges,edges
D. vertex,vertex
```

Answer : Option A

Q10. The Knapsack problem is an example of

A. Greedy algorithm
B. 2D dynamic programming
C. 1D dynamic programming
D. Divide and conquer

Answer : Option B

Q11. Which of the following methods can be used to solve the Knapsack problem

A. Brute force algorithm
B. Recursion
C. Dynamic programming
D. Brute force, Recursion and Dynamic Programming

Answer : Option D

Q12. 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(n3)

Answer : Option C

Q13. Job sequencing with deadline is based on _ method.

A. Greedy Method
B. Branch & Bound
C. Dynamic Programming
D. Divide & Conquer

Answer : Option A

Q14. Which of the following algorithms is the best approach for solving Huffman codes

A. Greedy algorithm
B. 2D dynamic programming
C. 1D dynamic programming
D. Divide and conquer

Answer : Option A

Q15. In Huffman coding, data in a tree always occur

A. roots
B. leaves
C. left sub trees
D. right sub trees

Answer : Option B

Q16. An optimal code will always be present in a full tree.

A. True
B. False

Answer : Option A

Q17. What is the running time of the Huffman encoding algorithm

A. O(C)
B. O(log C)
C. O(C log C)
D. O(N log C)

Answer : Option C

Q18. What is the running time of the Huffman algorithm, if its implementation of the priority queue is done using linked lists

A. O(C)
B. O(log C)
C. O(C log C)
D. O(C^2)

Answer : Option D

Q19. Identify the correct problem for multistage graph from the list given below.

A. Resource allocation problem
B. Traveling salesperson problem
C. Producer consumer problem
D. Barber's problem
E. Dining philosopher problem.

Answer : Option A

Q20. In job sequencing with deadlines, an optimal solution is a feasible solution with _____ profit.

A. Positive
B. Negative
C. Maximum
D. Minimum

Answer : Option C

Q21. The multistage graph problem is to find the/a _____ path.

A. Maximum-cost
B. Minimum-cost
C. Shortest
D. Longest

Answer : Option B

Q22. Which of the following is/are property/properties of a dynamic programming problem

```
A. Optimal substructure
B. Overlapping subproblems
C. Greedy approach
D. Both optimal substructure and overlapping subproblems
```

Answer : Option D

Q23. 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. Memoization
D. Greedy
```

Answer : Option B

Q24. 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 subproblems.

```
A. True
B. False
```

Answer : True

Q25. 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
```

Answer : Option C

Unit 3

Q1. Which of the problems can be solved by backtracking method

```
A. n-queen problem
B. subset sum problem
C. hamiltonian circuit problem
D. All above
```

Answer : Option D

Q2. 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
```

Answer : Option A

Q3. 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
```

Answer : Option B

Q4. A node is said to be _____ if it has a possibility of reaching a complete solution.

```
A. Non-promising
B. Promising
C. Succeeding
D. Preceding
```

Answer : Option B

Q5. 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 neighbour first
```

Answer : Option A

Q6. The leaves in a state-space tree represent only complete solutions.

```
A. True
B. False
```

Answer : Option B

Q7. In general, backtracking can be used to solve

```
A. Numerical problems
B. Exhaustive search
C. Combinatorial problems
D. Graph coloring problems
```

Answer : Option C

Q8. 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
```

Answer : Option D

Q9. Backtracking algorithm is faster than the brute force technique

```
A. True
B. False
```

Answer : Option A

Q10. Which of the following logical programming languages is not based on backtracking

```
A. Icon
B. Prolog
C. Planner
D. Fortran
```

Answer : Option D

Q11. 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
```

Answer : Option B

Q12. Who coined the term 'backtracking

```
A. Lehmer
B. Donald
C. Ross
D. Ford
```

Answer : Option A

Q13. ___ 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
```

Answer : Option C

Q14. 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
```

Answer : Option B

Q15. 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
```

Answer : Option A

Q16. Who published the eight queens puzzle

```
A. Max Bezzel
B. Carl
C. Gauss
D. Friedrich
```

Answer : Option A

Q17. 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
```

Answer : Option D

Q18. Who proposed the depth first backtracking algorithm

```
A. Edsger Dijkshtra
B. Max Bezzel
C. Frank Nauck
D. Carl Friedrich
```

Answer : Option A

Q19. How many solutions are there for 8 queens on 8*8 board

```
A. 12
B. 91
C. 92
D. 93
```

Answer : Option C

Q20. In how many directions do queens attack each other

```
A. 1
B. 2
C. 3
D. 4
```

Answer : Option C

Q21. Where is the n-queens problem implemented

```
A. carom
B. chess
C. ludo
D. cards
```

Answer : Option B

Q22. Branch and bound is a _

```
A. problem solving technique
B. data structure
C. sorting algorithm
D. type of tree
```

Answer : Option A

Q23. Which data structure is most suitable for implementing best first branch and bound strategy

```
A. stack
B. queue
C. priority queue
D. linked list
```

Answer : Option C

Q24. 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
```

Answer : Option A

Q25. 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

Answer : Option C

Q26. Travelling salesman problem is an example of___

A. Divide & Conquer
B. Recursive Approach
C. Dynamic Algorithm
D. Greedy Algorithm

Answer : Option D

Q27. _____ organizes details of all candidate solutions and discards large subsets of fruitless candidates by using upper and lower estimated bounds of the quantity being optimized.

A. Approximation algorithms
B. Dynamic programming
C. Greedy algorithm
D. Branch and Bound

Answer : Option D

Q28. In a knapsack problem, if a set of items are given, each with a weight and a value, the goal is to find the number of items that ___ the total weight and _____ the total value.

A. Minimizes, Minimizes
B. Maximizes, Maximizes
C. Maximizes, Minimizes
d. Minimizes, Maximizes

Answer : Option D

Q29. 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 neighbour first

Answer : Option A

Q30. Backtracking algorithm is faster than the brute force technique.

A. True
B. False

Answer : True