Cs502 Solved MCQS for Final Term Without Repetitions

22/02/2013

Question # 1
Word Algorithm comes from the name of the Muslim author:
Abu Ja'far Mohammad ibn Musaal-Khowarizmi. (p7)

Question # 2
Al-Khwarizmi's work was written in a book titled
al Kitab al-mukhatasar fi hisab al-jabr wa'l-muqabalah (p7)

Question # 3
The running time of quick sort depends heavily on the selection of:
No of inputs
Arrangement of elements in array
Size of elements
Pivot element (p49)

Question # 4
Which sorting algorithm is faster?
O(n^2)
O(nlogn)
O(n+k) (p58)
O(n^3)

Question # 5
There is relationship between number of **back edges** and **number of cycles** in DFS
Select correct option:
Both are equal.
Cycles are half of back edges.
Cycles are one fourth of back edges.
There is no relationship between back edges and number of cycle (p131)

Question # 6
You have an adjacency list for G, what is the time complexity to compute Graph transpose G^T.?
Select correct option:
(V+E) (Reference)
V.E
V
E

Question # 7
Dijkstra's algorithm:
Has greedy approach to find all shortest paths
Has both greedy and dynamic approach to find all shortest paths
Has greedy approach to compute single source shortest paths to all other vertices (p154)
Has both greedy and dynamic approach to compute single source shortest paths to all other vertices.

Question # 8

What is the time complexity to **extract a vertex** from the **priority queue** in **Prim's algorithm**?
Select correct option:
O (log E)
(V)
(V+E)
O (log V) (p152)

Question # 9
Which is true statement in the following?
Kruskal algorithm is multiple source technique for finding MST.
Kruskal's algorithm is used to find minimum spanning tree of a graph, time complexity of this algorithm is O(EV)
Both of above
Kruskal's algorithm (choose best non-cycle edge) is better than Prim's (choose best tree edge) when the graph has relatively few edges.

Question # 11
Kruskal's algorithm (choose best non-cycle edge) is better than Prim's (choose best tree edge) when the graph has relatively few edges.
True
False

Question # 12
Q knapsack problem is called a "0-1" problem, because
Each item must be entirely accepted or rejected (p92)

Question # 13
Which statement is true?
Select correct option:
If a **dynamic-programming problem** satisfies the optimal-substructure property, then a locally optimal solution is globally optimal.
If a **greedy choice property** satisfies the optimal-substructure property, then a locally optimal solution is globally optimal.
Both of above (p77, p98)
None of above

Question # 14
A **dense undirected** graph is:
Select correct option:
A graph in which E = O (V^2) (Reference)
A graph in which E = O (V)
A graph in which E = O (log V)
All items above may be used to characterize a dense undirected graph

Question # 15
What algorithm technique is used in the implementation of **Kruskal solution** for the MST?
Greedy Technique (p142)
Divide-and-Conquer Technique
Dynamic Programming Technique
The algorithm combines more than one of the above techniques

Question # 16
A digraph is strongly connected under what condition?
A digraph is strongly connected if for every pair of vertices u, v e V, u can reach v .
A digraph is strongly connected if for every pair of vertices u, v e V, u can reach v and vice versa. (p135)
A digraph is strongly connected if for at least one pair of vertex u, v e V, u can reach v and vice versa.
A digraph is strongly connected if at least one third pair of vertices u, v e V, u can reach v and vice versa.

Question # 17
The relationship between number of back edges and number of cycles in DFS is,
Both are equal
Back edges are half of cycles
Back edges are one quarter of cycles
There is no relationship between no. of edges and cycles (p131)

Question # 18
Suppose that a graph G = (V,E) is implemented using adjacency lists. What is the complexity of a breadth-first traversal of G? Select correct option:
O(|V |^2)
O(|V | |E|)
O(|V |^2|E|)
O(|V | + |E|) (p116)

Question # 19
Forward edge is?
Select correct option:
(u, v) where u is a proper descendent of v in the tree.
(u, v) where v is a proper descendent of u in the tree. (p129)
(u, v) where v is a proper ancestor of u in the tree.
(u, v) where u is a proper ancestor of v in the tree.

Question # 20
Back edge is?
Select correct option:
(u, v) where v is an ancestor of u in the tree. (p128)
(u,v) where u is an ancestor of v in the tree.
(u, v) where v is an predecessor of u in the tree.
None of above

Question # 21
Cross edge is?
(u, v) where u and v are not ancestor of one another
(u, v) where u is ancestor of v and v is not descendent of u.
(u, v) where u and v are not ancestor or descendent of one another (p129)
(u, v) where u and v are either ancestor or descendent of one another.

Question # 22
If you find yourself in maze the better traversel approach will be?
Select correct option:
BFS
BFS and DFS both are valid (p119)

Level order
DFS

Question # 23
In digraph G=(V,E) ;G **has cycle** if and only if
Select correct option:
The DFS forest has forward edge.
The DFS forest has back edge (p131)
The DFS forest has both back and forward edge
BFS forest has forward edge

Question # 24
What is generally true of Adjacency List and Adjacency Matrix representations of graphs?
Select correct option:
Lists require less space than matrices but take longer to find the weight of an edge (v1,v2)
Lists require less space than matrices and they are faster to find the weight of an edge (v1, v2) (p116)
Lists require more space than matrices and they take longer to find the weight of an edge (v1, v2)
Lists require more space than matrices but are faster to find the weight of an edge (v1, v2)

http://cs-mcqs.blogspot.com/2012/06/data-structures-algorithms-multiple.html

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Question No: 25
Although it requires more complicated data structures, **Prim's algorithm** for a minimum spanning tree **is better** than **Kruskal's** when the graph has a **large number** of vertices.
True False

Question No: 26
If a problem is in NP, it must also be in P.
True **False (p178)** unknown

Question No: 27
If a problem is in NP-complete, it must also be in NP.
True False

Question No: 28
Maximum number of vertices in a Directed Graph may be $|V^2|$
True False

Question No: 29
The Huffman algorithm finds a (n) _____________ solution.
Optimal (Reference) Non-optimal Exponential Polynomial

Question No: 30
The Huffman algorithm finds an **exponential** solution True **False (Reference)**

Question No: 31
The Huffman algorithm finds a **polynomial** solution True **False (Reference)**

Question No: 32

The codeword assigned to characters by the Huffman algorithm have the property that no codeword is the **postfix** of any other. True **False**

Question No: 33
The codeword assigned to characters by the Huffman algorithm have the property that no codeword is the **prefix** of any other. **True (p101)** False

Prefix Property:
The codewords assigned to characters by the Huffman algorithm have the property that no codeword is a prefix of any other:

Question No: 34
Shortest path problems can be solved efficiently by modeling the road map as a graph. **True** False

Question No: 35
Dijkstra's algorithm is operates by maintaining a subset of vertices. **True** False

Question No: 36
Merge sort is stable sort, but not an in-place algorithm **True (p54)** False

Question No: 37
In counting sort, once we know the ranks, we simply ______ numbers to their final positions in an output array.
Delete **copy (p57)** Mark arrange

Question No: 38
Dynamic programming algorithms need to store the results of intermediate sub-problems. **True (p75)** False

Question No: 39
A p × q matrix A can be multiplied with a q × r matrix B. The result will be a p × r matrix C. There are (p . r) total entries in C and each takes _________ to compute.
O (q) **O (1) (p84)** O (n^2) O (n^3)

Question No: 40
6. Due to left-complete nature of binary tree, heaps can be stored in
Link list
Structure
Array (p40)
None of above

Question No: 41
Which of the following is calculated with **big O notation**?
Lower bounds **Upper bounds**
Both upper and lower bound Medium bounds

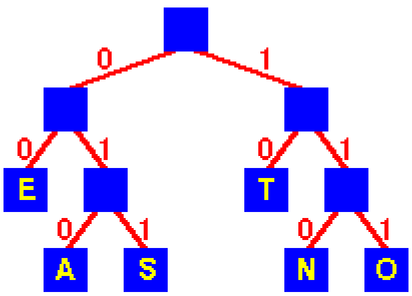
- The definition of Θ-notation relies on proving both a lower and upper asymptotic bound.
- The O-notation is used to state only the asymptotic upper bounds.

Question No: 42
Merge sort makes two recursive calls. Which statement is true after these recursive calls finish, but before the merge step?

The array elements form a heap
Elements in each half of the array are sorted amongst themselves
Elements in the first half of the array are less than or equal to elements in the second half of the array
None of the above

Question No: 43
Who invented Quick sort procedure?
Hoare Sedgewick Mellroy Coreman

Question No: 44
Consider the following Huffman Tree. The binary code for the string **TEA** is:
10 00 010
011 00 010
10 00 110
11 10 110



String	Encoding
TEA	10 00 010
SEA	011 00 010
TEN	10 00 110

Question No: 45
Can an adjacency matrix for a directed graph ever not be square in shape? Yes **No**

- No. since we want to describe the relationship between each node and each other node, we need precisely n^2 matrix entries.

Question No: 46
One of the clever aspects of heaps is that they can be stored in arrays without using any______
Pointers (p40) constants variables functions

Question No: 47
Merge sort requires extra array storage. **True (p54)** False

- Mergesort is a stable algorithm but **not** an in-place algorithm. It requires extra array storage.

Question No: 48
Non-optimal or greedy algorithm for money change takes____________
O(k) (p99) O(kN) O(2k) O(N)

Question No: 49
The Huffman codes provide a method of encoding data **inefficiently** when coded using ASCII standard.
True **False (p99)**

- The Huffman codes provide a method of encoding data **efficiently**.

Question No: 50
Using ASCII standard the string "abacdaacacwe" will be encoded with __________ bits
Select correct option:

64
128
96 (p101 12x8=96)
120

Question No: 51
Using ASCII standard the string abacdaacac will be encoded with __________ bits.
80 (p99) 160 320 100

- Consider the string " abacdaacac". if the string is coded with ASCII codes, the message length would **be10 × 8 = 80 bits.**

Question No: 52
Using ASCII standard the string abacdaacac will be encoded with 160 bits. True **False (p99)**

Question No: 53
Using ASCII standard the string abacdaacac will be encoded with 320 bits. True **False (p99)**

Question No: 54
Using ASCII standard the string abacdaacac will be encoded with 100 bits. True **False (p99)**

Question No: 55
Using ASCII standard the string abacdaacac will be encoded with 32 bytes. True **False (p99)**

Question No: 56
The greedy part of the Huffman encoding algorithm is to first find two nodes with **smallest** frequency.
True (p100) False

Question No: 57
The greedy part of the Huffman encoding algorithm is to first find two nodes with **character** frequency.
True **False (p100)**

Question No: 58
The greedy part of the Huffman encoding algorithm is to first find two nodes with **larger** frequency.
True **False**

Question No: 59
Dijkestra's single source shortest path algorithm works if all edges weights are non-negative and there are negative cost cycles. True **False**

Question No: 60
Dijkestra s single source shortest path algorithm works if all edges weights are non-negative and there are no negative cost cycles. **True (p159)** False

Question No: 61
Dijkestra s single source shortest path algorithm works if all edges weights are negative and there are no negative cost cycles. True **False**

Question No: 62
Floyd-Warshall algorithm is a dynamic programming algorithm; the genius of the algorithm is in the clever recursive formulation of the shortest path problem. **True (p162)** False

Question No: 63
Floyd-Warshall algorithm, as in the case with DP algorithms, we avoid recursive evaluation by generating a table for $d_{ij}^{(k)}$
True (p164)
False

Question No: 64
The term coloring came from the original application which was in **map drawing**. **True (p173)** False

The term "coloring" came from the original application which was in **architectural design**. True **False**

Question No: 65
In the **clique cover** problem, for two vertices to be in the same group, they must be _____ each other.
Apart from Far from Near to **Adjacent to (p176)**

Question No: 66
In the clique cover problem, for two vertices to be in the same group, they **must be adjacent** to each other.
True False

Question No: 67
In the **clique cover** problem, for two vertices to be in the same group, they **must be apart** from each other.
True **False (p176)**

Question No: 68
The difference between Prims algorithm and Dijkstra s algorithm is that Dijkstra s algorithm uses a different key.
True (p156) False

Question No: 69
The difference between Prim s algorithm and Dijkstra s algorithm is that Dijkstra s algorithm uses a same key.
True **False (p156)**

Question No: 70
You have an adjective list for G, what is the time complexity to computer graph transpose G^T.?
(V + E) (p138)

Question No: 71
Given an adjacency list for G, it is possible to compute G^T in Θ(V + E) time.
It takes O(log V) to extract a vertex from the priority queue.

Question No: 72
Overall time for Kruskal is Θ(E log E) = Θ(E log V) if the graph is sparse. **(p149) True**

Question No: 73
An optimization problem is one in which you want to find,
Not a solution
An algorithm
Good solution
The best solution

Question No: 74
Although it requires more complicated data structures, Prim's algorithm for a minimum spanning tree is better than Kruskal's when the graph has a large number of vertices.
True
False

Question No: 75
If a graph has v vertices and e edges then to obtain a spanning tree we have to delete
v edges.
v – e + 5 edges
v + e edges.
None of these

Question No: 76
Huffman algorithm uses a greedy approach to generate an antefix code T that minimizes the expected length B (T) of the encoded string. True **False (p102)**

Question No: 77
Huffman algorithm uses a greedy approach to generate a postfix code T that minimizes the expected length B (T) of the encoded string. True **False (p102)**

Question No: 78
Huffman algorithm uses a greedy approach to generate a prefix code T that minimizes the expected length B (T) of the encoded string. **True (p102)** False

Question No: 79
Bellman-Ford allows negative weights edges and negative cost cycles. True **False (p159)**
- Bellman-Ford allows negative weights edges and no negative cost cycles.

Question No: 80
We do sorting to,
keep elements in random positions
keep the algorithm run in linear order
keep the algorithm run in (log n) order
keep elements in increasing or decreasing order

Question No: 81
After partitioning array in Quick sort, pivot is placed in a position such that
Values smaller than pivot are on left and larger than pivot are on right (Ref)
Values larger than pivot are on left and smaller than pivot are on right
Pivot is the first element of array
Pivot is the last element of array

Question No: 82
Dynamic programming algorithms need to store the results of intermediate sub-problems. **True** False

Question No: 83
Which statement is true?
If a dynamic-programming problem satisfies the optimal-substructure property, then a locally optimal solution is globally optimal.

If a greedy choice property satisfies the optimal-substructure property, then a locally optimal solution is globally optimal.
Both of above None of above

Question No: 84
What **general property** of the list indicates that the graph has an **isolated vertex**?
There is Null pointer at the end of list.
The Isolated vertex is not handled in list.
Only one value is entered in the list.
There is at least one null list.

Question No: 85
Depth first search is **shortest path** algorithm that works on **un-weighted** graphs. True **False (p153)**

- The **breadth-first-search** algorithm is a shortest-path algorithm that works on **un-weighted graphs.**

Question No: 86
Which is true statement?
Select correct option:
Breadth first search is shortest path algorithm that works on un-weighted graphs (p153)
Depth first search is shortest path algorithm that works on un-weighted graphs.
Both of above are true.
None of above are true.

(1) In Prim's algorithm, the additional information maintained by the algorithm is the **length of the shortest edge** from vertex v to points already in the tree.
a) True **b) False** c) unknown

(2) Although it requires more complicated data structures, Prim's algorithm for a minimum spanning tree is better than Kruskal's when the graph has a **large number of vertices**.
a) True b) False c) unknown

(3) If a problem is NP-complete, it must also be in NP.
a) True b) False c) unknown

(4) Which statement is true?
(i) The running time of Bellman-Ford algorithm is T (VE)
(ii) Both Dijkstra's algorithm and Bellman-Ford are based on performing **repeated relaxations**
(iii) The 0-1 knapsack problem is hard to solve
Only i Only iii Both i and iii **All of these**

5) Which of the following arrays represent **descending (max) heaps**?
i. [10,7,7,2,4,6] ii. [10,7,6,2,4,7]
iii. [10,6,7,2,4,6] iv. [6,6,7,2,4,10]
Only ii Only iv Both ii and iv Both i and iii

6. Which of the following statement(s) is/are correct?
(a) O(n log n + n2) = O(n2). (b) O(n log n + n2) = O(n2 log 2n)
(c) O(c n2) = O(n2) where c is a constant. (d) O(c n2) = O(c) where c is a constant.
(e) O(c) = O(1) where c is a constant.
Only (a) & (e) Both (c) and (e)

7. Which of the shortest path algorithms would be most appropriate for finding paths in the graph with **negative edge weights** and **cycles**?
i.Dijkstra's Algorithm
ii. Bellman-Ford Algorithm
iii. Floyd Warshall Algorithm
Only ii Only iii **Both ii & iii**

9. Suppose we have two problems A and B .Problem A is polynomial-time reducible and problem B is NP-complete. If we reduce problem A into B then problem A becomes NP-complete **Yes** No

12. Edge (u, v) is a forward edge if
u is a proper descendant of v in the tree
v is a proper descendant of u in the tree
None of these

14. If, in a DFS forest of digraph G = (V, E), f[u] = f[v] for an edge (u, v) ? E then the edge is called
Back edge Forward edge Cross Edge Tree Edge None of these

16. Best and worst case times of an algorithm may be same. **True** False

17. Can an adjacency matrix for a directed graph ever not be square in shape? **Yes** No

1. In which order we can sort?
Increasing order only decreasing order only
Increasing order or decreasing order both at the same time

3. In the analysis of **Selection algorithm**, we make a number of passes, in fact it could be as many as,
T(n) T(n / 2) **log n (p37)** n / 2 + n / 4

4. How much time **merge sort** takes for an array of numbers?
T(n^2) T(n) T(log n) **T(n log n) (p40)**

7. Sieve Technique applies to problems where we are interested in finding a single item from a larger set of ___
n items (p34) phases pointers constant

8. The sieve technique works in ___________ as follows
Phases (p34) numbers integers routines

9. For the heap sort, access to nodes involves simple _______________ operations.
Arithmetic binary algebraic logarithmic

10. The analysis of Selection algorithm shows the total running time is indeed _________in n,
Arithmetic geometric **linear (p39)** orthogonal

12. Slow sorting algorithms run in,
T(n^2) (p39) T(n) T(log n) T(n log n)

13. A heap is a left-complete binary tree that conforms to the
Increasing order only decreasing order only **heap order** (log n) order

14. For the heap sort we store the tree nodes in
Level-order traversal (p40) in-order traversal pre-order traversal post-order traversal

20: In Sieve Technique we do not know which item is of interest **True (p34)** False

22: Divide-and-conquer as breaking the problem into a small number of
Pivot Sieve **smaller sub problems (p34)** Selection

23: For the sieve technique we solve the problem,
Recursively (p34) mathematically precisely accurately

25: The reason for introducing **Sieve Technique** algorithm is that it illustrates a very important special case of,
Divide-and-conquer (p34) decrease and conquer greedy nature 2-dimension Maxima

32. Sorting is one of the few problems where provable _____ bonds exits on how fast we can sort,
Upper **Lower (p39)** Average log n

34: Sieve Technique can be applied to selection problem? **True** False

Heaps can be stored in arrays without using any pointers; this is due to the ___ nature of the binary tree,
Left-complete right-complete tree nodes tree leaves

38: How many elements do we eliminate in each time for the Analysis of Selection algorithm?
n / 2 elements (p36) (n / 2) + n elements n / 4 elements 2 n elements

42: The sieve technique is a special case, where the number of sub problems is just
5 Many **1 (p34)** few

Question # 1
For the Sieve Technique we take time
T(nk) (p34) T(n / 3) n^2 n/3

Question # 2
The number of nodes in a complete binary tree of height h is
Select correct option:
$2^{(h+1)} - 1$
2 * (h+1) – 1
2 * (h+1)
((h+1) ^ 2) – 1

Question No: 1
Random access machine or RAM is a/an
Machine build by Al-Khwarizmi
Mechanical machine
Electronics machine
Mathematical model (p10)

Question No: 2
Analysis of Selection algorithm ends up with,

T(n)
T(1 / 1 + n)
T(n / 2)
T((n / 2) + n)

Question # 6
Continuation sort is suitable to sort the elements in range 1 to k
1. K is Large 2. K is not known 3. K may be small or large **4. K is small (p57)**

Question # 5
Counting sort is suitable to sort the elements in range 1 to k:
K is large **K is small** K may be large or small None

Question # 10
Continuing sort has time complexity of?
1. O (n) (p58) 2. O(n+k) 3. O(nlogn)

Question # 11
Counting sort has time complexity:
O (n) (p58) O(n+k) O(k) O(nlogn)

Question # 6
Memoization is :
To store previous results for further use.
To avoid unnecessary repetitions by writing down the results of recursive calls and looking them again if needed later. (p74)
To make the process accurate
None of the above

Question # 9
In Quick sort algorithm, constants hidden in T(n lg n) are:
Large Medium Not known **small (Ref)**

Question # 12
Quick sort is based on divide and conquer paradigm; we divide the problem on base of pivot element and:
There is explicit combine process as well to conquer the solution.
No work is needed to combine the sub-arrays, the array is already sorted
Merging the subarrays
None of above.

Question # 13
In RAM model instructions are executed
One after another (p10)
Parallel
Concurrent
Random

Question # 14
In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the **convergent ________________** series in the analysis,

linear arithmetic **geometric (p37)** exponent

Question No: 2
_________ is a graphical representation of an algorithm
Σ notation Θnotation **Flowchart (Ref)** Asymptotic notation

Question No: 3
A RAM is an idealized machine with ______ random-access memory.
256MB 512MB **An infinitely large (p10)** 100GB

Question No: 4
What type of instructions Random Access Machine (RAM) can execute? Choose best answer
Algebraic and logic
Geometric and arithmetic
Arithmetic and logic (p10)
Parallel and recursive

Question No: 5
What will be the total number of **max comparisons** if we run **brute-force maxima** algorithm with n elements?
n^2 (p14) 2n/n n 8n

Question No: 6
What is the solution to the recurrence T(n) = T(n/2)+n .
O(logn) **O(n)** O(nlogn) O(n2)

Question No: 7
Consider the following code:

```
For(j=1; j<n;j++)
    For(k=1; k<15;k++)
        For(l=5; l<n; l++)
        {
            Do_something_constant();
        }
```

What is the order of execution for this code.
O(n)
O(n3)
O(n2 log n)
O(n2)

Question No: 8
Consider the following Algorithm:

```
Factorial (n){
  if (n=1)
    return 1
  else
    return (n * Factorial(n-1))
{
```

Recurrence for the following algorithm is:
T(n) = T(n-1) +1
T(n) = nT(n-1) +1

T(n)= T(n-1) +n

T(n)=T(n(n-1)) +1

Question No: 9 -

What is the total time to heapify?

O(log n) (p43) O(n log n) O(n2 log n) O(log2 n)

Question No: 10

When we call heapify then at each level the comparison performed takes time

It will take Θ (1) (p43)

Time will vary according to the nature of input data

It cannot be predicted

It will take Θ (log n)

Question No:

In Quick sort, we don't have the control over the sizes of recursive calls

-True (p49) -False -Less information to decide -Either true or false

Question No: 12

Is it possible to sort without making comparisons? **Yes (p57)** No

Question No: 13

If there are **Θ (n2) entries** in **edit distance matrix** then the total running time is

Θ (1)

Θ (n2)

Θ (n)

Θ (n log n)

Question No: 14

For **Chain Matrix Multiplication** we cannot use divide and conquer approach because,

We do not know the optimum k (p86)

We use divide and conquer for sorting only

We can easily perform it in linear time

Size of data is not given

Question No: 15

The Knapsack problem belongs to the domain of _______________ problems.

Optimization (p91) NP Complete Linear Solution Sorting

Question No: 16

Suppose we have three items as shown in the following table, and suppose the capacity of the knapsack is 50 i.e. W = 50.

Item	Value	Weight
1	60	10
2	100	20
3	120	30

The optimal solution is to pick

Items 1 and 2

Items 1 and 3

Items 2 and 3

None of these

Quiz 5

Question # 1
Theta asymptotic notation for T (n):
Select correct option:
Set of functions described by: c1g(n)<=f(n) for c1 some constant and n=n0
Set of functions described by c1g(n)>=f(n) for c1 some constant and n=n0
Theta for T(n)is actually upper and worst case complexity of the code
Set of functions described by: c1g(n)<=f(n)<=c2g(n) for c1 and c2 some constants and n=n0

Question # 2
A (an) ______ is a left-complete binary tree that conforms to the heap order
Heap (page 40)
Binary tree
Binary search tree
Array

Question # 3
Consider the following Algorithm: Fun(n){ if (n=1) return 1 else return (n * Fun(n-1)) } Recurrence for the above algorithm is: Select correct option:
nT(n-1)+1
2T(n-1)+1
T(n-1)+cn
T(n-1)+1

Question # 4
The recurrence relation of Tower of Hanoi is given below T(n)={1 if n=1 and 2T(n-1) if n >1 In order to move a tower of 5 rings from one peg to another, how many ring moves are required?
Select correct option: 16 10 **32** 31

Question # 5
In Quick Sort Constants hidden in T(n log n) are
1. Large 2. Medium **3. Small (Reference)** 4. Not Known

Question # 6
In stable sorting algorithm:
One array is used
In which duplicating elements are not handled.
More than one arrays are required.
Duplicating elements remain in same relative position after sorting. (p54)

Question # 7
In in-place sorting algorithm is one that uses arrays for storage:
An additional array
No additional array (p54)
Both of above may be true according to algorithm
More than 3 arrays of one dimension

Question # 8
Which may be a stable sort?
1. Merger 2. Insertion **3. Both above (p54)** 4. None of the above

Question # 9
An in place sorting algorithm is one that uses ___ arrays for storage
1. Two dimensional arrays
2. More than one array
3. **No Additional Array (p54)**
4. None of the above

Question # 10
Quick sort is
Stable and In place
Not stable but in place (p54)
Stable and not in place
Sometime in place and sometime stable

Question # 11
One Example of **in place** but **not stable** sort is
Quick (p54) Heap Merge Bubble

Question # 12
Which may be stable sort?
Bubble sort Insertion sort **both of above (p54)**

Question # 13
Merge sort is stable sort, but not an in-place algorithm **True (p54)** False

An **in-place sorting** algorithm is one that uses **no additional array** for storage. A sorting algorithm is stable if duplicate elements remain in the same relative position after sorting. **(p54)**

9	3	3′	5	6	5′	2	1	3″		unsorted
1	2	3	3′	3″	5	5′	6	9		stable sort
1	2	3′	3	3″	5′	5	6	9		unstable

Bubble sort, **insertion** sort and **selection** sort are **in-place** sorting algorithms.

Bubble sort and **insertion sort** can be implemented as **stable** algorithms but selection sort cannot (without significant modifications).

Mergesort is a **stable algorithm** but **not an in-place** algorithm. It requires **extra array** storage.

Quicksort is **not stable** but is an **in-place** algorithm.

Heapsort is an **in-place** algorithm but is **not stable**.