

# National Testing Agency

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## Data Structures

<b>Group Number :</b>	1
<b>Group Id :</b>	94091887
<b>Group Maximum Duration :</b>	0
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## Data Structures -1

<b>Section Id :</b>	940918125
<b>Section Number :</b>	1
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory

<b>Number of Questions :</b>	100
<b>Number of Questions to be attempted :</b>	100
<b>Section Marks :</b>	100
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	940918171
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 1 Question Id : 9409185808 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

\_\_\_\_\_ is the traversal technique which lists the nodes of a binary search tree in ascending order.

1. In-order
2. Post-order
3. Pre-order
4. None of these

**Options :**

- 94091821845. 1
- 94091821846. 2
- 94091821847. 3
- 94091821848. 4

**Question Number : 2 Question Id : 9409185809 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Insertion of a record in a circularly linked list organization involves the modification of\_\_\_\_\_.

1. No pointer
2. pointer
3. pointers
4. None of these

**Options :**

94091821849. 1

94091821850. 2

94091821851. 3

94091821852. 4

**Question Number : 3 Question Id : 9409185810 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following sorting methods will be the most efficient to check a given set of sorted items which is already in sorted order?

1. Bubble sort
2. Selection sort
3. Insertion sort
4. Merge sort

**Options :**

94091821853. 1

94091821854. 2

94091821855. 3

94091821856. 4

**Question Number : 4 Question Id : 9409185811 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Stacks could not be used to\_\_\_\_\_.

1. Evaluate an arithmetic expression in postfix form
2. Implement recursion
3. Convert a given arithmetic expression in infix form to its equivalent postfix form
4. Allocate resources by the operating system

**Options :**

94091821857. 1

94091821858. 2

94091821859. 3

94091821860. 4

**Question Number : 5 Question Id : 9409185812 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Sorting is NOT suitable for\_\_\_\_\_.

1. Report generation
2. Making searching easier and efficient
3. Minimizing the storage needed
4. Responding to queries easily

**Options :**

94091821861. 1

94091821862. 2

94091821863. 3

94091821864. 4

**Question Number : 6 Question Id : 9409185813 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

\_\_\_\_\_ is the number of binary trees possible with 3 nodes.

1. 12
2. 13
3. 5
4. 15

**Options :**

94091821865. 1

94091821866. 2

94091821867. 3

94091821868. 4

**Question Number : 7 Question Id : 9409185814 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Preorder is also termed as\_\_\_\_\_.

1. Depth-first order
2. Breadth- first order
3. Topological order
4. Linear order

**Options :**

94091821869. 1

94091821870. 2

94091821871. 3

94091821872. 4

**Question Number : 8 Question Id : 9409185815 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Sorting is useful for\_\_\_\_\_.

1. report generation
2. responding to queries easily
3. making searching easier and efficient
4. All of these options

**Options :**

94091821873. 1

94091821874. 2

94091821875. 3

94091821876. 4

**Question Number : 9 Question Id : 9409185816 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

There are 4 dissimilar algorithms A1, A2, A3, A4 to solve a given problem with the order  $\log(n)$ ,  $\log(\log(n))$ ,  $n \log(n)$ ,  $n/\log(n)$  respectively. Which is the best algorithm?

1. A1
2. A2
3. A3
4. A4

**Options :**

94091821877. 1

94091821878. 2

94091821879. 3

94091821880. 4

**Question Number : 10 Question Id : 9409185817 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The postfix expression for the infix expression:  $A + B * (C + D) / F + D * E$  is\_\_\_\_\_.

1.  $AB+CD+*F/D+E*$
2.  $A*B+CD/F*DE++$
3.  $ABCD+*F/+DE*+$
4.  $A+*BCD/F*DE++$

**Options :**

94091821881. 1

94091821882. 2

94091821883. 3

94091821884. 4

**Question Number : 11 Question Id : 9409185818 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

What is the benefit of using a dynamic set in direct addressing?

1. It saves time
2. It saves space
3. It saves both time and space
4. None of these

**Options :**

94091821885. 1

94091821886. 2

94091821887. 3

94091821888. 4

**Question Number : 12 Question Id : 9409185819 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Bit array is a \_\_\_\_\_.

1. Data structure for representing arrays of records
2. Data structure that compactly stores bits
3. An array in which most of the elements have the same value
4. None of these

**Options :**

94091821889. 1

94091821890. 2

94091821891. 3

94091821892. 4

**Question Number : 13 Question Id : 9409185820 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The complexity of multiplying two matrices of order  $m*n$  and  $n*p$  is\_\_\_\_\_.

1.  $mnp$
2.  $mp$
3.  $mn$
4.  $np$

**Options :**

94091821893. 1

94091821894. 2

94091821895. 3

94091821896. 4

**Question Number : 14 Question Id : 9409185821 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**



A full binary tree with  $2n+1$  nodes comprise\_\_\_\_\_.

1. n leaf nodes
2. n non-leaf nodes
3. n-1 leaf nodes
4. n-1 non-leaf nodes

**Options :**

94091821897. 1

94091821898. 2

94091821899. 3

94091821900. 4

**Question Number : 15 Question Id : 9409185822 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Given an empty AVL tree, how would you construct AVL tree when a set of numbers are given without carrying out any rotations?

1. just build the tree with the given input
2. find the median of the set of elements given, make it as root and construct the tree
3. use trial and error
4. use dynamic programming to build the tree

**Options :**

94091821901. 1

94091821902. 2

94091821903. 3

94091821904. 4

**Question Number : 16 Question Id : 9409185823 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

A \_\_\_\_\_ is a mathematical-model defined with a collection of operations.

1. Data Structure
2. Abstract Data Type
3. Primitive Data Type
4. Algorithm

**Options :**

94091821905. 1

94091821906. 2

94091821907. 3

94091821908. 4

**Question Number : 17 Question Id : 9409185824 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

A technique for direct search is\_\_\_\_\_.

1. Binary Search
2. Linear Search
3. Tree Search
4. Hashing

**Options :**

94091821909. 1

94091821910. 2

94091821911. 3

94091821912. 4

**Question Number : 18 Question Id : 9409185825 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The number of leaf nodes in a complete binary tree of depth  $d$  is\_\_\_\_\_.

1.  $2d$
2.  $2^{d-1}+1$
3.  $2^{d+1}+1$
4.  $2^{d+1}$

**Options :**

94091821913. 1

94091821914. 2

94091821915. 3

94091821916. 4

**Question Number : 19 Question Id : 9409185826 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The time taken for Merging 4 sorted files containing 50, 10, 25 and 15 records is \_\_\_\_\_.

1. O (125)
2. O (200)
3. O (175)
4. O (100)

**Options :**

94091821917. 1

94091821918. 2

94091821919. 3

94091821920. 4

**Question Number : 20 Question Id : 9409185827 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

For an undirected graph with  $n$  vertices and  $e$  edges, the sum of the degree of each vertex is equal to \_\_\_\_\_.

1.  $2n$
2.  $(2n-1)/2$
3.  $2e$
4.  $e^2/2$

**Options :**

94091821921. 1

94091821922. 2

94091821923. 3

94091821924. 4

**Question Number : 21 Question Id : 9409185828 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

What is the number of interchanges required to sort 5, 1, 6, 2 4 in ascending order using Bubble Sort?

1. 6
2. 5
3. 7
4. 8

**Options :**

94091821925. 1

94091821926. 2

94091821927. 3

94091821928. 4

**Question Number : 22 Question Id : 9409185829 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

If a node in a Binary Search Tree has two children, then its inorder predecessor has\_\_\_\_\_.

1. No right child
2. No left child
3. Two children
4. One child

**Options :**

94091821929. 1

94091821930. 2

94091821931. 3

94091821932. 4

**Question Number : 23 Question Id : 9409185830 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

What is the minimum number of keys in any non-root node while considering a B+-tree in which the maximum number of keys in a node is 5?

1. 1
2. 2
3. 3
4. 4

**Options :**

94091821933. 1

94091821934. 2

94091821935. 3

94091821936. 4

**Question Number : 24 Question Id : 9409185831 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which one of the following is a key factor for preferring B-trees to binary search trees for indexing database relations?

1. Database relations have a large number of records
2. Database relations are sorted on the primary key
3. B-trees require less memory than binary search trees
4. Data transfer from disks is in blocks

**Options :**

94091821937. 1

94091821938. 2

94091821939. 3

94091821940. 4

**Question Number : 25 Question Id : 9409185832 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

B+ trees are ideal to binary trees in databases for the reason that \_\_\_\_\_.

1. Disk capacities are greater than memory capacities
2. Disk access is much slower than memory access
3. Disk data transfer rates are much less than memory data transfer rates
4. Disks are more reliable than memory

**Options :**

94091821941. 1

94091821942. 2

94091821943. 3

94091821944. 4

**Question Number : 26 Question Id : 9409185833 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

A B-tree of order 4 is built from scratch by 10 successive insertions. What is the maximum number of node splitting operations that may take place?

1. 3
2. 4
3. 5
4. 6

**Options :**

94091821945. 1

94091821946. 2

94091821947. 3

94091821948. 4

**Question Number : 27 Question Id : 9409185834 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

In B+ tree, the order of leaf node is the maximum number of (value, data record pointer) pairs it can hold. Given that the block size is 1K bytes, data record pointer is 7 bytes long, the value field is 9 bytes long and a block pointer is 6 bytes long, what is the order of the leaf node?

1. 63
2. 64
3. 67
4. 68

**Options :**

94091821949. 1

94091821950. 2

94091821951. 3

94091821952. 4

**Question Number : 28 Question Id : 9409185835 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

What is the order of the internal node? If the order of an internal node in a B+ tree index is the maximum number of children it can have and a child pointer takes 6 bytes, the search field value takes 14 bytes, and the block size is 512 bytes.

1. 24
2. 25
3. 26
4. 27

**Options :**

94091821953. 1

94091821954. 2

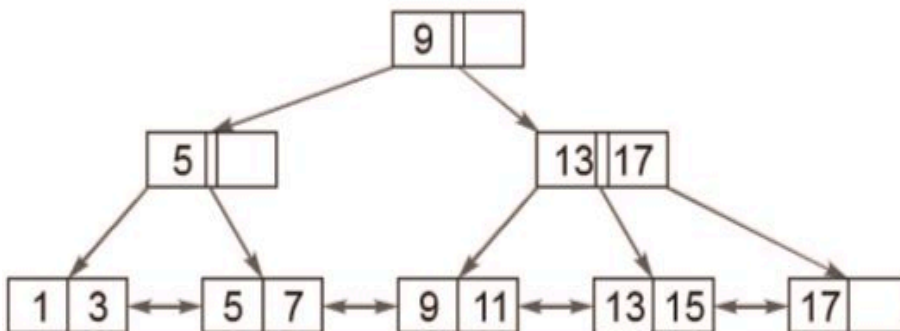
94091821955. 3

94091821956. 4

**Question Number : 29 Question Id : 9409185836 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

With reference to the B+ tree index of order 1 shown below, the minimum number of nodes (including the root node) that must be fetched in order to fulfill the following query: "Get all records with a search key greater than or equal to 7 and less than 15" is \_\_\_\_\_ .



1. 4
2. 5
3. 6
4. 7

**Options :**

94091821957. 1

94091821958. 2



94091821959. 3

94091821960. 4

**Question Number : 30 Question Id : 9409185837 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

\_\_\_\_\_ data structure is most effectual to find the top 10 largest items out of 1 million items stored in file.

1. Min heap
2. Max heap
3. BST
4. Sorted array

**Options :**

94091821961. 1

94091821962. 2

94091821963. 3

94091821964. 4

**Question Number : 31 Question Id : 9409185838 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Assume a situation of client receiving the packets from a server. The speed of the client and the server may differ. Which data structure is best suitable for synchronization?

1. Circular Linked List
2. Priority Queue
3. Stack
4. Queue

**Options :**

94091821965. 1

94091821966. 2

94091821967. 3

94091821968. 4

**Question Number : 32 Question Id : 9409185839 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following is correct recurrence for worst case of Binary Search?

1.  $T(n) = 2T(n/2) + O(1)$  and  $T(1) = T(0) = O(1)$
2.  $T(n) = T(n-1) + O(1)$  and  $T(1) = T(0) = O(1)$
3.  $T(n) = T(n/2) + O(1)$  and  $T(1) = T(0) = O(1)$
4.  $T(n) = T(n-2) + O(1)$  and  $T(1) = T(0) = O(1)$

**Options :**

94091821969. 1

94091821970. 2

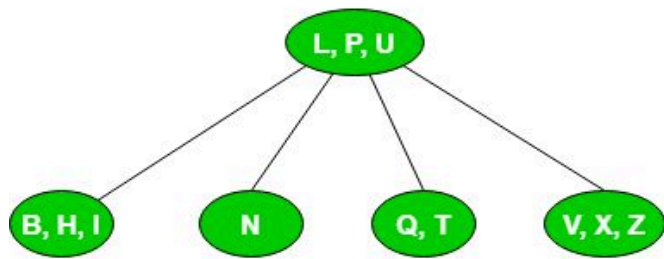
94091821971. 3

94091821972. 4

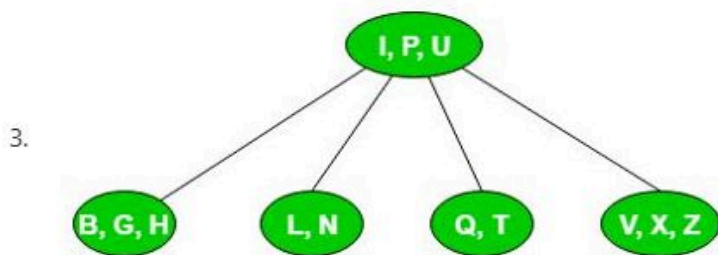
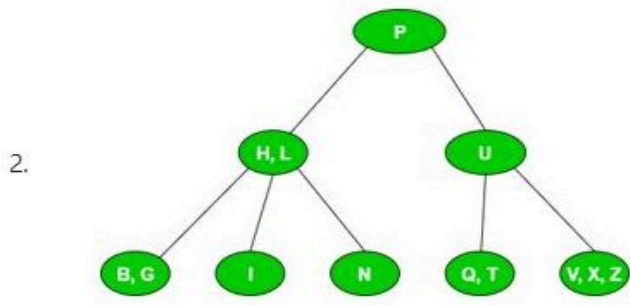
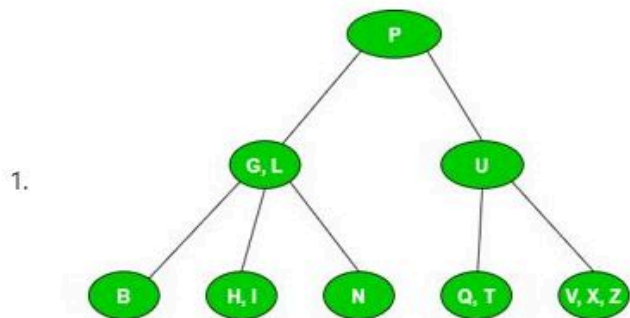
**Question Number : 33 Question Id : 9409185840 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Consider the following 2-3-4 tree (i.e., B-tree with a minimum degree of two) in which each data item is a letter. The normal alphabetical ordering of letters is used in constructing the tree.



What is the result of inserting G in the above tree?



4. None of the options

**Options :**

94091821973. 1

94091821974. 2

94091821975. 3

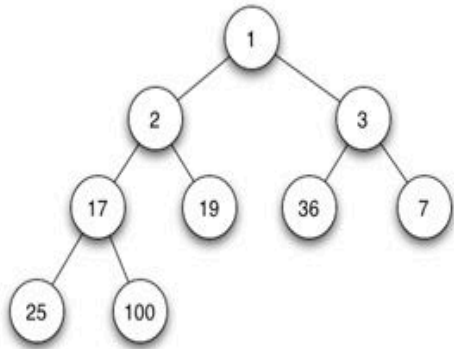
94091821976. 4

**Question Number : 34 Question Id : 9409185841 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

If we implement heap as min-heap, deleting root node (value 1) from the heap. What would be the value of root node after second iteration if leaf node (value 100) is chosen to replace the root at start?



1. 2
2. 100
3. 17
4. 3

**Options :**

94091821977. 1

94091821978. 2

94091821979. 3

94091821980. 4

**Question Number : 35 Question Id : 9409185842 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

A hash table of length 10 uses open addressing with hash function  $h(k) = k \bmod 10$ , and linear probing. After inserting 6 values into an empty hash table, the table is as shown below.

0	
1	
2	42
3	23
4	34
5	52
6	46
7	33
8	
9	

Which one of the following choices gives a possible order in which the key values could have been inserted in the table?

1. 46, 42, 34, 52, 23, 33
2. 34, 42, 23, 52, 33, 46
3. 46, 34, 42, 23, 52, 33
4. 42, 46, 33, 23, 34, 52

**Options :**

94091821981. 1

94091821982. 2

94091821983. 3

94091821984. 4

**Question Number : 36 Question Id : 9409185843 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Consider a hash table of size seven, with starting index zero, and a hash function  $(3x + 4) \bmod 7$ . Assuming the hash table is initially empty, which of the following is the contents of the table when the sequence 1, 3, 8, 10 is inserted into the table using closed hashing? Note that '\_' denotes an empty location in the table.

1. 8, \_, \_, \_, \_, \_ 10
2. 1, 8, 10, \_, \_, \_ 3
3. 1, \_, \_, \_, \_ 3
4. 1, 10, 8, \_, \_, \_ 3

**Options :**

94091821985. 1

94091821986. 2

94091821987. 3

94091821988. 4

**Question Number : 37 Question Id : 9409185844 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Given the following input (4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199) and the hash function  $x \text{ mod } 10$ , which of the following statements are true?

i. 9679, 1989, 4199 hash to the same value

ii. 1471, 6171 hash to the same value

iii. All elements hash to the same value

iv. Each element hashes to a different value

1. i only

2. ii only

3. i and ii

4. iii or iv

**Options :**

94091821989. 1

94091821990. 2

94091821991. 3

94091821992. 4

**Question Number : 38 Question Id : 9409185845 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which one of the following hash functions on integers will distribute keys most uniformly over 10 buckets numbered 0 to 9 for  $i$  ranging from 0 to 2020?

1.  $h(i) = i^2 \bmod 10$
2.  $h(i) = i^3 \bmod 10$
3.  $h(i) = (11 * i^2) \bmod 10$
4.  $h(i) = (12 * i) \bmod 10$

**Options :**

94091821993. 1

94091821994. 2

94091821995. 3

94091821996. 4

**Question Number : 39 Question Id : 9409185846 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Given a hash table  $T$  with 25 slots that stores 2000 elements, the load factor  $\alpha$  for  $T$  is

\_\_\_\_\_.

1. 80
2. 0.0125
3. 8000
4. 1.25

**Options :**

94091821997. 1

94091821998. 2

94091821999. 3

94091822000. 4

**Question Number : 40 Question Id : 9409185847 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following statement(s) is TRUE?

- I. A hash function takes a message of arbitrary length and generates a fixed length code.
- II. A hash function takes a message of fixed length and generates a code of variable length.
- III. A hash function may give the same hash value for distinct messages.

- 1. I only
- 2. II and III
- 3. I and III
- 4. II only

**Options :**

- 94091822001. 1
- 94091822002. 2
- 94091822003. 3
- 94091822004. 4

**Question Number : 41 Question Id : 9409185848 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Suppose we are sorting an array of eight integers using quicksort, and we have just finished the first partitioning with the array looking like this:

2 5 1 7 9 12 11 10

Which statement is correct?

- 1. The pivot could be either the 7 or the 9.
- 2. The pivot could be the 7, but it is not the 9
- 3. The pivot is not the 7, but it could be the 9
- 4. Neither the 7 nor the 9 is the pivot

**Options :**

- 94091822005. 1
- 94091822006. 2
- 94091822007. 3
- 94091822008. 4



**Question Number : 42 Question Id : 9409185849 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Suppose we are sorting an array of eight integers using heap sort, and we have just finished some heapify (either maxheapify or minheapify) operations. The array now looks like this: 16 14 15 10 12 27 28 How many heapify operations have been completed on root of heap?

1. 1
2. 2
3. 3 or 4
4. 5 or 6

**Options :**

- 94091822009. 1
- 94091822010. 2
- 94091822011. 3
- 94091822012. 4

**Question Number : 43 Question Id : 9409185850 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The worst case occurs in linear search algorithm when\_\_\_\_\_.

1. Item is somewhere in the middle of the array
2. Item is not in the array at all
3. Item is the last element in the array
4. Item is the last element in the array or item is not there at all

**Options :**

- 94091822013. 1
- 94091822014. 2
- 94091822015. 3
- 94091822016. 4

**Question Number : 44 Question Id : 9409185851 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Prim's algorithm is a \_\_\_\_\_.

1. Divide and conquer algorithm
2. Greedy algorithm
3. Dynamic Programming
4. Approximation

**Options :**

94091822017. 1

94091822018. 2

94091822019. 3

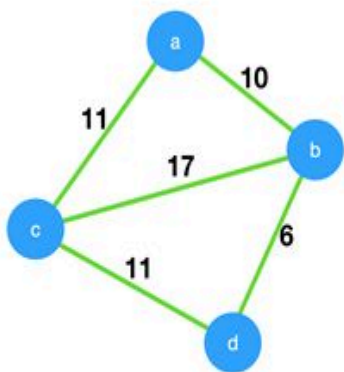
94091822020. 4

**Question Number : 45 Question Id : 9409185852 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

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



1. 23
2. 28
3. 27
4. 11

**Options :**

94091822021. 1

94091822022. 2

94091822023. 3

94091822024. 4

**Question Number : 46 Question Id : 9409185853 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Binary search algorithm cannot be applied to \_\_\_\_\_.

1. sorted linked list
2. sorted binary trees
3. sorted linear array
4. pointer array

**Options :**

94091822025. 1

94091822026. 2

94091822027. 3

94091822028. 4

**Question Number : 47 Question Id : 9409185854 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Sorting algorithm can be characterized as \_\_\_\_\_.

1. Simple algorithm which require the order of  $n^2$  comparisons to sort  $n$  items.
2. Sophisticated algorithms that require the  $O(n \log_2 n)$  comparisons to sort items.
3. Both of these
4. None of these

**Options :**

94091822029. 1

94091822030. 2

94091822031. 3

94091822032. 4

**Question Number : 48 Question Id : 9409185855 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

State True or False for internal sorting algorithms.

i) Internal sorting are applied when the entire collection of data to be sorted is small enough that the sorting can take place within main memory.

ii) The time required to read or write is considered to be significant in evaluating the performance of internal sorting.

1. i-True, ii-True
2. i-True, ii-False
3. i-False, ii-True
4. i-False, ii-False

**Options :**

94091822033. 1

94091822034. 2

94091822035. 3

94091822036. 4

**Question Number : 49 Question Id : 9409185856 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following algorithm(s) can be used to sort  $n$  integers in range  $[1, \dots, n^3]$  in  $O(n)$  time?

1. Heap sort
2. Quick sort
3. Merge sort
4. Radix sort

**Options :**

94091822037. 1

94091822038. 2

94091822039. 3

94091822040. 4

**Question Number : 50 Question Id : 9409185857 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Partition and exchange sort is\_\_\_\_\_.

1. Quick sort
2. Tree sort
3. Heap sort
4. Bubble sort

**Options :**

94091822041. 1

94091822042. 2

94091822043. 3

94091822044. 4

**Question Number : 51 Question Id : 9409185858 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

\_\_\_\_\_ is used to define the algorithm, in less formal language.

1. None of the options
2. Cannot be defined
3. Natural language
4. Pseudocode

**Options :**

94091822045. 1

94091822046. 2

94091822047. 3

94091822048. 4

**Question Number : 52 Question Id : 9409185859 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

\_\_\_\_\_ is the step-by-step recipe for solving an instance problem.

1. Analysis
2. Pseudocode
3. Complexity
4. Algorithm

**Options :**

94091822049. 1

94091822050. 2

94091822051. 3

94091822052. 4

**Question Number : 53 Question Id : 9409185860 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following shortest path algorithm cannot identify presence of negative weight cycle graph?

1. Bellman ford algorithm
2. Floyd –Warshall algorithm
3. Dijkstra algorithm
4. None of these

**Options :**

94091822053. 1

94091822054. 2

94091822055. 3

94091822056. 4

**Question Number : 54 Question Id : 9409185861 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Dijkstra algorithm finds \_\_\_\_\_.

1. Shortest path from single source to several sinks
2. Minimum spanning tree for graph
3. Shortest list of nodes in a undirected graph with negative edge weights
4. All of these

**Options :**

94091822057. 1

94091822058. 2

94091822059. 3

94091822060. 4

**Question Number : 55 Question Id : 9409185862 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The amount of memory used at once by the algorithm until it completes its execution is \_\_\_\_\_ of a program.

1. Space Complexity
2. Time Complexity
3. Divide and Conquer
4. Dynamic Programing

**Options :**

94091822061. 1

94091822062. 2

94091822063. 3

94091822064. 4

**Question Number : 56 Question Id : 9409185863 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The property of binary tree is\_\_\_\_\_.

1. The first subset is called left subtree
2. The second subtree is called right subtree
3. The root cannot contain NULL
4. The right subtree can be empty

**Options :**

94091822065. 1

94091822066. 2

94091822067. 3

94091822068. 4

**Question Number : 57 Question Id : 9409185864 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

A linear collection of data elements where the linear node is given by means of pointer is called\_\_\_\_\_.

1. Linked list
2. Node list
3. Primitive list
4. None of the options

**Options :**

94091822069. 1

94091822070. 2

94091822071. 3

94091822072. 4

**Question Number : 58 Question Id : 9409185865 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**



\_\_\_\_\_ is not the component of data structure.

1. Operations
2. Storage Structures
3. Algorithms
4. None of the options

**Options :**

94091822073. 1

94091822074. 2

94091822075. 3

94091822076. 4

**Question Number : 59 Question Id : 9409185866 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

If the address of  $A[1][1]$  and  $A[2][1]$  are 1000 and 1010 respectively and each element occupies 2 bytes then the array has been stored in \_\_\_\_\_ order.

1. Row major
2. Column major
3. All of these
4. None of these

**Options :**

94091822077. 1

94091822078. 2

94091822079. 3

94091822080. 4

**Question Number : 60 Question Id : 9409185867 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Any node is the path from the root to the node is called\_\_\_\_\_.

1. Successor node
2. Ancestor node
3. Internal node
4. None of the options

**Options :**

94091822081. 1

94091822082. 2

94091822083. 3

94091822084. 4

**Question Number : 61 Question Id : 9409185868 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

\_\_\_\_\_ is very useful in situation when data have to stored and then retrieved in reverse order.

1. Stack
2. Queue
3. List
4. Link list

**Options :**

94091822085. 1

94091822086. 2

94091822087. 3

94091822088. 4

**Question Number : 62 Question Id : 9409185869 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The model becomes compatible executable code in \_\_\_\_\_ level.

1. Abstract level
2. Application level
3. Implementation level
4. All the options

**Options :**

94091822089. 1

94091822090. 2

94091822091. 3

94091822092. 4

**Question Number : 63 Question Id : 9409185870 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The operation which is not performed on linear list is \_\_\_\_\_ .

1. Insertion
2. Insertion & Deletion
3. Deletion & Traversal
4. None of the options

**Options :**

94091822093. 1

94091822094. 2

94091822095. 3

94091822096. 4

**Question Number : 64 Question Id : 9409185871 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

An adjacency matrix representation of a graph cannot comprise information of\_\_\_\_\_.

1. Parallel Edges
2. Edges
3. Direction of Edges
4. Nodes

**Options :**

94091822097. 1

94091822098. 2

94091822099. 3

94091822100. 4

**Question Number : 65 Question Id : 9409185872 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following is/are the levels of implementation of data structure\_\_\_\_\_?

1. Abstract level
2. Application level
3. Implementation level
4. All of these

**Options :**

94091822101. 1

94091822102. 2

94091822103. 3

94091822104. 4

**Question Number : 66 Question Id : 9409185873 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

\_\_\_\_\_ is a directed tree in which out degree of each node is less than or equal to two.

1. Unary tree
2. Ternary tree
3. Binary tree
4. Both Ternary tree and Binary tree

**Options :**

94091822105. 1

94091822106. 2

94091822107. 3

94091822108. 4

**Question Number : 67 Question Id : 9409185874 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Representation of data structure in memory is known as\_\_\_\_\_.

1. Recursive
2. Abstract Data Type
3. Storage Structure
4. File Structure

**Options :**

94091822109. 1

94091822110. 2

94091822111. 3

94091822112. 4

**Question Number : 68 Question Id : 9409185875 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

If the elements '1', '2', '3' and '4' are added in a stack, so what would be the order for the removal?

1. 1234
2. 2134
3. 4321
4. None of the above

**Options :**

94091822113. 1

94091822114. 2

94091822115. 3

94091822116. 4

**Question Number : 69 Question Id : 9409185876 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

An ADT is defined to be a mathematical model of a user-defined type along with the collection of all \_\_\_\_\_ operations on that model.

1. Cardinality
2. Assignment
3. Primitive
4. Structured

**Options :**

94091822117. 1

94091822118. 2

94091822119. 3

94091822120. 4

**Question Number : 70 Question Id : 9409185877 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The memory address of fifth element of an array can be calculated by the formula\_\_\_\_\_.

1.  $LOC(Array[5]) = Base(Array) + w(5 - \text{lower bound})$ , where  $w$  is the number of words per memory cell for the array
2.  $LOC(Array[5]) = Base(Array[5]) + (5 - \text{lower bound})$ , where  $w$  is the number of words per memory cell for the array
3.  $LOC(Array[5]) = Base(Array[4]) + (5 - \text{Upper bound})$ , where  $w$  is the number of words per memory cell for the array
4. None of the options

**Options :**

94091822121. 1

94091822122. 2

94091822123. 3

94091822124. 4

**Question Number : 71 Question Id : 9409185878 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following data structures are indexed structures?

1. Linked Lists
2. Linear Arrays
3. Both of these
4. None of these

**Options :**

94091822125. 1

94091822126. 2

94091822127. 3

94091822128. 4

**Question Number : 72 Question Id : 9409185879 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

A characteristic of the data that is used by binary search, but ignored by the linear search is the\_\_\_\_\_.

1. Order of the elements of the list
2. Length of the list
3. Maximum value in list
4. Type of elements of the list

**Options :**

94091822129. 1

94091822130. 2

94091822131. 3

94091822132. 4

**Question Number : 73 Question Id : 9409185880 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

\_\_\_\_\_ data structure is required to convert infix notation to postfix notation.

1. Branch
2. Queue
3. Tree
4. Stack

**Options :**

94091822133. 1

94091822134. 2

94091822135. 3

94091822136. 4

**Question Number : 74 Question Id : 9409185881 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**



Which of the following operations is performed more capably by doubly linked list than by singly linked list?

1. Deleting a node whose location is given
2. Searching of an unsorted list for a given item
3. Inverting a node after the node with given location
4. Traversing a list to process each node

**Options :**

94091822137. 1

94091822138. 2

94091822139. 3

94091822140. 4

**Question Number : 75 Question Id : 9409185882 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The postfix form of the following prefix  $*+ab-cd$  is \_\_\_\_\_.

1.  $ab+cd-*$
2.  $abc+*-$
3.  $ab+*cd-$
4.  $ab+*cd-$

**Options :**

94091822141. 1

94091822142. 2

94091822143. 3

94091822144. 4

**Question Number : 76 Question Id : 9409185883 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The largest element of an array index is called its\_\_\_\_\_.

1. Lower bound
2. Range
3. Upper bound
4. All the options

**Options :**

94091822145. 1

94091822146. 2

94091822147. 3

94091822148. 4

**Question Number : 77 Question Id : 9409185884 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

An algorithm is made up of two independent time complexities  $f(n)$  and  $g(n)$ . Then the complexities of the algorithm are in the order of\_\_\_\_\_.

1. Product( $f(n),g(n)$ )
2. Max ( $f(n),g(n)$ )
3. Min ( $f(n),g(n)$ )
4. Sum( $f(n),g(n)$ )

**Options :**

94091822149. 1

94091822150. 2

94091822151. 3

94091822152. 4

**Question Number : 78 Question Id : 9409185885 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following is not a constraint of binary search algorithm?

1. Must use a sorted array
2. Requirement of sorted array is expensive when a lot of insertion and deletions are needed
3. There must be a mechanism to access middle element directly
4. Binary search algorithm is not efficient when the data elements are more than 1000

**Options :**

94091822153. 1

94091822154. 2

94091822155. 3

94091822156. 4

**Question Number : 79 Question Id : 9409185886 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The extra key inserted at the end of the array is called as\_\_\_\_\_.

1. End key
2. Stop key
3. Sentinel
4. Transposition

**Options :**

94091822157. 1

94091822158. 2

94091822159. 3

94091822160. 4

**Question Number : 80 Question Id : 9409185887 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

What is the result of the subsequent operation Top (Push (S, X))?

1. X
2. Null
3. S
4. None of these

**Options :**

94091822161. 1

94091822162. 2

94091822163. 3

94091822164. 4

**Question Number : 81 Question Id : 9409185888 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The best average behavior is presented by\_\_\_\_\_.

1. Quick Sort
2. Merge Sort
3. Insertion Sort
4. Heap Sort

**Options :**

94091822165. 1

94091822166. 2

94091822167. 3

94091822168. 4

**Question Number : 82 Question Id : 9409185889 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Consider an implementation of unsorted singly linked list. Suppose it has its representation with a head pointer only. Which of the following operation can be implemented in  $O(1)$  time?

- i) Insertion at the front of the linked list
- ii) Insertion at the end of the linked list
- iii) Deletion of the front node of the linked list
- iv) Deletion of the last node of the linked list

- 1. I and II
- 2. I and III
- 3. I, II and III
- 4. I, II and IV

**Options :**

- 94091822169. 1
- 94091822170. 2
- 94091822171. 3
- 94091822172. 4

**Question Number : 83 Question Id : 9409185890 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Match the following pairs

I. $O(\log n)$	(M) Heap sort
II. $O(n)$	(N) DFS
III. $(n \log n)$	(O) Binary search
IV. $O(n^2)$	(P) Selecting $K^{\text{th}}$ smallest elements

- 1. I -O, II-N, III-M, IV-P
- 2. I -P, II-M, III-N, IV-O
- 3. I -O, II-P, III-M, IV-N
- 4. I -O, II-N, III-P, IV-M

**Options :**

- 94091822173. 1

94091822174. 2

94091822175. 3

94091822176. 4

**Question Number : 84 Question Id : 9409185891 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Solve the following recurrence relation?

$$T(n) = 7T(n/2) + 3n^2 + 2$$

1.  $O(n^{2.8})$
2.  $O(n^3)$
3.  $\theta(n^{2.8})$
4. All of these

**Options :**

94091822177. 1

94091822178. 2

94091822179. 3

94091822180. 4

**Question Number : 85 Question Id : 9409185892 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The time factor when determining the efficiency of algorithms is measured by\_\_\_\_\_.

1. Counting microseconds
2. Counting the number of key operations
3. Counting the number of operations
4. Counting the kilobytes of an operation

**Options :**

94091822181. 1

94091822182. 2

94091822183. 3

94091822184. 4

**Question Number : 86 Question Id : 9409185893 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The difference between linear array and a record is\_\_\_\_\_.

1. An array is suitable for homogeneous data but the data items in a record may have different data type
2. In a record, there may not be a natural ordering in opposed to linear array
3. A record form a hierarchical structure but a linear array does not
4. All of these

**Options :**

94091822185. 1

94091822186. 2

94091822187. 3

94091822188. 4

**Question Number : 87 Question Id : 9409185894 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following statement is false?

1. Arrays are dense lists and static data structure
2. Data elements in linked list need not be stored in adjacent space in memory
3. Pointers store the next data element of a list
4. Linked lists are collection of the nodes that contain information part and next pointer

**Options :**

94091822189. 1

94091822190. 2

94091822191. 3

94091822192. 4

**Question Number : 88 Question Id : 9409185895 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Consider the tree. If the post order traversal gives  $ab - cd * +$  then the label of the nodes 1, 2, 3, ..... Will be\_\_\_\_\_.

1. +, -, \*, a, b, c, d
2. a, -, b, +, c, \*, d
3. a, b, c, d, -, \*, +
4. -, a, b, +, \*, c, d

**Options :**

94091822193. 1

94091822194. 2

94091822195. 3

94091822196. 4

**Question Number : 89 Question Id : 9409185896 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Two main measures of the efficiency of an algorithm are \_\_\_\_\_.

1. Processor and memory
2. Complexity and capacity
3. Time and memory
4. Data and space

**Options :**

94091822197. 1

94091822198. 2

94091822199. 3

94091822200. 4

**Question Number : 90 Question Id : 9409185897 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**



**Correct Marks : 1 Wrong Marks : 0**

The term "push" and "pop" is associated to the\_\_\_\_\_.

1. Array
2. Lists
3. Stacks
4. All of these

**Options :**

94091822201. 1

94091822202. 2

94091822203. 3

94091822204. 4

**Question Number : 91 Question Id : 9409185898 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following is a two way list?

1. Grounded header list
2. Circular header list
3. Linked list with header and trailer nodes
4. None of these

**Options :**

94091822205. 1

94091822206. 2

94091822207. 3

94091822208. 4

**Question Number : 92 Question Id : 9409185899 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

A binary tree in which every non-leaf node has non-empty left and right subtrees is called a strictly binary tree. Such a tree with 10 leaves\_\_\_\_\_.

1. Cannot have more than 19 nodes
2. Has exactly 19 nodes
3. Has exactly 17 nodes
4. Cannot have more than 17 nodes

**Options :**

94091822209. 1

94091822210. 2

94091822211. 3

94091822212. 4

**Question Number : 93 Question Id : 9409185900 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

If the result of inorder traversing a tree is E A C K F H D B G; then the preorder traversal would return \_\_\_\_\_.

1. FAEKDBHG
2. FAEKDHGB
3. EAFKHDCBG
4. FEAKDCHBG

**Options :**

94091822213. 1

94091822214. 2

94091822215. 3

94091822216. 4

**Question Number : 94 Question Id : 9409185901 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following data structure can't store the non-homogeneous data elements?

1. Arrays
2. Records
3. Pointers
4. None of the options

**Options :**

94091822217. 1

94091822218. 2

94091822219. 3

94091822220. 4

**Question Number : 95 Question Id : 9409185902 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

\_\_\_\_\_ is a data structure where elements can be added or removed at either end but not in the middle.

1. Linked lists
2. Stacks
3. Queues
4. Deque

**Options :**

94091822221. 1

94091822222. 2

94091822223. 3

94091822224. 4

**Question Number : 96 Question Id : 9409185903 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

In a linked list, START=NULL refers to \_\_\_\_\_.

1. Underflow
2. Overflow
3. Houseful
4. Saturated

**Options :**

94091822225. 1

94091822226. 2

94091822227. 3

94091822228. 4

**Question Number : 97 Question Id : 9409185904 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Each data item in a record may be a group item composed of sub-items; those items which are indecomposable are called \_\_\_\_\_.

1. Elementary items
2. Atoms
3. Scalars
4. All the options

**Options :**

94091822229. 1

94091822230. 2

94091822231. 3

94091822232. 4

**Question Number : 98 Question Id : 9409185905 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following abstract data types can be used to represent a many to many relation?

1. Plex
2. Graph
3. both 1 and 2
4. Queue

**Options :**

94091822233. 1

94091822234. 2

94091822235. 3

94091822236. 4

**Question Number : 99 Question Id : 9409185906 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Merge sort uses \_\_\_\_\_.

1. Divide and conquer strategy
2. Backtracking approach
3. Heuristic search
4. Greedy approach

**Options :**

94091822237. 1

94091822238. 2

94091822239. 3

94091822240. 4

**Question Number : 100 Question Id : 9409185907 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

The way a card game player places his cards as he picks them up one by one, is an example of

\_\_\_\_\_.

1. Bubble sort
2. Selection sort
3. Insertion sort
4. Merge sort

**Options :**

94091822241. 1

94091822242. 2

94091822243. 3

94091822244. 4