MCQs for Data Structures & Algorithms

1. A binary search tree is generated by inserting in order of the following integers-

50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24

The number of nodes in the left subtree and right subtree of the root respectively is \_\_\_\_\_.

1. (4, 7)
2. **(7, 4)**
3. (8, 3)
4. (3, 8)

Answer: B

1. How many distinct binary search trees can be constructed out of 4 distinct keys?
2. 5
3. 14
4. 24
5. 35

Answer: B

1. Process of inserting an element in stack is called \_\_\_\_\_\_\_\_\_\_\_\_  
   a) Create  
   b) Push  
   c) Evaluation  
   d) Pop

Answer: B  
Explanation: Push operation allows users to insert elements in the stack. If the stack is filled completely and trying to perform push operation stack – overflow can happen.

1. Process of removing an element from stack is called \_\_\_\_\_\_\_\_\_\_  
   a) Create  
   b) Push  
   c) Evaluation  
   d) Pop

Answer: D  
Explanation: Elements in the stack are removed using pop operation. Pop operation removes the top most element in the stack i.e. last entered element.

1. In a stack, if a user tries to remove an element from an empty stack it is called \_\_\_\_\_\_\_\_\_  
   a) Underflow  
   b) Empty collection  
   c) Overflow  
   d) Garbage Collection

Answer: A  
Explanation: Underflow occurs when the user performs a pop operation on an empty stack. Overflow occurs when the stack is full and the user performs a push operation. Garbage Collection is used to recover the memory occupied by objects that are no longer used.

6. Pushing an element into stack already having five elements and stack size of 5, then stack becomes \_\_\_\_\_\_\_\_\_\_\_  
a) Overflow  
b) Crash  
c) Underflow  
d) User flow  
Answer: a  
Explanation: The stack is filled with 5 elements and pushing one more element causes a stack overflow. This results in overwriting memory, code and loss of unsaved work on the computer.

7. Entries in a stack are “ordered”. What is the meaning of this statement?  
a) A collection of stacks is sortable  
b) Stack entries may be compared with the ‘<‘ operation  
c) The entries are stored in a linked list  
d) There is a Sequential entry that is one by one  
Answer: d  
Explanation: In stack data structure, elements are added one by one using push operation. Stack follows LIFO Principle i.e. Last In First Out(LIFO).

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8. Which of the following is not the application of stack?  
a) A parentheses balancing program  
b) Tracking of local variables at run time  
c) Compiler Syntax Analyzer  
d) Data Transfer between two asynchronous process  
Answer: d  
Explanation: Data transfer between the two asynchronous process uses the queue data structure for synchronisation. The rest are all stack applications.

9. Consider the usual algorithm for determining whether a sequence of parentheses is balanced. The maximum number of parentheses that appear on the stack AT ANY ONE TIME when the algorithm analyzes: (()(())(()))?  
a) 1  
b) 2  
c) 3  
d) 4 or more  
Answer: c  
Explanation: In the entire parenthesis balancing method when the incoming token is a left parenthesis it is pushed into stack. A right parenthesis makes pop operation to delete the elements in stack till we get left parenthesis as top most element. 3 elements are there in stack before right parentheses comes. Therefore, maximum number of elements in stack at run time is 3.

10. Consider the usual algorithm for determining whether a sequence of parentheses is balanced. Suppose that you run the algorithm on a sequence that contains 2 left parentheses and 3 right parentheses (in some order). The maximum number of parentheses that appear on the stack AT ANY ONE TIME during the computation?  
a) 1  
b) 2  
c) 3  
d) 4 or more  
Answer: b  
Explanation: In the entire parenthesis balancing method when the incoming token is a left parenthesis it is pushed into stack. A right parenthesis makes pop operation to delete the elements in stack till we get left parenthesis as top most element. 2 left parenthesis are pushed whereas one right parenthesis removes one of left parenthesis.1 elements are there before right parenthesis which is the maximum number of elements in stack at run time.

11. Minimum number of fields in each node of a doubly linked list is \_\_\_\_

(A) 2

(B) 3

(C) 4

(D) None of the above

Ans: B 3

12. To perform level-order traversal on a binary tree, which of the following data structure will be required?

(A) Hash table

(B) Queue

(C) Binary search tree

(D) Stack

Ans: B Queue

13. Which of the following data structure is required to convert arithmetic expression in infix to its equivalent postfix notation?

(A) Queue

(B) Linked list

(C) Binary search tree

(D) None of above

Ans: D None of above

14. A binary tree in which all its levels except the last, have maximum numbers of nodes, and all the nodes in the last level have only one child it will be its left child. Name the tree.

(A) Threaded tree

(B) Complete binary tree

(C) M-way search tree

(D) Full binary tree

Ans: B Complete binary tree

15. If two trees have same structure and but different node content, then they are called \_\_\_

(A) Synonyms trees

(B) Joint trees

(C) Equivalent trees

(D) Similar trees

Ans: D Similar trees

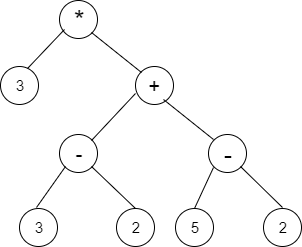
16. If an array is declared as arr[] = {1,3,5,7,9}; then what is the value of arr[3]?

(a) 1 (b) 7 (c) 9 (d) 5

Answer: B 7

17. How many stacks are required for applying evaluation of infix expression algorithm?  
a) one  
b) two  
c) three  
d) four  
Answer: B  
Explanation: Two stacks are required for evaluation of infix expression – one for operands and one for operators.

18. Identify the infix expression from the list of options given below.  
a) a/b+(c-d)  
b) abc\*+d+ab+cd+\*ce-f-  
c) ab-c-  
d) +ab  
Answer: A  
Explanation: a/b+(c-d) is an infix expression since the operators are placed in between the operands.

20.  From the given expression tree, identify the infix expression, evaluate it and choose the correct result.  
[](https://www.sanfoundry.com/wp-content/uploads/2018/07/data-structures-questions-answers-evaluation-infix-expression-not-parenthesized-q13.png)  
a) 5  
b) 10  
c) 12  
d) 16

Answer: C  
Explanation: From the given expression tree, the result of the infix expression is evaluated to be 12.

21. Which of the following is not an inherent application of stack?  
a) Reversing a string  
b) Evaluation of postfix expression  
c) Implementation of recursion  
d) Job scheduling  
Answer: D  
Explanation: Job Scheduling is not performed using stacks.

22. How many distinct binary search trees can be constructed out of 4 distinct keys?

1. 5
2. 14
3. 24
4. 35

Solution-

Number of distinct binary search trees possible with 4 distinct keys

= 2nCn / n+1

= 2×4C4 / 4+1

= 8C4 / 5

= 14

23. In a queue, insertion is done at

(a) Rear

(b) Front

(c) Back

(d) Top

Answer: A Rear

24. The circular queue will be full only when

(a) FRONT = MAX –1 and REAR = Max –1

(b) FRONT = 0 and REAR = Max –1

(c) FRONT = MAX –1 and REAR = 0

(d) FRONT = 0 and REAR = 0

Answer: B FRONT = 0 and REAR = Max –1

25.  What is a memory efficient double linked list?  
a) Each node has only one pointer to traverse the list back and forth  
b) The list has breakpoints for faster traversal  
c) An auxiliary singly linked list acts as a helper list to traverse through the doubly linked list  
d) A doubly linked list that uses bitwise AND operator for storing addresses

Answer: A  
Explanation: Memory efficient doubly linked list has only one pointer to traverse the list back and forth. The implementation is based on pointer difference. It uses bitwise XOR operator to store the front and rear pointer addresses. Instead of storing actual memory address, every node store the XOR address of previous and next nodes.

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| Q.26 | Which if the following is/are the levels of implementation of data structure | | | |  | | --- | |  | |  |  |  |  |  |
|  |  | a. | Abstract level |  |  |  |  |  |  |
|  |  | b. | Application level | |  |  |  |  |  |
|  |  | c. | Implementation level | | |  |  |  |  |
|  |  | **d.** | **All of the above** |  |  |  |  |  |  |
| Q.27 | A binary search tree whose left subtree and right subtree differ in hight by at most 1 unit is called …… | | | | | | | | |
|  |  | **a.** | **AVL tree** |  |  |  |  |  |  |
|  |  | b. | Red-black tree |  |  |  |  |  |  |
|  |  | c. | Lemma tree |  |  |  |  | | |
|  |  | d. | None of the above | |  |  |  | | |
| Q.28 | Which function places an element on the stack? | | | | | | |  |  |
|  |  | a. | Pop() |  |  |  |  |  |  |
|  |  | **b.** | **Push()** |  |  |  |  |  |  |
|  |  | c. | Peek() |  |  |  |  |  |  |
|  |  | d. | isEmpty() |  |  |  |  |  |  |
| Q.29 | Which of the following data structure can’t store the non-homogeneous data elements? | | | | | | | | |
|  |  | a. | Pointers |  |  |  |  |  |  |
|  |  | b. | Records |  |  |  |  |  |  |
|  |  | **c.** | **Arrays** |  |  |  |  |  |  |
|  |  | d. | Stacks |  |  |  |  |  |  |
| Q.30 | Total number of nodes at the nth level of a binary tree can be given as | | | | | | |  |  |
|  |  | a. | 2n |  |  |  |  |  |  |
|  |  | b. | 2n |  |  |  |  |  |  |
|  |  | c. | 2n+1 |  |  |  |  |  |  |
|  |  | **d.** | **2n–1** |  |  |  |  |  |  |
| Q.31 | Which type of linked list contains a pointer to the next as well as the | | | | | | |  |  |
|  | previous node in the sequence? | | | |  |  |  |  |  |
|  |  | a. | Singly linked list | | | | |  |  |
|  |  | b. | Circular linked list | | |  |  |  |  |
|  |  | **c.** | **Doubly linked list** | | |  |  |  |  |
|  |  | d. | All of these | | |  |  |  |  |
| Q.32 | The process of examining memory locations in a hash table is called | | | | | | |  |  |
|  |  | a. | Hashing |  |  |  |  |  |  |
|  |  | b. | Collision |  |  |  |  |  |  |
|  |  | **c.** | **Probing** |  |  |  |  | | |
|  |  | d. | Addressing |  |  |  |  | | |
| Q.33 | A card game player arranges his cards and picks them one by one. With which | | | | | | | | |
|  | sorting technique can you compare this example? | | | | |  |  |  |  |
|  |  | a. | Bubble sort |  |  |  |  |  |  |
|  |  | b. | Selection sort |  |  |  |  |  |  |
|  |  | c. | Merge sort |  |  |  |  |  |  |
|  |  | **d.** | **Insertion sort** |  |  |  |  |  |  |
| Q.34 | Linked list is used to implement data structures like | | | | |  |  |  |  |
|  |  | a. | Stacks |  |  |  |  |  |  |
|  |  | b. | Queues |  |  |  |  |  |  |
|  |  | c. | Trees |  |  |  |  |  |  |
|  |  | **d.** | **All of these** |  |  |  |  |  |  |
| Q.35 | How many distinct binary search trees can be constructed out | | | | | | |  |  |
|  | of 4 distinct keys? | | |  |  |  |  |  |  |
|  |  | a. | 4 |  |  |  |  |  |  |
|  |  | **b.** | **14** |  |  |  |  |  |  |
|  |  | c. | 8 |  |  |  |  |  |  |
|  |  | d. | 16 |  |  |  |  |  |  |
| Q.36 | In a binary tree, the number of internal nodes of degree-1 is 5 and the | | | | | | |  |  |
|  | number of internal nodes of degree-2 is 10. The number of leaf nodes in | | | | | | | |  |
|  | the binary tree is \_\_\_\_\_\_? | | |  |  |  |  |  |  |
|  |  | a. | 10 |  |  |  |  |  |  |
|  |  | **b.** | **11** |  |  |  |  |  |  |
|  |  | c. | 12 |  |  |  |  |  |  |
|  |  | d. | 15 |  |  |  |  |  |  |
| Q.37 | typedef can be used with which of these data types? | | | | |  |  |  |  |
|  |  | a. | struct |  |  |  |  |  |  |
|  |  | b. | union |  |  |  |  |  |  |
|  |  | c. | enum |  |  |  |  | | |
|  |  | **d.** | **all of these** |  |  |  |  | | |
| Q.38 | The function that deletes values from a queue is called | | | | | |  |  |  |
|  |  | a. | enqueue |  |  |  |  |  |  |
|  |  | **b.** | **dequeue** |  |  |  |  |  |  |
|  |  | c. | pop |  |  |  |  |  |  |
|  |  | d. | Peek |  |  |  |  |  |  |
| Q.39 | If TOP = MAX–1, then that the stack is | | | | |  |  |  |  |
|  |  | a. | Empty |  |  |  |  |  |  |
|  |  | **b.** | **Full** |  |  |  |  |  |  |
|  |  | c. | Contains some data | | |  |  |  |  |
|  |  | d. | None of these |  |  |  |  |  |  |
| Q.40 | Memory for a structure is allocated at the time of | | | | |  |  |  |  |
|  |  | a. | Structure definition | | |  |  |  |  |
|  |  | **b.** | **Structure variable declaration** | | |  |  |  |  |
|  |  | c. | Structure declaration | | | | |  |  |
|  |  | d. | Function declaration | | | | |  |  |

Q.41

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| The Huffman algorithm can be implemented using a \_\_\_\_\_\_. | | | | | | |  |  |
|  | a. | Circular Queue | |  |  |  |  |  |
|  | b. | Dequeue |  |  |  |  |  |  |
|  | c. | **Priority queue** | |  |  |  | | |
|  | d. | Queue |  |  |  |  | | |

Q.42

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| A linked list is a | | | | |  |  |  |
|  | a. | | **Random access structure** | | | |  |
|  | b. | | Sequential access structure | | | |  |
|  | c. | | Both | |  |  |  |
|  | d. | | None of these | | |  |  |
| Q. 43 Which rotation is done when the new node is inserted in the | | | | | | | | | | | | |  |
| right sub-tree of the right sub-tree of the critical node? a. | | | | | | | | | | | | |  |
|  | | a. | | LL | | | | |  |  |  |  |  |
|  | | b. | | LR | | | | |  |  |  |  |  |
|  | | c. | | RL | | | | |  |  |  |  |  |
|  | | d. | | **RR** | | | | |  |  |  |  |  |