



BRAINWARE UNIVERSITY

Term End Examination 2020 - 21

Programme – Bachelor of Technology in Computer Science & Engineering

Course Name – Data Structure and Algorithms

Course Code - PCC-CS301

Semester / Year - Semester III

Time allotted : 75 Minutes

Full Marks : 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 60=60

1. (Answer any Sixty)

(i) Finding the location of a given item in a collection of items is called

- | | |
|----------------|------------|
| a) Discovering | b) Finding |
| c) Searching | d) Mining |

(ii) What is the worst case time complexity of linear search algorithm?

- | | |
|---------|---------|
| a) O(1) | b) O(1) |
| c) O(n) | d) O(n) |

(iii) The operation of processing each element in the list is known as:

- | | |
|--------------|--------------|
| a) Traversal | b) Inserting |
| c) Merging | d) Sorting |

(iv) 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 |

(v) Arrays can be stored in memory by

- | | |
|--|-----------------------|
| a) row major order | b) column major order |
| c) Both row major order and column major order | d) none of these |

(vi) Which of the following algorithm does not divide the list

- a) Linear Search
- b) Binary Search
- c) Quick sort
- d) Merge sort

(vii) If the address of $A[1,1]$ and $A[2,1]$ are 1000 and 1010 respectively and each element occupies 2 byte of memory, then the array has been stored in

- a) row major order
- b) column major order
- c) matrix major order
- d) none of these

(viii) An Algorithm that calls itself directly or indirectly is known as

- a) Sub Algorithm
- b) Recursion
- c) Polish Notation
- d) Traversal Algorithm

(ix) If the elements are arranged in sorted order then the time complexity of linear search is

- a) $O(1)$
- b) $O(n)$
- c) $O(\log n)$
- d) none of these

(x) Which matrix has most of the elements (not all) as Zero?

- a) Identity Matrix
- b) Unit Matrix
- c) Sparse Matrix
- d) Zero Matrix

(xi) Operations on a data structure may be

- a) creation
- b) deletion
- c) selection
- d) all of the these

(xii) Which of the following case does not exist in complexity theory?

- a) Best case
- b) Worst case
- c) Average case
- d) Null case

(xiii) Which of the following uses FIFO method?

- a) Queue
- b) Stack
- c) Hash table
- d) Linked List

(xiv) We can create a queue using _____ stacks.

- a) 1
- b) 2
- c) 3
- d) 4

(xv) If push(x) and pop(x) are two functions and both the functions return x then pop(pop(push(2))) will return

- a) 2
- b) 1
- c) 0
- d) -1

(xvi) Evaluate the postfix expression $3574-2^{*}+$

- a) 41
- b) 45
- c) 48
- d) 50

(xvii) The disadvantages of linear queue can overcome by

- a) Shifting each element to the left
- b) Using circular queue
- c) Both Shifting each element to the left and Using circular queue
- d) None of these

(xviii) In input restricted dqueue means

- a) Insertion can be done at both end deletion can be done from both end of the queue.
- b) Insertion can be done at one end deletion can be done from both end of the queue
- c) Insertion can be done at both end deletion can be done from one end of the queue
- d) Insertion can be done at one end deletion can be done from one end of the queue

(xix) The prefix expression of the following postfix expression “ab+cd/+” is

- a) +/cd+ab
- b) +/ab+cd
- c) ++/abcd
- d) ++ab/cd

(xx) The data structure which is one ended is _____

- a) queue
- b) stack
- c) tree
- d) graph

(xxi) The infix form of the following postfix expression is $A B C + * D E / -$

- a) $(A*B+C - (D/E))$
- b) $(A*(B+C) - (D/E))$
- c) $((A*B)+C - (D/E))$
- d) None of these

(xxii) An ADT is defined to be a mathematical model of a user-defined type along with the collection of all _____ operations on that model.

- a) Cardinality
- b) Assignment
- c) Primitive
- d) Structured

(xxiii) What is the most appropriate data structure to implement a priority queue?

- a) heap
- b) circular array
- c) linked list
- d) binary tree

(xxiv) Which of the following is/are example(s) of ADT

- a) stack
- b) queue
- c) array
- d) all of these

(xxv) In array representation of a stack, $top=2$ means

- a) one elements present in the stack
- b) two elements present in the stack
- c) three elements present in the stack
- d) none of these

(xxvi) Which of the following is called Ring Buffer?

- a) Priority queue
- b) Circular queue
- c) dequeue
- d) none of these

(xxvii) An array of size MAX_SIZE is used to implement a circular queue. Front, Rear, and count are tracked. Suppose front is 0 and rear is MAX_SIZE - 1. How many elements are present in the queue?

- a) 0
- b) 1
- c) MAX_SIZE - 1
- d) MAX_SIZE

(xxviii) Josephus problem can be efficiently solved by

- a) singly linked list
- b) doubly linked list
- c) circular linked list
- d) none of these

(xxix) Traversal of a linked list always starts from the _____.

- a) First Node
- b) Middle Node
- c) Last Node
- d) None of these

(xxx) What is the time complexity to traverse the elements in the linked list?

- a) $O(1)$
- b) $O(n)$
- c) $O(\log n)$
- d) $O(n^2)$

(xxxii) Which of the following list is best to answer the question “What is value of nth position”

- a) List implemented by singly linked list
- b) List implemented by doubly linked list
- c) List implemented by circular linked list
- d) List implemented by an array

(xxxiii) Circular doubly linked list contains

- a) 3 NULL links
- b) 2 NULL links
- c) 1 NULL link
- d) 0 NULL link

(xxxiiii) Which of the following is not a disadvantage to the usage of array?

- a) It is Fixed size
- b) We know the size of the array prior to allocation
- c) Insertion based on position
- d) Accessing elements at specified

positions

(xxxiv) In a linked list, underflow occurs when we attempt to

- a) insert a node at the end but there is no free space for it
- b) delete a non existence element in the list
- c) delete a node in empty list
- d) insert a new node in the empty list

(xxxv) Consider the following definition in c programming language. Which of

the following c code is used to create new node? struct node { int data; struct node * next; } typedef struct node NODE; NODE *ptr;

- a) ptr = (NODE*)malloc(sizeof(NODE));
- b) ptr = (NODE*)malloc(NODE);
- c) ptr = (NODE)malloc(sizeof(NODE));
- d) ptr = (NODE*)malloc(sizeof(NODE*));

(xxxvi) What is the hash function used in the division method?

- a) $h(k) = k/m$
- b) $h(k) = k \bmod m$
- c) $h(k) = m/k$
- d) $h(k) = m \bmod k$

(xxxvii) Which of the following sorting technique use the term 'pivot'?

- a) Bubble sort
- b) Selection sort
- c) Insertion sort
- d) Quick sort

(xxxviii) The time complexity of bubble sort algorithm is

- a) $O(n)$
- b) $O(\log n)$
- c) $O(n^2)$
- d) $O(n \log n)$

(xxxix) Quick sort can be categorized into which of the following?

- a) Brute Force technique
- b) Divide and conquer
- c) Greedy algorithm
- d) Dynamic programming

(xl) In which of the following hashing methods, we first divide keys into parts and then add them to get Hash value?

- a) Truncation Method
- c) Mid Square Method

- b) Folding Method
- d) Modular Method

(xli) Let $A = \{10,15,20,30,40\}$; now if you sort the element using insertion sorting technique, the time complexity will be

- a) $O(1)$
- c) $O(\log n)$
- b) $O(n)$
- d) $O(n^2)$

(xlii) Radix sorting can be easily implemented by

- a) stack
- c) tree
- b) queue
- d) linked list

(xliii) Sorting of n elements in brute force technique is

- a) $O(n)$
- c) $O(n^2)$
- b) $O(n \log n)$
- d) $O(n!)$

(xliv) Linear probing suffers from a problem know as

- a) collision
- c) indexing
- b) clustering
- d) none of these

(xlv) If a B tree of order 3, the following keys are inserted as follows 18, 3, 1, 9; then the root of the tree will be

- a) 18
- c) 1
- b) 3
- d) 9

(xlvi) A binary tree with 16 nodes has _____ NULL branches.

- a) 16
- c) 32
- b) 17
- d) none of these

(xlvii) If we create a binary search tree with the following two key values 18, 3 ; then the tree is called

- a) 2-tree
- b) Complete binary tree
- c) Full binary tree
- d) None of these

(xlviii) The maximum number of leaf nodes in a complete binary tree of depth d is

- a) $2d$
- b) $2^{d-1} + 1$
- c) $2^{d+1} + 1$
- d) $2d + 1$

(xlix) How many orders of traversal are applicable to a binary tree (In General)?

- a) 3
- b) 1
- c) 4
- d) 2

(l) By definition tree is

- a) iterative
- b) recursive
- c) Both iterative and recursive
- d) None of these

(li) Leaves of which of the following trees are at the same level?

- a) Binary tree
- b) B-tree
- c) AVL-tree
- d) Normal Tree

(lii) In a max-heap Data Structure, element with the greatest key is always in the which node?

- a) Leaf node
- b) Root Node
- c) First node of left subtree
- d) First node of right subtree

(liii) A graph is a collection of nodes, called _____ and line segments called arcs or _____ that connect pair of nodes.

- a) vertices, edges
- b) edges, vertices
- c) vertices, paths
- d) graph node, edges

(liv) Extended tree is also called

- a) 2 -Tree
- b) 3 -Tree
- c) 4 -Tree
- d) 5 -Tree

(lv) Number of nodes of left and right subtree of a binary search tree of the given sequence 40, 30 42, 5, 7, 23, 9, 19 is

- a) 2,5
- b) 1,6
- c) 6,1
- d) None of these

(lvi) In linked representation of binary tree, if N =number of nodes in the tree and L = number of NULL links, then which of the following is true?

- a) $L = N$
- b) $L = N - 1$
- c) $L = N + 1$
- d) $L = 2N - 3$

(lvii) If all the traversal of a binary tree gives the same result, then that tree must contain

- a) one node
- b) two nodes
- c) three nodes
- d) four nodes<

(lviii) Which is true for the AVL tree?

- a) $-1 < \text{balance factor} < 1$
- b) $-1 ? \text{balance factor} < 1$
- c) $-1 ? \text{balance factor} ? 1$
- d) $0 < \text{balance factor} < 1$

(lix) The preorder traversal sequence of nodes in a binary tree is given below:

Preorder: 20 10 40 30 After deleting 20, the preorder traversal will be

- a) 10 40 30
- b) 30 10 40
- c) 40 30 10
- d) 40 10 30

(lx) The preorder traversal sequence of nodes in a binary tree is given below:

Preorder: 20 10 30 35 40 50 ; the post order traversal of the above tree is

- a) 50 40 35 30 10 20
- b) 10 35 30 50 40 20

c) 10 30 35 50 40 20

d) 10 50 40 35 30 20