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 : 85 Minutes | Full Marks : 70

[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 70=70

1. *(Answer any Seventy)*

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

a) O(1) b) O(1)

c) O(n) d) O(n)

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

a) Traversal b) Inserting

c) Merging d) Sorting

(iii) 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

(iv) 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

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

a) Linear Search b) Binary Search

c) Quick sort d) Merge sort

(vi) Which of the following is true for the statement of an Algorithm "each instruction is clear and unambiguous"

a) Input
b) Definiteness
c) Effectiveness
d) output

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

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

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

a) O(1)
b) O(n)
c) O(logn)
d) none of these

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

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

(x) Operations on a data structure may be

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

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

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

(xii) What is the postfix expression for the corresponding infix expression? a+b*c

a) ab+c*
b) abc+*
c) a+bc*
d) abc*+

(xiii) The following postfix expression with single digit operands is evaluated using a stack: 8 2 3 ^ / 2 3 * + 5 1 * - ;Note that ^ is the exponentiation operator. The top two elements of the stack after the first * is evaluated are:

a) 6, 1
b) 5, 7
c) 3, 2
d) 1, 5

(xiv) What is the postfix expression for the following infix expression? a + b * c – d

a) abc* + d –
b) ab*c + –d
c) ab + c * d –
d) – + a * bcd

(xv) Which of the following uses FIFO method?

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

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

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

(xvii) 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

(xviii) When new data are to be inserted into a data structure, but there is not available space; this situation is usually called

a) Underflow
b) Overflows
c) houseful
d) saturated

(xix) Evaluate the postfix expression 3574-2^*+

a) 41
b) 45

c) 48 d) 50

(xx) 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

(xxi) 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

(xxii) The prefix expression of the following postfix expression "ab+cd/+" is

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

(xxiii) 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

(xxiv) 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

(xxv) Conversion of decimal to binary can be easily done using only

a) one stack
b) two stacks
c) one stack and one queue
d) two queues

(xxvi) int fact(int n) { if (n==0) return 1; else return n*fact(n-1); } the above function is

a) tail recursive
b) non-tail recursive
c) indirect recursive
d) Both non-tail recursive and indirect recursive

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

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

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

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

(xxix) 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

(xxx) 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

(xxxi) Josephus problem can be efficiently solved by

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

(xxxii) The push() and pop() operation of stack using linked list is similar to the

a) insert at the end and delete first
b) insert at the beginning and delete first

c) insert at the end and delete last
d) insert at the beginning and delete last

(xxxiii) Linked list is considered as an example of _____ type of memory allocation.

a) Dynamic
b) Static
c) Compile time
d) Heap

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

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

(xxxv) In a circular linked list

a) It is possible to get into infinite loop.
b) Last node points to first node.
c) Time consuming
d) Requires more memory space

(xxxvi) The pointer variable tail in linked list stores the address of the

a) First Node
b) Last Node
c) Both First Node and Last Node
d) None of these

(xxxvii) 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) Lit implemented by circular linked list
d) List implemented by an array

(xxxviii) Circular doubly linked list contains

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

(xxxix) 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

(xl) 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

(xli) The concatenation of two list can performed in O(1) time. Which of the following variation of linked list can be used?

a) Singly linked list

b) Doubly linked list

c) Circular doubly linked list

d) Array implementation of list

(xlii) 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*));

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

a) h(k) = k/m

b) h(k) = k mod m

c) h(k) = m/k

d) h(k) = m mod k

(xliv) Which of the following sorting technique use the term ‘pivot’?

a) Bubble sort

b) Selection sort

c) Insertion sort

d) Quick sort

(xlv) The time complexity of quick sort in worst case is

a) O(n)

b) O(n^2)

c) O(n log n)

d) O(log n)

(xlvi) The time complexity of bubble sort algorithm is

a) O(n)
b) O(log n)
c) O(n^2)
d) O(n log n)

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

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

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

a) Truncation Method
b) Folding Method
c) Mid Square Method
d) Modular Method

(xlix) 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)
b) O(n)
c) O(log n)
d) O(n^2)

(l) Radix sorting can be easily implemented by

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

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

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

(lii) Linear probing suffers from a problem know as

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

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

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

(liv) 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

(lv) How many children does a binary tree have?

a) 2
b) any number of children
c) 0 or 1 or 2
d) 0 or 1

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

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

(lvii) If the i-th level of a full binary tree contains 32 elements, then the value of i=?

a) 3
b) 4
c) 5
d) 6

(lviii) By definition tree is

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

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

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

(lx) 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

(lxi)

A binary search tree whose left subtree and right subtree differ in height by at most 1 unit is called ……

a) AVL tree
b) Red-black tree
c) Lemma tree
d) None of these

(lxii) 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

(lxiii) Extended tree is also called

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

(lxiv) Which of the following is true?

a) Strictly binary tree should have nonempty left subtree and nonempty right subtree.
b) Strictly binary tree should have nonempty left subtree but can have empty right subtree.
c) Strictly binary tree should have empty left subtree but should be nonempty right subtree.
d) None of these

(lxv) 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

(lxvi) 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

(lxvii) 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<

(lxviii) Which is true for the AVL tree?

a) -1 < balance factor < 1
b) -1 ? balance factor < 1
c) -1 ? balance factor ? 1
d) 0 < balance factor < 1

(lxix) 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

(lxx) 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