17831

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – B.Tech.(CSE)-CYS-2024
Course Name – Data Structure and Algorithm
Course Code - BTY30103
(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[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 15=15

1. *Choose the correct alternative from the following :*

(i) Select the key advantage of using linked lists over arrays
a) Linked lists require less memory.
b) Linked lists have faster access to elements.
c) Linked lists allow dynamic memory allocation and resizing.
d) Linked lists are easier to sort.

(ii) Select the average case time complexity of binary search using recursion
a) O(n)
b) O(log n)
c) O(n log n)
d) O(1)

(iii) Choose the data structure best suited for a breadth-first search.
a) Stack
b) Queue
c) Heap
d) Tree

(iv) Choose the best approach for collision handling in hashing.
a) Dynamic memory allocation
b) Chaining
c) Linear recursion
d) Stack insertion

(v) Choose the condition for a binary tree to be full.
a) All nodes have one child
b) Every node has 0 or 2 children
c) All leaf nodes at same level
d) All internal nodes are full

(vi) Choose the algorithm used in the top tree data structure
a) Backtracking
b) Divide and Conquer
c) Branch
d) Greedy

(vii) Select the worst case complexity of bubble sort
a) O(log N)
b) O(N)
c) O(N logN)
d) $O(N^2)$

(viii) Choose the correct structure to implement multiple stacks in a single array.
a) Divide array in blocks
b) Use doubly linked list

c) Use queue
d) Use trie

(ix) Select the best option for the following piece of code for (int i = 0; i < n-1; i++) // n is the size of array { for (int j = i+1; j < n; j++) { if((arr[i]==(arr[j])) && (i != j)) { printf("%d",arr[i]); } } }

a) Print the duplicate elements in the array
b) Print the element with maximum frequency
c) Print the unique elements in the array
d) Prints the element with minimum frequnecy

(x) Interpret the correct Full condition(overflow) of circular Queue

a) Front == Rear
b) Front == -1 && Rear == -1
c) (Front == Rear + 1) % Size (Y)
d) Front == Rear + 1) % Size

(xi) Define the behavior of a circular doubly linked list.

a) Each node points to the previous node and the first node points to NULL.
b) Each node points to the previous and next nodes, and the last node points to the first node.
c) Each node has one pointer, and the list forms a ring structure
d) The list contains two head pointers: one for the first node and one for the last node.

(xii) Choose the formula to find a parent node of a tree be located in an array

a) parent(i) = i / 2
b) parent(i) = (i – 1) / 2
c) parent(i) = 2 * i(N)
d) parent(i) = 2 * i + 1

(xiii) Select the correct operation that inserts a node at the beginning of a singly linked list.

a) Modify the tail pointer
b) Adjust the head pointer to point to the new node
c) Shift all elements to the right and insert the node
d) Rearrange all elements in sorted order after insertion

(xiv) Number of total nodes in a full binary tree with n internal nodes

a) 2n
b) 2n + 1
c) n + 1
d) n^2

(xv) Select the time complexity for deleting the first node in a singly linked list.

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

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Deduce the no of elements inside Queue at any point of time when Font =2 and Rear=6 and Queue [8] = [20,30,25,12,15,24,32,16]? (3)
3. Write a function to implement stack using Linked List. (3)
4. Solve the following. (3)

   F [0] =0, F [1] =1 is given, find F [9] =? where F[i]=F[i-1] F[i-2] holds. // Hints : Fibonacci Series

5. Construct Postfix expression of ((A+B)-C*(D/E))+F using stack ? (3)

6. Express the application of preorder, postorder, level-order, or inorder tree traversals to check whether the given binary tree is full or not. (3)

   OR

   Create a BST with the following nodes : JAN, FEB, MAR, APR, JUN, JUL, AUG, SEP, OCT, NOV, DEC (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Compare circular arrays and linked lists in queue implementation by analyzing their memory usage and operational efficiency. (5)
8. Write a program to create a node and display doubly linked list using function (5)
9. Write a program to implement circular queue using third variable. (5)
10. Compare the performance of searching operations in arrays and linked lists. (5)
11. Analyze the impact of inserting and deleting elements at the beginning, middle, and end of an array and a singly linked list. (5)
12. Break down the characteristics of recursive and iterative tree traversal techniques and explain their impact on deep binary trees. (5)

OR

Write a program to implement quick sort function (5)

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