17676



# BRAINWARE UNIVERSITY

## Term End Examination 2024-2025
## Programme – MCA-2024
## Course Name – Data Structure and Algorithm
## Course Code - MCA27107 (T)
## ( Semester II )

**Full Marks : 40** **Time : 2:0 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 10=10

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

(i) The postfix equivalent of the prefix * + ab - cd is
   a) ab+cd-* b) abcd+-*
   c) ab+cd*- d) ab+-cd*

(ii) Linked lists are not suitable for
   a) Stack b) Dequeue
   c) AVL tree d) Binary Search

(iii) Maximum possible height of an AVL tree with 7 nodes is
   a) 3 b) 64
   c) 5 d) 6

(iv) What is the time complexity of the following code snippet: for(i=1;i<=n;i++) { if (i==100) break; printf("Hello");}
   a) O(n) b) O(100n)
   c) O(logn) d) O(1)

(v) Total number of comparisons needed to search 70 from the list [ 10, 20, 30 40, 50, 60, 70, 80, 90] is using binary search algorithm.
   a) 4 b) 3
   c) 2 d) 1

(vi) The best sorting technique when data is almost in sorted order is
   a) Selection sort b) Bubble sort
   c) Insertion sort d) None of these

(vii) The time complexity of interpolation search if the elements are uniformly distributed is

a) O(n) b) O(log(logn))
c) O(1) d) O(logn)

(viii) A binary tree has n leaf nodes. The number of nodes of degree 2 in this tree is

a) logn b) n-1
c) n d) cannot be said

(ix) A machine needs a minimum of 100 sec to sort 1000 names by quick sort. The minimum time needed to sort 100 names will be approximately

a) 72.7 sec b) 11.2 sec
c) 50.2 sec d) 6.7 sec

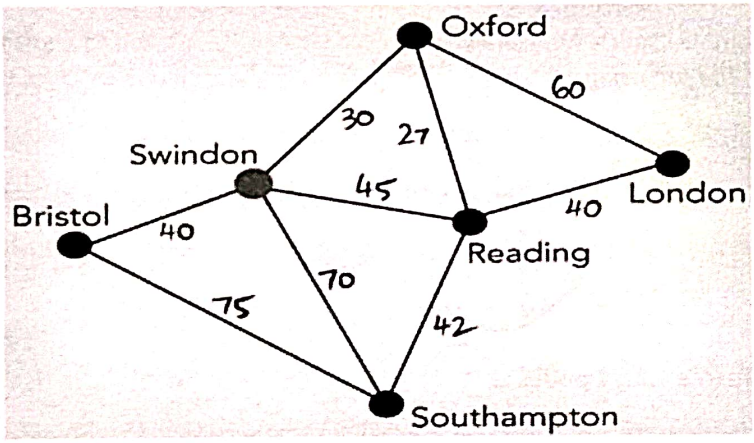
(x) In a stack, if a user tries to remove an element from an empty stack it is called _____

a) Underflow b) Overflow
c) Garbage d) Delete

## Group-B

(Short Answer Type Questions) 3 x 5=15

2. Write two differences between linear search and binary search. (3)
3. Convert the following infix expression into postfix expression using the stack data structure with detailed explanation : A + (B * C - (D / E * F)). (3)
4. Explain how a circular queue overcomes the limitations of a simple queue. (3)
5. Find the minimum spanning tree of the following graph using PRIM's algorithm, assume Swindon is the starting node. (3)




6. How does Selection Sort work step-by-step? (3)

**OR**

Given a hash table of size 7 and the hash function h(k) = k mod 7, insert the following keys using linear probing: Keys: {50, 700, 76, 85, 92, 73}. Show the final hash table. (3)

## Group-C

(Long Answer Type Questions) 5 x 3=15

7. The in-order and post-order traversal sequence of nodes in a binary tree are given below: Post-order: I E J F C G K H D B A In-order: E I C F J B G D K H L A. Construct the tree. (5)
8. Write an algorithm to insert an element into the middle of a singly linked list. (5)

9. Insert the following keys in the order given below to build them into an AVL tree: 12, 11, 13, 10, 9, 15, 18, 7, 6. (5)

**OR**

Draw a B-tree of order 3 with the following key values: 30, 20, 10, 70, 50, 90, 80, 40, 60, 100. (5)

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