



VIT

Vellore Institute of Technology

Final Assessment Test - June 2023

Course: SWE2001 - Data Structures and Algorithms

Class NBR(s): 0475/0516

Time: Three Hours

Slot: B2+TB2

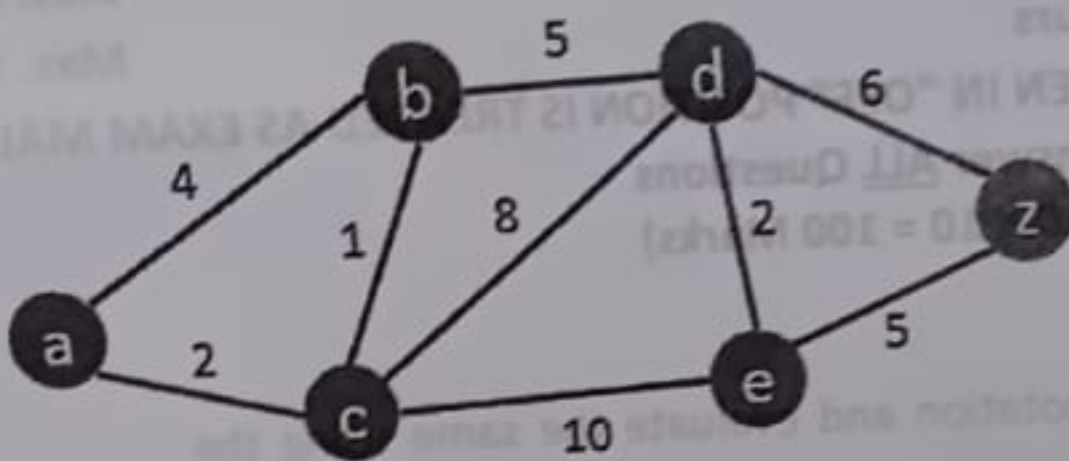
Max. Marks: 100

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN "OFF" POSITION IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions
(10 X 10 = 100 Marks)

1. Convert the infix expression,
 $A+B+C-(D+E*F+G)/H$ into reverse polish notation and evaluate the same using the values $A=12, B=16, C=5, D=8, E=9, F=3, G=1, H=2$.
2. Choosing last element as pivot, sort the following elements: 22, 88, 58, 76, 110, 15, 66, 40, 33, 99, 7. Write a pseudo code for it.
3. a) Show that the time complexity of insertion sort is quadratic with an example. [4]
b) For the recurrence relation given, derive its time complexity. [6]
$$T(n)=T(n-1)+n^2, n \geq 1$$
$$T(0)=1, n=0$$
4. a) Compare and contrast linear data structures. [3]
b) Suggest a suitable data structure to simulate vehicles on toll-tax bridge. Explain the operations of data structure suggested using pointers. *queue* [7]
5. a) Construct an expression tree for the expression $A+B*(C-(D-E)+F)/G+H$ and traverse it using preorder and postorder. [7]
b) Show that the maximum number of nodes in a binary tree of height 'h' is $2^{h+1} - 1$. [3]
6. Write a pseudo code to create a doubly linked list and determine whether its elements forms a palindrome or not.
7. Construct an AVL tree on inserting the following data. 3, 5, 8, 1, 10, 4, 9, 12, 7, 6, 2 and 11.
8. Using the hash function $h(x) = x \% 17$, construct a hash table with the following elements: 86, 102, 51, 153, 103, 19, 68, 190, 204, 140, 187, and 200. Resolve collisions if any, with linear probing and separate chaining method.

9. Using Dijkstra's algorithm, find the shortest path from Vertex A to all other nodes for the graph given below.



10. a) Show the content of stack S_1 and S_2 on performing the following operations. [5]

Assume the stacks are empty initially.

Data set- 5, 3, 7, 8, 10, 1, 9, 4, 2, 6

While(! EOF)

{

Read number

Push(S_1 , number)

Read number

Push(S_2 , number)

if ($\text{top}(S_1) > \text{top}(S_2)$)

{

Pop(S_1 , X)

Push(S_2 , X)

}

}

b) Write a pseudo code to demonstrate the operations of stack.

[5]

